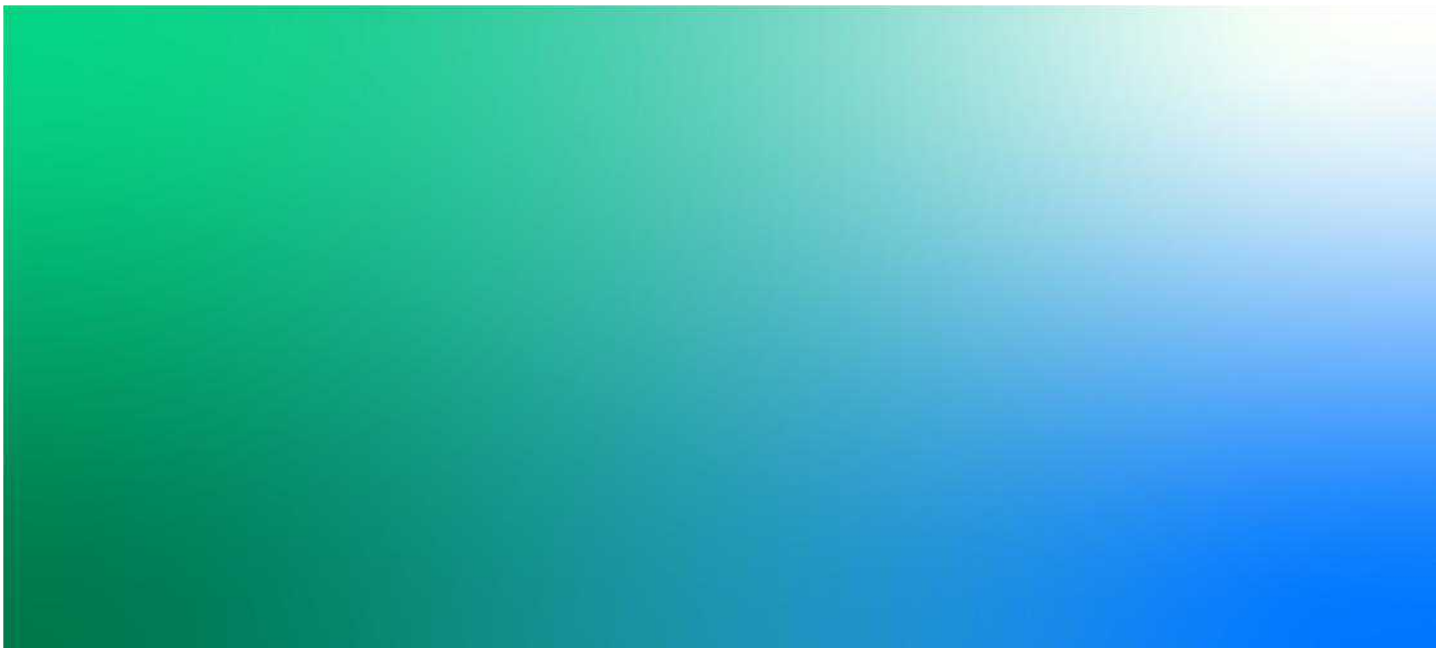
Kildare-Meath Grid Upgrade

Planning & Environmental Considerations Report (PECR)

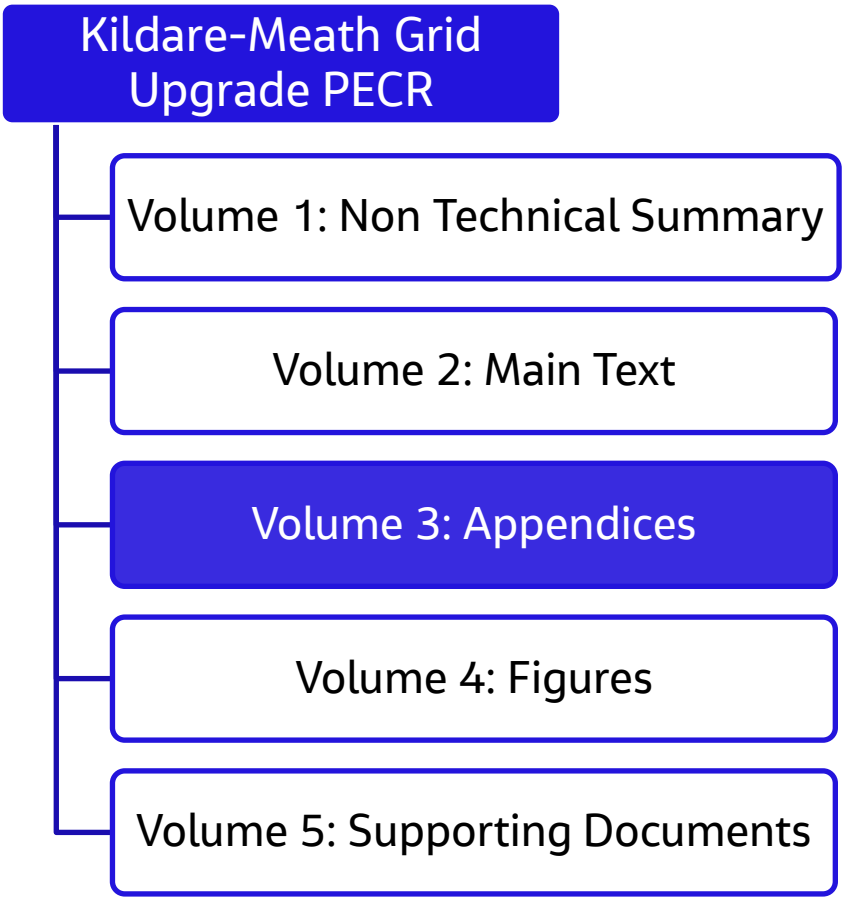
Volume 3: Appendices

April 2023



This document is Volume 3: Appendices of the Kildare-Meath Grid Upgrade Planning and Environmental Considerations Report (PECR).

The whole PECR consists of a number of documents and should be read together.



Kildare-Meath Grid Upgrade Planning & Environmental Considerations Report (PECR)

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Author:	Caroline Hannan
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Jacobs Engineering Ireland Limited
Merrion House,
Merrion Road,
D4, Dublin,
Tel: +353 1 269 5666

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Appendix 1.1 PECR Contributors

Chapter/Report	Name	Competency
Introduction Background to the Project Stakeholder Engagement Consideration of Alternatives Population and Human Health Material Assets – Non-Agriculture Cumulative Assessment and Interactions	Fay Lagan	Fay Lagan BSc (Hons) MSc MIEMA CEnv has wide-ranging experience in the environmental field. He has over 20 years' experience in major environmental projects including Environmental Impact Assessment (EIA), Appropriate Assessment and planning applications. He is a graduate of Queen's University with a Masters in Applied Environmental Sciences. Fay has lead EIA and other projects across the UK and Ireland on a wide diversity of projects. His extensive support to clients includes Transport Infrastructure Ireland, Highways England; Translink, Department for Infrastructure, SONI, EirGrid, Belfast City Council and a range of private sector clients. The types of projects Fay has advised on numerous large scale infrastructure schemes (power, water, highways, and mixed-use commercial).
Project Description	Nigel Edwards, Enda Casey	Nigel Edwards BSc, MICE, is a chartered civil engineer with over 35 years experience working on major linear infrastructure projects mainly within the water industry and for the last 14 years in the HV transmission and distribution industry. During that time Nigel has worked as a designer on these projects from inception, through feasibility, outline design and planning and detailed design. He has contributed to numerous planning applications for schemes. For the last 5 years he has been involved in the outline design and planning applications for various T&D projects in Ireland on behalf of EirGrid. EUR ING Enda Casey, B.Eng (Hons) CEng MICE MAPM has over 20 years construction experience both in delivery and pre-construction phases. This is on various civil engineering projects in Ireland, the UK and internationally. Originally from an on-site delivery background, Enda brings this experience to assessment of potential construction impacts during the design and consenting phases. He has prepared numerous construction implication assessments in the UK – such as Hybrid Bill for the London stage of High Speed 2 Phase 1 and in Ireland as part of the MetroLink EIAR assessment. As well as preparing technical assessments for the PECR and supporting information, he acts as reviewer for works of others to ensure consistency and appropriate consideration of construction impacts.
Planning	John Kehoe	John Kehoe BA MSc has wide experience of all aspects of land-use planning, in both the public and private sectors and provides ongoing planning advice to a number of clients in relation to planning law and practice. John has worked extensively on a wide range of strategic planning studies at the national and regional level. He has also prepared local area plans and action area plans for a number of local authorities, and has provided analysis and studies for a range of project types, including retail, population estimates, leisure, housing and urban regeneration.

Chapter/Report	Name	Competency
Air Quality and Climate	Gary Wilson	Gary Wilson BSc., MSc, is an experienced member of the Jacobs air quality team with over 17 years' experience and has undertaken a considerable number of projects that have included air quality assessment aspects in order to assess the potential air quality impacts. Gary manages leads on the air quality, dust and odour assessments for large scale infrastructure developments in Ireland, UK and internationally including EIA scoping, EIA assessments, environmental constraints and route/site options analysis and EIARs. Gary has prepared numerous chapters of EIARs for transmission, power generation and other linear transport projects. Gary is an experienced user of air quality dispersion modelling software including ADMS 5, AERMOD, CALPUFF and ADMS Roads. Modelling has been undertaken for various different sources and circumstances including: power, transport, industrial, waste, mining and construction. Gary has also planned and carried out baseline air quality, dust, odour and noise monitoring surveys.
Noise and Vibration	Chris Conroy	Chris Conroy MA (Hons) MSc MIOA, has over 10 years' experience in managing, coordinating and conducting noise and vibration impact assessments for large scale infrastructure developments in Ireland and the UK. He has successfully conducted operational and construction noise and vibration assessments for major environmental projects including Environmental Impact Assessment (EIA), Appropriate Assessment and planning applications. Chris has presented as an expert witness at an An Bord Pleanála oral hearing. He authored and compiled the Roads Noise Action Plan for Northern Ireland Round 3. He also has a background in Geographical Information Systems (GIS).
Biodiversity AA Screening and NIS	Susie Coyle	Dr Susie Coyle BSc (Hons) MCIEEM MIFM MRSB is a chartered biologist with over 16 year consultancy experience carrying out environmental assessments. She is a highly skilled aquatic and terrestrial ecologist and is an Associate Director. She is the lead for Ecology in Ireland. Susie has coordinated Jacobs' ecologists both in Ireland and in the UK and has experience of multiple ecological survey techniques and associate reporting. She has over 20 years' experience of field surveys and environmental sampling techniques. Susie has delivered multiple Appropriate Assessment Screening Reports and Natura Impact Statements at both plan and project level along with many Environmental Impact Assessment Reports. She has undertaken options assessment appraisals including EirGrid projects at Steps 4a and 4b, and has experience as an expert witness at oral hearing.
Soils, Geology and Hydrogeology	Vanina Saint-Martin	Vanina Saint-Martin MSc. Hydrogeology, has over 20 years technical expertise in hydrogeological matters. Vanina has worked on a large

Chapter/Report	Name	Competency
		variety of projects including groundwater resources, hydrogeological-hydrological assessments, mining and quarrying issues, contaminated land and groundwater risk assessments, environmental impact assessments, landfills HRAs, groundwater flooding and groundwater dependent ecological assessments. She has worked on a significant number of multi-disciplinary projects working collaboratively with a strong EIA focus and ensuring client expectations are met. Her experience includes a number of infrastructure projects in Ireland (including Cork Light Rail System, N60 Balla to Claremorris, N69 Listowel Bypass), Scotland (including A9 Dualling Perth to Inverness, A96 Inverness to Nairn, Forth Road Crossing, Aberdeen Western Peripheral Route) and England (including A12, A14 Huntington to Cambridge, M1 A6, Haweswater Aqueduct Resilience Programme). She has previously acted as an Expert Witness.
Hydrology	Nick Stokes	Nick Stokes BA Hons MSc MCIWEM, C.WEM Chartered Scientist/Environmental Engineer with over 20 - years' post graduate experience working in the water industry delivering projects for clients including: Irish Water, TII, Natural Resources Wales and the Environment Agency (UK). Nick's background is in flood risk management appraisal and civil engineering design, drainage analysis, surface water hydrology and hydraulic modelling and Nick is currently leading flood risk assessment and mapping work for the MetroLink and Eastern and Midlands Water Supply Project. Prior to moving to Ireland, Nick worked extensively on flood risk studies across the UK leading hydraulic modelling, hydrological appraisal and flood defence design on the number of high-profile schemes including the award winning Nottingham Trent Left Bank Flood Alleviation Scheme, Our City Our River (Derby) Flood Alleviation Scheme and St Asaph Flood Risk Management Scheme. Nick also have extensive Project Management experience from managing projects throughout their lifecycle with extensive experience of initial option appraisal and concept design, business case development and approval, outline and detailed design, contract documentation and procurement and construction supervision.
Archaeology, Architectural Heritage, and Cultural Heritage	Jonathan Dempsey	Jonathan Dempsey (MA (Hons)) is a Member of the Chartered Institute for Archaeologists with 26 years professional experience. During this time he has contributed to archaeological, architectural and cultural heritage assessments for windfarms, energy transmission projects, roads, rail, WWTW, ports, prisons and retail and residential developments. This has included inputs into SEA, Constraints Studies and options appraisals, MCA, EIA scoping, screening and Environmental Impact Assessment Reports (EIAR). Jonathan was the heritage team lead for Steps 4 and 5 of this project, for Steps 4 and 5 of the CP1021 North Dublin East Meath to North Dublin Grid Upgrade and for Step 5 of the Maynooth GIS Substation Development.

Chapter/Report	Name	Competency
		Jonathan was an expert witness at oral hearings for the N15 Bundoran to Ballyshannon Bypass (2001), the N21 Adare Bypass (2010) and Dunkettle Interchange (2013). He has been eligible to hold excavation licences in Ireland since 1999 and in Northern Ireland since 2003.
Traffic and Transport	David King	David King BSc MEng has over 20 years' professional experience in policy derivation, transport strategy preparation, modelling, traffic impact, multi-modal scheme appraisal, business case development, planning applications, EIA preparation, Compulsory Purchase Order (CPO), and Oral Hearings for all modes of transport including heavy rail, light rail, bus and BRT, and Metro.
Material Assets – Agriculture	Con Curtin	Con Curtin B.Agric.Sc is an Agricultural Consultant with over 30 years of experience in farm consultancy and set up his own company in October 1996 – Curtin Agricultural Consultants Ltd (curtinagriculturalconstultants.com). He is a member of the Agricultural Consultants Association and Agricultural Science Association. He has a Level 6 Certificate in Land Drainage. A strong feature of his company is the wide range of agricultural services and expertise it provides to its clients. Con advises his dairy, beef, sheep, tillage and pig farmer clients on issues such as on farm production, financial advice, farm yard design and Department of Agriculture Schemes. Con is agronomist for Gas Networks Ireland whom he advises on land re-instatement and drainage. He also acts as Agronomist for TII, Irish Water and various County Councils.
Landscape and Visual	Richard Barker	Richard Barker BA MSc is a Corporate Member of the Irish Landscape Institute and has 20 years of experience in the field of landscape and visual impact assessment.

Appendix 1.2 EIA Screening Report

Environmental Impact Assessment Screening Report

EirGrid

Kildare Meath Eirgrid Upgrade
8 February 2023

Environmental Impact Assessment Screening Report

Client name:	EirGrid		
Project name:	Kildare Meath Eirgrid Upgrade		
Client reference:	CP966	**Project no:**	321084AH
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Jacobs Engineering Ireland Limited

Merrion House
Merrion Road
Dublin 4, D04 R2C5
Ireland

T +44 (0)131 659 1500
F +44 (0)131 228 6177
[Website]

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1. Introduction

The Proposed Development is an EirGrid development involving the construction of a 400 kV underground cable between the Dunstown and Woodland Substations in Kildare and Meath respectively. The scheme necessitates an upgrade in facilities at both substations. The development aims to help meet the anticipated increased future energy demands in the east of Ireland (due to economic and population growth) by transferring energy from the South & South-West of Ireland, where a large amount of nation's energy is produced (via power stations such as Moneypoint and renewable energy sources- wind farms). The purpose of this combined Environmental Impact Assessment (EIA) Screening is to demonstrate the requirements for the EIA Process as part of the planning process for Proposed Development.

Screening for Environmental Impact Assessment is the term used to describe the process for determining whether a proposed development requires an EIA by reference to mandatory classes of development and legislative threshold requirements or by reference to the type and scale of the proposed development and the significance or the environmental sensitivity of the receiving baseline environment. Annex I to Directive 2011/92/EU as amended by Directive 2014/52/EU requires as mandatory the preparation of an EIA for all projects listed therein. Projects listed in Annex II to the Directive are not automatically subjected to EIA. Member States can decide to subject them to an assessment on a case-by-case basis or according to thresholds and/or criteria (for example size), location (sensitive ecological areas and potential impact (surface affected, duration). The European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018 (S.I. No. 296/2018) amended the Planning and Development Act 2000 and the Planning and Development Regulations 2001 in order to transpose into Irish Law the provisions of Directive 2014/52/EU. In Ireland, Schedule 5 (Part 1 and Part 2) of the Planning and Development Regulations 2001, as amended, transposes Annex I and Annex II to the amended EIA Directive.

The proposed development is not of a type described by the relevant classes detailed in either Part 1 or Part 2 of Schedule 5 of the Planning and Development Regulations 2001, as amended.

As such, there is no requirement for the proposed development to be subject to EIA.

It should be noted that the EIA screening considerations relate to EIA under the Planning and Development Act 2000 (as amended) and the Planning and Development Regulations 2001 (as amended) which govern this application to the Board for planning approval. A separate process is being undertaken under the European Communities (Environmental Impact Assessment) (Agriculture) Regulations 2011 (as amended) in respect to the removal of hedgerows.

2. Overview of the Proposed Development

2.1 Location of the Proposed Development

The proposed cable route runs for approximately 53km through Kildare and Meath between Dunstown Substation and Woodland Substation. A map of the proposed cable route can be found below (Figure 2).

Figure 1. Proposed 400kV underground cable route.

2.2 Proposed Development Description

The proposed development comprises the installation of a 400 kV underground cable (UGC) between Dunstown substation in the south and Woodland substation in the north. The route alignment is shown in Figure 2.

The Proposed Development consists of the following principal elements:

A. Installation of an underground cable (UGC), approximately 53 km in length, connecting Woodland 400 kV Substation in the townland of Woodland in County Meath and Dunstown 400 kV Substation in the townland of Dunnstown in County Kildare. The development of the UGC will incorporate the following:

- Construction of a trench of approximately 1.5 m in width and approximately 1.3 m in depth in the public road (approximately 43.5 km) and approximately 1.7 m in depth in private lands (approximately 9.5 km) in which the UGC is laid;

- Construction of joint bays, each approximately 10 m in length and 2.5 m in width – with adjacent communication chambers and link boxes along the alignment of the UGC (on average every 750 m). Where the joint bays are located off-road, permanent hardstanding areas will be created approximately 3 m around the joint bays;
- The laying of communication links and fibre optic cables between both substations, running in the same trench as the UGC;
- The laying of twelve no. permanent access tracks (approximately 4 m in width, approximately 4.5 km in length) over private lands to access the off-road joint bays (and adjacent communication chambers and link boxes);
- The provision of six no. temporary construction compounds (approximately 5.7 ha total) and two no. construction laydown areas along the alignment of the cable route;
- The provision of temporary construction passing bays at 33 joint bay locations, each approximately 100m in length and 5.5 m in width;
- The laying of 11 no. temporary construction tracks (approximately 9.5 km in total length);
- All associated water, rail, road and utility crossings using either trenchless drilling or open cut techniques; and
- All associated and ancillary above and below ground site development works, including works comprising or relating to permanent and temporary construction, roadworks, utility diversions and site and vegetation clearance.

B. Installation of additional electrical equipment and apparatus at the Woodland Substation in the townland of Woodland in County Meath. which is similar to the existing infrastructure and will be installed in a substation compound extension (Meath County Council Reference: 22/1550). This will include:

- Installation of a 400 kV feeder bay and associated electrical shunt reactor (approximately 8 m in height);
- Insulators, instrument transformers, overhead conductors, disconnectors, circuit breakers, surge arrestors (approximately 12.6 m in height) in order to connect the bay to the busbar;
- All ancillary site development works including site preparation works, temporary compound, underground cabling, and earthgrid, as required to facilitate the development.

C. Installation of additional electrical equipment and apparatus at the Dunstown Substation in the townland of Dunnstown in County Kildare which are similar to the existing infrastructure and does not require the extension of the substation compound. This will include:

- Installation of a 400 kV feeder bay and associated electrical shunt reactor (approximately 9 m in height);
- an extension to the 400 kV busbar in order to connect the 400 kV cable feeder bay to the existing 400 kV busbar
- Ten no. lightning masts (approximately 41 m high);
- Insulators, instrument transformers, current transformers, overhead conductors, disconnectors, circuit breakers, surge arrestors (approximately 12.7 m in height) in order to connect the bay to the busbar; and
- An ancillary site development works including site preparation works, temporary compound, underground cabling and earthgrid, surface water drainage, and lighting poles as required to facilitate the development.

In summary, the Proposed Development is approximately 53 kilometres of new underground cable in a trench along public roads and private lands, connecting the Woodland and Dunstown substations. Approximately 38 kilometres of the underground cable is in County Kildare and approximately 15 kilometres are in County Meath. The Proposed Development will include associated works such as fibre optic cables in the same trench, permanent access tracks, temporary construction compounds, laydown areas, joint bays, and passing bays. Approximately 82% of the underground cable will be located within roads while approximately 18% will be located off-road, to avoid constraints. In addition, there will be works at the existing Woodland and Dunstown substations.

2.3 Substation Works

Works at the existing Woodland substation, will involve installation of additional electrical equipment and apparatus within a substation compound extension, including a 400 kV feeder bay, an associated shunt electrical reactor, and other associated equipment and site development works.

Works at Dunstown substation will not require an extension of the substation compound. Works will include installation of additional electrical equipment and apparatus will include a 400 kV feeder bay, an associated shunt electrical reactor, an extension to the busbar, and other associated equipment and site development works.

2.4 Construction of the Underground Cable

There are three key elements of the underground cable:

- **Enabling works:** These are works to allow the construction phase to progress, including site investigations and other survey activities, vegetation clearance, construction of access tracks and the temporary construction areas (e.g. compound areas and haul roads on off-road sections);
- **Phase 1: Installation of passing bays and joint bay structures:** The construction of passing bays (where required) at joint bay locations. On completion of the passing bays, it is proposed that the joint bays be installed at the same time;
- **Phase 2: Excavation and installation of ducts:** A trench will be dug along the cable route, ducts installed, and the road surfacing or agricultural land will be restored. This will also include physical crossings such as motorways, rivers and railways**;**
- **Phase 3: Installation of cables:** The cables will be installed at joint bay locations within the ducts. The cables will then be jointed (connected) at each joint bay location to allow the installation of a continuous circuit. The circuits will then be tested to ensure they are ready to be commissioned for use;
- **Substation works:** Construction works are required in the existing Woodland and Dunstown substations to connect the underground cable to the existing electrical grid**;** and
- **Decommissioning:** At this stage, the project will decommission the temporary construction compounds and passing bays and complete any agreed landscaping works.

Subject to receipt of planning permission and other approvals, the construction phase will commence in the Summer of 2025 with the underground cable element of the Proposed Development becoming fully operational after construction and testing in the Autumn of 2028 – taking approximately three and a half years.

The proposed cable route leaves the Woodland substation and travels across agricultural land until it enters the R156. Traveling west until the Mullagh crossroads, the cable route then turns south along the R125 until approaching Kilcock. The cable route travels in the R158 to go to the west of Kilcock, where there will be two trenchless underground crossings – one of the Rye Water and one of the Royal Canal and the railway. Continuing to the south, along the R148, there will be a trenchless underground crossing of the M4 motorway.

The cable route connects with the R407 to the south of Kilcock. There is a trenchless underground crossing of a watercourse along the R407. At the junction of the R408 and R407, the cable route turns west towards

Prosperous. However before the village, the cable route turns off-road to the south to then connect with the R403 and Millicent Road (L2002) and travel southeast towards the River Liffey.

There will be a trenchless underground crossing of the River Liffey and then the cable route will connect with the Sallins Bypass road to travel to the south. Past the Osberstown Road bridge, the cable route leaves the Sallins Bypass to pass under the M7 in the existing road, before connecting with the Millennium Parkway. The cable route travels to the west of Naas, using the Parkway and the R409. There will be a trenchless underground crossing of Grand Canal close to the Naas Sports Centre and Jigginstown Castle . The cable route will travel along the R447 and R448, to the south of Naas. The cable route travels along the R412 for a short section before entering the Dunstown substation.

2.5 Need for the Proposed Development

There are two drivers that underpin the need for this proposed transmission infrastructure development, namely:

- Increased demand on East coast – An increase in electricity demand as part of natural growth is expected. In addition, there is a demand increase in the order of 1200 MW due to the planned connection of high energy users. This is based on executed and offered connection agreements mostly in the counties Kildare, Meath and Dublin. Part of this demand is expected to start to connect to the system in 2017 and is ramping up to the total demand figure in 2030. The interest is high and it is expected that this trend will continue with further requests for connection.
- Integration of generation from the South and South West regions - Significant levels of new renewable generation have connected or are in the process of connecting to the transmission and distribution system in the south and south west of Ireland. This is also where the newer and more cost effective existing conventional generation units are located. This results in a scenario whereby a significant portion of the generation sources are located in the south and south west of Ireland away from the main demand centres within the Dublin and Greater Dublin Area, and East region in general. The power produced will hence have to be transported to get to where it is needed (known as demand centres).

The Proposed Development will help to meet the Government of Ireland's Climate Action Plan target of up to 80% renewable energy generation by 2030, this includes the transmission of electricity from offshore renewable sources. Significant levels of new renewable generation have connected or are in the process of connecting to the transmission and distribution system in the South and South West of Ireland. This is also where the newer and more cost effective existing conventional generation units are located. This results in that a significant portion of the generation sources are located in the south and south west of Ireland away from the main demand centres. The power produced will hence have to be transported to get to where it is needed. This project will allow more renewable generation to be connected to the electrical grid and to supply this energy to where demand is largest.

EirGrid has identified that the Proposed Development will have the following benefits:

- Community - Deliver community benefit in the areas that facilitate the project infrastructure;
- Competition - Apply downward pressure on the cost of electricity;
- Sustainability - Help facilitate Ireland's transition to a low carbon energy future;
- Security of Supply - Improve electricity supply for Ireland's electricity consumers; and
- Economic - Contribute to the regional economy and support foreign direct investment.

The Proposed Development will create a new circuit in the electricity transmission network and will enhance the network in the area and provide capacity to connect new demand for electricity to support economic growth in the area and to connect new renewable generation to help with meeting national Climate Action Plan targets.

3. Requirement for an EIA

3.1 EIA Legislation

The EIA Directive is based on the precautionary principle and on the principles that preventive action should be taken, that environmental damage should, as a priority, be rectified at source and that the polluter should pay. Effects on the environment should be taken into account at the earliest possible stage in all of the technical planning and decision-making processes.

The original Council Directive 85/337/EEC of 27 June 1985 on the assessment of the effects of certain public and private projects on the environment has been amended three times (Directive 97/11/EC, 2003/35/EC and 2009/31/EC) and subsequently codified in an informal consolidated version by Directive 2011/92/EU of the European Parliament and of the Council of 13 December 2011 on the assessment of the effects of certain public and private projects on the environment (hereafter referred to as the 2011 EIA Directive). The EIA Directive, amending the 2011 EIA Directive, came into force on 15 May 2014 and was transposed into Irish legislation on 1 September 2018.

The Proposed Development has been reviewed against the classes of development and thresholds set out in Annexes I and II of the EIA Directive, as transposed into Irish law by Schedule 5 of the Planning and Development Regulations 2001 to 2023 (hereafter referred to as the Planning Regulations).

3.2 EIA Screening Methodology

EIA Screening is the first stage of the EIA process and determines whether the environmental impact of a proposed development or project will be such that an EIA is required.

EIA Screening for the Proposed Development was undertaken with consideration of the following legislation and guidance:

- Number 30 of 2000 - Planning and Development Act, 2000 (as amended) (hereafter referred to as the Planning and Development Act);
- The Planning Regulations 2001 (as amended);
- Environmental Impact Assessment of Projects - Guidance on Screening (European Commission 2017); and
- Environmental Protection Agency (EPA) - Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (EPA 2022).

3.3 Planning and Development Regulations 2001 (as amended)

S172 of the Planning and Development Act 2000 (as amended) states:

> "*(1) An environmental impact assessment shall be carried out by the planning authority or the Board, as the case may be, in respect of an application for consent for proposed development where either—*
> *(a) the proposed development would be of a class specified in—*
> *(i) Part 1 of Schedule 5 of the Planning and Development Regulations 2001, and either—*
> *(I) such development would equal or exceed, as the case may be, any relevant quantity, area or other limit specified in that Part, or*
> *(II) no quantity, area or other limit is specified in that Part in respect of the development concerned, or*
> *(ii) Part 2 (other than subparagraph (a) of paragraph 2) of Schedule 5 of the Planning and Development Regulations 2001 and either—*
> *(I) such development would equal or exceed, as the case may be, any relevant quantity, area or other limit specified in that Part, or*
> *(II) no quantity, area or other limit is specified in that Part in respect of the development concerned,*

or
(b) (i) the proposed development would be of a class specified in Part 2 of Schedule 5 of the Planning and Development Regulations 2001 but does not equal or exceed, as the case may be, the relevant quantity, area or other limit specified in that Part, and
[(ii) it is concluded, determined or decided, as the case may be…that the proposed development is likely to have a significant effect on the environment."

3.4 EIA Screening – Requirement for Mandatory EIA

The EIA Directive specifies the classes of project for which an EIA is required, and the information which must be furnished within an Environmental Impact Assessment Report (EIAR). In accordance with Article 4(1) of the EIA Directive, all projects listed in Annex I to the EIA Directive are considered as having significant effects on the environment and shall be subject to environmental assessment. For projects listed in Annex II to the EIA Directive, the national authorities may determine whether an EIA is needed, either on the basis of thresholds / criteria or on a case-by-case examination.

The obligations, as set out in the EIA Directive, have been implemented into Irish law by the provisions of the Planning and Development Act, and the Planning Regulations.

In order to determine whether an EIA is required for the Proposed Development, it is necessary to determine whether it is a project listed in one of the Annexes to the EIA Directive. These Annexes have been transposed into Irish law by the provisions of the Planning and Development Act and the Planning Regulations.

The relevant classes of development that require EIA are set out in Schedule 5 of the Planning Regulations. Classes within Schedule 5, Parts 1 and 2, that are most relevant to the Proposed Development were considered and a determination against each one made, as follows.

3.4.1 Schedule 5, Part 1

The proposed development is not of a type or class described by the relevant classes detailed in Part 1 of the Planning and Development Regulations 2001, as amended. As such, there is no requirement for the proposed development to be subject to EIA.

3.4.2 Schedule 5, Part 2

The proposed development is not of a type or class described by the relevant classes detailed in Part 2 of the Planning and Development Regulations 2001, as amended. As such, there is no requirement for the proposed development to be subject to EIA nor to be subject to an EIA screening determination.

4. Conclusion

The Proposed Development does not fall under any class of Part 1 or Part of Schedule 5 of the Planning and Development Act 200 (as amended). As such, EIA is not required.

Appendix 1.3 AA Screening Report and Natura Impact Statement

Kildare Meath Grid Upgrade

Appropriate Assessment Screening Report

April 2023

EirGrid

Kildare to Meath

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Jacobs Engineering Ireland Limited

Merrion House
Merrion Road
Dublin 4, D04 R2C5
Ireland
T +353 (0)1 269 5666
F +353 1 269 5497
www.jacobs.com

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Contents

1. Introduction

1.1 Background

This Appropriate Assessment (AA) Screening Report is in relation to the Kildare Meath Grid Upgrade Project, Capital Project 0966 (CP 0966) (the "Proposed Development"). This project involves improvements to the transfer of electricity to the east of Ireland and its distribution within the network in Meath, Kildare, and Dublin. The project will help meet the growing demand for electricity in the east which is due to an increase in economic activity and the planned construction of a number of data centres in the country. The Proposed Development aims to strengthen the transmission network between Dunstown substation in Kildare and Woodland substation in Meath.

Jacobs was engaged by EirGrid to prepare the AA Screening Report for the cable route which is provided to inform the AA Screening determination by An Bord Pleanála, the competent authority for this application. The Proposed Development comprises the installation of a 400 kV underground cable (UGC) between Dunstown substation in the south and Woodland substation in the north. A summary description of the Proposed Development is shown in Section 4.1. The route alignment is shown in Image 1.

Image 1: Proposed cable route alignment

1.2 Legislative context for Appropriate Assessment

The EU Habitats Directive 92/43/EEC (the Habitats Directive) and the EU Birds Directive 2009/147/ES (the Birds Directive) set out a system of protection for habitats and species of community interest through the establishment and conservation of an EU-wide network of sites known as the Natura 2000 network (hereafter referred to as

European sites[1]). European sites comprise Special Areas of Conservation (SACs[2]) and Special Protection Areas (SPAs).

Both the Habitats and Birds Directive have been transposed into Irish law by the Planning and Development Act 2000 (as amended) and the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. 477/2011) as amended. Articles 6(3) and 6(4) of the Habitats Directive set out the decision-making tests for plans and projects likely to affect European sites.

Article 6(3) establishes the requirement for AA:

"Any plan or project not directly connected with or necessary to the management of the site but likely to have a significant effect thereon, either individually or in-combination with other plans or projects, shall be subject to Appropriate Assessment of its implications for the site in view of the site's conservation objectives. In the light of the conclusions of the assessment of the implications for the site and subject to the provisions of paragraph 4, the competent national authorities shall agree to the plan or project only after having ascertained that it will not adversely affect the integrity of the site concerned and, if appropriate, after having obtained the opinion of the general public."

Article 6(4) states:

"If, in spite of a negative assessment of the implications for the [Natura 2000] site and in the absence of alternative solutions, a plan or project must nevertheless be carried out for imperative reasons of overriding public interest, including those of a social or economic nature, Member States shall take all compensatory measures necessary to ensure that the overall coherence of Natura 2000 is protected. It shall inform the Commission of the compensatory measures adopted."

The Planning and Development Act (2000) states the following:

177U (1) A screening for appropriate F930 [assessment of a draft Land use plan or application for consent for proposed development] shall be carried out by the competent authority to assess, in view of best scientific knowledge, if that Land use plan or proposed development, individually or in combination with another plan or project is likely to have a significant effect on the European site.

177U (4) The competent authority shall determine that an appropriate assessment of a draft Land use plan or a proposed development, as the case may be, is required if it cannot be excluded, on the basis of objective information, that the draft Land use plan or proposed development, individually or in combination with other plans or projects, will have a significant effect on a European site.

177U (5) The competent authority shall determine that an appropriate assessment of a draft Land use plan or a proposed development, as the case may be, is not required if it can be excluded, on the basis of objective information, that the draft Land use plan or proposed development, individually or in combination with other plans or projects, will have a significant effect on a European site.

1.3 Stages in Appropriate Assessment

The purpose of Screening is to identify whether activities associated with plans or projects, either acting individually or in-combination with other plans or projects will result in likely significant effects (LSEs) on any European sites. All potential effects from activities associated with the plans or projects and the Conservation Objectives of European sites must be considered. This includes potential effects on mobile species, including birds, mammals, invertebrates and migratory fish.

1 The term Natura 2000 network was replaced by 'European site' under the EU (Environmental Impact Assessment and Habitats) Regulations 2011 S.I. No. 473 of 2011.

2 Candidate SAC (cSAC) are afforded the same protection as SACs. The process of designating cSACs as SACs by means of Statutory instrument is ongoing. In this report, the term SAC is used hereafter to refer both cSACs and SACs.

If the potential of LSEs occurring cannot be excluded on the basis of objective information, the plan or project is taken forward to the next stage of the process, Appropriate Assessment (AA). At Screening, the burden of evidence is to show, on the basis of objective information, and beyond reasonable scientific doubt, that the proposed plan or project will have no LSEs on a European site. If the effect is significant, or its significance is not known, it would trigger the need for AA of its implications for the site in view of the site's conservation objectives. An overview of the two AA process is outlined below:

- **Screening:** Screening determines whether an AA is required by determining if the project or plan is likely to have a significant effect on any European site(s) either individually or in-combination with other plans or projects, in light of the site's conservation objectives.
- **Appropriate Assessment**: If the screening has determined that AA is required, the competent authority then considers whether the plan or project will adversely affect the integrity of a European site(s) either individually or in-combination with other plans and projects in view of the site's conservation objectives. Where potential adverse effects on site integrity (AESI) are identified, appropriate mitigation measures are proposed to avoid adverse effects. For projects, the AA process is documented within a Natura Impact Statement (NIS). The developer may prepare an Natura Impact Statement (NIS) to inform the competent authority's AA process.

Following AA, including mitigation proposals, if AESI remain, or uncertainty remains and the project/plan is to be progressed, an Assessment of Alternative Solutions is required under the provisions of Article 6(4) of the Habitats Directive. This process examines the alternative ways of achieving the objectives of the project or plan that avoid adverse impacts on the integrity of the European site. If no alternatives exist, or all alternatives would result in adverse effects on the integrity of a European site, then either the process moves to the next stage, or the project is abandoned.

In the unlikely event where an Assessment of Alternative Solutions fails to identify any suitable alternatives, then for a project or plan to be progressed it must meet the requirements of Imperative Reasons of Overriding Public Interest IROPI. In this case the provisions of Article 6(3) cannot be met (i.e. an adverse effect on site integrity) and therefore, the provisions of Article 6(4) are used. If, in light of an assessment of imperative reasons of overriding public interest (IROPI), it is deemed that the project or plan should proceed, compensatory measures are implemented to maintain the coherence of the European site network despite adverse effects to the integrity of the site(s).

The process is set out in Image 2, below.

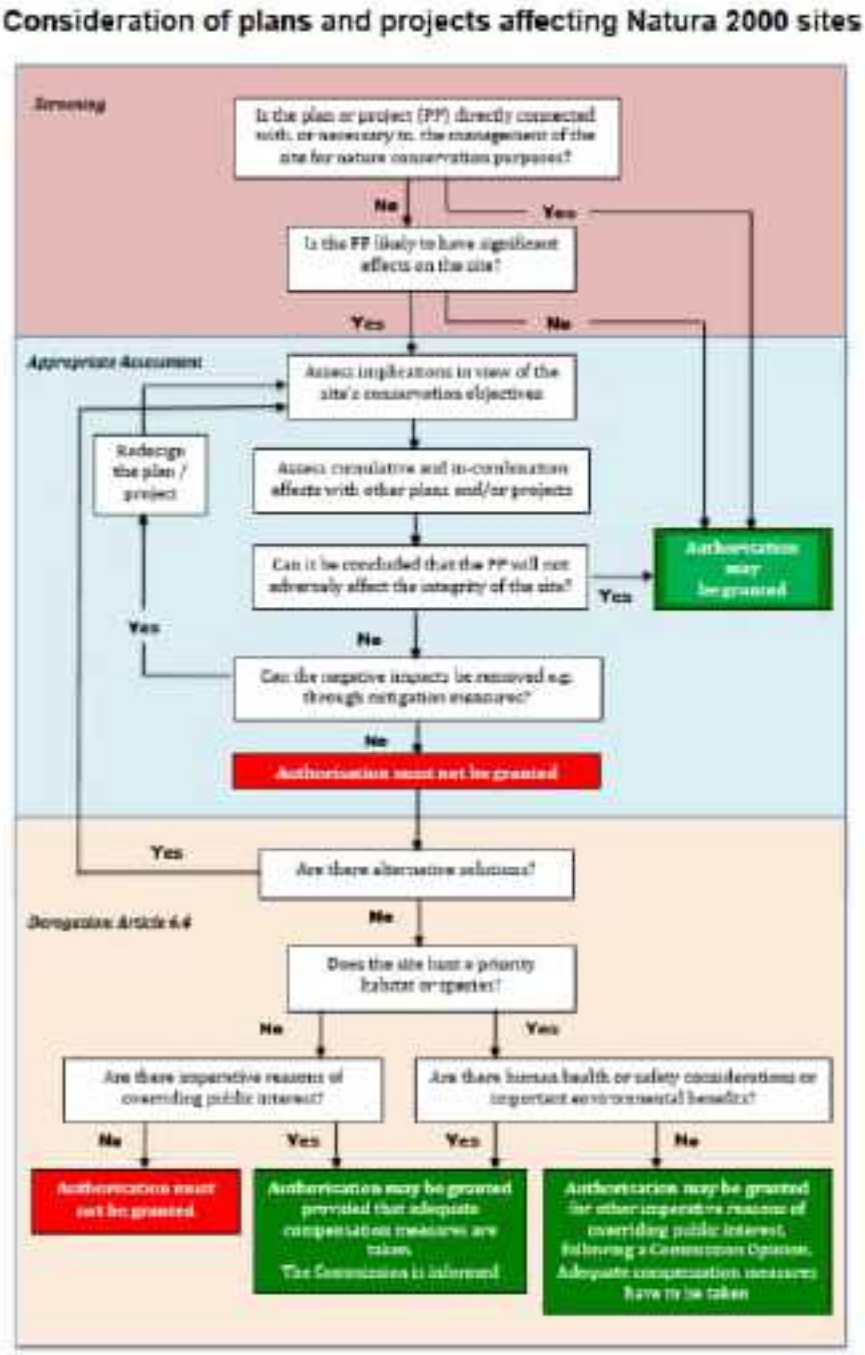

Image 2: Flow chart of Article 6 (3) and (4) procedure (European Commission, 2018).

1.4 Purpose of this report

In the context of Article 6(3), the competent authority, (ABP) must carry out Screening for AA of the Proposed Development to assess whether, on the basis of objective scientific information and in view of best scientific knowledge, the Proposed Development either individually or in-combination with other plans or projects, is likely to have a significant effect on the conservation objectives of a European site(s). This report presents the information required for the competent authority to undertake Screening for AA for the Proposed Development.

1.5 Authors' qualifications and expertise

This report was prepared by Harry Jones, then updated by Duncan Smith and check/reviewed by Dr Susie Coyle.

Harry is a Senior Environmental Consultant and an Associate Member of the Chartered Institute of Ecology and Environmental Management (ACIEEM). Harry has a Master's degree (MAI) in Civil, Structural and Environmental Engineering from Trinity College Dublin, as well as a Postgraduate Certificate (PGCert) in Ecological Surveying from Oxford University. He has more than five years' professional experience working predominantly in environmental coordination and ecological surveying. He has worked on a variety of projects of all sizes across various disciplines including water, wastewater, transportation, and infrastructure.

Duncan Smith is a Principal Ecologist and Chartered Environmentalist. He has a BSc (Hons) in Zoology from the University of Leeds, an MSc in Environmental Technology with Ecological Management from Imperial College and as MSc in Marine Environmental Protection from Bangor University. He has twenty-four years professional ecological experience specialising in botanical surveying, habitat management and evaluation for Ecological Impact Assessment. During his career he has worked in the private, public, and voluntary sectors, including fifteen years in the private sector, seven years for UK Statutory Nature Conservation Bodies in England and Wales and two years in the voluntary sector.

The report was checked and reviewed by an Associate Director of Ecology, who also led the aquatic surveys for the Proposed Development. Dr Susie Coyle holds a BSc (Hons) in Aquatic Bioscience and a PhD in fish biodiversity from the University of Glasgow. She is a Chartered full Member of the Royal Society of Biology (MRSB), a full Member of CIEEM and a Member of the Institute of Fisheries Management (MIFI). Susie has coordinated Jacobs' ecologists both in Ireland and in the UK and has experience of multiple ecological survey techniques and associate reporting. She has over fifteen years of consultancy experience in aquatic and terrestrial ecology with over twenty years' experience of field surveys and environmental sampling techniques. One of Susie's main roles is the check and review of reports including Appropriate Assessment Screening reports and Natura Impact Statements.

Susie has over 20 years' experience of field surveys and environmental sampling techniques, including electric fishing and gill/seine/drag/hand netting, kick sampling and water chemistry analysis. She is a certified team lead for electric fishing through the Scottish Fisheries Co-Ordination Centre and has worked for the Lomond Fisheries Trust undertaking targeted electric fishing surveys for salmonids. She has held several pan-Scotland and England freshwater pearl mussel licences.

2. Methodology

2.1 Desk review

The following key resources were analysed to inform the baseline description of the sites and surrounding environment:

- Aerial imagery (Bing, https://www.bing.com/maps; ESRI).
- Environmental Protection Agency (EPA) rivers and water quality data Water Framework Directive (WFD) status) https://gis.epa.ie/EPAMaps/ (accessed November 2022).
- Mapping of European site boundaries available online at www.npws.ie.
- National Parks and Wildlife Service (2019a). The Status of EU Protected Habitats and Species in Ireland. Volume 2: Habitat Assessments. Unpublished NPWS report. Edited by: Deirdre Lynn and Fionnuala O'Neill.
- National Parks and Wildlife Service (2019b). The Status of EU Protected Habitats and Species in Ireland. Volume 3: Species Assessments. Unpublished NPWS report. Edited by: Deirdre Lynn and Fionnuala O'Neill.
- Online data available on Natura 2000 sites, including Conservation Objectives, as held by the National Parks and Wildlife Service (NPWS) from www.npws.ie including: the Natura 2000 network Data Form; Site Synopsis; Generic Conservation Objective data.
- Other opensource information available online regarding fisheries (e.g., www.salmonireland.com and www.fishingireland.info).
- Protected and invasive species data from the National Biodiversity Data Centre (NBDC) online at http://www.biodiversityireland.ie/ (accessed November 2022).

2.2 Site visits

Site visits were undertaken by experienced Jacobs's ecologists multiple times in 2021 and 2022 beginning on 11/10/2021. The study area extent varied across the Proposed Development according to the infrastructure associated with the scheme and its likely ecological impacts. Surveys included wintering and breeding birds, mammals, fish, invertebrate and habitats. The study area includes all areas of works required for the Proposed Development. All surveys were undertaken within the relevant optimal surveying period (National Roads Authority, 2009). Habitats within the study area were assessed for their potential to support rare or protected species and/ or qualifying interests (Annex I habitats or Annex II species) associated with European sites. The assessment of protected species and habitats and/ or invasive species was undertaken in line with the following guidelines and informed this Screening for AA:

- A Guide to Habitats in Ireland. The Heritage Council (Fossitt, 2000).
- Article 17 reports (NPWS, 2019a, 2019b, and 2019c).
- CIEEM Good Practice Guidance for Habitats and Species (CIEEM, 2021).
- CIEEM Guidelines for Preliminary Ecological Appraisal. Second Edition (CIEEM, 2017).
- CIEEM Guidelines for Ecological Impact Assessment in the UK and Ireland (CIEEM, 2018).
- Guidelines on the Management of Noxious Weeds and Non-Native Invasive Plant Species on National Roads (NRA, 2010).
- Transport Infrastructure Ireland (TII) The Management of Invasive Alien Plant Species on National Roads - Standard (TII, 2020a).
- Transport Infrastructure Ireland (TII) The Management of Invasive Alien Plant Species on National Roads - Technical Guidance (TII, 2020b).

Ecology surveys and their dates completed are shown in Table 2.1, below.

Table 2.1 showing all ecological surveys carried out for the Kildare to Meath Proposed Development.

Species/Habitat	Survey methodology/target species	Survey date(s)
Habitat Survey	Habitat classification (Fossitt, IVC etc.)	June 2022 – October 2022 (Week commencing: 06.06.2022, 27.06.2022, 11.07.2022, 18.07.2022, 22.08.2022, 05.09.2022, 26.09.2022, 12.10.2022)
Habitat Suitability Assessment	Reptile and amphibian	December 2021 –June 2022 (week commencing 13.12.21; 27.6.22)
	Terrestrial invertebrate (Marsh fritillary)	December 2021 – June 2022 week commencing 13.12.21; 27.6.22
	Fish and white-clawed crayfish,	June 2022 – October 2022 (Week commencing: 06.06.2022, 27.06.2022, 11.07.2022, 18.07.2022, 22.08.2022, 05.09.2022, 26.09.2022, 12.10.2022)
Mammal Survey	Mammal species other than bats i.e. otter, badger, red squirrel etc.	October 2021 – April 2022
Birds	Winter Bird Surveys	October 2021 – April 2022 (Week commencing: 11.10.2021, 01.11.2021, 06.12.2021, 10.01.2022, 07.02.2022, 07.03.2022, 11.04.2022)
	Hen harrier winter roost surveys	October 2021 – March 2022 (Week commencing 11.10.2021, 18.10.2021, 01.11.2021, 06.12.2021, 10.01.2022, 07.02.2022, 07.03.2022)
	Breeding bird surveys	March – May 2022 (Week commencing: 28.03.2022, 25.04.2022, 23.05.2022, 30.05.2022)
Bats	Identification of potential roost features (PRFs) in trees/buildings	February 2022 – September 2022 (week commencing 21.2.22; 21.3.22; 6.6.22; 15.7.22; 22.8.22; 5.9.22
	Static detector surveys	May 2022 – August 2022 (Week commencing 16.05.2022, 23.05.2022, 30.05.202, 06.06.2022, 27.06.2022, 04.07.2022, 18.07.2022, 25.07.2022, 01.08.2022, 08.08.2022)
	Emergence/re-entry surveys (structures and trees)	May 2022 – July 2022 (Week commencing 16.05.2022, 23.05.2022, 30.05.2022, 06.06.2022, 17.06.2022, 18.07.2022, 25.07.2022)
Fish	eDNA Sampling for Atlantic salmon and European eel	August 2022 – September 2022 (Week commencing: 08.08.2022, 19.09.2022)

Invertebrates	eDNA Sampling for white-clawed crayfish	August 2022 – September 2022 (Week commencing: 08.08.2022, 19.09.2022)
Smooth newt	eDNA Sampling for smooth newt at WB19 and WB05	August 2022 – October 2022 (Week commencing: 08.08.2022, 19.09.2022, 10.10.2022)

2.3 Guidance documents

This Screening for AA was undertaken in accordance with to the following guidance:

- Appropriate Assessment of Plans and Proposed Schemes in Ireland. Guidance for Planning Authorities (Department of Environment, Heritage and Local Government (DoEHLG), 2010).
- Assessment of Plans and Projects Significantly Affecting Natura 2000 Sites – Methodological Guidance on the Provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC (EC, 2021a).
- Communication from the Commission on the Precautionary Principle (EC, 2000).
- Guidance Document on Article 6(4) of the 'Habitats Directive' 92/43/EEC. Clarification of the concepts of: Alternative Solutions, Imperative Reasons of Overriding Public Interest, Compensatory Measures, Overall Coherence, Opinion of the Commission (EC, 2007).
- Guidance document on the strict protection of animal species of Community interest under the Habitats Directive (EC, 2021b).
- Managing Natura 2000 sites: The provisions of Article 6 of the 'Habitats' Directive 92/43/EEC (EC, 2018).
- Office of the Planning Regulator (2021). Appropriate Assessment Screening for Development Management. OPR Practice Note PN01.

2.4 Screening methodology

The guidance documents outlined above set out the process for carrying out AA, the first stage of which is referred to as Screening. Steps required for Screening include the following.

- Determination of whether a project or plan is directly connected with or necessary to the conservation management of any European sites[3].
- Description of the details of the project/ plan (including the site characteristics/ plan area).
- Description of the characteristics of European sites that might be affected (i.e., identification of Qualifying Interest (QI which refers to the habitats and/or non-bird species for which an SAC is designated), and Special Conservation Interests which refers to the habitats and bird species for which an SPA is designated))and conservation objectives (CO) that could be affected as a result of progressing the project/ plan.
- Assessment of LSEs on relevant European sites in view of the sites' CO, either individually or in-combination with other plans and projects.
- Presentation of a screening assessment which should determine if the project/ plan individually or in-combination with other plans and projects could undermine the CO of the site(s) and give rise to LSEs. The assessment of LSEs must be undertaken in the absence of mitigation measures.

2.4.1 Guiding principles and case law

The most recent Irish guidance in relation to AA was published by the Office of the Public Regulator (OPR Practice Note PN01, 2021). This document provides information and guidance on the Irish planning application process

3 The Proposed Development is not directly connected with or necessary to the conservation management of any European sites.

and how to undertake a Screening for AA. Several legal cases have been brought to both the national and European courts in relation to the AA process. Therefore, relevant case law, European Court of Justice (ECJ) rulings and EC publications have also been considered in the preparation of this AA Screening.

2.4.2 Source-pathway-receptor model and Zone of Influence

When assessing the Zone of Influence (ZoI) the 'source-pathway-receptor' model is applied taking consideration of all potential impact pathways connecting elements of the project or plan to European sites in view of their conservation objectives.

The source-pathway-receptor conceptual model is a standard tool in environmental assessment. For an effect to occur, all three elements of this mechanism must be in place. The absence or removal of one of the elements of the mechanism means that there is no likelihood for the effect to occur (e.g., no potential for LSEs). Potential impact pathways that may arise from a development may include but are not limited to:

- Removal or loss of QI/ Special Conservation Interest (SCI)[4] habitat.
- Removal or loss of habitat with which QI species are associated.
- Mortality of QI species.
- Physical disturbance to QI species.
- Risk of pollution/ reduction in water quality impacting on QI species.

The 'source- pathway-receptor' model is focused solely on the QIs for which European sites are designated as shown on the latest conservation objectives from the NPWS website[5].

The ZoI is the area over which effects could occur to ecological features from a project. The determination of a ZoI for a project should be identified on a case-by-case basis as there may be an effect on European sites that are at a distance from the works. For example, where there is a hydrological link between the development site and a European site.

Considerations key in determining the potential ZoI include:

- Ecological features within and in proximity to the Proposed Development.
- Migratory/ mobile species of the area.
- Construction/ operational activities that may cause a significant effect.
- Linkages to European sites or sensitive habitats connected to those sites.

4 The specific named bird species for which a SPA is selected is called the 'Special Conservation Interests' (SCIs). However, in practice, the common terminology of Qualifying Interests applies also to SCI (and is used throughout this report for simplicity).
5 www.npws.ie/protected-sites/conservation-management-planning/conservation-objectives.

3. Baseline Characterisation

3.1.1 Overview of the baseline environment

The results of the desk-based review and site visits are presented in the following sections.

The study area comprised predominantly agricultural grasslands with some arable fields, built surfaces, and hedgerows and treelines between Dunstown substation in the townland of Dunnstown in Co. Kildare and Woodland substation in the townland of Woodland in Co. Meath.

3.1.2 European designated sites

European designated sites potentially within the ZoI the Proposed Development are shown on Figure 1 (321084AH-JAC-ZZ-XX-DR-K-3000), Appendix A and in Table 3.1. Sites were included based on the 'source-pathway-receptor' model (Section 4.3) and were near enough to the Proposed Development to either have hydrological connectivity or to have mobile QI requiring further investigation into their potential to be impacted by the Proposed Development (birds and otters).

- Ballynafagh Bog SAC (Site code 000391) 1.64km west;
- Ballynafagh Lake SAC (Site code 001387) 2.75km west;
- Mouds Bog SAC (Site code 002331) 6.21km west;
- Rye Water Valley/ Carton SAC (Site code 001398) approximately 7km east;
- Poulaphouca Reservoir SPA (Site code 004063) 7.08km east;
- Pollardstown Fen SAC (Site code 000396) 8.87km west;
- River Boyne and River Blackwater SAC (Site code 002299) 14.80km west; and
- River Boyne and River Blackwater SPA (Site code 004232) 18.77km west.

These are detailed further in Section 4.3 and in Table 3.1.

Table 3.1 European Designated Sites potentially within the projects ZoI and the QI habitats and species for which these sites are designated.

Site Name	Site Code	QI Habitats (Annex I Habitats)	QI Species
Ballynafagh Bog SAC	000391	[7110] Active raised bogs [7120] Degraded raised bogs still capable of natural regeneration [7150] Depressions on peat substrates of the Rhynchosporion	N/A
Ballynafagh Lake SAC	001387	[7230] Alkaline fens	[1016] Desmoulins Whorl Snail (*Vertigo moulinsiana*) [1065] Marsh Fritillary (*Euphydryas aurinia*)
Mouds Bog SAC	002331	[7110] Active raised bogs [7120] Degraded raised bogs still capable of natural regeneration	N/A

Site Name	Site Code	QI Habitats (Annex I Habitats)	QI Species
		[7150] Depressions on peat substrates of the Rhynchosporion	
Rye Water Valley/Carton SAC	001398	[7220] Petrifying springs with tufa formation (*Cratoneurion*)*	[1014] Narrow-mouthed Whorl Snail (*Vertigo angustior*) [1016] Desmoulins Whorl Snail (*Vertigo moulinsiana*)
Poulaphouca Reservoir SPA	004063	N/A	[A043] Greylag Goose (*Anser anser*) [A183] Lesser Black-backed Gull (*Larus fuscus*)
Pollardstown Fen SAC	000396	[7210] Calcareous fens with Cladium mariscus and species of the *Caricion davallianae** [7220] Petrifying springs with tufa formation (*Cratoneurion*)* [7230] Alkaline fens	[1013] Geyer's Whorl Snail (*Vertigo geyeri*) [1014] Narrow-mouthed Whorl Snail (*Vertigo angustior*) [1016] Desmoulins Whorl Snail (*Vertigo moulinsiana*)
River Boyne and River Blackwater SAC	002299	[7230] Alkaline fens [91E0] Alluvial Forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*)	[1099] River Lamprey (*Lampetra fluviatilis*) [1106] Atlantic Salmon (*Salmo salar*) [1355] Otter (*Lutra lutra*)
River Boyne and River Blackwater SPA	004232	N/A	[A229] Kingfisher (*Alcedo atthis*)

3.1.3 Species (including Annex I and II)

A search of the NBDC returned two records of QI species, as listed in Table 3.1 above, within approximately 2km of the study area as follows:

- Otter (*Lutra lutra*).
- Marsh fritillary (*Euphydryas aurinia*).

A potential otter holt was recorded along the River Liffey during the field survey on 09/06/2022 at approximately ITM E687929, N724445. This is located approximately 28km from the River Boyne and River Blackwater SAC (the nearest SAC for which otter is a qualifying feature) An otter slide was recorded along the River Liffey at approximately ITM E687940, N724511, approximately 66m from the potential otter holt. This is also located 28km for the River Boyne and the River Blackwater SAC.

Marsh fritillary was not recorded during the site visits, although its main food source devil's bit scabious (*Succisa pratensis*) was recorded at one location on Harristown Common (Grid Reference N 87879 12976), which lies c462m from the Proposed Development at its nearest location and 17.0km from Ballynafagh Lake SAC at its nearest location. The location of the devil's bit scabious on Harristown Common is well beyond the footprint of the

Proposed Development and separated from it by an amenity sports pitch. The nearest SAC to the Proposed Development which has marsh fritillary as a QI feature is Ballynafagh Lake SAC, which lies c2.75km from the Proposed Development at its nearest location.

In consideration of Greylag goose and lesser black-backed gull, the bird species listed as Special Conservation Interest for this SPA, Jacobs' winter bird survey (Jacobs, 2023) did not record any Greylag goose. Most records for wintering birds were from round several ponds or lakes, none of which will be impacted by the Proposed Development. The remaining records were of birds in flight or occasionally foraging in agricultural fields.

Jacobs' winter bird survey (Jacobs, 2023) recorded lesser black backed gull on two occasions foraging in fields, with a maximum count of 42 birds in a field of winter barley, approximately 224m to the west of the Proposed Development. The SPA citation states that the reservoir attracts roosting gulls during winter, including a large population of lesser-black backed gull, which in Ireland are rare away from the south coast.

Jacobs' winter birds survey recorded two Annex I bird species within 800m of the Proposed Development as follows:

Golden plover (*Pluvialis apricaria*) was recorded on one occasion within the study area (c70m to the east of the Proposed Development, south of Ballybrack feeding in recently sown winter barley. The nearest SPA designated for this SCI is North Bull Island SPA, 28.7km SW. The core foraging range of golden plover is 3km, with a maximum range of 11km (SNH, 2016). Due to the distance from the Proposed Development, the golden plover recorded during the survey are not considered likely to be part of the North Bull Island SPA population. In addition, there are many similar winter barley fields in the vicinity of the Proposed Development on which these birds can feed. It is considered that there will not be a significant effect on the SPAs golden plover population, and golden plover is not considered further.

Kingfisher (*Alcedo atthis*), the nearest SPA designated for the SCI is The River Boyne and River Blackwater SPA (18.7km NW). Kingfisher was recorded as part of the wintering bird survey on the River Liffey, but due to its distance away from the SPA, is not part of the population of the SPA.

3.1.4 Habitats (including Annex I)

Habitats within the study area (habitat codes as per Fossitt (2000)) are as follows. Note that no Annex I habitats associated with any of the SAC habitats listed in Table 3.1 above, were recorded during the survey:

- Hedgerow (WL1).
- Treeline (WL2)
- Improved agricultural grassland (GA1).
- Buildings and artificial surfaces (BL3).
- Arable crops (BC1).
- Scrub (WS1).
- Amenity grassland (GA2).
- Drainage ditches (FW4).
- (Mixed) broadleaved woodland (WD1).
- Mixed broadleaved/ conifer woodland (WD2).
- Depositing lowland river (FW2).
- Conifer plantation (WD4).
- Dry calcareous and neutral grassland (GS1)

3.1.5 Aquatic environment

The Waterbodies (WB) crossed by the Proposed Development are shown in Table 3.2, below. The locations of the WB crossing in relation to the proposed cable are shown in Figure 2 (321084AH-JAC-ZZ-XX-DR-K-3001 to 3034), Appendix B. The table shows all waterbodies in the study area and the river waterbody Water Framework Directive (WFD) status for the 2016-2021 monitoring period, and the risk rating where available (Environmental Project Agency (EPA) Maps website, 2023). The WFD status of WBs in the vicinity of the Proposed Development is shown in Figure 3 (321084AH-JAC-ZZ-XX-DR-K-3035), Appendix C.

Table 3.2. Waterbodies within the study area and Water Framework Directive status and risk rating of for WFD watercourses.

Waterbody number (WB)	Waterbody name	Waterbody location – Grid reference	EU Code	WFD status 2016-2021	Risk rating
WB01	Tributary of the Tolka 020	N 95028 46797	IE_EA_09T010600	Moderate	At risk
WB02	Dunboyne Stream_010	N 94782 46269	IE_EA_09D040500	Poor	At risk
WB03	Rye Water_030	N 93930 45180	IE_EA_09R010400	Poor	At risk
WB04	Jenkinstown stream_010	N 91730 45313	IE_EA_09J010950	Moderate	At risk
WB05	Pond	N 90677 45988	N/A	N/A	N/A
WB06	Jenkinstown Stream_010	N 90246 45483	IE_EA_09J010950	Moderate	At risk
WB07	Jenkinstown Stream_010	N 89775 43468	IE_EA_09J010950	Moderate	At risk
WB08	Jenkinstown Stream_010	N 89661 43153	IE_EA_09J010950	Moderate	At risk
WB09	Unassigned stream	N 89419 43023	N/A	N/A	N/A
WB10	Rye Water_020 (Brides Stream)	N 89243 42178	IE_EA_09R010300	Good	Under review
WB11	Newtownmoyaghy Stream tributary of Rye Water_020	N 89076 40939	N/A	N/A	N/A
WB12	Rye Water_020 (Padistown)	N 88410 40767	IE_EA_09R010300	Good	Under review
WB13	Rye Water_010	N 88065 40613	IE_EA_09R010100	Moderate	At risk

Waterbody number (WB)	Waterbody name	Waterbody location – Grid reference	EU Code	WFD status 2016-2021	Risk rating
WB14	Royal Canal	N 87874 40210	IE_09_AWB_RCMLE	Good	Under review
WB15	Lyreen_010	N 86262 37369	IE_EA_09L020035	Poor	At risk
WB16	Drainage ditches	N 86442 36490	N/A	N/A	N/A
WB17	Drainage ditches	N 86592 36149	N/A	N/A	N/A
WB18	Drainage ditch	N 86589 36154	N/A	N/A	N/A
WB19	Lyreen_010 (Baltracey Trib Lyreen)	N 86673 35787	IE_EA_09L020035	Poor	At risk
WB20	Tributary of Lyreen_010	N 86754 35459	N/A	N/A	N/A
WB21	Drainage ditches	N 86823 35188	N/A	N/A	N/A
WB22	Clonshanbo_010	N 87176 33938	IE_EA_09C030300	Poor	At risk
WB23	Drainage ditches	N 87298 33417	N/A	N/A	N/A
WB24	Clonshanbo_020	N 86916 31840	IE_EA_09C030600	Poor	At risk
WB25	Kilmurry_010	N 86272 30537	IE_EA_09K260890	Poor	Under review
WB26	Tributary of Kilmurray_010	N 86151 30369	N/A	N/A	N/A
WB27	Liffey_130	N 84449 28586	IE_EA_09L011600	Good	Not at risk
WB28	Tributary of Liffey_130	N 84283 28429	N/A	N/A	N/A
WB29	Liffey_130	N 84425 28283	IE_EA_09L011600	Good	Not at risk
WB30	Tributary of Slate_010	N 84237 27559	N/A	N/A	N/A
WB31	Liffey_130	N 84807 27542	IE_EA_09L011600	Good	Not at risk
WB32	Liffey_120	N 87519 25081	IE_EA_09L011500	Good	Not at risk
WB33	Drainage ditch	N 87844 24820	N/A	N/A	N/A
WB34	Drainage ditch	N 87950 24710	N/A	N/A	N/A

Waterbody number (WB)	Waterbody name	Waterbody location – Grid reference	EU Code	WFD status 2016-2021	Risk rating
WB35	Liffey_120	N 88001 24231	IE_EA_09L011500	Good	Not at risk
WB36	Liffey_120	N 88281 24006	IE_EA_09L011500	Good	Not at risk
WB37	Liffey_120	N 88110 23008	IE_EA_09L011500	Good	Not at risk
WB38	Grand Canal	N 88152 22604	IE_09_AWB_GCMLE	Good	Not at risk
WB39	Liffey_110	N 88249 21068	IE_EA_09L011300	Good	Under review
WB40	Liffey_110	N 87711 20395	IE_EA_09L011300	Good	Under review
WB41	Liffey_110	N 87394 20021	IE_EA_09L011300	Good	Under review
WB42	Grand Canal	N 88288 19245	IE_09_AWB_GCMLE	Good	Not at risk
WB43	Liffey_100	N 88310 18467	IE_EA_09L011200	Good	Under review
WB44	Drainage ditch	N 88077 15749	N/A	N/A	N/A
WB45	Dunstown Stream	N 87555 12433	N/A	N/A	N/A
WB46	Tributary of Liffey_120	N 88017 24231	N/A	N/A	N/A

Several drainage ditches, some wet and some dry, were identified predominantly along field boundaries in the vicinity of the scheme. It should be noted, however, that these contained water intermittently.

3.1.6 Invasive species

A search of the NBDC identified a number of records of invasive species within the study area including:

- Parrot's-feather (*Myriophyllum aquaticum*).
- Japanese knotweed (*Reynoutria japonica*).
- Three-cornered leek (*Allium triquetrum*).
- Spanish bluebell (*Hyacinthoides hispanica*).

Himalayan balsam was recorded during the field survey along the River Liffey at approximately ITM E687941, N724498 and in the back garden of a private residence at E687974, N724322.

It should be noted that these species are listed on the Third Schedule to the European Communities (EC) (Birds and Natural Habitats) Regulations, 2011, as amended.

4. Screening

4.1 Description of the Proposed Development

The Proposed Development is a 52.9km underground cable (UGC) between Dunstown substation in Kildare and Woodland substation in Meath (as shown in Image 1), of which 9.5km (18%) is off-road and 43.3km (25%) is in-road. The 400 kV UGC is proposed to be sited within the existing roads and will be in a trench excavated to 1.3m deep and 1.5m wide running the full length of the scheme. Approximately every 750m (on average) the cables will be joined together at a 'joint bay', of which there will be 70 in total. Joint bays are pre-cast concrete underground chambers approximately 2.5m wide by 10m long by 2m deep with two associated manhole covers to the side of the chamber. There are 31 off-road and 39 in-road joint bays. Where the joint bays are off road a permanent hard standing area in a 3 m radius around the joint bay will be provided. At joint bays, there will be additional land take to facilitate construction. At each joint, except for those which are off-road, there will be provision for cars to pass around it at a passing bay. Passing bays are temporary structures, which may be in place for up to two years. Each temporary passing bay will be on average 5.5m wide with length of 100m (exact length to be determined by engineering constraints). Passing bays will be reinstated post-construction.

The routing of the cable and associated jointing and passing bays took into consideration the location of mature trees along the route. The route and bay positions were moved to avoid mature trees where possible. However, due to narrow treelined roads in several locations and the requirement for set distances between jointing bays, avoidance of vegetation loss was not possible in all areas and to accommodate the trenches for the UGC there will need to be significant removal of hedgerows, trees, including mature trees, which are lining the road network where the development is proposed to be. The other habitats which are impacted to the greatest extent by area comprise arable and pastural land, dry calcareous grassland, immature woods at the north of the scheme at Woodland substation. Refer to the Planning and Environmental Considerations Report (Jacobs, 2023) for further details of these habitats.

Six temporary construction compounds are proposed, each approximately one hectare in size. All temporary construction compounds will be secured with hoarding/ fencing around their perimeter as appropriate. Temporary construction compounds will include facilities such as construction phase car parking and welfare facilities and temporary material storage areas as necessary.

Access tracks comprise both temporary and permanent tracks. Where a permanent access track is required to access off-road joint bays, this will comprise of approximately 300mm of fill material and finished to approximately 100mm above ground level. The access track will remain in place to allow access to cables should future maintenance works be required. The permanent access track will be designed and constructed to accommodate heavy plant (5t axel loading) movement. Where a temporary construction road is required, engineering stone fill will be laid and compacted and maintained as required for the duration of the works. Once the works are completed, the engineered stone fill will be removed, and the land will be reinstated to its original condition.

Horizonal directional drilling (HDD) is proposed at major watercourse crossings or where there are significant constraints. There will be a 'launch' and 'reception' pit either side of the drilling and those temporary HDD compounds will be within the planning application boundary. There are six HDD proposed along the cable route including at Rye Water (WB13) which is approximately 6km direct distance over land and approximately 8km hydrologically, at the closed point.

Programme and Timing of Works

Subject to the grant of statutory approvals, it is anticipated that the construction phase will commence in Quarter 2, 2025 with the underground cable element of the Proposed Development becoming fully operational after construction and testing in Quarter 3, 2028.

The works at the Woodland Substation are expected to last approximately 24 months while the works at Dunstown Substation are expected to last approximately 12 months and will run concurrently with the cabling works.

Construction activities will gradually phase out from pre-construction to predominantly civil activities followed by commissioning and testing.

In general, it is anticipated that construction will occur during normal working hours i.e. Monday to Friday 7 am to 7 pm and Saturday from 7 am to 2 pm. There may be localised instances where night-time working is required to facilitate traffic management, however, should working outside these hours / days be required they will only be undertaken with prior agreement with Meath and Kildare County Councils.

Clearance of hedgerow, treeline or scrub vegetation, where required, will take place after 31 August and before 1 March in order to protect breeding birds, (i.e. outside of the bird breeding season). Clearance may take place during the restricted period, if a suitably qualified ecologist has determined that nesting birds and other protected species are absent. Enabling works have been provisionally programmed for Q1 2025.This allows sufficient time for habitat clearance outside of the breeding season. This would increase the construction period to 45 months if it is required.

Any element of the scheme requiring instream works in watercourses with fisheries value will be restricted to the fisheries open season (i.e. will only take place during the period July to September), unless with the agreement of IFI.

Subject to the grant of consents, it is anticipated that installation of the underground cable will take approximately 42 months in total. Safety requirements for the installation operations / procedures, detailed design considerations and weather condition will however ultimately dictate the final programme.

The majority of the construction activities are not dependent on outages on the existing transmission system, however, specific activities associated with the connection at the existing Woodland and Dunstown substations on to the existing transmission infrastructure will be planned and programmed into EirGrid's multi-year outage programme. This is because the existing live infrastructure needs to be switched off during such connection activities. EirGrid, as Transmission System Operator, develops a detailed plan for such outages each year to ensure the undertaking of the safe and efficient construction and maintenance activities involving or in proximity to existing infrastructure.

4.2 Potential effect pathways from Proposed Development

Table 4.1 outlines broad categories of potential impacts that could occur as a result of generic development, and the potential effects on European sites.

Table 4.1 Generic potential effect pathways from development on European sites.

Broad categories of potential impacts on European sites	Potential effect pathways
Physical loss of habitats/ supporting habitat	Development could result in direct loss of QI habitat (terrestrial or aquatic) in a European site. Physical loss of habitat is only likely to be significant if it is within the boundary of a European site, or within an area of supporting habitat outside of the European site (for example, off-site area of known foraging, roosting, breeding habitat for a QI for which a European site is designated).
Mortality	Mortality of species could occur through direct impact of habitat used by that species or as a result of pollution to habitats that support QI species, aquatic species in particular .
Habitat degradation – changes in water quality (pollution)	Water quality can be affected by oil, chemicals, heavy metals and so on, or through chronic runoff of such materials. Water quality can also be affected by sedimentation through runoff from construction sites. Changes in water quality could directly affect QI species or habitats or affect them indirectly through loss of aquatic prey species, or through changes in their habitat. Pollution effects can occur outside of a European site and at a considerable distance from works (for example, via hydrological link).
Habitat degradation – hydrological/ hydrogeological changes	Construction impacts could affect groundwater quality and/or quantity and thereby the existing hydrological regime. Changes in hydrology can alter geomorphological processes which can affect the deposition of shingle or other material potentially impacting on QI fish species amongst others. Changes in these processes can impact aquatic/riparian/terrestrial habitats and species either directly or indirectly.
Disturbance (including biological disturbance)	Development could result in disturbance of QI species. This disturbance may include, but not be limited to, noise, vibration, movement (of people and/or vehicles) and lighting. Disturbance may lead to the abandonment of habitats or resting sites by QI species, which could include designated or supporting habitats outside of a European site. Spread of non-native invasive species.

4.3 European Site within the ZoI of the Proposed Development

The 'source-pathway-receptor' model was applied to Proposed Development works locations with respect to European sites taking consideration of the above potential impact pathways connecting them. A map showing the location of the European sites in the vicinity of the Proposed Development is shown in Figure 1 (321084AH-JAC-ZZ-XX-DR-K-3000), Appendix A.

Two European sites are within the ZoI of the Proposed Development are as follows, and their conservation objectives and qualifying interest are shown in Table 4.2:

- River Boyne and River Blackwater SAC and
- Rye Water Valley/Carton SAC.

Table 4.2: Conservation objectives of the River Boyne and River Blackwater SAC, and Rye Water Valley / Carlton SAC, which lay within the ZoI of the Proposed Development

European site name and code	Distance of site from project	Conservation Objectives and Qualifying Interests (*=priority habitat).
Special Area of Conservation (SAC)		
Rye Water Valley/Carton SAC (site code 001398) **(NPWS, 2021b)**	The Proposed Development will be 6.2km west at the closest distance from the SAC (at Dolanstown). The Proposed Development is in the same catchment and the shortest hydrological distance between the Proposed Development and this SAC is 8.15km, commencing at Kilcock (Rye Water, WB13)	***To maintain or restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the SAC has been selected.*** **Annex I habitats:** Petrifying springs with tufa formation (*Cratoneurion*) [7220] **Annex II species:** Narrow mouthed whorl snail (*Vertigo angustior*) [1014] Desmoulin's whorl snail [1016]
River Boyne and River Blackwater SAC (site code: 002299) **(NPWS, 2018).**	The Proposed Development will be 14.2km east at its closest distance from the SAC (at Brannockstown). Not hydrologically linked as is separate catchment.	***To maintain or restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the SAC has been selected.*** **Annex I habitats:** Alkaline fens [7230] Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*)* [91E0] **Annex II species:** River lamprey (*Lampetra fluviatilis*) [1099] Salmon (*Salmo salar*) [1106] Otter (*Lutra lutra*) [1355]

4.3.1 Other European sites within the vicinity of the Proposed Development but outside the ZoI

The following European sites are considered to be within the vicinity of the Proposed Development works but outside the ZoI:

River Boyne and River Blackwater SPA (Site code 004232) is approximately 14km distant and in a separate catchment to that of the Proposed Development (the Boyle catchment rather than the Tolka catchment), and therefore it has no hydrological connectivity to the Proposed Development. The SPA is designated for kingfisher (*Alcedo atthis*) only. The territories of kingfishers tend to cover at least 1km of river but may extend over up to 5km depending on the amount of food available, and on the bird population in the area (RSPB, undated). There is no potential for the Proposed Development to impact the QI species within or linked to the SPA for the following reasons.

- Given the overland distance (>14km) and lack of hydrological connectivity/ecological connectivity this is considered outside the ZoI of the Proposed Development.
- Given the distance of the SPA from the Proposed Development, kingfisher populations along the SPA are not considered to be affected by the works.

Ballynafagh Bog SAC (Site code 000391) is located 1.6km west of the Proposed Development at its nearest point. It is designated for active raised bogs, degraded raised bogs still capable of natural regeneration, depressions on peat substrates of the *Rhynchosporion* (NPWS, 2015a). Although there may be some interactions with ground

water, raised bogs are generally rainwater fed, receiving water and nutrients from precipitation (Gilroy, *et al*., 2008). There is no potential for the Proposed Development to impact upon the QI habitats within or linked to the SAC for the following reasons:

- Works are proposed at Maynooth Road, which, at grid reference N 83909 28033 lies 220m from a tributary which flows, after 2.0km, into a watercourse running along the southern boundary of Ballynafagh Bog SAC. This tributary crosses Maynooth Road at N 83742 27890. There is no hydrological link between the SAC and the Proposed Development due to the distance between the Proposed Development and where the tributary crosses Maynooth Road.
- Given the overland distance and lack of hydrological connectivity/ ecological connectivity this is considered outside the ZoI of the Proposed Development.
- Ballynafagh Bog SAC does not have species as qualifying interest (i.e., no mobile birds and mammals).

Ballynafagh Lake SAC (Site code 001387) is located 2.8km west of the Proposed Development. It is designated for alkaline fens, Desmoulin's whorl snail (*Vertigo moulinsiana*), and marsh fritillary (*Euphydryas aurinia*) (NPWS, 2021a). There is no potential for the Proposed Development to impact upon the QI habitats or species within or linked to the SAC for the following reasons.

- Marsh fritillary butterfly is found in a range of habitats in which its larval food plant, devil's bit scabious occurs and although populations may occur occasionally on wet heath, bog margins and woodland clearings, most colonies are found in damp acidic or dry calcareous grassland[6]. The Proposed Development is within the potential foraging range of marsh fritillary. A mark release recapture study of this species found the longest straight distances flown by adults was 7.6km (Zimmerman *et al*., 2011). Marsh fritillary was identified on the NBDC within 2km of the Proposed Development. Marsh fritillary was not recorded during the site visits, although its main food plant devil's bit scabious was recorded at one discrete location on Harristown Common at (Grid Reference N 87879 12976), which lies c462m east of the Proposed Development at its nearest location. The plant is separated from the Proposed Development by an amenity playing field and lies well outside the Proposed Development's footprint, and is not expected to have an impact on this species. In addition, the habitat between the SAC and the proposed works is predominantly arable, with limited opportunity for devil's bit scabious to flourish.
- Aerial images show the habitat between the SAC and Proposed Development is predominantly arable. Desmoulin's whorl snail is restricted to calcareous wetlands where it lives on reed grasses and sedges[7] There is no similar habitat between the SAC and the Proposed Development area. Given the absence of suitable habitat and lack of hydrological connectivity/ ecological connectivity this is considered outside the ZoI of the Proposed Development.

Mouds Bog SAC (Site code 002331) is located 6km west of the Proposed Development. It is designated for active raised bogs, degraded raised bogs still capable of natural regeneration, and depressions on peat substrates of the *Rhynchosporion* (NPWS, 2015b). There is no potential for the Proposed Development works to impact upon the QI habitats within or linked to the SAC for the following reasons:

- This SAC lies upstream of the Proposed Development.
- Given the overland distance and lack of hydrological connectivity/ ecological connectivity this is considered outside the ZoI of the Proposed Development.

Poulaphouca Reservoir SPA (Site code 004063) is located 8km east of the southern extent of the proposed works. It is designated for greylag goose (*Anser anser*), and lesser black-backed gull (*Larus fuscus*) (NPWS, 2022a). It should be noted that this SPA provides the main roost for this species. There is no potential for the Proposed Development area to impact upon the QI species within or linked to the SPA for the following reasons.

Greylag goose and lesser black-back gulls feed on improved grassland and could potentially fly from this SPA to the improved fields adjoining the Proposed Development: the foraging range for Greylag goose during the winter

[6] JNCC (2022). Marsh Fritillary: https://sac.jncc.gov.uk/species/S1065/
[7] JNCC (2022): Desmoulin's whorl snail. https://sac.jncc.gov.uk/species/S1016/

season is 15-20km (SNH, 216) and the nearest distance of the proposed works to Poulaphouca Reservoir SPA is 8km away and therefore within for foraging range of this species. However, 85% of the works are proposed to take place within the road and the habitat within and adjacent to the Proposed Development is unsuitable for them as it comprises predominantly trees and hedgerows. Where the Proposed Development is off-road, it does cross some improved pasture, which could potentially be used by Greylag goose. The desk study found Greylag goose wintering at Poulaphouca Reservoir mainly use fields at Threecastles to the northeast of Blessington Bridge and roost on the adjacent section of the reservoir, approximately 12.06km west of the proposed works at their nearest location; they may also use fields at Mount Seskin in County Dublin around 8 km to the north-east of Threecastles and approximately 17.57km from the proposed works at their nearest location. They also formerly roosted near Ballymore Eustace, around 5km to the south-west, and approximately 5.43km from the proposed works at its nearest location (Boland and Crowe, 2008).

Jacobs' winter bird survey (Jacobs, 2023) did not record any Greylag goose. Most records for wintering birds were from round several ponds or lakes, none of which will be directly impacted by the Proposed Development. The Proposed Development crosses WB39 which flows into the pond lying between Osberstown Millennium Park Road and the M7. The winter birds survey did not record birds using this pond which are QI of SPAs within foraging range of the pond, and therefore no indirect potential impacts on SPAs are predicted from birds using this pond. The Proposed Development does not any waterbodies with hydrological linkage to the pond lying between the R411 and Naas General Hospital and will therefore have no direct or indirect effect on the birds using this pond. The remaining records were of birds in flight or occasionally foraging in agricultural fields.

Jacobs' winter bird survey (Jacobs, 2023) recorded lesser black backed gull on two occasions foraging in fields, with a maximum count of 42 birds in a field of winter barley, approximately 224m to the west of the Proposed Development. The SPA citation states that the reservoir attracts roosting gulls during winter, including a large population of lesser-black backed gull, which in Ireland is rare away from the south coast. Given the preference of gulls for the coast and given the abundance of similar agricultural habitat available between the Proposed Development and the SPA 8km away, no likely significant effect is expected. In summary given that: 1) all nationally important sites for Greylag goose lie nearer to the coast than Poulaphouca Reservoir SPA; 2) the desk study found Greylag goose at Poulaphouca Reservoir SPA mainly using the fields in the vicinity of the SPA; 3) Jacob's winter bird survey (Jacobs 2023) did not record any Greylag goose and; 4) given the extent of other similar unimpacted habitat in the vicinity of the Proposed Development, as well as that lying between the SPA and the Proposed Development, the temporary loss the improved grassland is not expected to have a significant effect on these SPA bird populations.

Pollardstown Fen SAC (Site code 000396) is located 9km west of the Proposed Development. It is designated for the following habitats: 1) calcareous fens with *Cladium mariscus* and species of the *Caricon davallianae*, petrifying springs with tufa formation (*Cratoneurion*); 2) petrifying springs with tufa formation; and 3) alkaline fens. It is also designated for the following three species: Geyer's whorl snail (*Vertigo geyeri*), narrow-mouthed whorl snail, and Desmoulin's whorl snail (NPWS, 2022b). There is no potential for the Proposed Development to impact upon the QI habitats within or linked to the SAC for the following reasons:

- This SAC lies in a separate catchment to the Proposed Development so surface water will not be impacted.
- Pollardstown Fen SAC is a ground water dependent ecosystem (GWDTE). The cable trench will be 1.5m width by approximately 1.3m depth and given that he SAC it is 9km away from the Proposed Development and the likelihood of greatest impact to GWDTE is within 250m (SEPA, 2001), no detailed ground water assessment is required and no significant impact is likely.

The three habitats for which the SAC is designated do not have connectivity with the Proposed Development area. Connected habitat suitable to support the three QI species was not present between the proposed works and SAC. The habitat requirements for narrow-mouth whorl snail and Desmoulin's whorl snail are described above. Geyer's whorl snail is found in relatively exposed, constantly humid calcareous flush-fens that are fed by tufa-depositing springs.[8]

[8] JNCC (2022) Geyer's whorl snail: https://sac.jncc.gov.uk/species/S1013/

5. Assessment of Likely Significant Effects (LSEs)

5.1 Screening Exercise

A screening exercise is presented in Table 5.1 below which examines the potential effects of the Proposed Development on 1) Rye Water Valley/Carton SAC and 2) the River Boyne and River Blackwater SAC and their qualifying interest (Annex I habitats and Annex II species) for which they are designated. The results of this exercise and the rationale for 'screening in or screening out' European sites within the ZoI (and therefore, of potential relevance to the AA) are also detailed in Table 5.1.

Table 5.1: European Site with the Potential for likely significant effects from the Proposed Development (grey text = qualifying feature with no effect pathway identified.)

European site name and code	Distance of site from projects	Conservation Objectives and Qualifying Interests (*=priority habitat).	Pathway	Likely Significant Effects (LSEs)
Special Area of Conservation (SAC)				
Rye Water Valley/Carton SAC **(NPWS, 2021b)**	The Proposed Development is 6.2km west at the closest distance from the SAC (at Dolanstown) The Proposed Development is in the same catchment and the shortest hydrological distance between the Proposed Development and this SAC is 8.15km, commencing at Kilcock (Rye Water, WB13)	***To maintain or restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the SAC has been selected.*** **Annex I habitats:** Petrifying springs with tufa formation (*Cratoneurion*) [7220] **Annex II species:** Narrow mouthed whorl snail (*Vertigo angustior*) [1014] Desmoulin's whorl snail (*Vertigo moulinsiana*) [1016]	**Habitat degradation (Pollution)** There is hydrological connectivity to this SAC where the Proposed Development crosses waterbodies which flow indirectly to Rye Water, since Rye Water flows through Rye Water Valley/Carton SAC. The nearest is WB13 which is 8.15km from this SAC. Directional drilling is proposed here which could potentially cause a pollution event resulting from: • oil and fuel spillages from drilling rig operation. • inadvertent drilling fluid returns (bentonite breakout) and • drilling fluid disposal. A total of ten further waterbody crossings have hydrological connectivity with the SAC. There is potential for surface sediment run-off during construction of the Proposed Development to enter waterbodies at these locations and be transported to the SAC. Therefore, water pollution incidents at these watercourses have the potential to indirectly affect the SAC's qualifying habitats and species. Petrifying springs have exacting water level and quality requirements and are therefore potentially susceptible to a water pollution/ hydrological incident. Desmoulin's whorl snail was recorded at the SAC in the 2014-2017 survey season (Long and Brophy, 2019) while narrow mouthed whorl was last recorded on the site in 1997 (NPWS, 2021b). Further assessment needed.	**Yes.** Petrifying springs with tufa formation (*Cratoneurion*), narrow mouthed whorl snail and Desmoulin's whorl snail screened in on a precautionary basis as all the SAC QI could be indirectly impacted by inadvertent drilling fluid returns from HDD in WB13 and/or surface sediment run-off into one of the connecting watercourses.

European site name and code	Distance of site from projects	Conservation Objectives and Qualifying Interests (*=priority habitat).	Pathway	Likely Significant Effects (LSEs)
			Direct mortality Desmoulin's whorl snail is restricted to calcareous wetlands where it lives on reed grasses and sedges. Such habitat does not connect the SAC to the Proposed Development area, so there is no likelihood of direct mortality of this species from habitat loss. Narrow mouthed whorlsnail is found primarily in marshy ground of high, even humidity, with flowing groundwater, but subject neither to deep or prolonged flooding nor to periodic desiccation. It requires unshaded conditions and lives amongst short vegetation, composed of grasses, mosses or low herbs, that is quickly warmed by the sun. The vegetation may be grazed. Such habitat does not connect the SAC to the Proposed Development area, so there is no likelihood of direct mortality of this species from habitat loss. No further consideration needed.	
River Boyne and River Blackwater SAC (site code: 002299) **(NPWS, 2018).**	The Proposed Development is 14.2km from the SAC at its closest location. There is no hydrological link.	***To maintain or restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the SAC has been selected.*** **Annex I habitats:** *Alkaline fens* *Alluvial forests with Alnus glutinosa and Fraxinus excelsior* **Annex II species:** River lamprey Salmon Otter (potential effect pathway identified)	**Habitat loss** Direct/ indirect impacts: alkaline fens and alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* are not located nearby the Proposed Development. There will be no loss of these habitats therefore direct impacts associated with direct habitat loss were ruled out. Further, the SAC is in a separate catchment therefore there is no hydrological link. No further consideration needed. **Disturbance** Otter is a qualifying feature of the River Boyne and River Blackwater SAC, and otter signs were recorded close to the Proposed Development during the Jacobs 2021/22 survey season as follows: • potential otter holt was recorded along the River Liffey at approximately ITM E687929 N724445, (this grid reference lies along the route the proposed HDD where it crosses the River Liffey, WB35.	No potential for LSEs.

European site name and code	Distance of site from projects	Conservation Objectives and Qualifying Interests (*=priority habitat).	Pathway	Likely Significant Effects (LSEs)
			• an otter slide at approximately ITM E687940, N724511 (this grid reference lies approximately 16m east of the cable route. The Proposed Development is located 14.2km south-east of the SAC at its closest point. The otters present adjacent to the River Liffey are in a different catchment to those in the SAC, and the otter signs are approximately 28km south-east of the SAC at its nearest point. The Proposed Development lies 14.2km from this SAC at its nearest point, and a male otter's territory is 13.2 ± 5.3km[9]. However, as there are no other rivers designated for otters between the SAC and the proposed works, the SAC is considered the core area for otters, rather than in intervening rivers and tributaries. As the SAC extends for approximately 65km to the Baltry Estuary, is it considered that otters are more likely to remain in the River Boyne and River Blackwater SAC and/Boyne catchment than to migrate into Liffey catchment. Therefore, the Proposed Development is not considered to have a likely significant effect on otters, a QI of this SAC. No further consideration needed. **Direct mortality** As described in the paragraph above the proposed route lies close to the otter signs on the River Liffey. However, as the otters at this location belong to a different population to those of the River Boyne and River Blackwater SAC, the interest feature of the SAC will not be impacted by the Proposed Development. No further consideration needed. **Pollution** There is no hydrological pathway between the SAC and the Proposed Development since the water flowing in the River	

[9] National Otter Survey of Ireland 2010/12, published by the National Parks and Wildlife Service (2013)

European site name and code	Distance of site from projects	Conservation Objectives and Qualifying Interests (*=priority habitat).	Pathway	Likely Significant Effects (LSEs)
			Boyne and River Blackwater lies in the Boyne catchment rather than the Liffey and Dublin Bay catchment, the location of the Proposed Development. Consequently, there is no potential for a pollution event to occur. No further consideration needed.	

5.2 Determination of Likely Significant Effects

Potential pathways were considered between the Proposed Development and the two European designated sites which lay with the ZoI (the Rye Water Valley/Carton SAC and the River Boyne and River Blackwater SAC) as outlined in Table 5.1.

The determination of LSEs is considered to be any effect that may possibly occur as a consequence of the proposed works that would undermine the conservation objectives for the site's QI features. In the assessment of LSEs, consideration is given to what would constitute a significant effect in terms of loss, fragmentation, disruption, disturbance and changes to key elements affecting the QI features that may compromise the conservation objectives for that feature.

The determination found that there was the potential for LSE for the Rye Water Valley/Carton SAC. There are no LSEs on any other European site or associated QI from the Proposed Development.

5.3 In-Combination Effects

To take account of in-combination effects, plans, and projects that are completed, approved but uncompleted, or proposed (but not yet approved) should be considered in appropriate assessment screening (EC, 2021). A search of the National Planning Application Database (NPAD) (DoHLGH, accessed March, 2022) and general web searches for major infrastructure projects and plans in the vicinity of the Proposed Development in the last five years has been undertaken to identify other projects that may result in cumulative impacts.

Planning applications that have been proposed or granted permission in the nearby vicinity which constitute significant works are presented below in Table 5.2. The majority of recent planning applications in the vicinity of the Proposed Development are small scale domestic and commercial applications. These smaller developments are presented in Table 5.3.

Table 5.2 Plans and significant developments in the vicinity of the Proposed Development.

Planning ref.	Planning Authority	Project Description	Comment
N/A	Meath County Council	Meath County Development Plan 2021-2027. A Natura Impact Report was prepared (Scott Cawley, 2021) in support of The Meath County Development Plan 2021-2027. This report assessed potential impacts arising from the Meath County Development Plan 2021-2027 (Meath County Council, 2021). No impacts were identified on any of the European sites identified within the ZoI or the vicinity of the Proposed Development. As such, no in-combination effects are anticipated between the Proposed Development and the Meath County Development Plan 2021-2027 or the supporting NIS.	No in-combination effects are anticipated.
N/A	Kildare County Council	Kildare County Development Plan 2017-2023. A Natura Impact Report was prepared (CAAS, 2017) in support of the Kildare County Development Plan 2017-2023. This report assessed potential impacts arising from the Kildare County Development Plan 2017-2023 (Kildare County Council, 2017). No impacts were identified on any of the European sites identified within the ZoI or the vicinity of the Proposed Development. As such, no in-combination effects are anticipated between the Proposed Development and the NIS	No in-combination effects are anticipated.

Planning ref.	Planning Authority	Project Description	Comment
		prepared in support of the Kildare County Development Plan 2017-2023.	
N/A	Kildare County Development Plan 2023-2029	Kildare County Development Plan 2023-2029. A Natura Impact Report was prepared (Arup, 2022) in support of the Draft Kildare County Development Plan 2023-2029. This report assessed potential impacts arising from the Draft Kildare County Development Plan 2023-2029. No impacts were identified on any of the European sites identified within the ZoI or the vicinity of the Proposed Development. As such, no in-combination effects are anticipated between the Proposed Development and the Kildare County Development Plan 2023-2029.	No in-combination effects are anticipated.
N/A	EirGrid Grid Implementation Plan 2017-2022	The policies, objectives and projects within EirGrid's Grid Implementation Plan were screened for their potential to have Likely Significant Effects (LSEs) on European sites and five projects identified with the potential for LSE. These were assessed in the NIS for the plan. No impacts were identified on any of the European sites identified within the ZoI or the vicinity of the Proposed Development. As such, no in-combination effects are anticipated between the Proposed Development and the NIS prepared in support of the Grid Implementation Plan 2017-2022.	No in-combination effects are anticipated.
201143	Kildare County Council	Conditional permission granted for a proposed extension to a Distribution Centre of height 19m to comprise of a: warehouse extension (approx. 11,82m^2), main office extension over two storeys; dispatch and extension goods-in office over two storeys; new one storey transport office; and vehicle maintenance unit extension. The gross floor area of the premises will increase from 29,106m^2 to 41,891m^2, an increase of 12,785m^2. Some demolition will be required. Additional new vehicle parking areas will be provided including a new HGV parking area located to the east of the Distribution Centre and a new additional car parking area to the south of the Distribution Centre, on the south side of the R148. Provision of 172 no. car parking spaces; 175 no. HGV trailer parking spaces; 27 no. tractor (HGV cab) parking spaces; and 128 no. bicycle parking spaces and associated infrastructure. The development will involve minor alterations to the existing entrance at R148 which will provide vehicular, pedestrian and cyclist access and egress to the Distribution Centre. An additional new vehicular, pedestrian and cyclist access and egress will be provided off R148 to a new car parking area to the south of the main Distribution Centre site. A pedestrian crossing over this road will be provided connecting the southern car park to the main site. The associated site and infrastructural works include provision for all landscaping works; boundary treatment; internal roads and footpaths; PV panels and electrical services. The Proposed Development will involve modifications to a previous permission - Planning Register	An Environmental Impact Assessment Report (EIAR) and Natura Impact Statement (NIS) were submitted to the Planning Authority with the planning application (Scott Cawley, 2020). This NIS concluded that 'the Proposed Development will not adversely affect (either directly or indirectly) the integrity of any European site, either alone or in combination with other plants or projects and there is no reasonable scientific doubt in relation to this conclusion.

Planning ref.	Planning Authority	Project Description	Comment
		Reference 02/1561. Project has hydrological connectively with Rye Water Valley /Carton SAC and lies 9.1km from it.	
20840	Kildare County Council	Conditional permission granted for the construction of a 5627m^2 Specialist Packaging Single Storey High Level Manufacturing Facility with Three Storey Head office incorporating administration, sales, design, research and development departments, staff changing room, staff canteen, car parking, bicycle parking, ESB sub station, two storey services plant room, loading bay, entrance gates, pedestrian gate, building signage, landscaping, extension to existing estate service road and all associated siteworks on a site of 2.5672ha. KCC (20840) does not cross a watercourse. The nearest watercourse to the Proposed Development is the Grand Canal which lies approximately 70m to its east and has no connectivity with Rye Valley/Carton SAC.	No in-combination effects are anticipated.
18303023	Kildare County Council	Conditional permission granted for a strategic housing development (SHD) (ABP Decision) consisting of 125 no. new residential units. Provision of a total of 251 no. car parking spaces, including 228 no. spaces serving the residential units and 23 no. visitor spaces are dispersed throughout the scheme. The Proposed Development includes all ancillary and associated site and infrastructural works, including an extension of the access road permitted under KCC Reg Ref 15/848 (ABP Reg Ref PL09.246859) to provide pedestrian / cycle and vehicular access to the application site from the R448 Kilcullen Road. KCC (18303023) does not cross any watercourse and has no hydrological connectivity with Rye Valley/Carton SAC.	No in-combination effects are anticipated.
19305701	Kildare County Council	Conditional permission granted for a strategic housing development (SHD) (ABP Decision) involving the demolition of an existing dwelling and agricultural buildings on the subject site and the construction of a residential development of 314 no. dwellings, a crèche, and retail unit. Demolition of 1 no. existing single storey house required as well as derelict unroofed agricultural buildings. Ancillary landscape works with public lighting, planting and boundary treatments including re-grading / re-profiling of site where required as well as provision of cycle paths and pedestrian connections and landscaping integrated with Rathasker Road and pedestrian bridge over Yeomanstown Stream (also known as Rathasker Stream) required. Vehicular and pedestrian access from 2 no. existing access points from the constructed Devoy Link Road for Area A and use of existing entrance to Elsmore Phase 1 for Area B (from the Devoy Link Road), 578 no. car parking spaces and 159 no. cycle parking spaces (including single storey bin / cycle stores) will be provided. KCC (19305701) has no connectivity with Rye Valley/Carton SAC.	No in-combination effects are anticipated.

Planning ref.	Planning Authority	Project Description	Comment
22837	Meath County Council	GDA Energy 4 Ltd Battery Storage Park- planning permission has been consented to a third party for an energy park to the north of the existing Woodland substation The Proposed Development is immediately adjacent to the Proposed Development. An AA screening report has been submitted as part of that application and has concluded that there are no likely significant effects for that application. Based on that conclusion and the nature the Proposed Development, it is concluded that there is no potential for LSEs in-combination with the Proposed Development.	No in-combination effects are anticipated.
N/A	Meath County Council/Fingal County Council	CP1021: EirGrid - A project which will add a high-capacity electricity connection between Belcamp substation in Dublin and Woodland substation in Meath. The need for the project is integration of generation and an increase in demand on the east coast. The project is currently in the design stage and so a planning application has not been submitted as yet. Given the timing of the works and the lack of LSE arising from the Woodland's Proposed Development there is no potential for LSEs in-combination with the Proposed Development.	No in-combination effects are anticipated.
221550	Meath County Council	CP1194: EirGrid Woodland 400 kV Extension Project. The northern end of the Kildare Meath Grid Upgrade project connects to the Woodland substation. EirGrid is proposing to upgrade and expand the Woodland Substation in order to accommodate potential future upgrades to the electricity network in Meath. An AA screening report has been submitted as part of that application and has concluded that there are no likely significant effects for that application. Based on that conclusion and the nature the Proposed Development, it is concluded that there is no potential for LSEs in-combination with the Proposed Development.	No in-combination effects are anticipated.
211175	Kildare County Council	EirGrid Dunstown 400 kV series Compensation project. The southern end of the Kildare Meath Grid Upgrade project connects to the Dunstown substation. Permission granted for development on lands to the west of the Dunstown substation within the townland of Dunstown, Brannockstown, Naas, Co. Kildare. The Proposed Development will consist of an extension to the western boundary of the existing Dunstown substation to allow connection of series compensation equipment to the Dunnstown-Moneypoint 400 kV circuit. An AA screening report has been submitted as part of that application and has concluded that there are no likely significant effects for that application. Based on that conclusion and the nature the Proposed Development, it is concluded that there is no potential for LSEs in-combination with the Proposed Development.	No in-combination effects are anticipated.

Planning ref.	Planning Authority	Project Description	Comment
N/A	Various including County Meath	North-South 400 kV Interconnection Development EirGrid plc (EirGrid) and System Operator Northern Ireland Ltd (SONI) (the respective applicants) are jointly planning a major cross-border electricity transmission development between the existing high-voltage transmission networks of Ireland2 and Northern Ireland. The overall interconnection project is a 400 kV overhead line (OHL) circuit linking the existing substation in Woodland, County Meath with a planned substation in Turleenan, County Tyrone. The proposed interconnector will provide a second high-capacity electricity interconnector between Ireland and Northern Ireland. The existing interconnector is a 275 kV double circuit OHL which connects the existing Tandragee and Louth substations. The proposed interconnector is planned to traverse the counties of Tyrone, Armagh, Monaghan, Cavan and Meath	No effects are likely on the Rye Water /Carton SAC from the Interconnector Development as there is no hydrological linkage to the SAC.
REF 22314564	Kildare County Council	Proposed development (30,839 sq.m GFA) will consist of the demolition of a detached, vacant cottage (gfa 69sq.m) and the construction of 272 residential units (149 no. houses, 65 apartments and 58 duplexes), childcare facility and foul pumping station along with associated ancillary works and site works. The 149 no. dwellings consist of: • 40 no. 4 bed 2 storey houses (House Type A1, A2, A3, A4, A5) • 8 no. 4 bed 3 storey houses (House Type E1, E2) • 90 no. 3 bed 2 storey houses (House Type B1, B2, B3, C1, C2) • 11 no. 2 bed 2 storey houses (House Type D1) The proposed apartments and duplexes are provided in 7 no. blocks (Blocks A, B, C, D, E, F, G) ranging in height from 3 to 4 storeys, with the exception of 1no. Duplex Block (Type N1), which is a 3 storey, end of terrace unit. Block A and Block B contain Rooftop terraces at 4th floor level. The Duplex Blocks (Type J1, Type, J2, Type J3, Type J4, Type K1, Type L1, Type M1, Type N1) are all 3-storey and contain 58 units divided as follows: - 6no. 1 bed ground floor apartment units (Units L1-A) - 23no. 2 bed ground floor apartment units (Units J1-A, J2-A, J3-A, J4-A, K1-A, M1-A, N1-A) - 1no. 2 bed duplex unit (two-storey unit) (Units K1-B) - 25no. 3 bed duplex units (two-storey units) (Units J1-B, J2-B, J3-B, J4-B, L1-B) - 3no. 4 bed duplex units (two-storey units) (Units M1-B, N1-B) The 65 apartments are located within Blocks A, B, C and D divided as follows: - 17no. 1 bed units (Type F1, Type F2, Type F3, Type F4, Type F5, Type F6) - 37no. 2 bed units (Type G1, Type G2, Type G3, Type G4, Type G5-A, Type G5-B, Type G6, Type G7, Type G8) - 11no. 3 bed units (Type H1, Type H2) Block D also contains a childcare facility (gfa.526.2 sqm) and includes a dedicated outdoor play area (c.210 sq.m). Ancillary works including 1 no. vehicular entrances off the R148 to the north and 1 no. vehicular entrance off the R158 to the west, a spine road which will link with the permitted spine road on the adjoining lands to the south-east under PL09.306826, internal roads, footpaths, cycle lanes, car parking (465 no. spaces), cycle	An AA screening Report carried out by Niamh Ní Bhroin in 2022 for the planning application Ltd. found no likely significant effects were no LSE therefore no in combination effects are possible

Planning ref.	Planning Authority	Project Description	Comment
		storage/parking (426 no. spaces), 2 no. bus stops, bin storage, public open space, hard and soft landscaping, natural play area, play equipment, boundary treatments, public lighting, 3 no. substations (14sq.m each) and controlled pedestrian crossing on the R148.	
201143	Kildare County Council	Project involves proposed extension to the Distribution Centre (overall external height approx. 19m) will comprise of a: Warehouse Extension (approx. 11,824 sqm) with dock levellers on the north-eastern and south-western elevations; Main Office Extension over two storeys (approx. 386 sqm); Dispatch and Extension Goods-In Office over two storeys (Approx. 352 sqm); A new one storey Transport Office (approx. 123 sqm); and Vehicle Maintenance Unit (VMU) Extension (approx. 100 sqm). The gross floor area of the premises will increase from 29,106 sqm to 41,891 sqm, an increase of 12,785 sqm. The existing two storey internal Ancillary Office A and Battery Charging Area will be demolished to allow for the construction of the warehouse extension. Additional new vehicle parking areas will be provided including a new HGV parking area located to the east of the Distribution Centre and a new additional car parking area to the south of the Distribution Centre, on the south side of the R148. The development will also consist of an additional Sprinkler Tank (approx. 54 sqm) and External Cage Storage with a maintenance shed (approx. 64 sqm). The existing vehicle parking area will be reconfigured, and new vehicle parking areas provided for an additional: 172 no. car parking spaces (including 12 no. electric car charging points and an additional 15 no. universally accessible bays); 175 no. HGV trailer parking spaces; 27 no. tractor (HGV cab) parking spaces; and 128 no. bicycle parking spaces and associated infrastructure. A total of 24 motorcycle parking spaces will also be created. The development will involve minor alterations to the existing entrance at R148 which will provide vehicular, pedestrian and cyclist access and egress to the Distribution Centre. An additional new vehicular, pedestrian and cyclist access and egress will be provided off R148 to a new car parking area to the south of the main Distribution Centre site. A pedestrian crossing over this road will be provided connecting the southern car park to the main site. The associated site and infrastructural works include provision for all landscaping works; boundary treatment; internal roads and footpaths; PV panels and electrical services. The Proposed Development will involve modifications to a previous permission - Planning Register Reference 02/1561	The NIS for KCC (201143) identified the need for mitigation to protect the receiving environment and surface water during construction and operation of the Proposed Development. In the absence of mitigation, there is likely to be a significant effect from KCC (201143) on Rye Water Valley /Carton SAC. With the mitigation measures proposed in this NIS, no significant effect was predicted. Since screening does not include mitigation, it is concluded that there is potential for in-combination effects with KCC (201143) and the Proposed Development.

Table 5.3 Residential and commercial developments in the vicinity of the Proposed Development

Planning ref.	Planning Authority	Description of development	Comments
2043	Kildare County Council	Project involves the demolition of an existing building on site and recladding the shared gable to match the remaining neighbouring building. The construction of a new three storey over basement mixed use development consisting of a basement car park and plant room, pharmacy unit, convenience store unit and retail unit at ground floor, 4 No. units of medical consultation suites at first floor and 1 unit of medical consultation suites. Ancillary works include office space at second floor, car-parking, boundary treatments, new site entrances and siteworks.	No potential for in combination effects given the scale and location of the project.
22325	Kildare County Council	Project involves the installation of new external steel racking to the existing materials yard (the racking is to be mounted on top of the existing concrete hard standings) and all associated site works. AASR carried out and no potential for significant negative environmental effects were identified.	No potential for in combination effects given the scale and location of the project.
20597	Kildare County Council	Project involves the side and front boundary wall piers increasing in height from circa 0.8m to circa 2m, a wrought iron railing between piers, a wrought iron sliding gate and all associated site works. AASR carried out and no potential for significant negative environmental effects were identified.	No potential for in combination effects given the scale and location of the project.
21386	Kildare County Council	Project involves (a) Erection of a single storey type house; (b) Garage/fuel store for domestic use; (c) Installation of septic tank and percolation area; and (d) Upgrading of existing agricultural entrance to a new recessed vehicular entrance and all associated site works. AASR carried out and no potential for significant negative environmental effects were identified.	No potential for in combination effects given the scale and location of the project.
191291	Kildare County Council	Project involves conversion and alterations of an existing workshop/office to create a two storey two-bedroom dwelling. New roof and raising of overall height of workshop, new doors and windows are proposed to the existing building. 2 no. new vehicular entrances, new wastewater treatment system for dwelling and associated works. Relocation of the parents' wastewater treatment system. AASR carried out and no potential for significant negative environmental effects were identified.	No potential for in combination effects given the scale and location of the project.
18502	Kildare County Council	Project involves alteration works to an existing bungalow on the grounds of Painestown House (Protected Structure Ref. No. B14-30). The works include the construction of a single and two storey extension circa 73sqm, a detached single storey shed and carport, landscaping around the house, new treatment plant, percolation area and all associated ancillary works. Painestown House is also a recorded monument, NIAH No. KD010-034. No works proposed directly affect	No potential for in combination effects given the scale and location of the project.

Planning ref.	Planning Authority	Description of development	Comments
		Painestown House. AASR carried out and no potential for significant negative environmental effects were identified.	
19154	Kildare County Council	Project involves (1) Upgrade of existing farm entrance to modern day safety standards as detailed on drawing No. E3639-5, Commercial-Agricultural Entrance, as published by the Roads Department of Kildare County Council. (2) To carry out realignment works to the existing fence line on the north side of the proposed upgraded entrance for the purpose of attaining safe sightlines as required by the Roads Department of Kildare County Council. The above upgrading and improvement works are to be carried out to facilitate the safe operation of modern-day machinery while entering and exiting farm. AASR carried out and no potential for significant negative environmental effects were identified.	No potential for in combination effects given the scale and location of the project.
191303	Kildare County Council	Project involves constructing a one and half storey type house, detached domestic garage, recessed vehicular entrance, effluent treatment system, and all associated ancillary site-works. Revised by Significant Further Information which consists of a revised Site Layout Plan and amendment to red line boundary to facilitate the relocation of entrance to provide a dual entrance with the adjoining dwelling.	No potential for in combination effects given the scale and location of the project.
223	Kildare County Council	Project involves alterations and extension to existing dormer style dwelling. The application will include the following: (a) Single storey extensions to the rear and side of the dwelling to provide new living room and utility room. (b) New entrance porch to the front of the dwelling. (c) Alterations to the elevational treatment of the dwelling, along with all associated site development and facilitating works including site landscaping. AASR carried out and no potential for significant negative environmental effects were identified.	No potential for in combination effects given the scale and location of the project.
181214	Kildare County Council	Project involves retention permission for 4 no. existing booths (used for drying, shotblasting and painting) and ancillary storage rooms (476.9 sq.m combined), standalone office (21 sq.m) along with the change of use of the cottage to office / storage unit (136 sq.m). Planning permission is sought to: 1. Demolish domestic garage (25 sq.m). 2. Construct an extension to the north side of the shot blasting booth in order to contain all dust associated with shotblasting (37 sq.m) 3. Construct a new shed structure to the front of the existing workshop (414 sq.m.) in order to protect trailers from the weather during shotblast / repainting process and also, critically, to prevent dust emissions. The shed will have a maximum ridge height of 6.38m high and will be enclosed on 3 sides with the south elevation open to allow trailers to enter. It includes a new doorway connection to the existing cottage building. 4. Alter the access arrangements to provide single access to the	No potential for in combination effects given the scale and location of the project.

Planning ref.	Planning Authority	Description of development	Comments
		business and family dwelling and significantly improve sightlines and safety (includes new gates and dwelling). 5. Create new ordered trailer parking area to the rear of the workshop (significantly smaller area than previous application – approximately one third the size) including a dedicated turning area. 6. Provide new lined car parking for staff and visitors (12 spaces) and dedicated HGV parking (12 spaces) 7. Decommission the existing on-site treatment system and percolation area and provide new high specification on-site foul treatment system at a location to the rear of the site. 8. Provide new surface water drainage infrastructure. 9. Provide new landscaping with significant screening planting along the front boundary with family dwelling. 10. Carry out all associated site works.	
211814	Kildare County Council	Project involves the construction of an agricultural style building to be used to the storage of vintage cars for hobby purposes and all associated site works. AASR carried out and no potential for significant negative environmental effects were identified.	No potential for in combination effects given the scale and location of the project.
21846	Kildare County Council	Project involves extensions to the rear and side of 123sq.m. Retention of change of use from garage to habitable space of 23sq.m. Retention of removal of block archways to the front elevation and retention of new septic tank and percolation area to existing detached bungalow. AASR carried out and no potential for significant negative environmental effects were identified.	No potential for in combination effects given the scale and location of the project.
20974	Kildare County Council	Project involves 1) the extension to existing house will comprise of a bathroom and access corridor area 18.4m^2. 2) The conversion of an existing domestic garage, area c65m^2, providing a one-bedroom family flat comprising of; living room, kitchen, storage, bathroom and bedroom and all associated site works. AASR carried out and no potential for significant negative environmental effects were identified.	No potential for in combination effects given the scale and location of the project.
RA200481	Meath County Council	Project involves a two-storey dwelling house, domestic garage, waste-water treatment system and percolation area, vehicular entrance onto public road and all associated site works. Significant further information/revised plans submitted on this application. AASR carried out and no potential for significant negative environmental effects were identified.	No potential for in combination effects given the scale and location of the project.
RA201288	Meath County Council	Project concerns a storey and a half type dwelling house, domestic garage, waste-water treatment system and percolation area, vehicular entrance onto public road and all associated site works.	No potential for in combination effects given the scale and location of the project.

Planning ref.	Planning Authority	Description of development	Comments
RA190130	Meath County Council	Project involves the construction of a two-storey dwelling and detached domestic garage, the installation of a proprietary domestic effluent system, new site entrance and all associated site works. AASR carried out and no potential for significant negative environmental effects were identified.	No potential for in combination effects given the scale and location of the project.

Outcome of consideration of in-combination effects

The NIS for KCC (201143) identified the need for mitigation to protect the receiving environment and surface water during construction and operation of the proposed development. In the absence of mitigation, it is there is likely to be a significant effect from KCC (201143) on Rye Water Valley /Carton SAC. With the mitigation measures proposed in this NIS, no significant effect was predicted. Since screening does not include mitigation, it is concluded that there is potential for and in-combination effects with KCC (201143) and the Proposed Development.

6. Statement and Conclusion

The Proposed Development is not connected with, or necessary to, the management of any European site(s).

This Appropriate Assessment Screening report presents the objective scientific information required to inform a robust and complete examination of the potential impacts of the Proposed Development on European sites alone or in combination with any other plan or project. No measures that avoid or reduce an adverse effect on European site (''mitigation measure'') or best practice measures were taken into account in this screening assessment. This screening assessment found that for the European sites listed below (which were in the vicinity of the Proposed Development), it can be excluded on the basis of objective information and in view of best scientific knowledge that there is no potential for the Proposed Development, alone or in combination with any other plan or project, to have a Likely Significant Effect on conservation objectives of these sites:

- River Boyne and River Blackwater SAC;
- River Boyne and River Blackwater SPA;
- Ballynafagh Bog SAC;
- Ballynafagh Lake SAC;
- Mouds Bog SAC;
- Poulaphouca Reservoir SPA and;
- Pollardstown Fen SAC.

The conclusion of the Screening for Appropriate Assessment is that it cannot be excluded on the basis of objective information and in view of best scientific knowledge that there there is potential for Likely Significant Effects, alone or in-combination, on the conservation objectives of only the Rye Water Valley/ Carton SAC, therefore it is respectfully submitted that Appropriate Assessment of the Proposed Development is to be undertaken by the competent authority (An Bord Pleanála) for that site..

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Appendix A. Figure 1 (321084AH-JAC-ZZ-XX-DR-K-3000). Cable route and nearest European sites

River Boyne and River Blackwater SPA

River Boyne And River Blackwater SAC

MEATH

Rye Water Valley/Carton SAC

KILDARE

Ballynafagh Lake SAC

Ballynafagh Bog SAC

Mouds Bog SAC

Pollardstown Fen SAC

DUBLIN

WICKLOW

Wicklow Mountains SAC

Wicklow Mountains SPA

Poulaphouca Reservoir SPA

Down
Longwood
Broadford
Clonicurry
Cadamstown
Johnstown Bridge
Newtown
Carbury
Derrinturn
Staplestown
Summerhill
Batterstown
Kilcock
Maynooth
Leixlip
Lucan
Celbridge
Kilcloone
Dunboyne
Clonee
Blanchardstown
Ashtown
Palmerston
Chapelizod
Ballyfermot
Ronanstown
Dolp
Fox & Geese
Cloondalkin
Greenhills
Tymon North
Tallaght
Bally
Rockb
Newcastle
Straffan
Clane
Blackwood
Prosperous
Allenwood
Robertstown
Kilmeage
Ballins
Kill
Johnstown
Kilteel
Carragh
Rathangan
Naas
Rathmore
Milltown
Newbridge
Two Mile House
Hillsborough
Kildare
Curragh Camp
Athgarvan
Blessington
Kilbride
Drogheda
Navan
Skerries
Dublin
Bray
Naas
Kildare
Athy
Edenderry

N
W
E
S

0 1 2 4
Kilometers

Appendix A; Figure 1

Legend

- Proposed Cable Route
- County Boundary
- Watercourses

European sites

- Special Area of Conservation (SAC)
- Special Protection Area (SPA)

Rev.	Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
01	Apr 2023	Final	PM	SJ	FL	FB

Client: EirGrid

Jacobs
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Project: Kildare-Meath Grid Upgrade

Drawing Title: Proposed cable route and nearby European Sites

Drawing Status: Final

Scale @ A3	1:150,000	DO NOT SCALE
Jacobs No.	321084AH	
Client No.	CP966	

Drawing No. 321084AH-JAC-ZZ-XX-DR-K-3000

Appendix B. Figure 2 (321084AH-JAC-ZZ-XX-DR-K-3001 to 3034). Detailed cable route, with chainage and Waterbody numbering

HAYESTOWN
WOODLAND
HAYESTOWN
WOODLAND
GAULSTOWN
GAULSTOWN
RIBSTOWN
CULCOMMON
0
250
500
750
1000
1250
1500
1750
WB01
N
W
E
S
0 50 100 200
Meters
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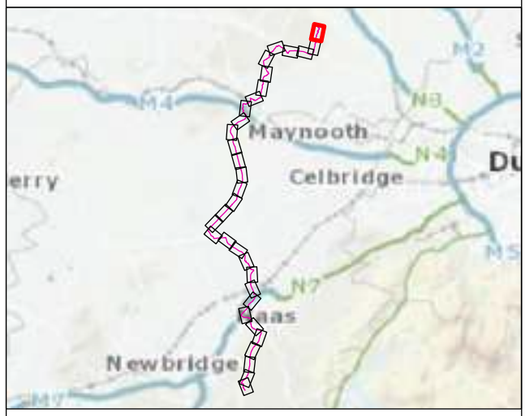
Appendix B; Figure 2.1



Legend

- Proposed Cable Route
- Planning Application Boundary
- Study Area (50m Buffer)
- Watercourses
- Waterbody (WB) number
- ●2250 Chainage Number

Rev.	Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
01	Apr 2023	Final	PM	SJ	FL	FB

Client: EirGrid

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Drawing Title: Cable route, with chainage and waterbody numbers

Sheet 1 of 33

Drawing Status: Final

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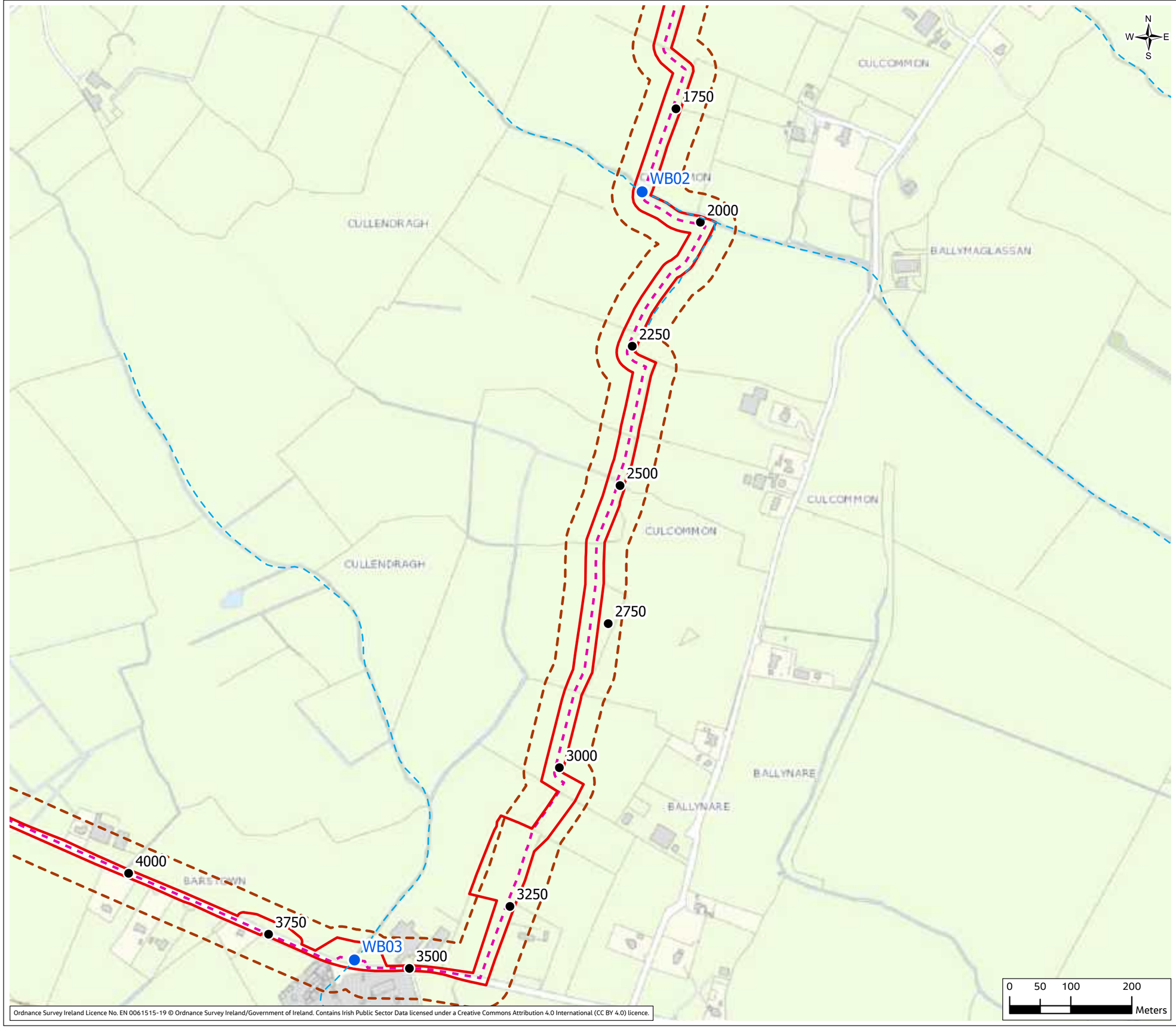
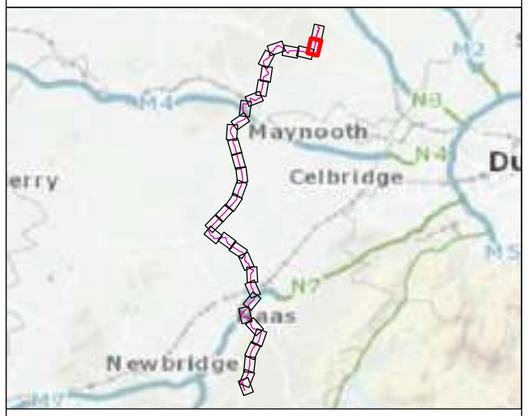
Client No.	CP966	

Drawing No. 321084AH-JAC-ZZ-XX-DR-K-3001



Appendix B; Figure 2.2



Legend

- Proposed Cable Route
- Planning Application Boundary
- Study Area (50m Buffer)
- Watercourses
- Waterbody (WB) number
- ●2250 Chainage Number

Rev.	Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
01	Apr 2023	Final	PM	SJ	FL	FB

Client: EirGrid

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Drawing Title: Cable route, with chainage and waterbody numbers

Sheet 2 of 33

Drawing Status: Final

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Client No.	CP966	

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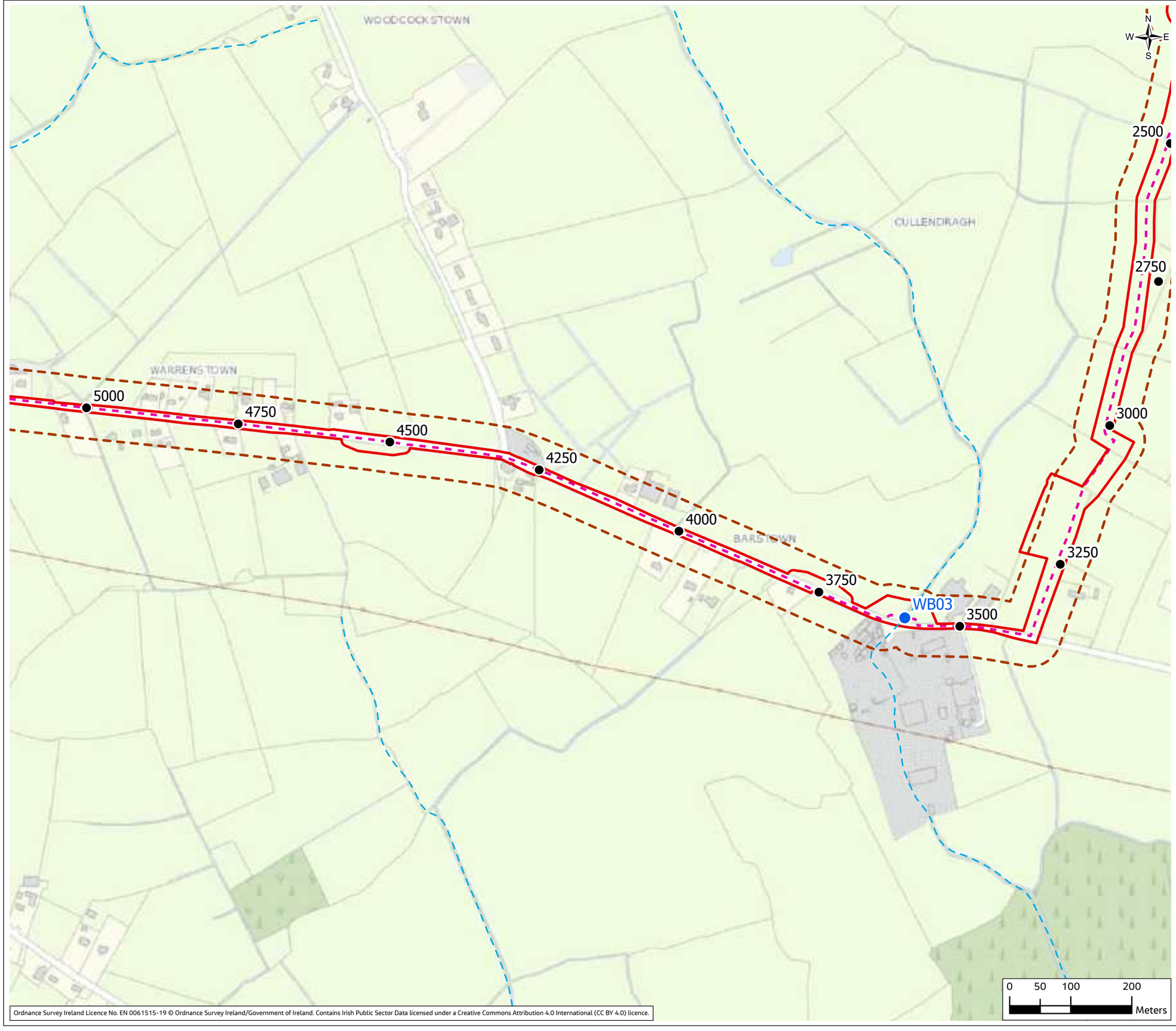
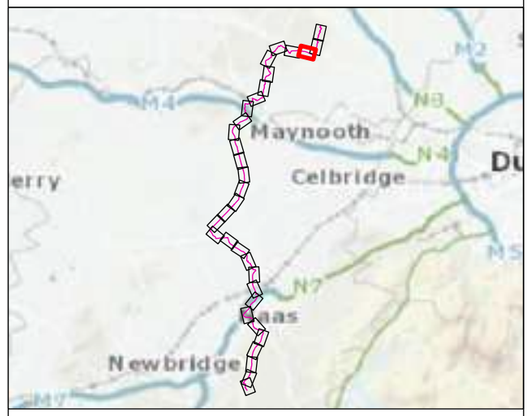


Appendix B; Figure 2.3



Legend

- Proposed Cable Route
- Planning Application Boundary
- Study Area (50m Buffer)
- Watercourses
- Waterbody (WB) number
- ●2250 Chainage Number

Rev.	Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
01	Apr 2023	Final	PM	SJ	FL	FB

Client: EirGrid

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Drawing Title: Cable route, with chainage and waterbody numbers

Sheet 3 of 33

Drawing Status: Final

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Client No.	CP966	

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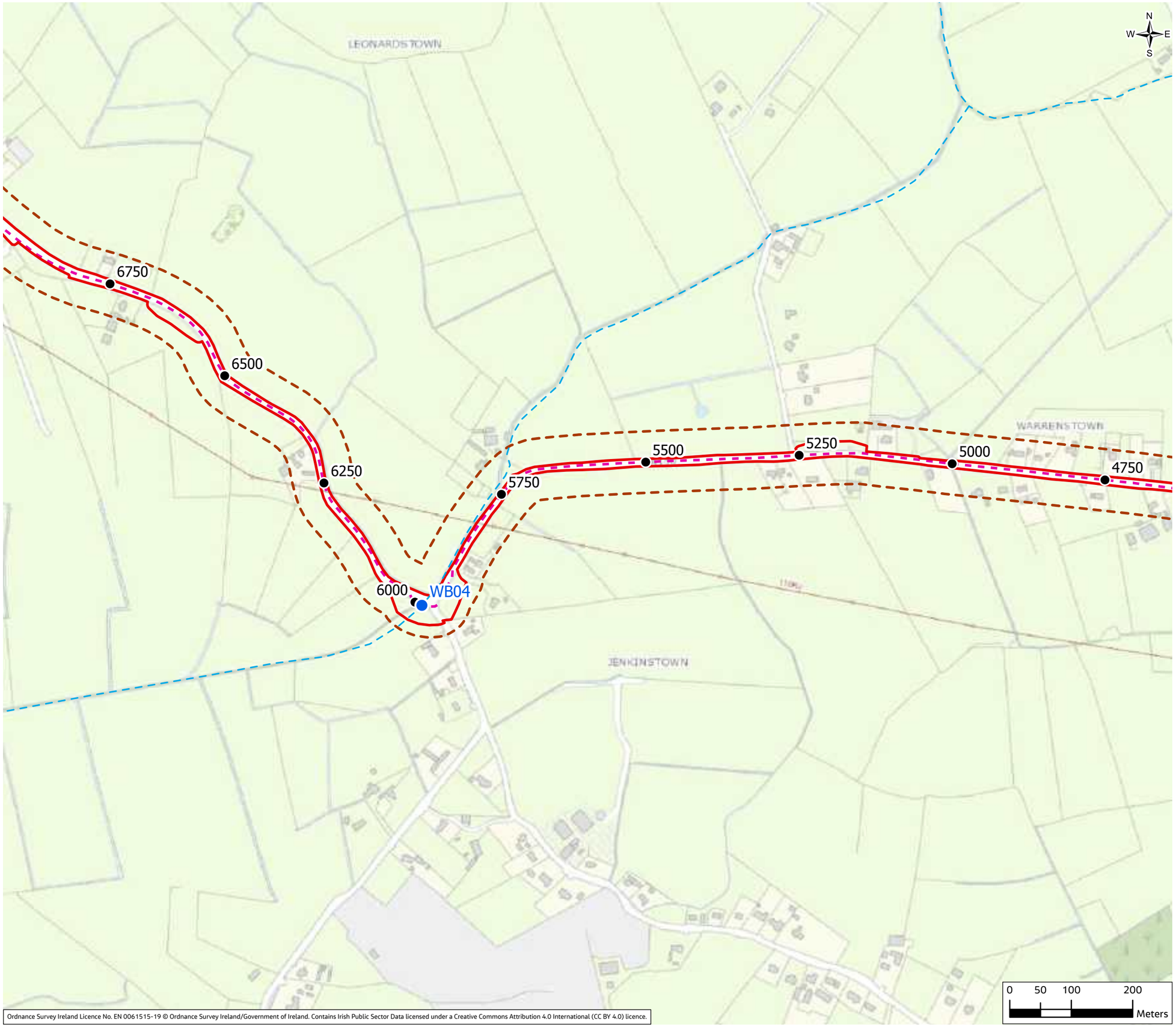
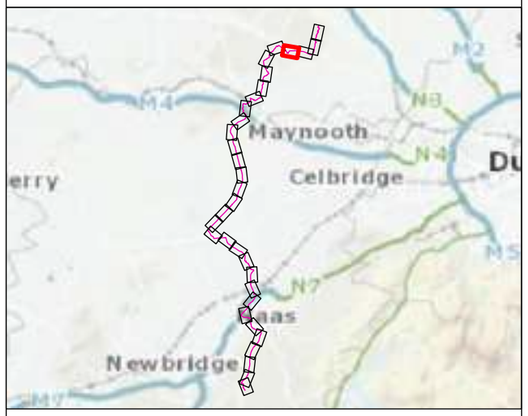


Appendix B; Figure 2.4



Legend

- Proposed Cable Route
- Planning Application Boundary
- Study Area (50m Buffer)
- Watercourses
- Waterbody (WB) number
- ●2250 Chainage Number

Rev.	Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
01	Apr 2023	Final	PM	SJ	FL	FB

Client: EirGrid

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Drawing Title: Cable route, with chainage and waterbody numbers

Sheet 4 of 33

Drawing Status: Final

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Client No.	CP966	

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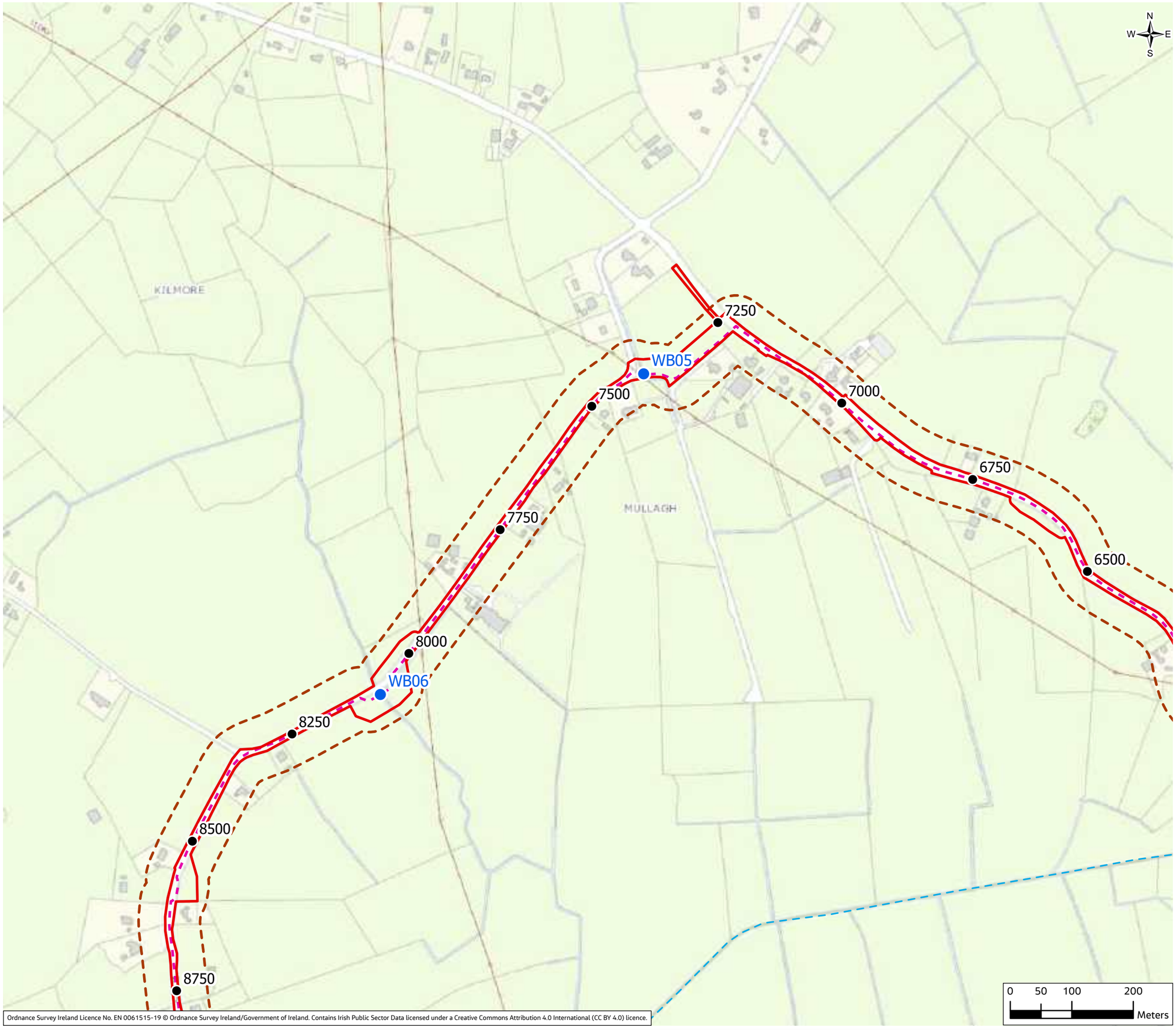
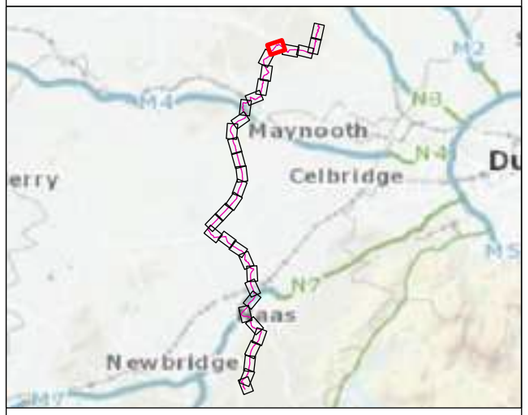


Appendix B; Figure 2.5



Legend

- Proposed Cable Route
- Planning Application Boundary
- Study Area (50m Buffer)
- Watercourses
- Waterbody (WB) number
- ●2250 Chainage Number

Rev.	Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
01	Apr 2023	Final	PM	SJ	FL	FB

Client: EirGrid

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Drawing Title: Cable route, with chainage and waterbody numbers

Sheet 5 of 33

Drawing Status: Final

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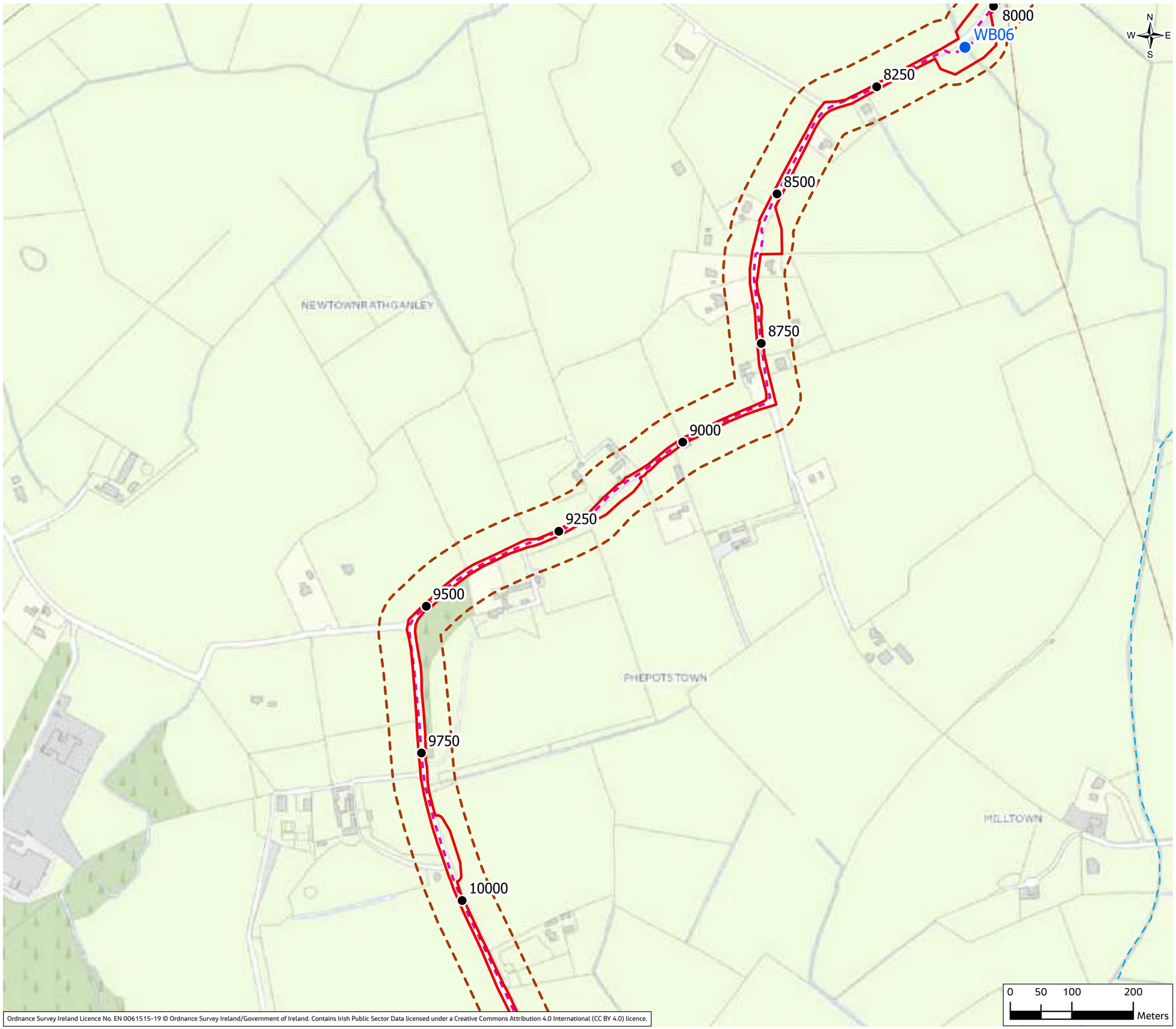

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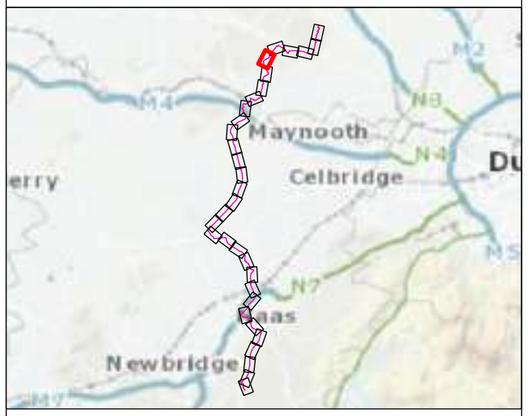

Legend

- Proposed Cable Route
- Planning Application Boundary
- Study Area (50m Buffer)
- Watercourses
- Waterbody (WB) number
- ●2250 Chainage Number

Rev.	Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
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Drawing Title: Cable route, with chainage and waterbody numbers

Sheet 6 of 33

Drawing Status: Final

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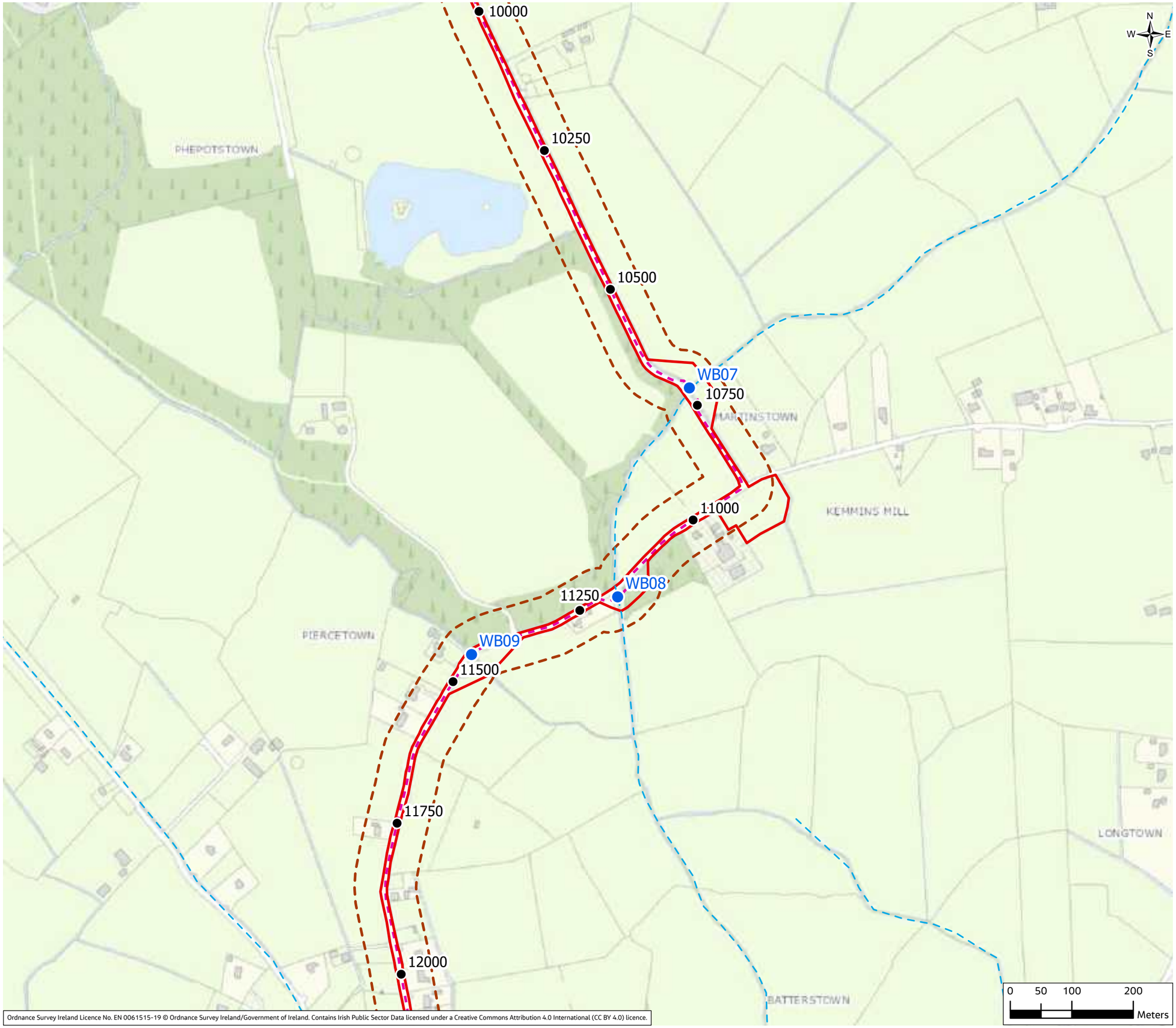
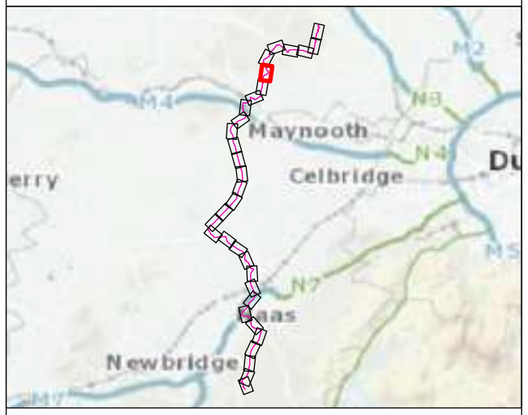


Appendix B; Figure 2.7



Legend

- Proposed Cable Route
- Planning Application Boundary
- Study Area (50m Buffer)
- Watercourses
- Waterbody (WB) number
- ●2250 Chainage Number

Rev.	Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
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Drawing Title: Cable route, with chainage and waterbody numbers

Sheet 7 of 33

Drawing Status: Final

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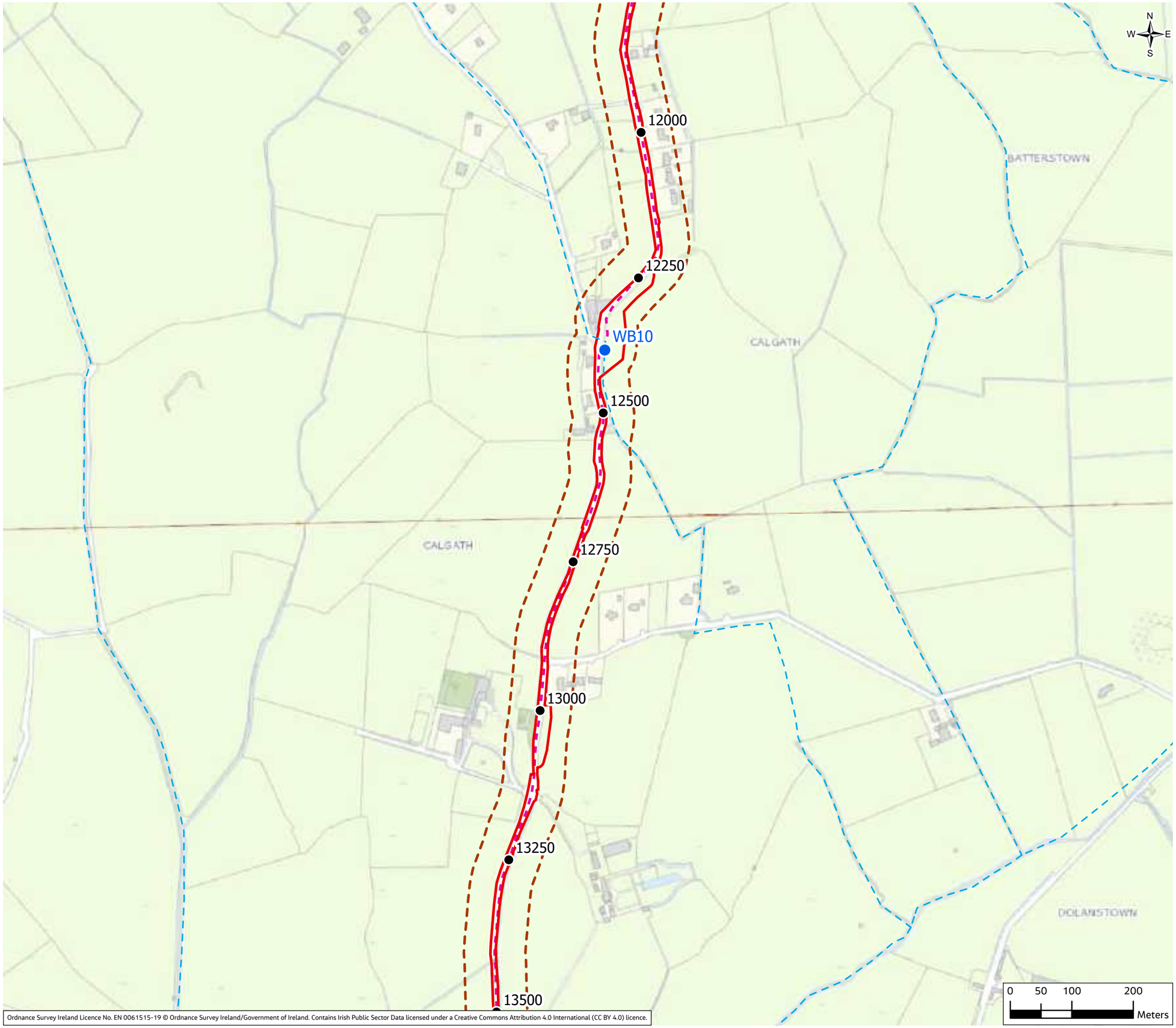

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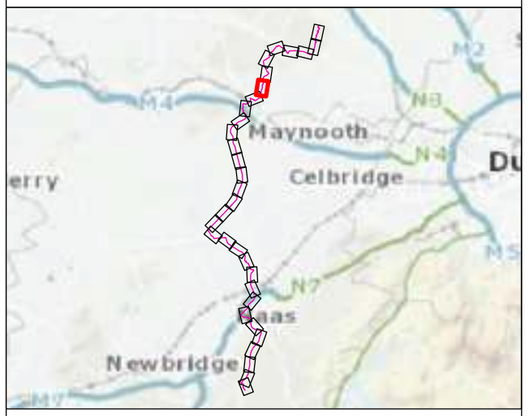

Legend

- Proposed Cable Route
- Planning Application Boundary
- Study Area (50m Buffer)
- Watercourses
- Waterbody (WB) number
- ●2250 Chainage Number

Rev.	Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
01	Apr 2023	Final	PM	SJ	FL	FB

Client: EirGrid

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Project: Kildare-Meath Grid Upgrade

Drawing Title: Cable route, with chainage and waterbody numbers

Sheet 8 of 33

Drawing Status: Final

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Client No.	CP966	

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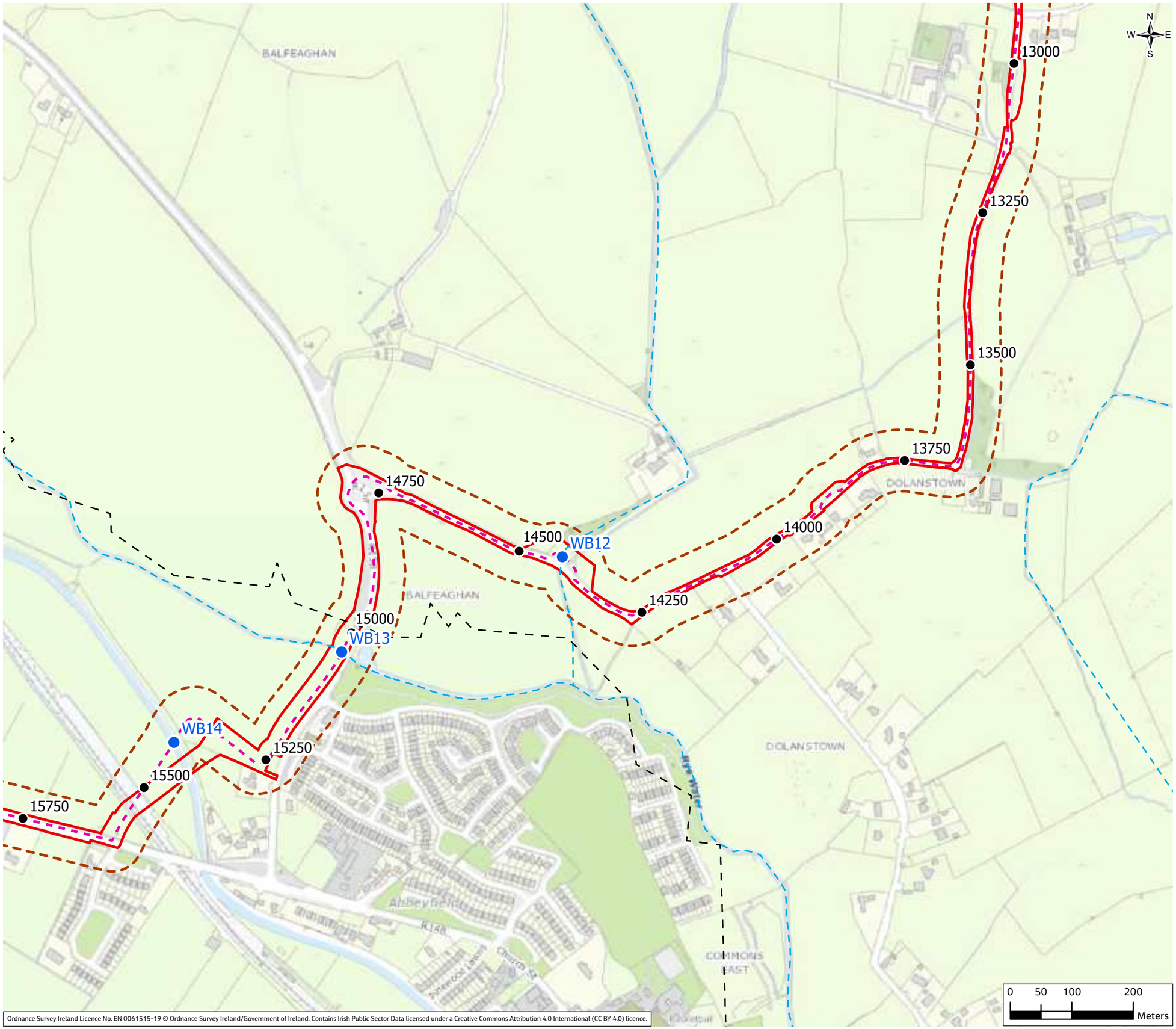

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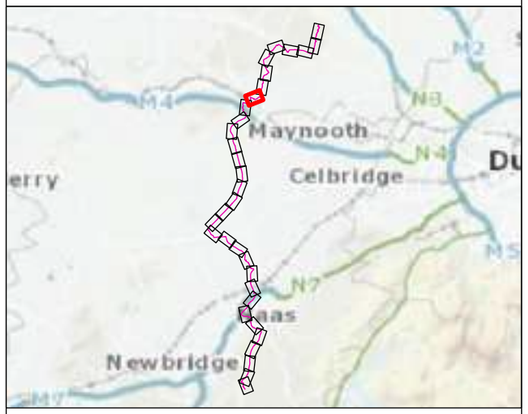

Legend

- Proposed Cable Route
- Planning Application Boundary
- Study Area (50m Buffer)
- Watercourses
- Waterbody (WB) number
- 2250 Chainage Number

Rev.	Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
01	Apr 2023	Final	PM	SJ	FL	FB

Client: EirGrid

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Drawing Title: Cable route, with chainage and waterbody numbers

Sheet 9 of 33

Drawing Status: Final

Scale @ A3	1:6,000	DO NOT SCALE
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Client No.	CP966	

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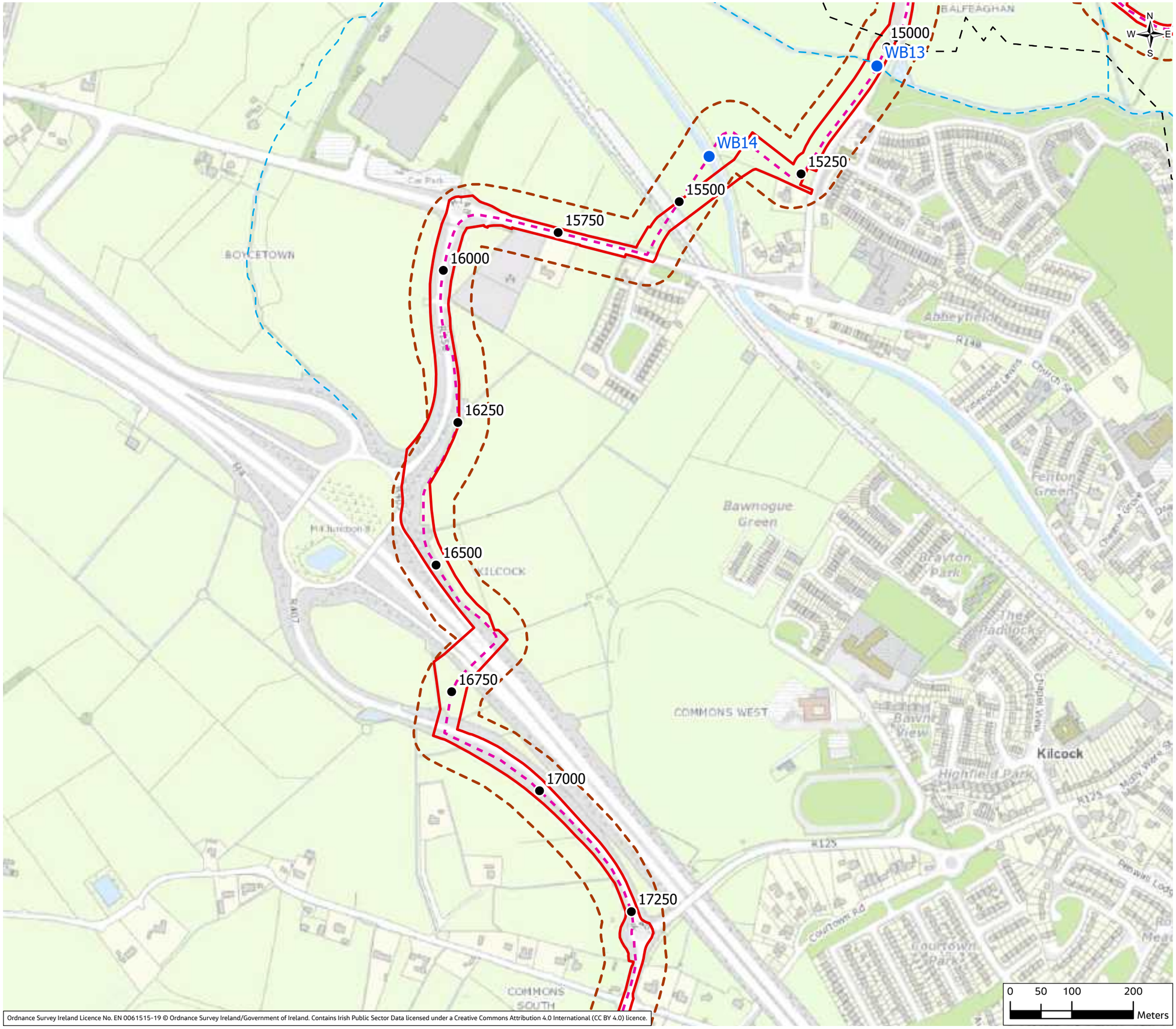

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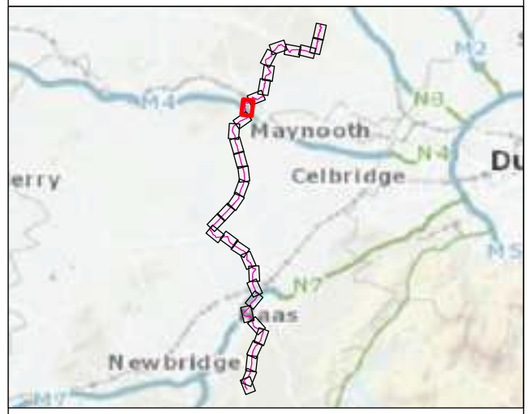

Legend

- Proposed Cable Route
- Planning Application Boundary
- Study Area (50m Buffer)
- Watercourses
- Waterbody (WB) number
- ●2250 Chainage Number

Rev.	Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
01	Apr 2023	Final	PM	SJ	FL	FB

Client: EirGrid

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Project: Kildare-Meath Grid Upgrade

Drawing Title: Cable route, with chainage and waterbody numbers

Sheet 10 of 33

Drawing Status: Final

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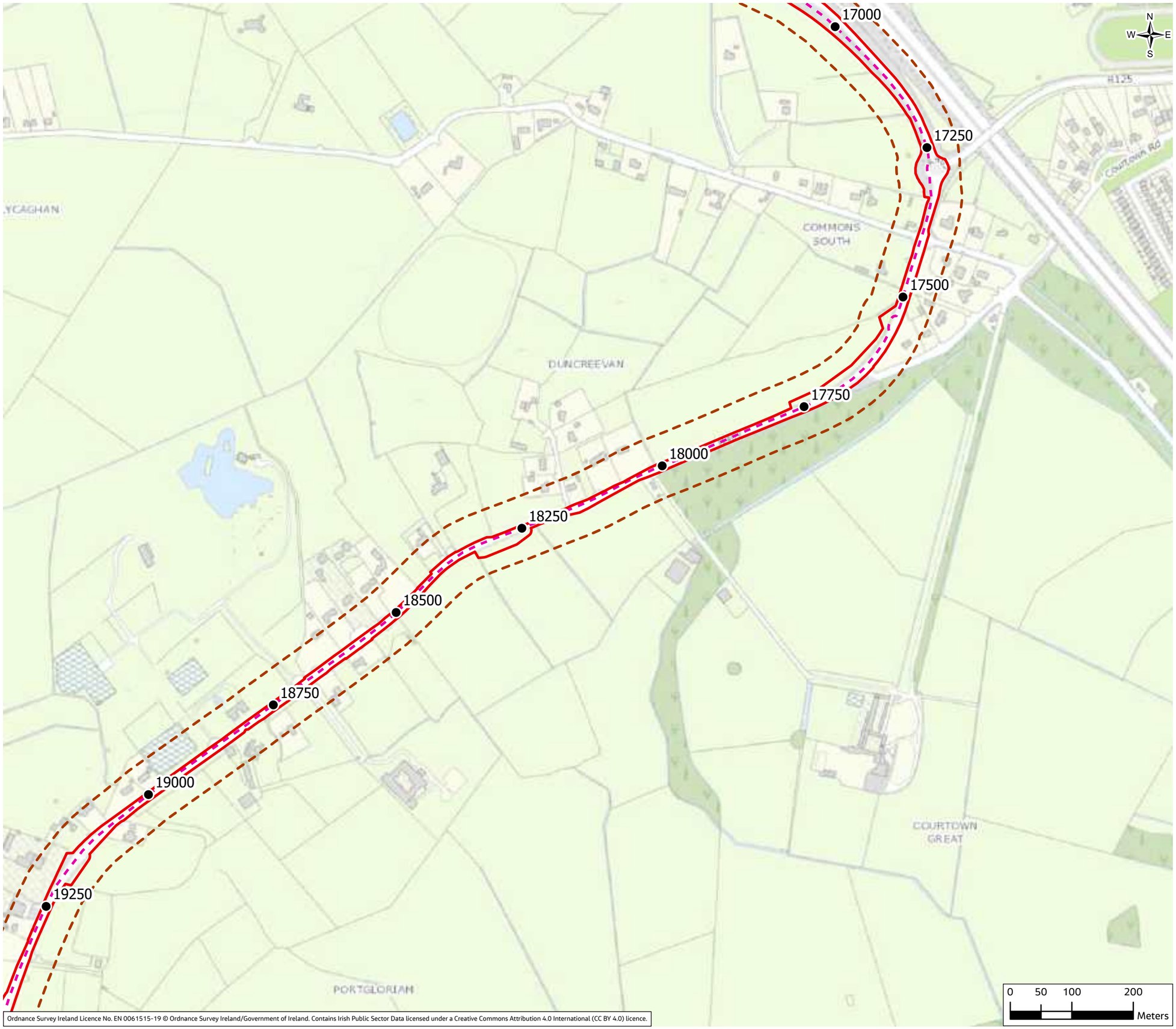

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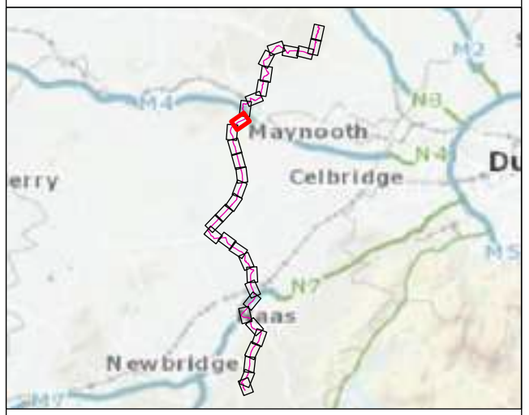

Legend

- Proposed Cable Route
- Planning Application Boundary
- Study Area (50m Buffer)
- Watercourses
- Waterbody (WB) number
- ●2250 Chainage Number

Rev.	Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
01	Apr 2023	Final	PM	SJ	FL	FB

Client: EirGrid

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Drawing Title: Cable route, with chainage and waterbody numbers

Sheet 11 of 33

Drawing Status: Final

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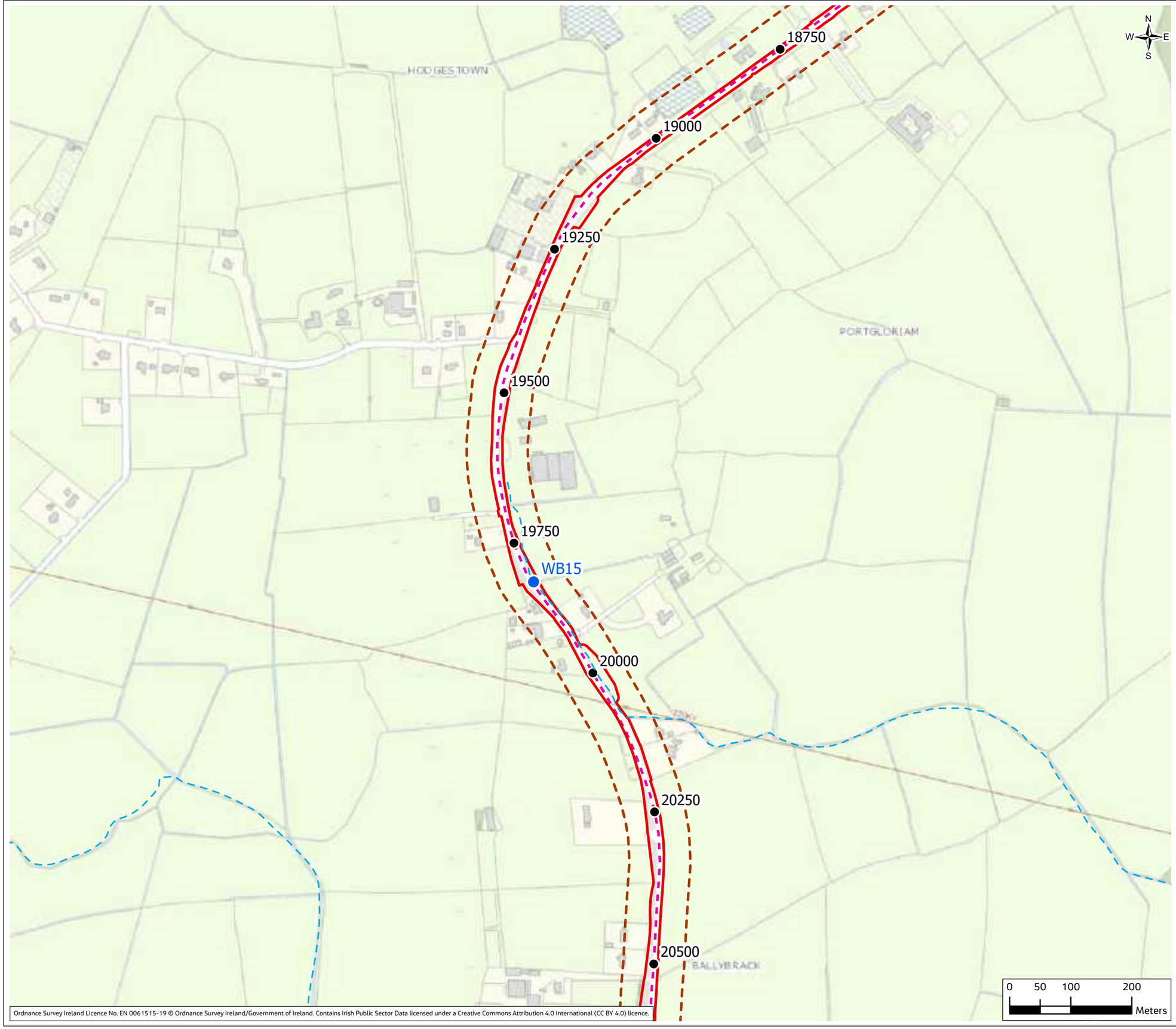
Client No.	CP966	

Drawing No. 321084AH-JAC-ZZ-XX-DR-K-3011



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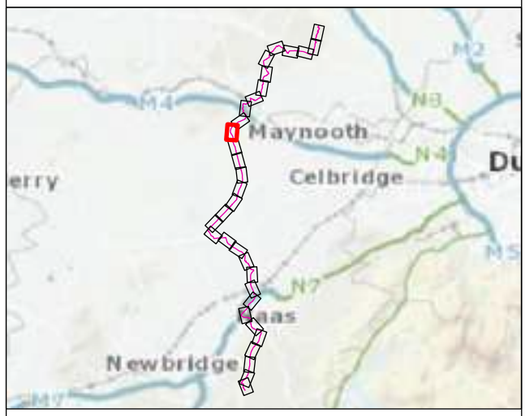

Legend

- Proposed Cable Route
- Planning Application Boundary
- Study Area (50m Buffer)
- Watercourses
- Waterbody (WB) number
- ●2250 Chainage Number

Rev.	Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
01	Apr 2023	Final	PM	SJ	FL	FB

Client: EirGrid

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Drawing Title: Cable route, with chainage and waterbody numbers

Sheet 12 of 33

Drawing Status: Final

Scale @ A3	1:6,000	DO NOT SCALE
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Client No.	CP966	

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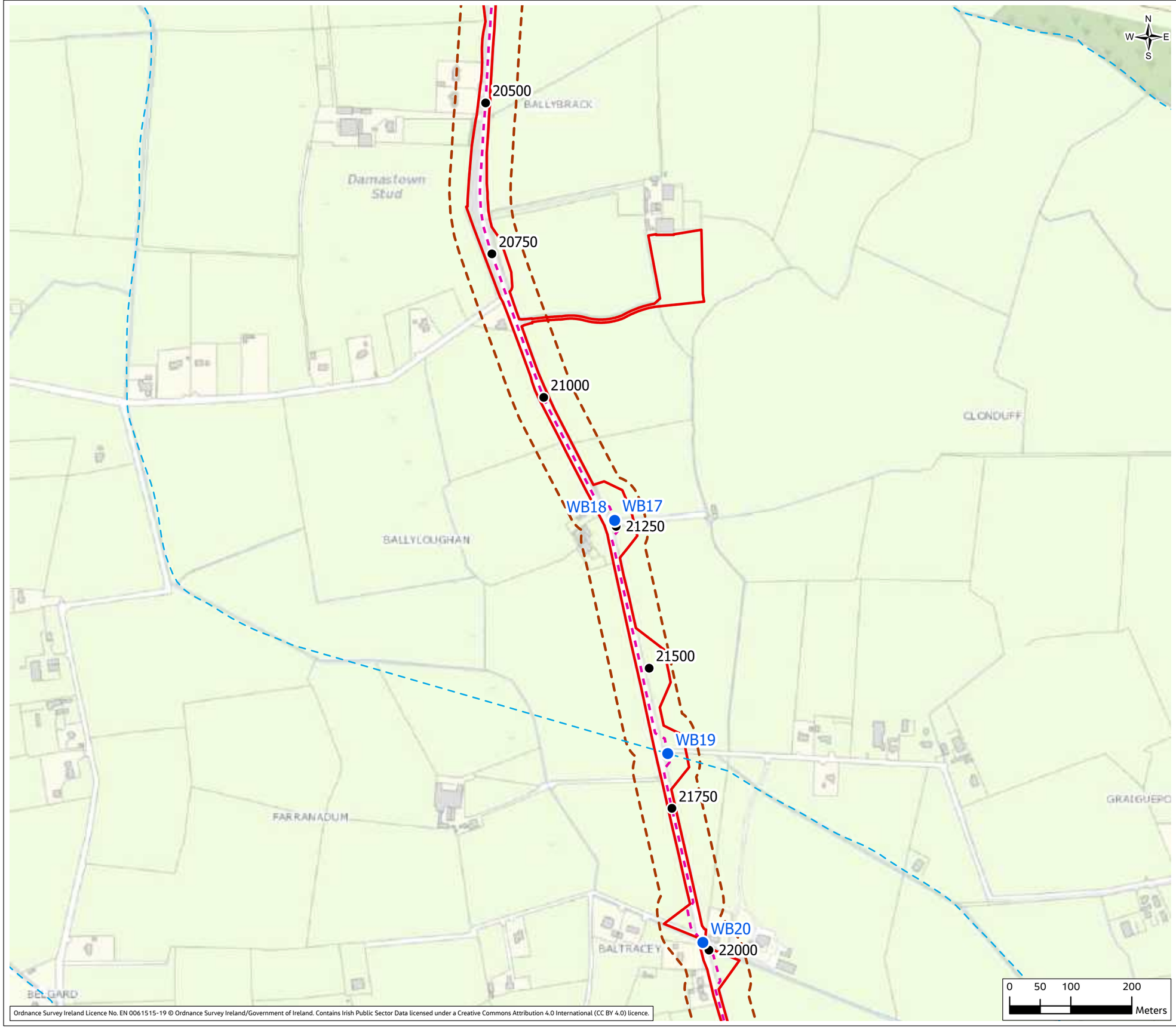

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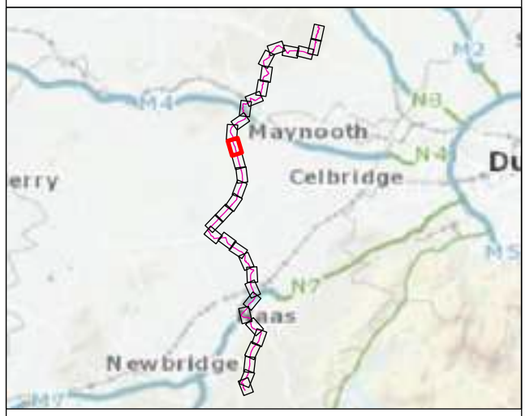

Legend

- Proposed Cable Route
- Planning Application Boundary
- Study Area (50m Buffer)
- Watercourses
- Waterbody (WB) number
- ●2250 Chainage Number

Rev.	Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
01	Apr 2023	Final	PM	SJ	FL	FB

Client: EirGrid

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Project: Kildare-Meath Grid Upgrade

Drawing Title: Cable route, with chainage and waterbody numbers

Sheet 13 of 33

Drawing Status: Final

Scale @ A3	1:6,000	DO NOT SCALE
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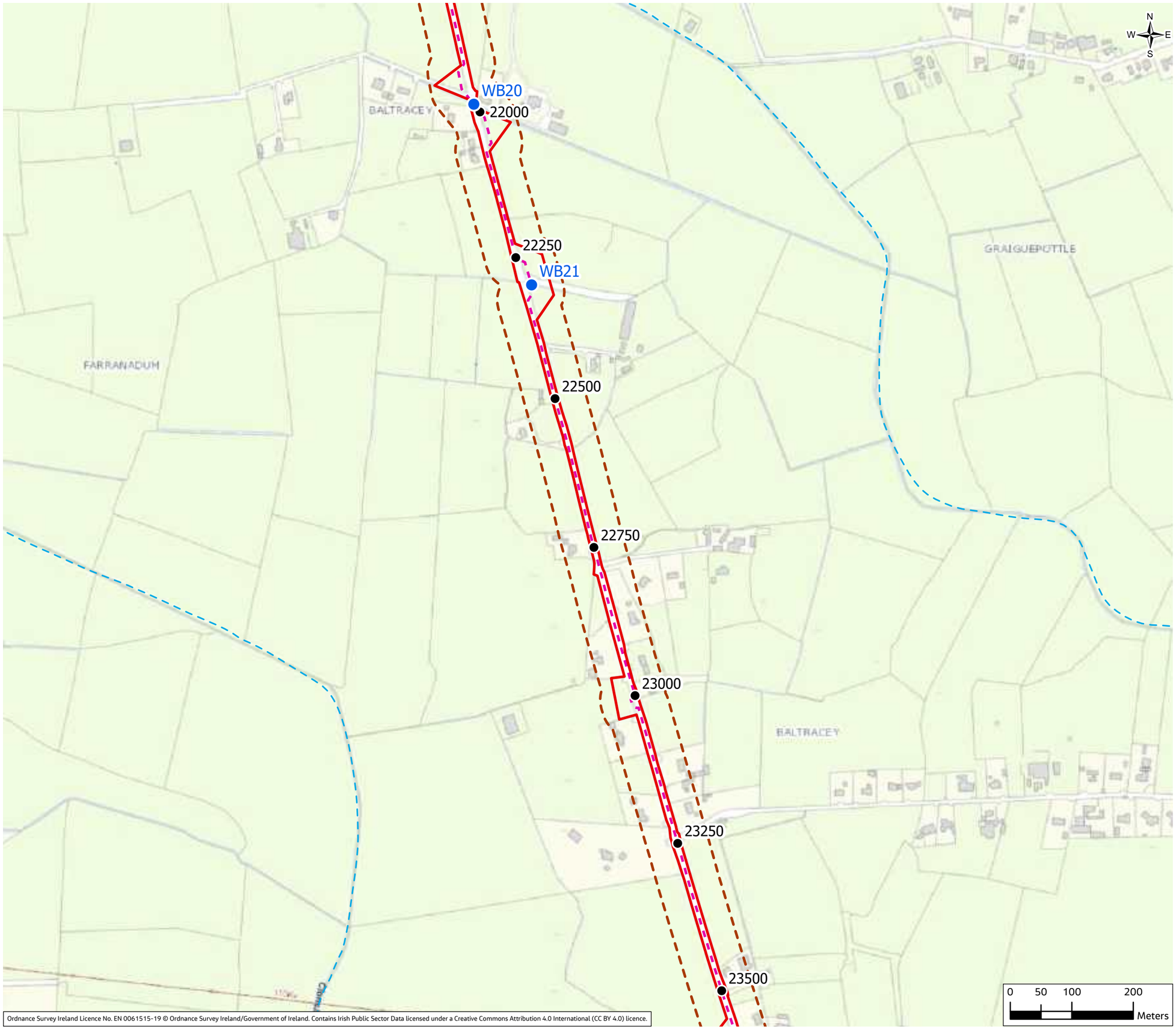
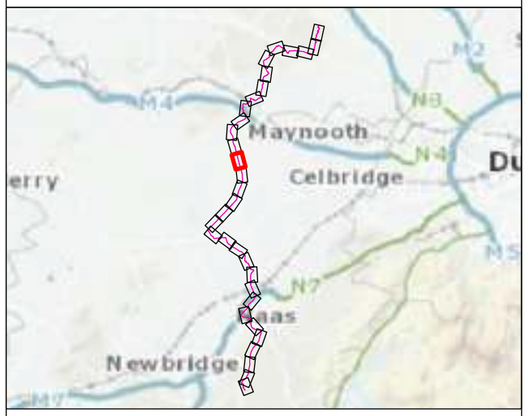
Client No.	CP966	

Drawing No. 321084AH-JAC-ZZ-XX-DR-K-3013



Appendix B; Figure 2.14



Legend

- Proposed Cable Route
- Planning Application Boundary
- Study Area (50m Buffer)
- Watercourses
- Waterbody (WB) number
- ●2250 Chainage Number

Rev.	Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
01	Apr 2023	Final	PM	SJ	FL	FB

Client: EirGrid

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Project: Kildare-Meath Grid Upgrade

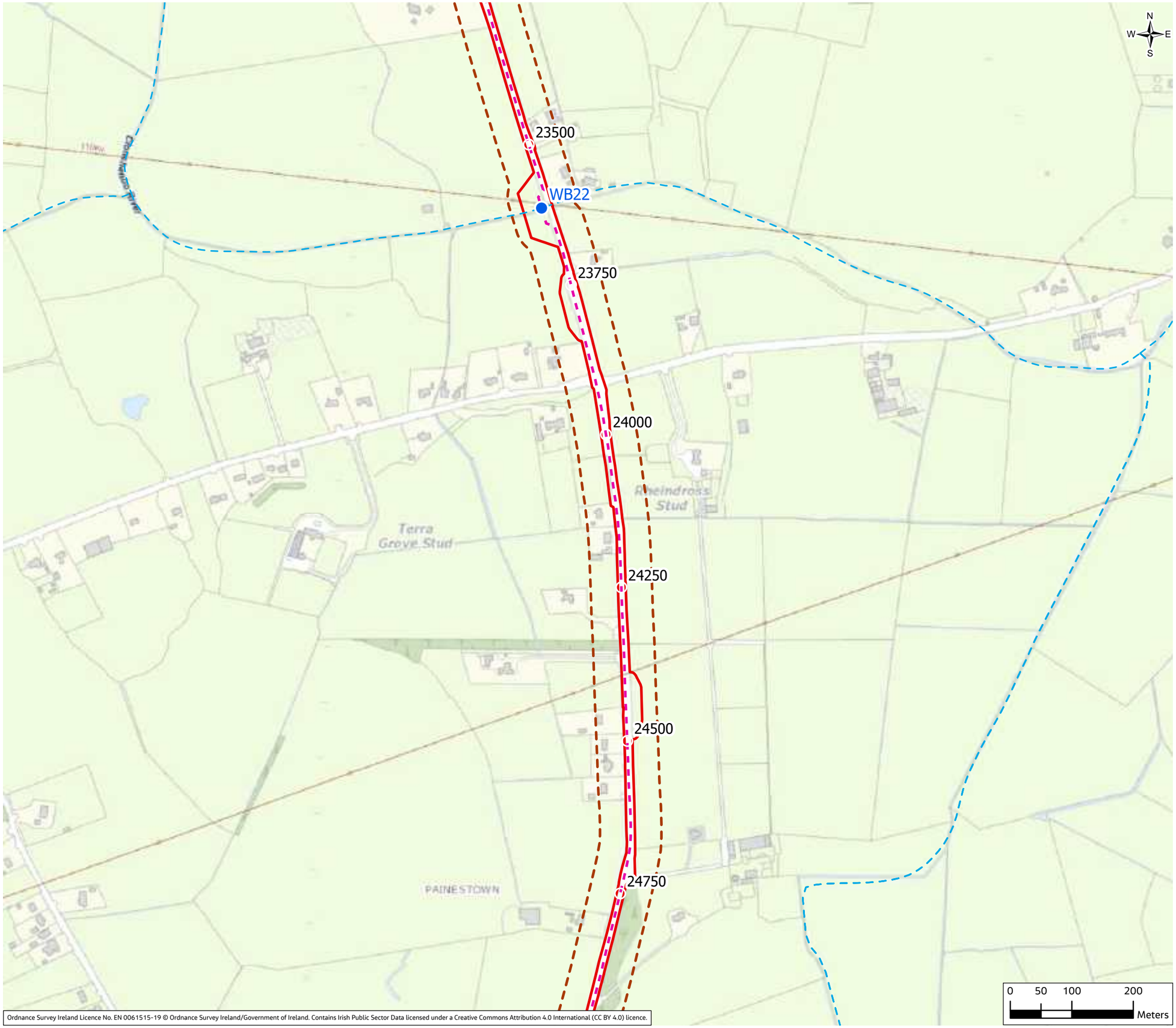
Drawing Title: Cable route, with chainage and waterbody numbers

Sheet 14 of 33

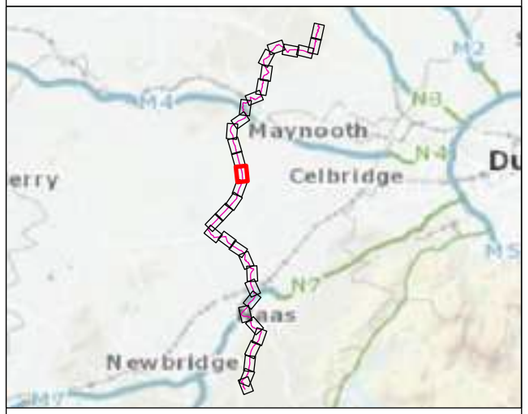
Drawing Status: Final

Scale @ A3	1:6,000	DO NOT SCALE
Jacobs No.	321084AH	
Client No.	CP966	

Drawing No. 321084AH-JAC-ZZ-XX-DR-K-3014



Appendix B; Figure 2.15



Legend

- Proposed Cable Route
- Planning Application Boundary
- Study Area (50m Buffer)
- Watercourses
- Waterbody (WB) number
- ●2250 Chainage Number

Rev.	Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
01	Apr 2023	Final	PM	SJ	FL	FB

Client: EirGrid

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Drawing Title: Cable route, with chainage and waterbody numbers

Sheet 15 of 33

Drawing Status: Final

Scale @ A3	1:6,000	DO NOT SCALE
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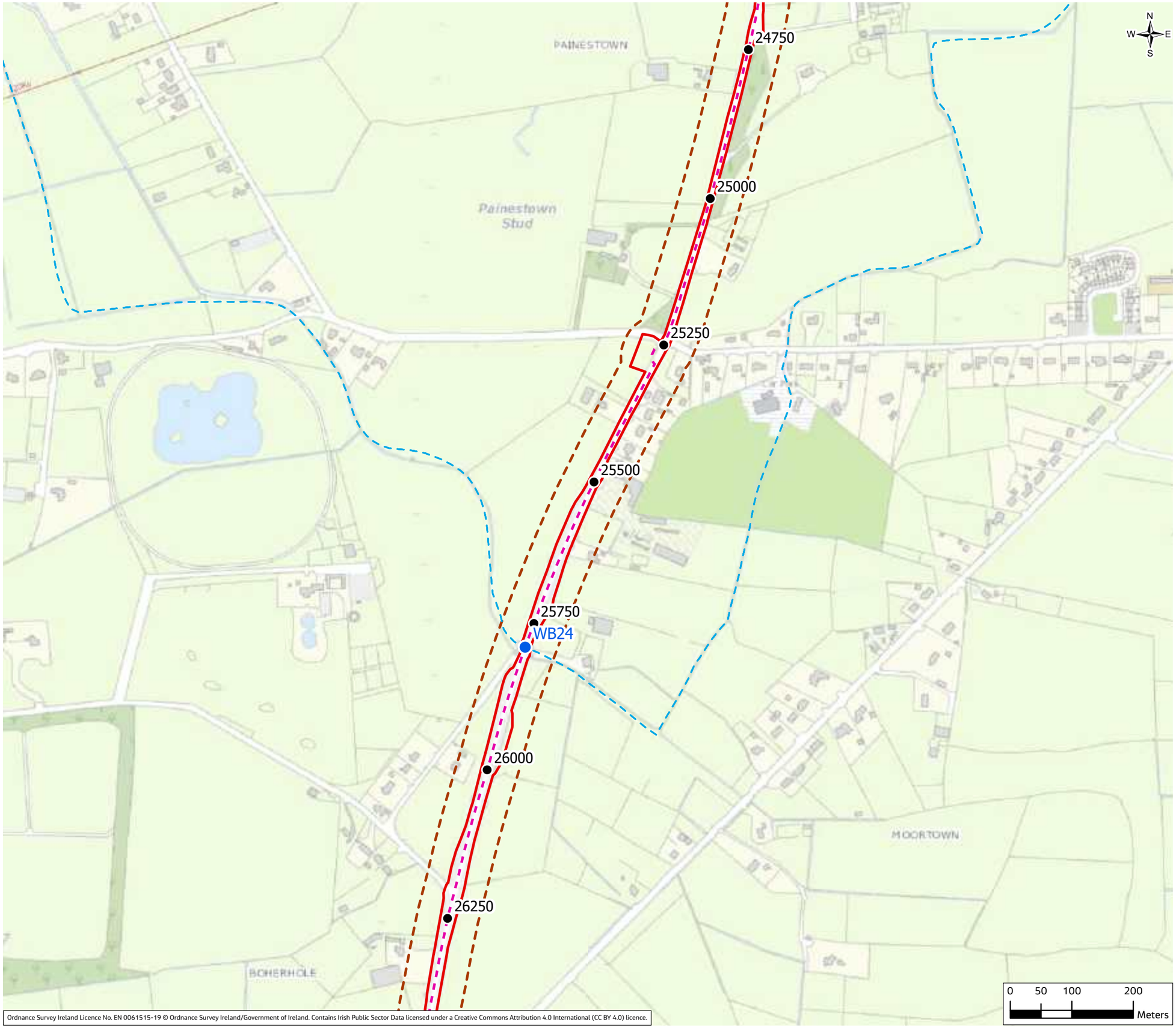
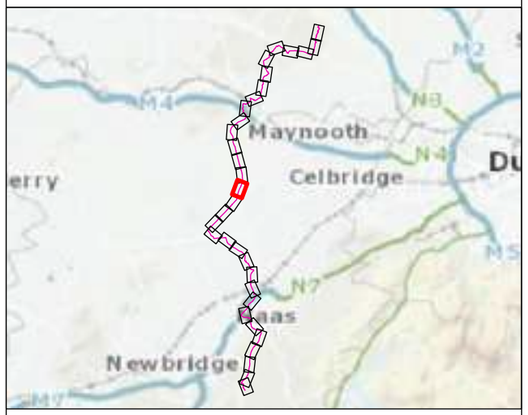
Client No.	CP966	

Drawing No.: 321084AH-JAC-ZZ-XX-DR-K-3015



Appendix B; Figure 2.16



Legend

- Proposed Cable Route
- Planning Application Boundary
- Study Area (50m Buffer)
- Watercourses
- Waterbody (WB) number
- ●2250 Chainage Number

Rev.	Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
01	Apr 2023	Final	PM	SJ	FL	FB

Client: EirGrid

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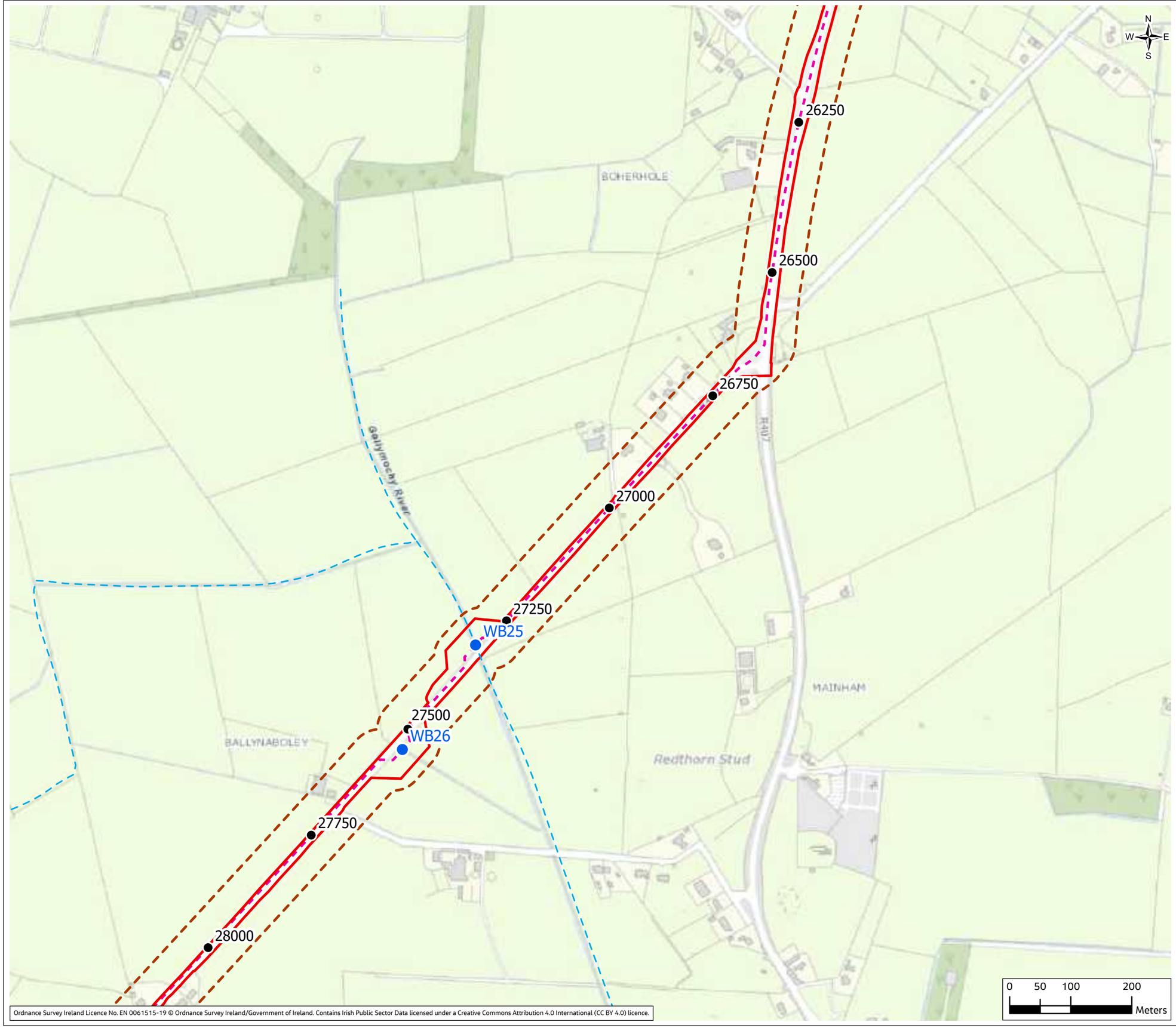
Drawing Title: Cable route, with chainage and waterbody numbers

Sheet 16 of 33

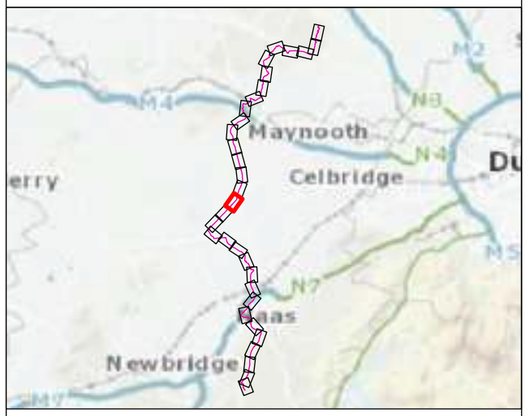
Drawing Status: Final

Scale @ A3	1:6,000	DO NOT SCALE
Jacobs No.	321084AH	
Client No.	CP966	

Drawing No.: 321084AH-JAC-ZZ-XX-DR-K-3016



Appendix B; Figure 2.17



Legend

- Proposed Cable Route
- Planning Application Boundary
- Study Area (50m Buffer)
- Watercourses
- Waterbody (WB) number
- ●2250 Chainage Number

Rev.	Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
01	Apr 2023	Final	PM	SJ	FL	FB

Client: EirGrid

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Drawing Title: Cable route, with chainage and waterbody numbers

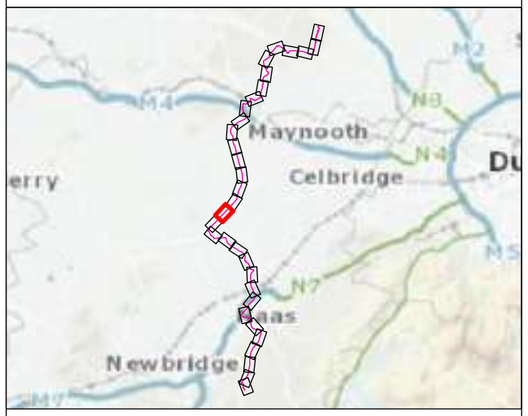
Sheet 17 of 33

Drawing Status: Final

Scale @ A3	1:6,000	DO NOT SCALE
Jacobs No.	321084AH	
Client No.	CP966	

Drawing No.: 321084AH-JAC-ZZ-XX-DR-K-3017

Appendix B; Figure 2.18



Legend

- Proposed Cable Route
- Planning Application Boundary
- Study Area (50m Buffer)
- Watercourses
- Waterbody (WB) number
- ●2250 Chainage Number

Rev.	Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
01	Apr 2023	Final	PM	SJ	FL	FB

Client: EirGrid

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Drawing Title: Cable route, with chainage and waterbody numbers

Sheet 18 of 33

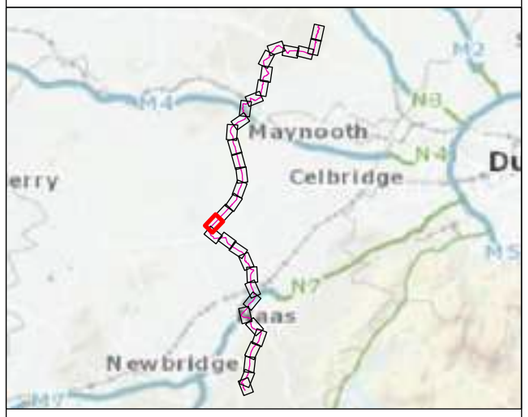
Drawing Status: Final

Scale @ A3	1:6,000	DO NOT SCALE
Jacobs No.	321084AH	
Client No.	CP966	

Drawing No. 321084AH-JAC-ZZ-XX-DR-K-3018

28750
29000
29250
29500
29750
30000
WB27
30250
WB28
WB29
30500
30750
31000
N
W
E
S
BALLYNAGAPPAGH
COTT
0 50 100 200
Meters

Appendix B; Figure 2.19



Legend

- Proposed Cable Route
- Planning Application Boundary
- Study Area (50m Buffer)
- Watercourses
- Waterbody (WB) number
- ●2250 Chainage Number

Rev.	Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
01	Apr 2023	Final	PM	SJ	FL	FB

Client: EirGrid

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Drawing Title: Cable route, with chainage and waterbody numbers

Sheet 19 of 33

Drawing Status: Final

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Client No.	CP966	

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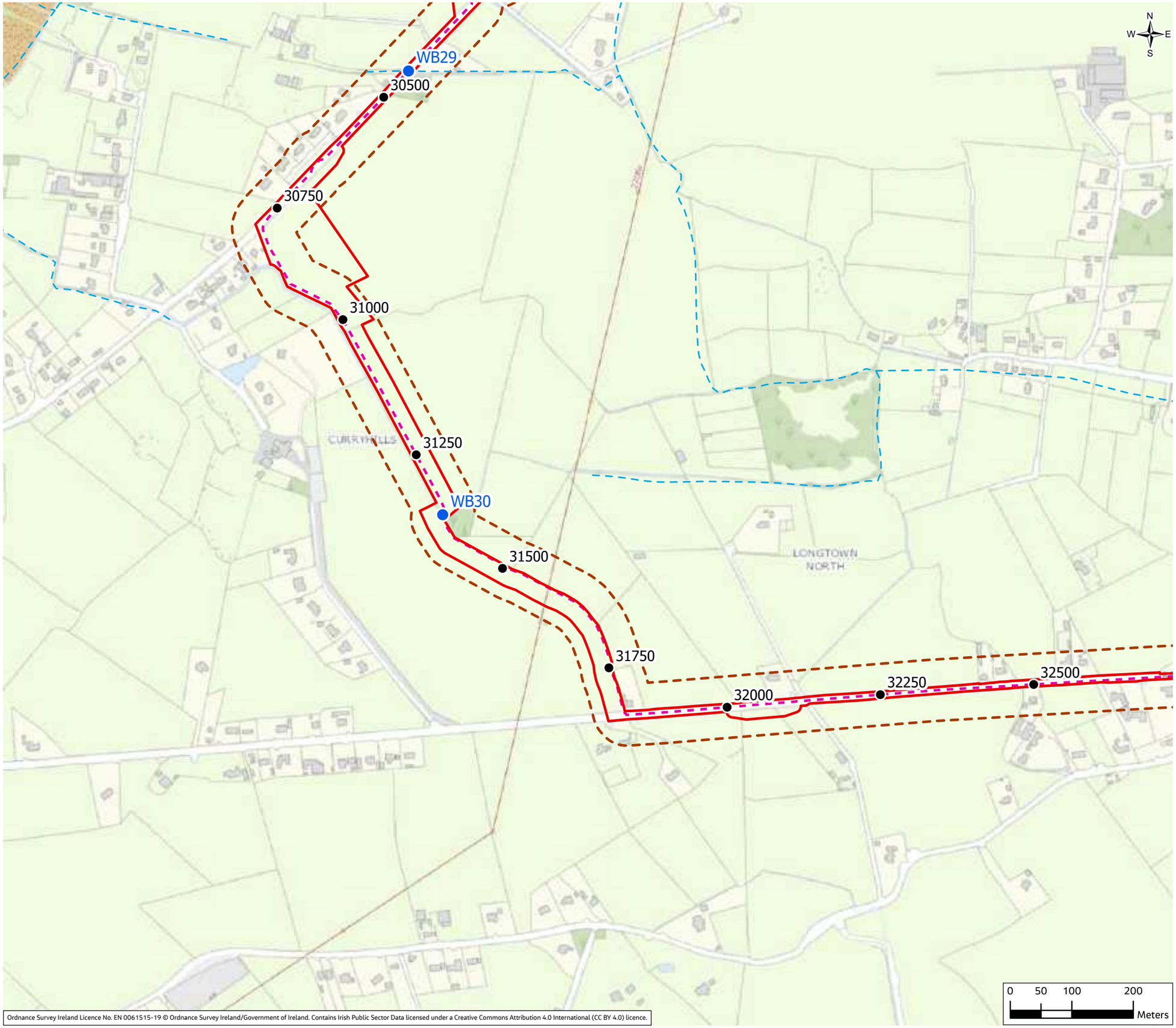
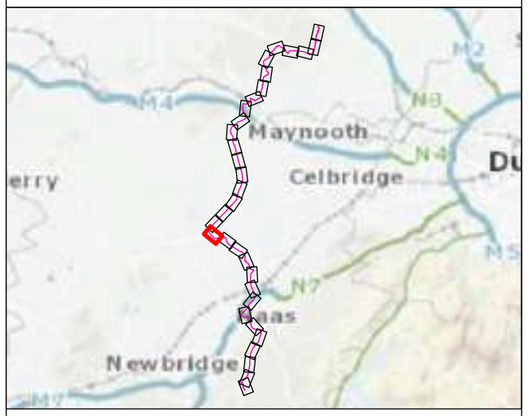


Appendix B; Figure 2.20



Legend

- Proposed Cable Route
- Planning Application Boundary
- Study Area (50m Buffer)
- Watercourses
- Waterbody (WB) number
- ●2250 Chainage Number

Rev.	Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
01	Apr 2023	Final	PM	SJ	FL	FB

Client: EirGrid

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Drawing Title: Cable route, with chainage and waterbody numbers

Sheet 20 of 33

Drawing Status: Final

Scale @ A3	1:6,000	DO NOT SCALE
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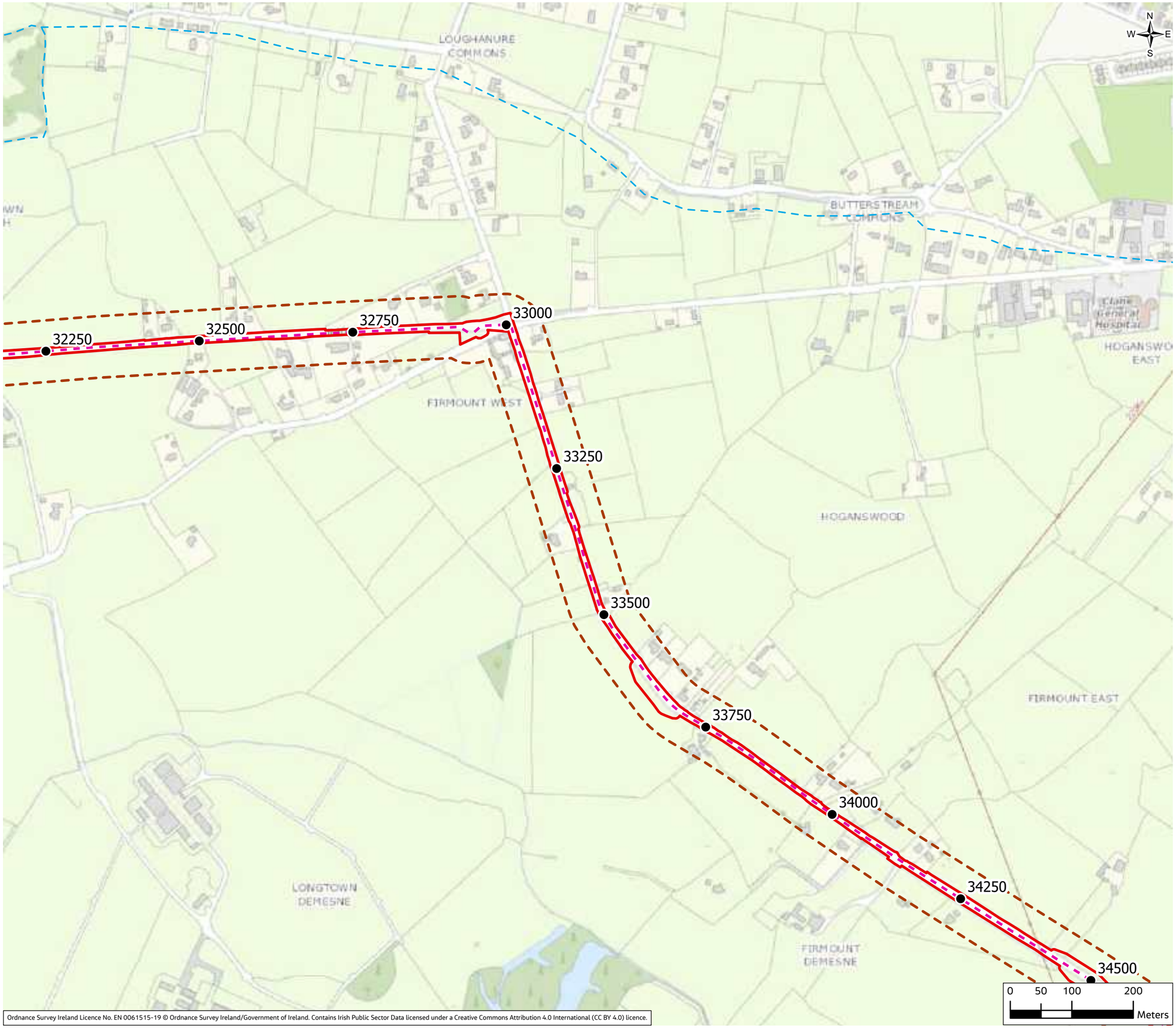
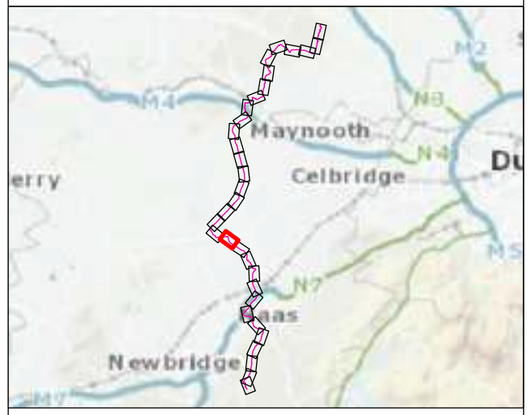
Client No.	CP966	

Drawing No. 321084AH-JAC-ZZ-XX-DR-K-3020



Appendix B; Figure 2.21



Legend

- Proposed Cable Route
- Planning Application Boundary
- Study Area (50m Buffer)
- Watercourses
- Waterbody (WB) number
- ●2250 Chainage Number

Rev.	Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
01	Apr 2023	Final	PM	SJ	FL	FB

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Drawing Title: Cable route, with chainage and waterbody numbers

Sheet 21 of 33

Drawing Status: Final

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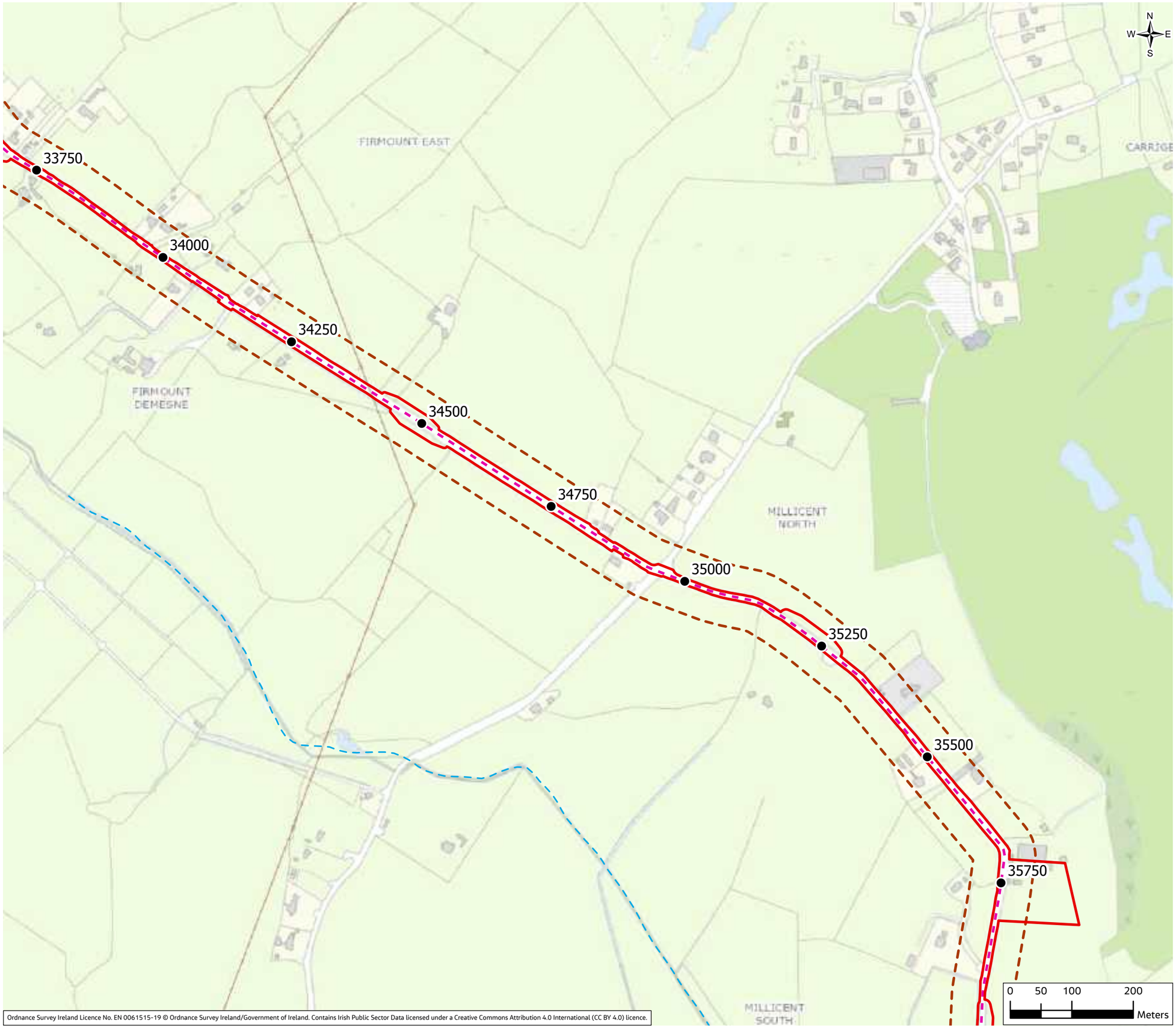
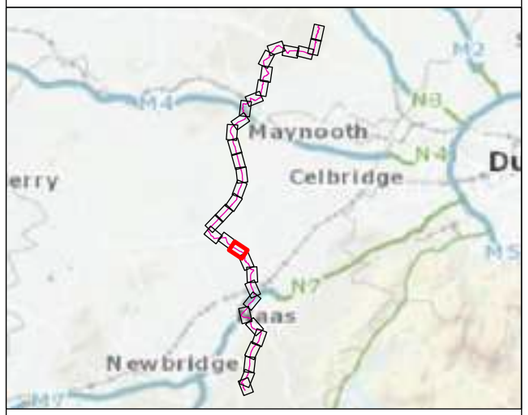
Client No.	CP966	

Drawing No. 321084AH-JAC-ZZ-XX-DR-K-3021



Appendix B; Figure 2.22



Legend

- Proposed Cable Route
- Planning Application Boundary
- Study Area (50m Buffer)
- Watercourses
- Waterbody (WB) number
- ●2250 Chainage Number

Rev.	Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
01	Apr 2023	Final	PM	SJ	FL	FB

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Drawing Title: Cable route, with chainage and waterbody numbers

Sheet 22 of 33

Drawing Status: Final

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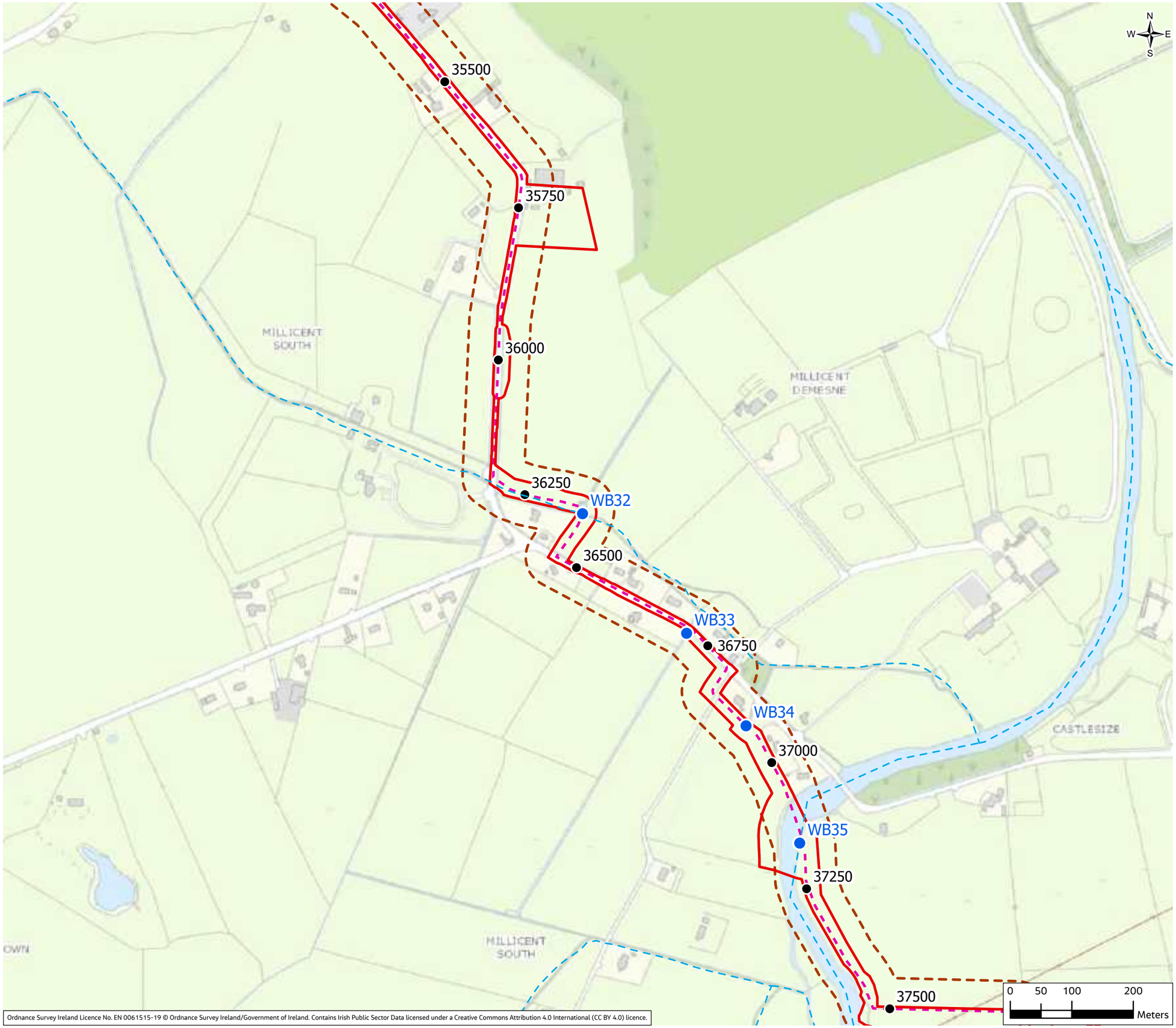
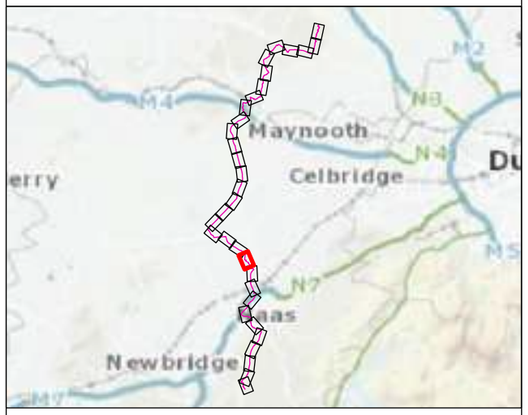
Client No.	CP966	

Drawing No.: 321084AH-JAC-ZZ-XX-DR-K-3022



Appendix B; Figure 2.23



Legend

- Proposed Cable Route
- Planning Application Boundary
- Study Area (50m Buffer)
- Watercourses
- Waterbody (WB) number
- ●2250 Chainage Number

Rev.	Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
01	Apr 2023	Final	PM	SJ	FL	FB

Client: EirGrid

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Drawing Title: Cable route, with chainage and waterbody numbers

Sheet 23 of 33

Drawing Status: Final

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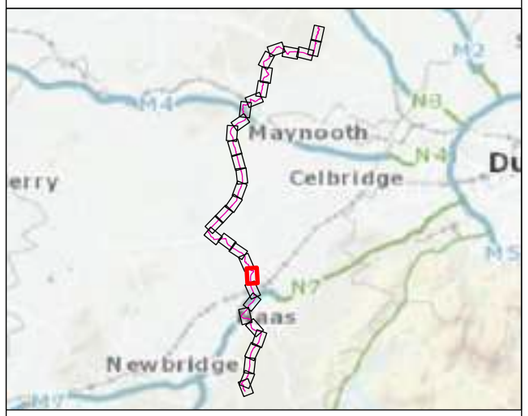
Client No.	CP966	
Drawing No.	321084AH-JAC-ZZ-XX-DR-K-3023	

WB35
37250
37500
37750
WB36
38000
38250
38500
38750
39000
WB37
MILLICENT SOUTH
CASTLESIZE
BODENSTOWN
SALLINS
Sallins
Ordnance Survey Ireland Licence No. EN 0061515-19 © Ordnance Survey Ireland/Government of Ireland. Contains Irish Public Sector Data licensed under a Creative Commons Attribution 4.0 International (CC BY 4.0) licence.
0 50 100 200 Meters

Appendix B; Figure 2.24



Legend

- Proposed Cable Route
- Planning Application Boundary
- Study Area (50m Buffer)
- Watercourses
- Waterbody (WB) number
- ●2250 Chainage Number

Rev.	Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
01	Apr 2023	Final	PM	SJ	FL	FB

Client: EirGrid

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Drawing Title: Cable route, with chainage and waterbody numbers

Sheet 24 of 33

Drawing Status: Final

Scale @ A3	1:6,000	DO NOT SCALE
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Client No.	CP966	
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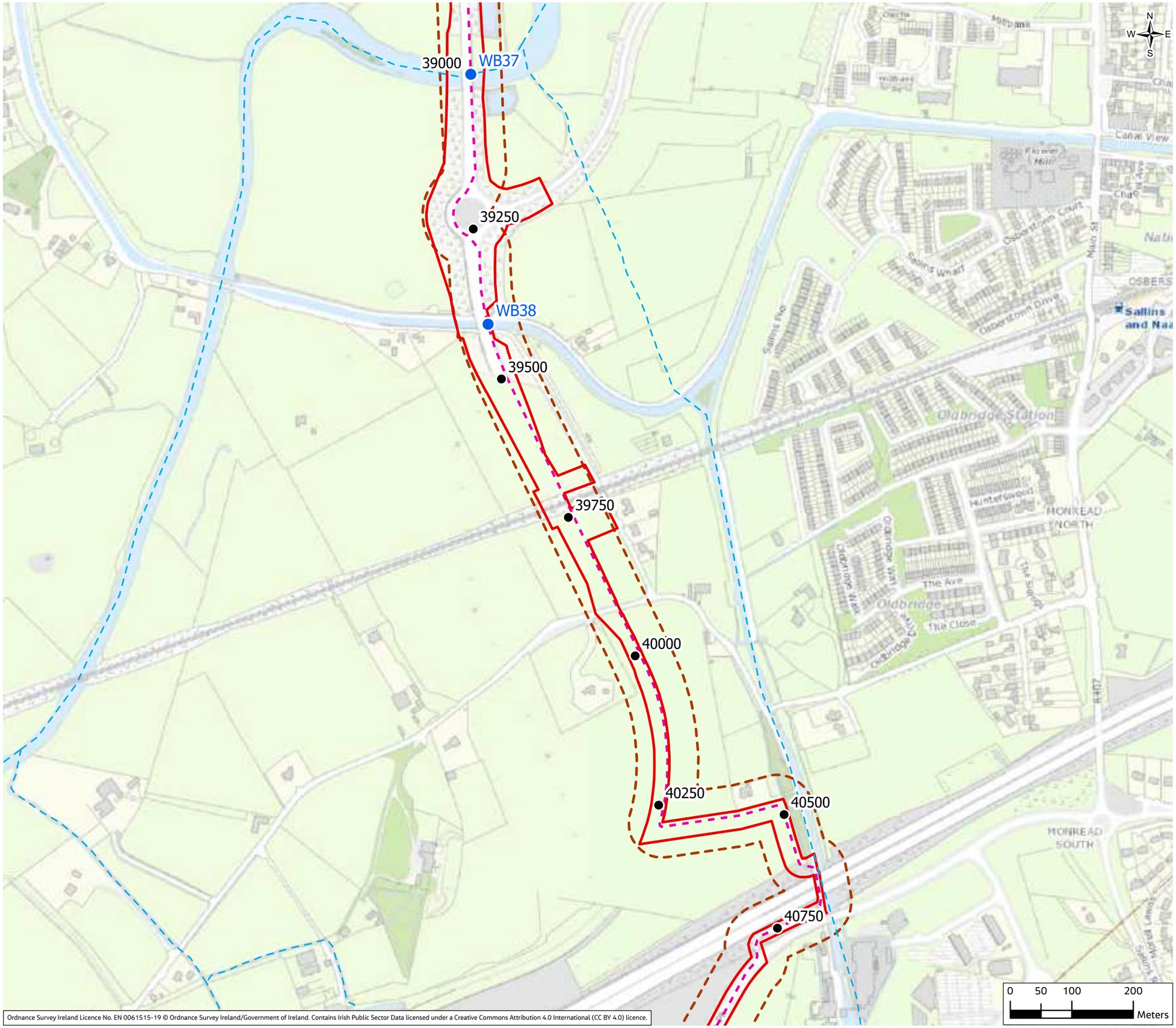
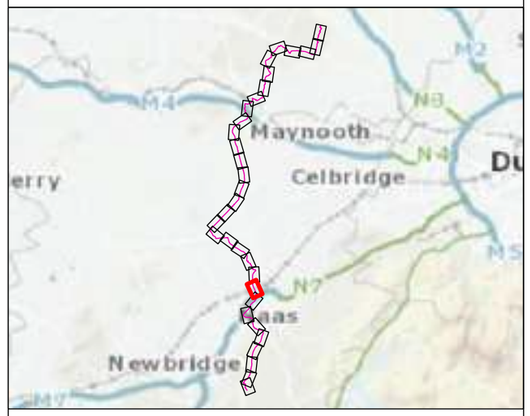


Appendix B; Figure 2.25



Legend

- Proposed Cable Route
- Planning Application Boundary
- Study Area (50m Buffer)
- Watercourses
- Waterbody (WB) number
- ●2250 Chainage Number

Rev.	Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
01	Apr 2023	Final	PM	SJ	FL	FB

Client: EirGrid

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Drawing Title: Cable route, with chainage and waterbody numbers

Sheet 25 of 33

Drawing Status: Final

Scale @ A3	1:6,000	DO NOT SCALE
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Client No.	CP966	

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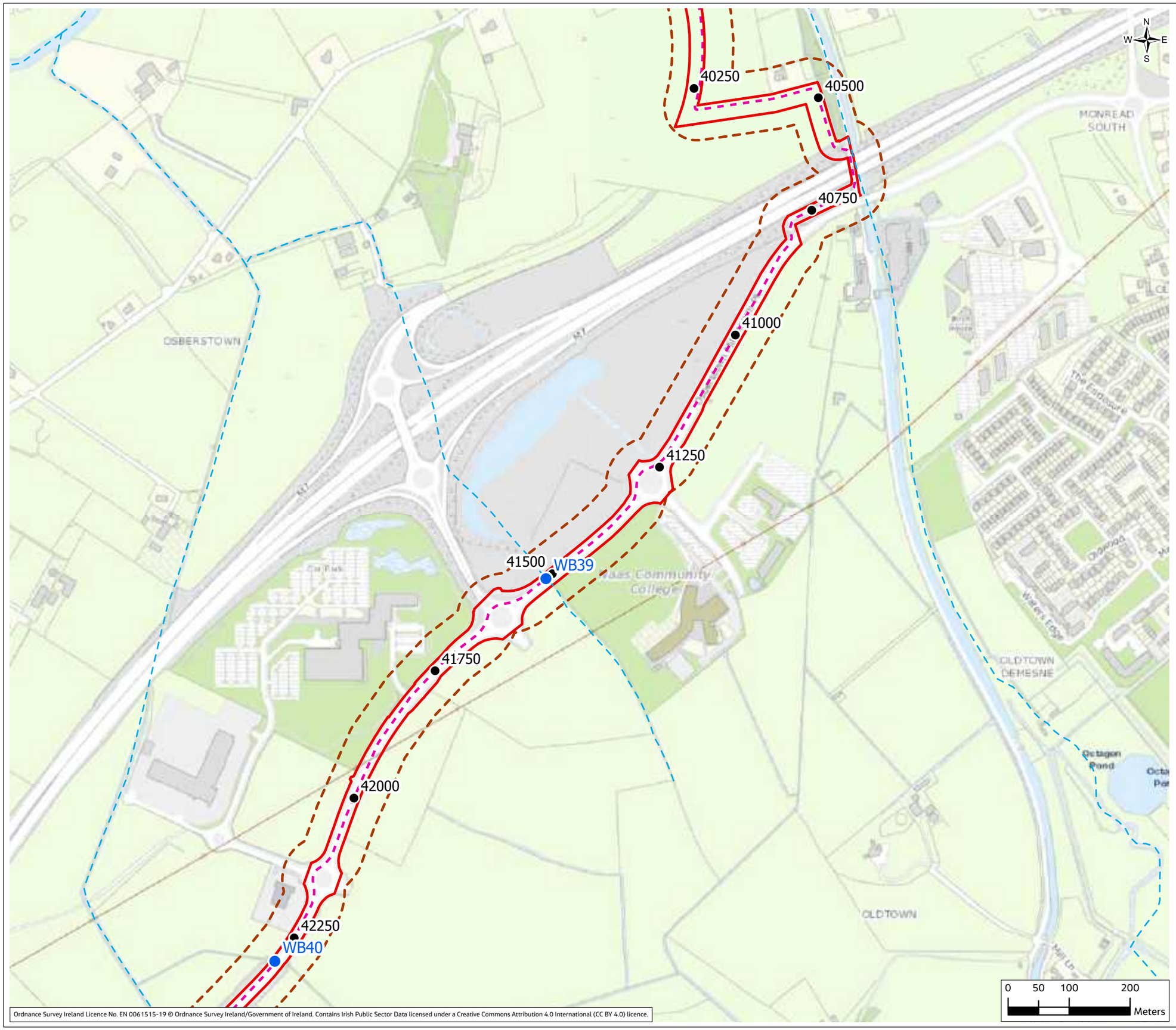
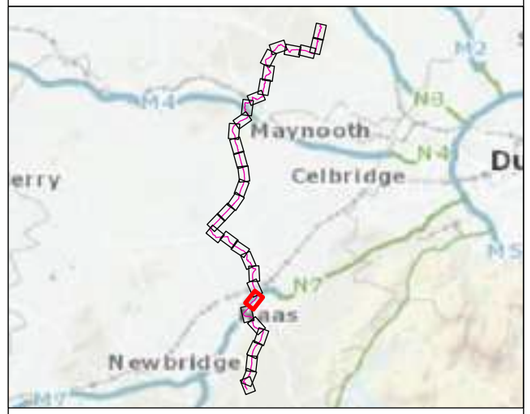


Appendix B; Figure 2.26



Legend

- Proposed Cable Route
- Planning Application Boundary
- Study Area (50m Buffer)
- Watercourses
- Waterbody (WB) number
- ●2250 Chainage Number

Rev.	Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
01	Apr 2023	Final	PM	SJ	FL	FB

Client: EirGrid

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Drawing Title: Cable route, with chainage and waterbody numbers

Sheet 26 of 33

Drawing Status: Final

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Jacobs No.	321084AH	
Client No.	CP966	

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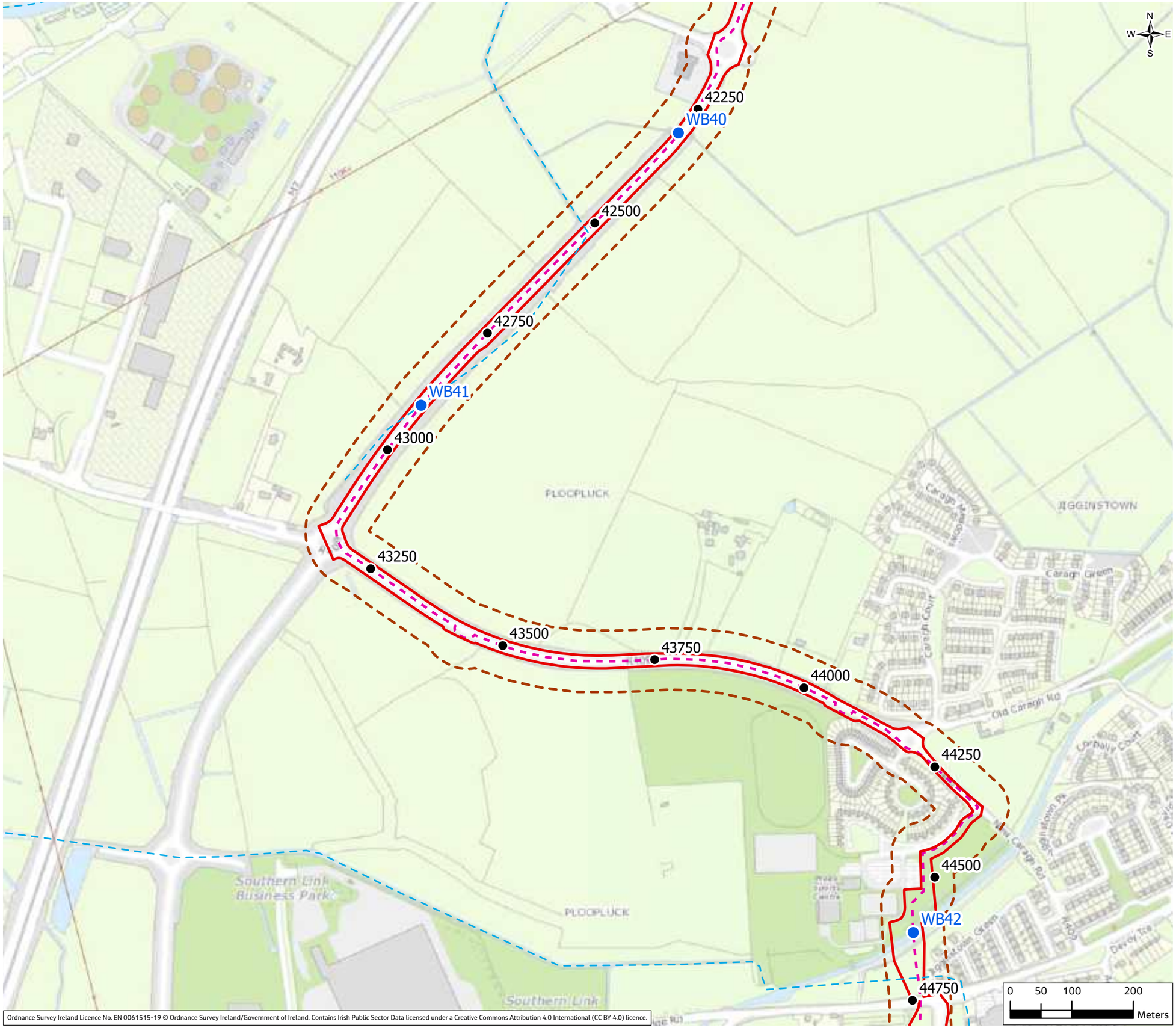
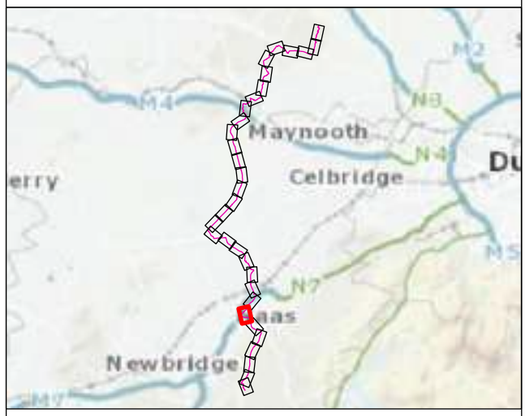


Appendix B; Figure 2.27



Legend

- Proposed Cable Route
- Planning Application Boundary
- Study Area (50m Buffer)
- Watercourses
- Waterbody (WB) number
- ●2250 Chainage Number

Rev.	Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
01	Apr 2023	Final	PM	SJ	FL	FB

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Drawing Title: Cable route, with chainage and waterbody numbers

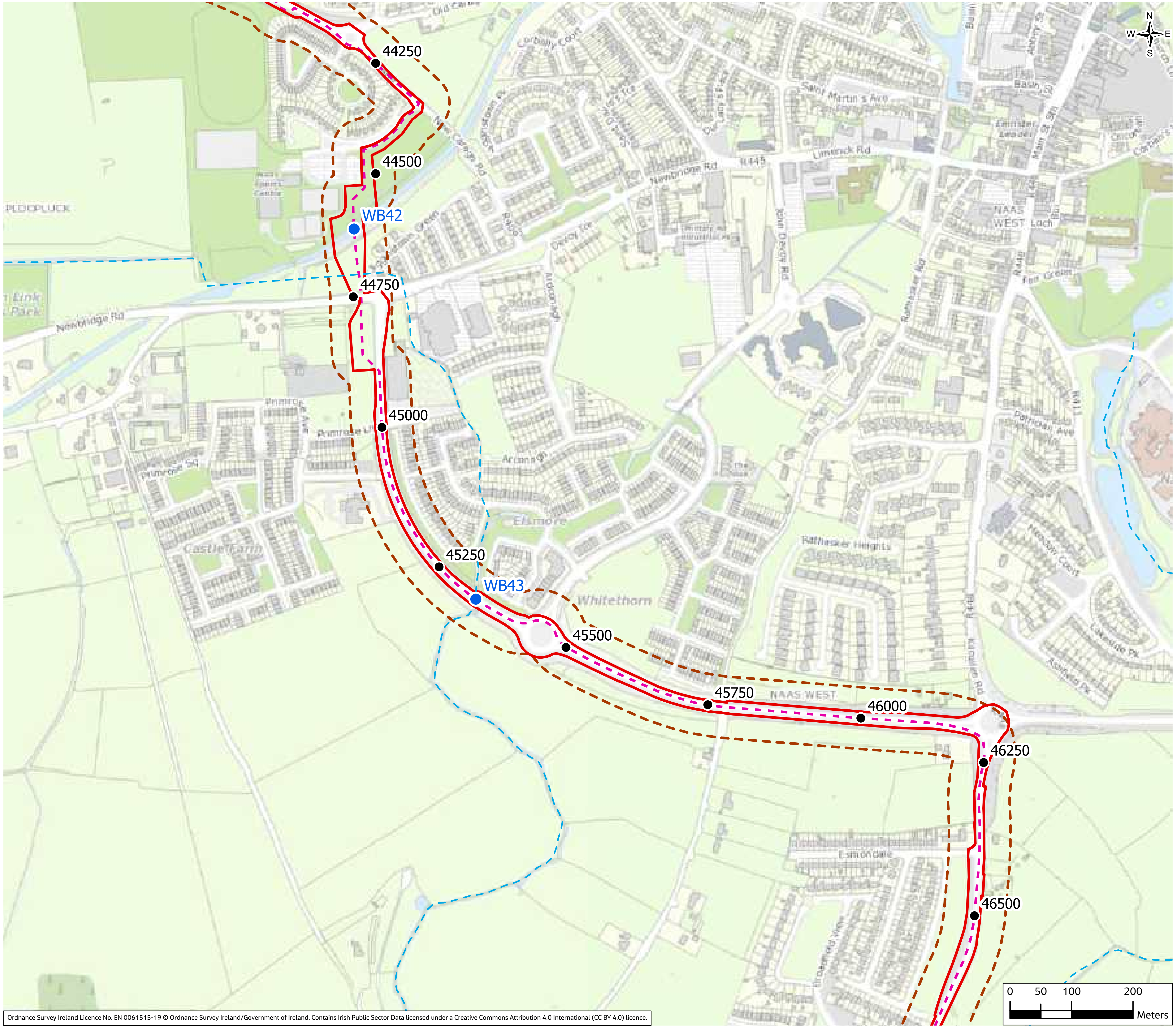
Sheet 27 of 33

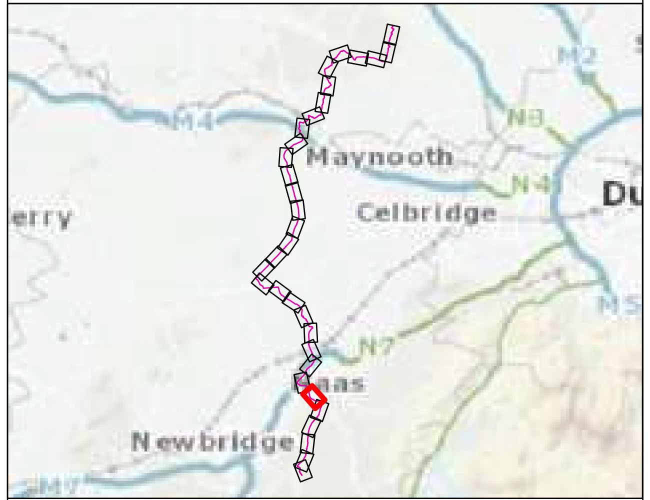
Drawing Status: Final

Scale @ A3	1:6,000	DO NOT SCALE
Jacobs No.	321084AH	
Client No.	CP966	

Drawing No. 321084AH-JAC-ZZ-XX-DR-K-3027

Appendix B; Figure 2.28





Legend

- Proposed Cable Route
- Planning Application Boundary
- Study Area (50m Buffer)
- Watercourses
- Waterbody (WB) number
- ●2250 Chainage Number

Rev.	Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
01	Apr 2023	Final	PM	SJ	FL	FB

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Project

Kildare-Meath Grid Upgrade

Drawing Title

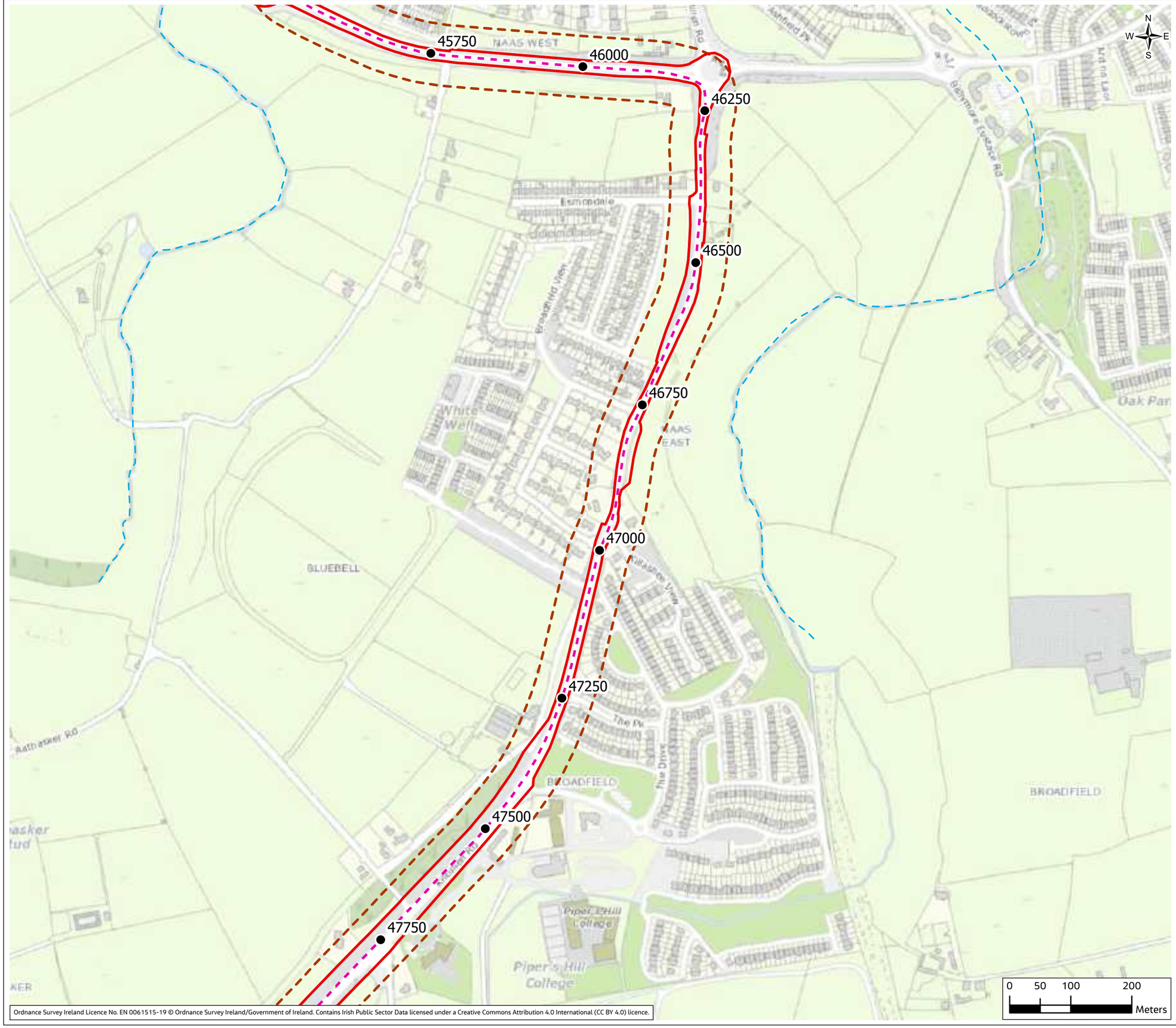
Cable route, with chainage and waterbody numbers

Sheet 28 of 33

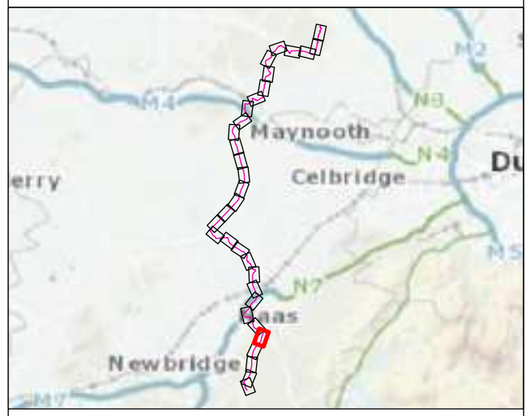
Drawing Status

Final

Scale @ A3	1:6,000	DO NOT SCALE
Jacobs No.	321084AH	
Client No.	CP966	
Drawing No.	321084AH-JAC-ZZ-XX-DR-K-3028	



Appendix B; Figure 2.29



Legend

- Proposed Cable Route
- Planning Application Boundary
- Study Area (50m Buffer)
- Watercourses
- Waterbody (WB) number
- ●2250 Chainage Number

Rev.	Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
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Drawing Title: Cable route, with chainage and waterbody numbers

Sheet 29 of 33

Drawing Status: Final

Scale @ A3	1:6,000	DO NOT SCALE
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Client No.	CP966	
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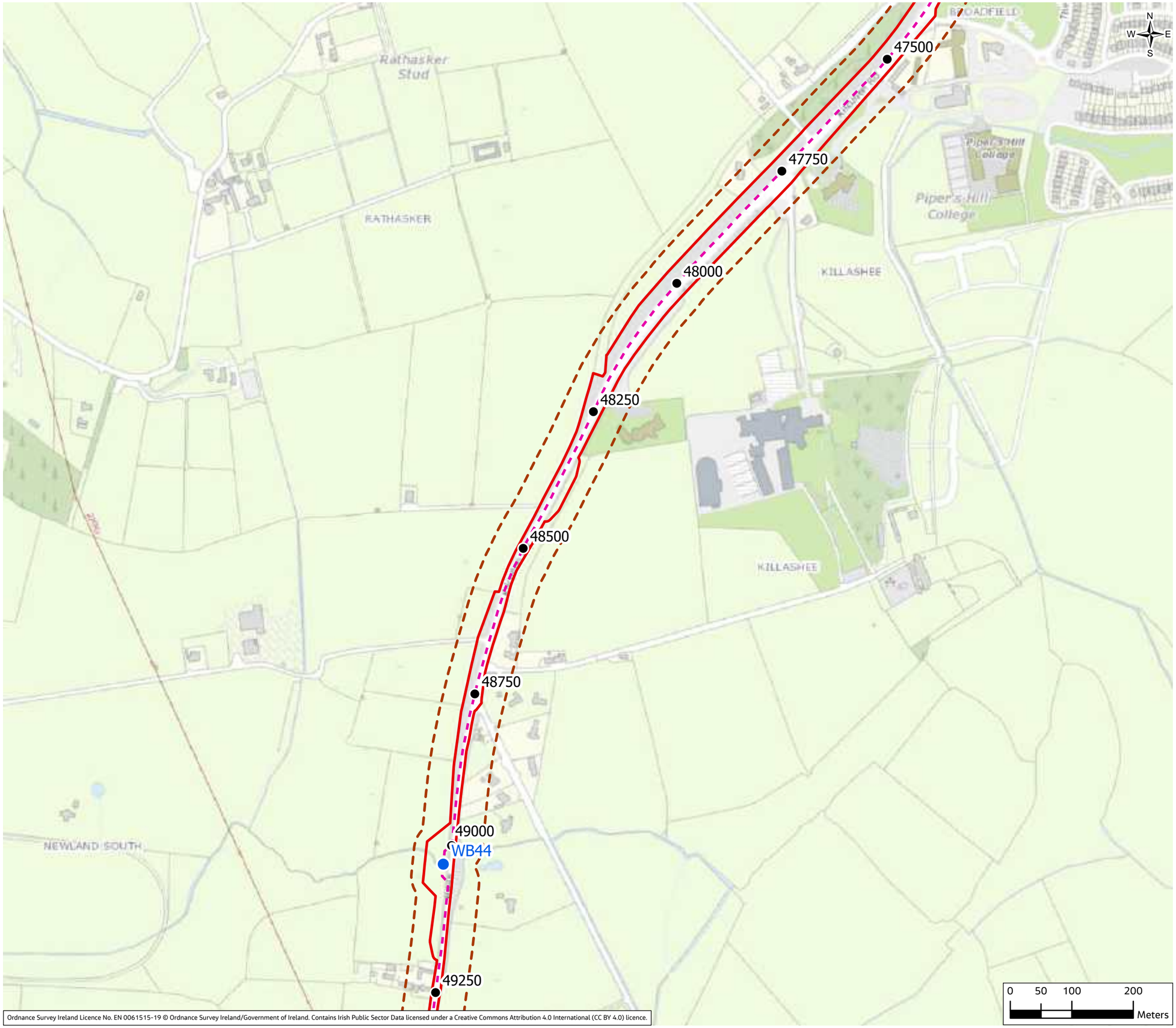
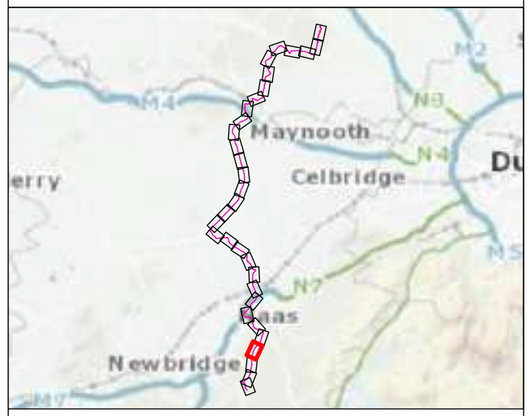


Appendix B; Figure 2.30



Legend

- Proposed Cable Route
- Planning Application Boundary
- Study Area (50m Buffer)
- Watercourses
- Waterbody (WB) number
- ●2250 Chainage Number

Rev.	Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
01	Apr 2023	Final	PM	SJ	FL	FB

Client: EirGrid

Jacobs
Merrion House, Merrion Road, Dublin, D04 R2C5, Ireland.
www.jacobs.com

Project: Kildare-Meath Grid Upgrade

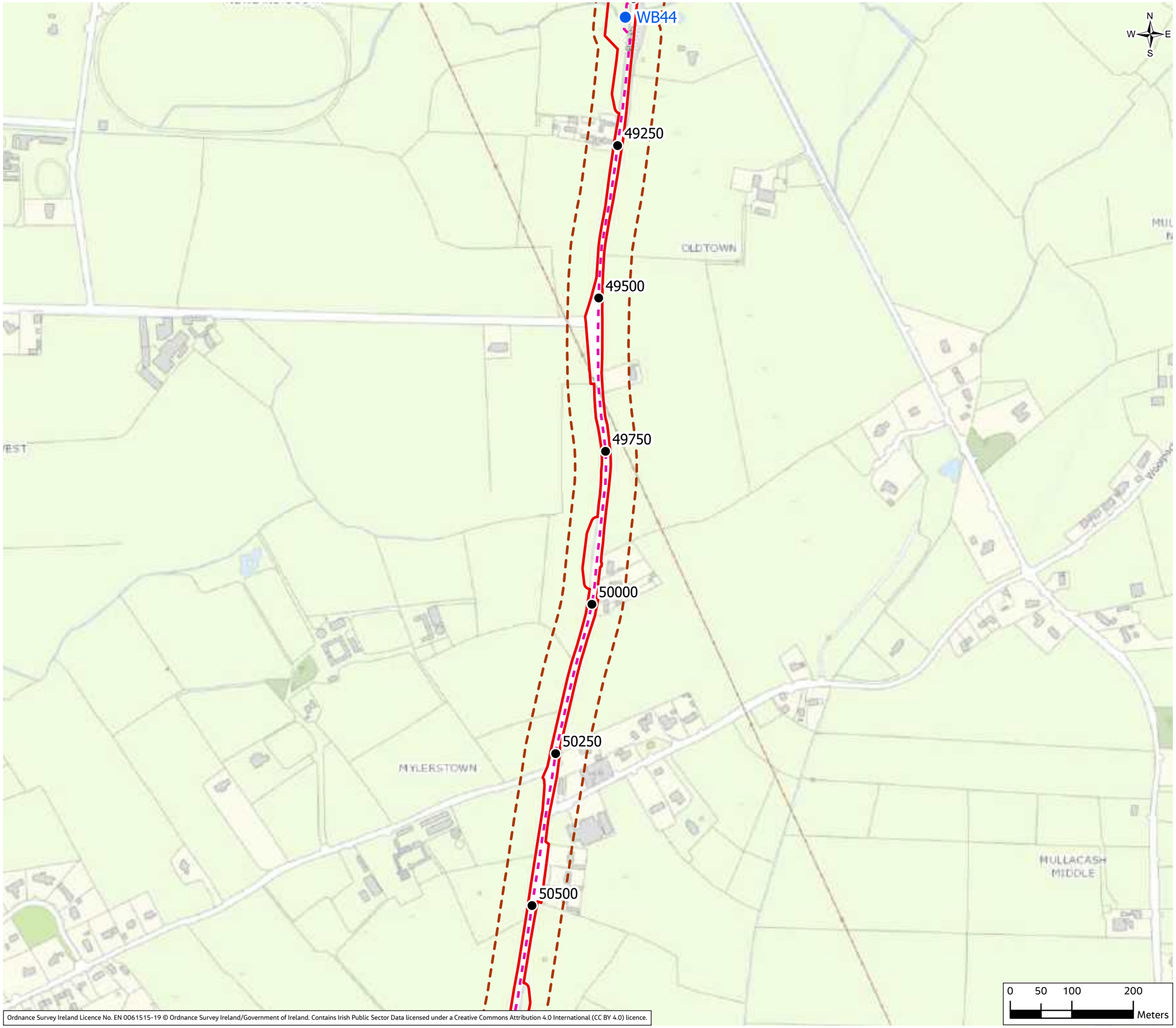
Drawing Title: Cable route, with chainage and waterbody numbers

Sheet 30 of 33

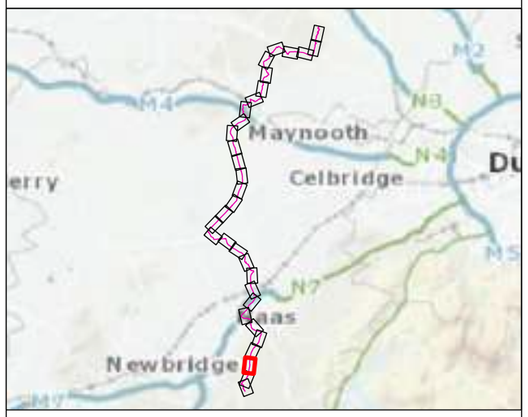
Drawing Status: Final

Scale @ A3	1:6,000	DO NOT SCALE
Jacobs No.	321084AH	
Client No.	CP966	

Drawing No.: 321084AH-JAC-ZZ-XX-DR-K-3030



Appendix B; Figure 2.31



Legend

- Proposed Cable Route
- Planning Application Boundary
- Study Area (50m Buffer)
- Watercourses
- Waterbody (WB) number
- ●2250 Chainage Number

Rev.	Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
01	Apr 2023	Final	PM	SJ	FL	FB

Client: EirGrid

Jacobs
Merrion House, Merrion Road, Dublin, D04 R2C5, Ireland.
www.jacobs.com

Project: Kildare-Meath Grid Upgrade

Drawing Title: Cable route, with chainage and waterbody numbers

Sheet 31 of 33

Drawing Status: Final

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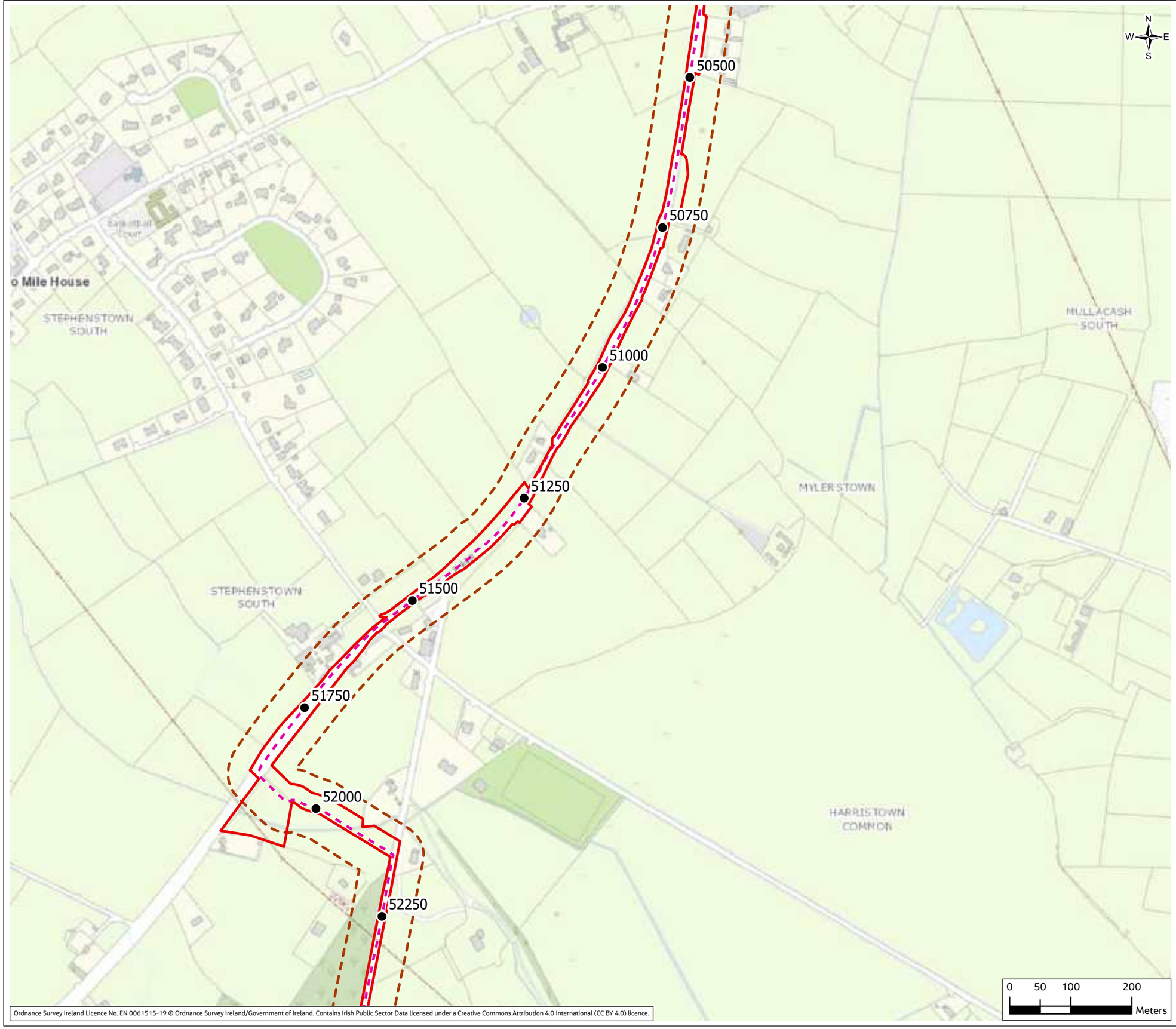
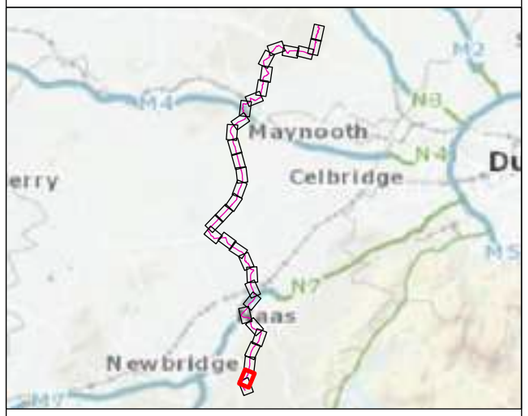
Client No.	CP966	

Drawing No.: 321084AH-JAC-ZZ-XX-DR-K-3031



Appendix B; Figure 2.32



Legend

- Proposed Cable Route
- Planning Application Boundary
- Study Area (50m Buffer)
- Watercourses
- Waterbody (WB) number
- ●2250 Chainage Number

Rev.	Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
01	Apr 2023	Final	PM	SJ	FL	FB

Client: EirGrid

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Merrion House, Merrion Road, Dublin, D04 R2C5, Ireland.
www.jacobs.com

Project: Kildare-Meath Grid Upgrade

Drawing Title: Cable route, with chainage and waterbody numbers

Sheet 32 of 33

Drawing Status: Final

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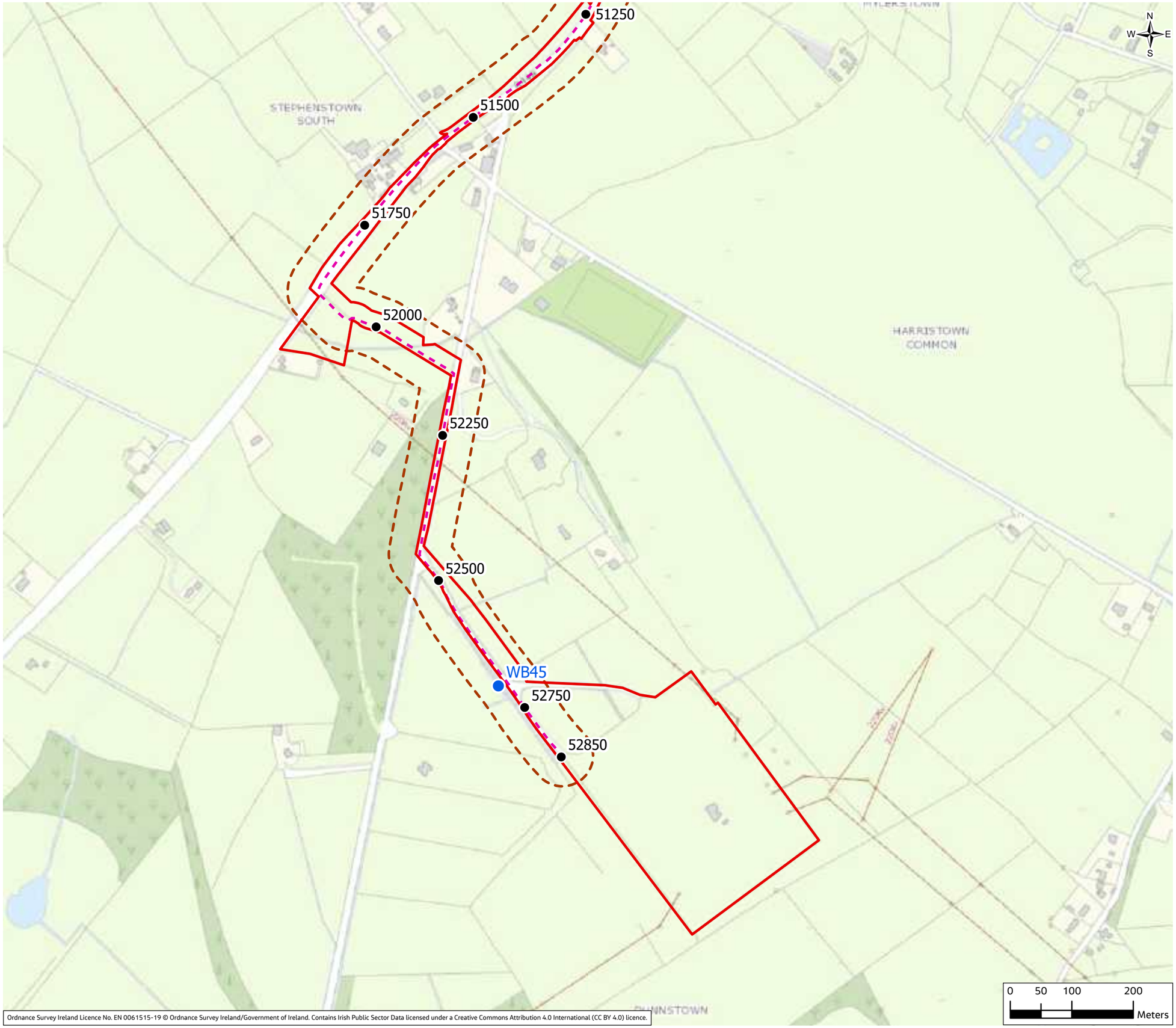
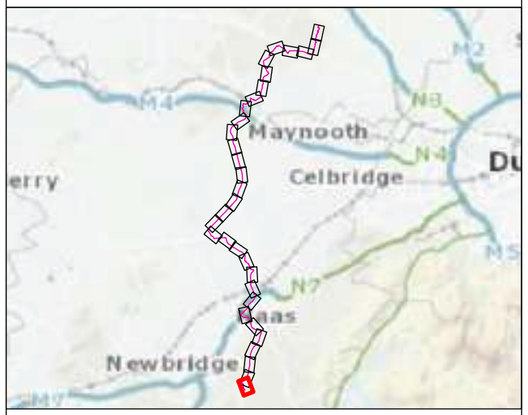
Client No.	CP966	

Drawing No.: 321084AH-JAC-ZZ-XX-DR-K-3032



Appendix B; Figure 2.33



Legend

- Proposed Cable Route
- Planning Application Boundary
- Study Area (50m Buffer)
- Watercourses
- Waterbody (WB) number
- ●2250 Chainage Number

Rev.	Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
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Project: Kildare-Meath Grid Upgrade

Drawing Title: Cable route, with chainage and waterbody numbers

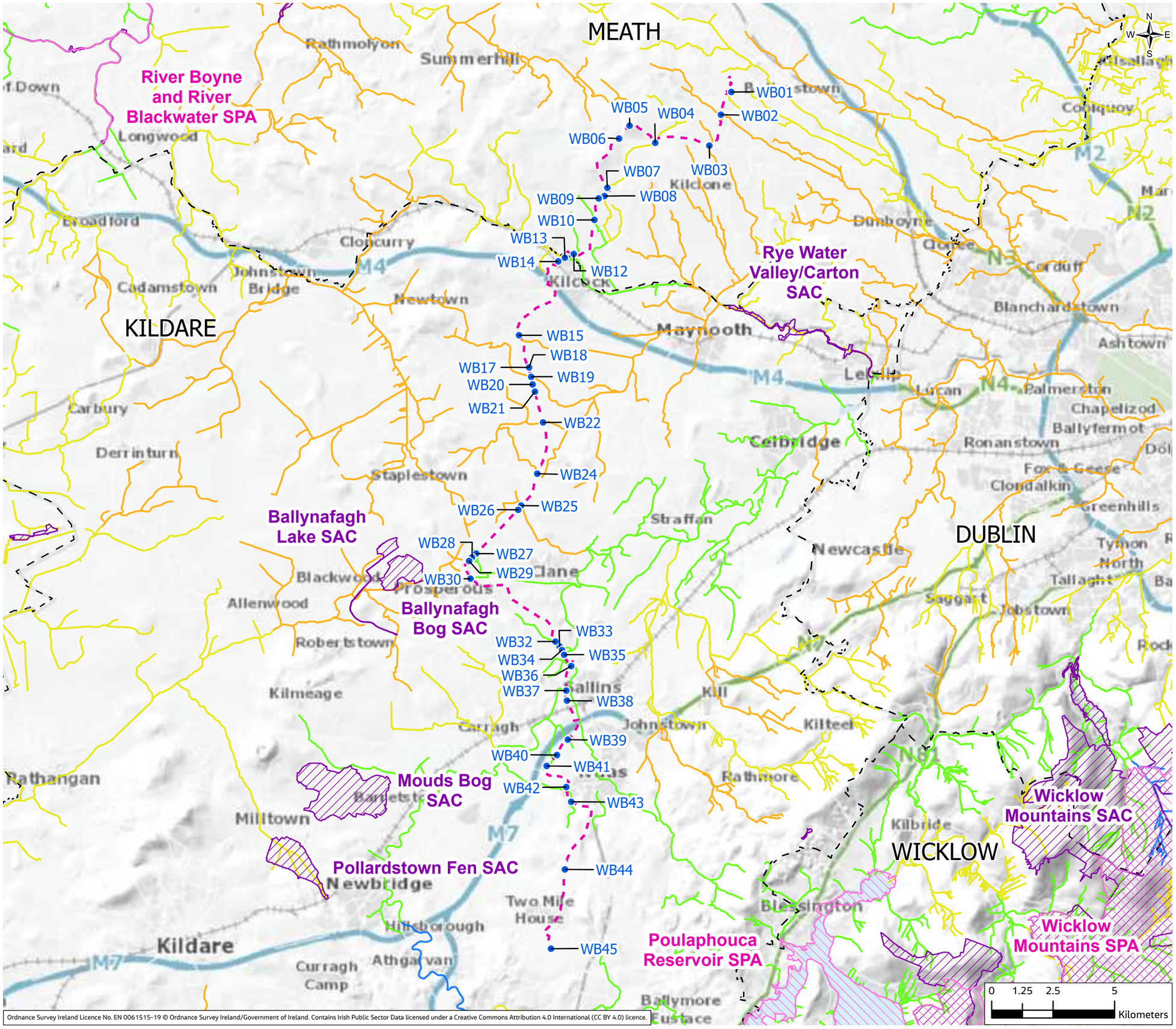
Sheet 33 of 33

Drawing Status: Final

Scale @ A3	1:6,000	DO NOT SCALE
Jacobs No.	321084AH	
Client No.	CP966	

Drawing No.: 321084AH-JAC-ZZ-XX-DR-K-3033

Appendix C. Figure 3 (321084AH-JAC-ZZ-XX-DR-K-3035). Water Framework Directive status of watercourses in the vicinity of the Proposed Development



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Appendix C; Figure 3

Legend

- Proposed Cable Route Alignment
- County Boundary
- Waterbody (WB) number

WFD River Waterbody Status (2016-2021)

- High
- Good
- Moderate
- Poor

European sites

- Special Protection Area (SPA)
- Special Area of Conservation (SAC)

Rev.	Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
01	Apr 2023	Final	PM	SJ	FL	FB

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Project: Kildare-Meath Grid Upgrade

Drawing Title: Water Framework Direct category of waterbodies in vicinity of proposed cable route

Drawing Status: Final

Scale @ A3	1:150,000	DO NOT SCALE
Jacobs No.	321084AH	
Client No.	CP966	
Drawing No.	321084AH-JAC-ZZ-XX-DR-K-3035	

Kildare Meath Grid Upgrade

Natura Impact Statement

April 2023

EirGrid

Project Name

Project No:	321084AH
Document Title:	Natura Impact Statement
Document No.:	NA
Revision:	Final
Document Status:	Final
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Client Name:	EirGrid
Client No:	CP966
Project Manager:	Andrew Power
Author:	Duncan Smith
File Name:	

Jacobs Engineering Ireland Limited

Merrion House
Merrion Road
Dublin 4, D04 R2C5
Ireland
T +353 1 269 5666
F +353 1 269 5497
www.jacobs.com

Document history and status

Revision	Date	Description	Author	Checked	Reviewed	Approved
		Final	DJS	SC	SC	FL

Contents

Executive Summary

An Appropriate Assessment Screening Report was produced for the Kildare to Meath Grid Upgrade project 'the Proposed Development' (Jacobs 2022a). It concluded that due to the hydrological linkage between the Proposed Development and the River Water Valley/Carton SAC it was not possible to exclude that the Proposed Development either alone or in combination with any other plan or project would have a likely significant effect on this European site and a Natura Impact Statement (NIS) has been prepared to inform an Appropriate Assessment by the competent authority.

The screening report found that for the European sites listed below (which were in the vicinity of the Proposed Development), it can be concluded ,on the basis of best scientific knowledge and objective evidence, that there was no potential for the Proposed Development, alone or in-combination with any other plan or project, to have likely significant effects on the conservation objectives of these sites and that Appropriate Assessment was not required:

- River Boyne and River Blackwater SAC;
- River Boyne and River Blackwater SPA;
- Ballynafagh Bog SAC;
- Ballynafagh Lake SAC;
- Mouds Bog SAC;
- Poulaphouca Reservoir SPA; and
- Pollardstown Fen SAC.

In this NIS, it was established that due to hydrological connections there was potential for impacts to the River Water Valley/Carton SAC in the absence of mitigation. The qualifying interest features of this SAC are petrifying springs with tufa formation and the species narrow mouthed whorl snail (*Vertigo angustior*) and Desmoulin's whorl snail (*Vertigo moulinsiana).* Consideration was given to the potential for a pollution event to undermine the conservation object of the qualifying interest features. In the absence of appropriate mitigation, three out of nine attributes of the conservation objectives of the petrifying springs, three out of four attributes of narrow mouthed whorl snail and four out of six attributes of Desmoulin's whorl snail were considered to have the potential to be undermined by a hydrologically linked pollution event. Mitigation measures are provided so that in the event of a water pollution incident at any of the watercourses crossed by or in proximity to the Proposed Development, the conservation objective qualifying interest of the SAC are not compromised.

The result of the in-combination assessment was that the planning application boundary of the four planning applications that constitute significant works described in Section 7 do not cross any watercourses that have connectivity with European sites. The three EirGrid projects subjected to Appropriate Assessment screening have concluded no potential for LSEs in-combination with those Proposed Developments. Likewise, no significant in-combination effects are predicted from the Meath County Development Plan 2021-2027 and the Kildare County Development Plan 2023-2029. Therefore, there is no potential for a significant in-combination pollution event(s) with these projects to undermine the integrity of any European site. The mitigation measures for the Proposed Development alone will mitigate all potential significant in-combination effects.

1. Introduction

1.1 Background

This Natura Impact Statement (NIS) is for the Kildare Meath Grid Upgrade Project (Capital Project 0966 (0966) (the "Proposed Development"). This project involves improvements to the transfer of electricity to the east of Ireland and its distribution within the network in Meath, Kildare, and Dublin. The project will help meet the growing demand for electricity in the east which is due to an increase in economic activity and the planned construction of a number of data centres in the country. CP 966 aims to strengthen the transmission network between Dunstown substation in Kildare and Woodland substation in Meath.

Jacobs was engaged by EirGrid to prepare this NIS for the cable route referred to in this report as the 'Proposed Development' (See Section 4 of this report for further details) which will see the installation of a 400 kV underground cable (UGC) between Dunstown substation in the south and Woodland substation in the north, whose approximate route alignment is shown in Image 1.

The cable route (the 'Proposed Development'), the watercourses and the European sites closest to it are shown in Figure 1 (321084AH-JAC-ZZ-XX-DR-K-3036), Appendix A.

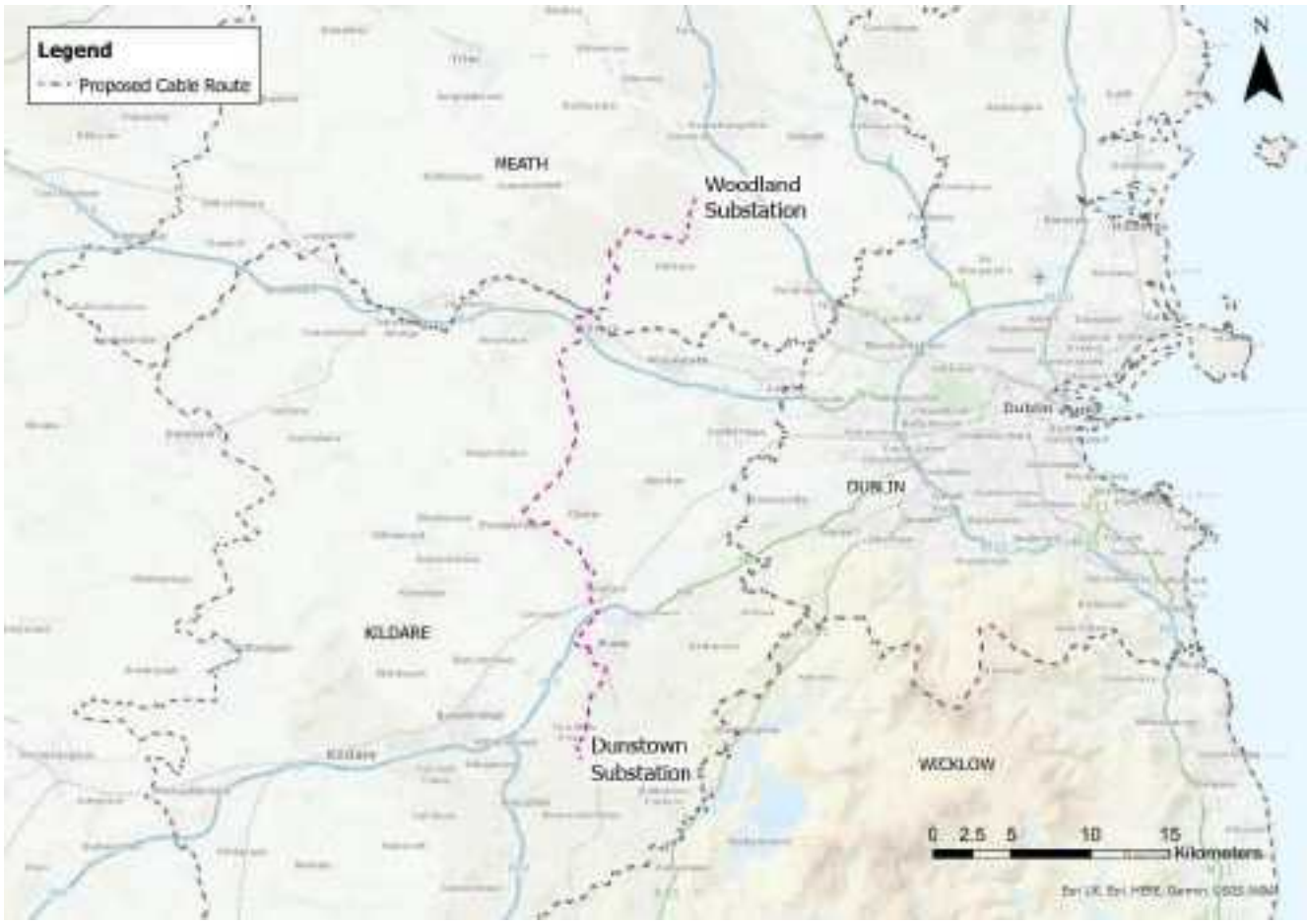

Image 1. Proposed cable route

1.2 Legislative context

Habitats and species of European importance are given legal protection under the EU Habitats Directive 92/43/EEC (the Habitats Directive). The Directive protects habitats and species of community interest through the establishment and conservation of an EU-wide network of sites known as the Natura 2000 network (hereafter referred to as European sites[1]). European sites comprise Special Areas of Conservation (SACs[2]) and Special Protection Areas (SPAs).

The EU Habitats Directive (92/43/EEC) has been transposed into Irish law by the Planning and Development Act 2000 (as amended) and the European Communities (Birds and Natural Habitats) Regulations 2011, as amended. Articles 6(3) and 6(4) of the Habitats Directive set out the decision-making tests for plans and projects likely to affect European sites.

Article 6(3) establishes the requirement for AA:

"Any plan or project not directly connected with or necessary to the management of the site but likely to have a significant effect thereon, either individually or in combination with other plans or projects, shall be subject to Appropriate Assessment of its implications for the site in view of the site's conservation objectives. In the light of the conclusions of the assessment of the implications for the site and subject to the provisions of paragraph 4, the competent national authorities shall agree to the plan or project only after having ascertained that it will not adversely affect the integrity of the site concerned and, if appropriate, after having obtained the opinion of the general public."

Article 6(4) states:

"If, in spite of a negative assessment of the implications for the [Natura 2000] site and in the absence of alternative solutions, a plan or project must nevertheless be carried out for imperative reasons of overriding public interest, including those of a social or economic nature, Member States shall take all compensatory measures necessary to ensure that the overall coherence of Natura 2000 is protected. It shall inform the Commission of the compensatory measures adopted."

As defined in Section 177T of the Planning and Development Act, 2000 as amended, an NIS means a statement, for the purposes of Article 6 of the Habitats Directive, of the implications of a proposed development, on its own and in combination with other plans and projects, for a European site in view of its conservation objectives. It is required to include a report of a scientific examination of evidence and data, carried out by competent persons to identify and classify any implications for the European site in view of its conservation objectives.

s177T(1)(b) and (2): 177T.— (1) In this Part—.

"(b) A Natura impact statement means a statement, for the purposes of Article 6 of the Habitats Directive, of the implications of a proposed development, on its own or in combination with other plans or projects, for one or more than one F924[European site], in view of the conservation objectives of the site or sites.

(2) Without prejudice to the generality of subsection (1), a Natura impact report or a Natura impact statement, as the case may be, shall include a report of a scientific examination of evidence and data, carried out by competent persons to identify and classify any implications for one or more than one F924[European site] in view of the conservation objectives of the site or sites."

1 The term Natura 2000 network was replaced by 'European site' under the EU (Environmental Impact Assessment and Habitats) Regulations 2011 S.I. No. 473 of 2011.

2 Candidate SACs (cSACs) are afforded the same protection as SACs. The process of designating cSACs as SACs by means of Statutory instrument is ongoing and hereafter both cSACs and SACs are collectively referred to as SACs.

1.3 Stages in Appropriate Assessment

The purpose of Screening is to identify whether, activities associated with plans or projects[3], either acting individually or in-combination with other plans or projects result in likely significant effects (LSEs) on any European sites. All potential effects between activities associated with the plans or projects and the Conservation Objectives of European sites must be considered. This includes potential effects on mobile species, notably birds, mammals, invertebrates and migratory fish.

If the potential of LSEs occurring cannot be excluded based on objective information, the plan or project is taken forward to the next stage of the process, Appropriate Assessment (AA). At Screening, the burden of evidence is to show, based on objective information, and beyond reasonable scientific doubt, that the proposed plan or project will have no LSEs on a European site(s). If the effect is significant, or its significance is not known, it would trigger the need for AA of its implications for the site in view of the site's conservation objectives. An overview of the two steps in the Appropriate Assessment process is outlined below:

- **Screening:** Screening determines whether an AA is required by determining if the project or plan is likely to have a significant effect on any European site(s) either individually or in-combination with other plans or projects, in light of the site's conservation objectives; and
- **Appropriate Assessment**: If the screening has determined that AA is required, the competent authority then considers whether the plan or project will adversely affect the integrity of a European site(s) either individually or in-combination with other plans and projects in view of the site's conservation objectives. Where potential adverse effects on site integrity (AESI) are identified, mitigation measures are proposed to avoid adverse effects, as appropriate. For projects, the AA process is documented within an NIS. Aa Natura Impact Statement may be prepared by the developer to inform the competent authority's AA process.

Following AA, including mitigation proposals, if AESI remain, or uncertainty remains and the project/plan is to be progressed, an Assessment of Alternative Solutions is required under the provisions of Article 6(4) of the Habitats Directive. This process examines the alternative ways of achieving the objectives of the project or plan that avoid adverse impacts on the integrity of the European site. If no alternatives exist, or all alternatives would result in adverse effects on the integrity of a European site, then either the process moves to the next stage, or the project is abandoned.

In the unlikely event where an Assessment of Alternative Solutions fails to identify any suitable alternatives, then for a project or plan to be progressed it must meet the requirements of IROPI. In this case the provisions of Article 6(3) cannot be met (i.e., a significant effect is likely) and therefore, the provisions of Article 6(4) are used. If in the light of an assessment of imperative reasons of overriding public interest (IROPI), it is deemed that the project or plan should proceed, thus compensatory measures are implemented to maintain the coherence of the European site network despite adverse effects to the integrity of the site(s).

3 For the purposes of this assessment the proposed works are considered a type of project.

1.4 Authors' and surveyors' qualifications and expertise

This report has been prepared primarily by Duncan Smith and checked/reviewed by Dr Susie Coyle.

Duncan Smith is a Principal Ecologist and Chartered Environmentalist. He has a BSc (Hons) in Zoology from the University of Leeds, an MSc in Environmental Technology with Ecological Management from Imperial College, and as MSc in Marine Environmental Protection from Bangor University. He has 24 years professional ecological experience specialising in botanical surveying, habitat management and evaluation for Ecological Impact Assessment and has written multiple reports informing AA. During his career he has worked in the private, public, and voluntary sectors, including fifteen years in the private sector, seven years for UK Statutory Nature Conservation Bodies in England and Wales and two years in the voluntary sector.

The report was checked and reviewed by an Associate Director of Ecology. Dr Susie Coyle holds a BSc (Hons) in Aquatic Bioscience and a PhD in fish biodiversity from the University of Glasgow. She is a Chartered full Member of the Royal Society of Biology (MRSB), a full Member of CIEEM and a Member of the Institute of Fisheries Management (MIFI). Susie has coordinated Jacobs' ecologists both in Ireland and in the UK and has experience of multiple ecological survey techniques and associate reporting. She has 15 years of consultancy experience in aquatic and terrestrial ecology with over 20 years' experience of field surveys and environmental sampling techniques. One of Susie's main roles is the check and review of reports including AA Screening reports and Natura Impact Statements.

Susie has over 20 years' experience of field surveys and environmental sampling techniques, including electric fishing and gill/seine/drag/hand netting, kick sampling and water chemistry analysis. She is a certified team lead for electric fishing through the Scottish Fisheries Co-Ordination Centre and has worked for the Lomond Fisheries Trust undertaking targeted electric fishing surveys for salmonids. She has held several pan-Scotland and England freshwater pearl mussel licences.

1.5 Purpose and structure of this report

This report provides information to support the relevant competent authority in undertaking Appropriate Assessment of the Proposed Development.

The structure of the report is as follows:

- **Section 1:** Introduction including legislative context and the authors experience;
- **Section 2:** Overview of the AA methodology including the guidance used in compiling this report;
- **Section 3:** Description of the baseline environment;
- **Section 4:** Description of the Proposed Development;
- **Section 5**: Summary and conclusion of Screening for Appropriate Assessment;
- **Section 6**: Information for Appropriate Assessment including information on European sites, potential impacts, and mitigation measures where required;
- **Section 7**: Assessment of in-combination effects with other plans and projects;
- **Section 8:** Conclusion in relation to adverse effects on site integrity; and
- **Section 9:** References.

This NIS should be read in full, with no excerpts to be representative of the findings. This NIS has been prepared exclusively for EirGrid and no liability is accepted for any use or reliance on the NIS by third parties (with exclusion of the competent authority). This report has been prepared from data available at the time means the report is for of writing. Where assumptions have been necessary, these are clearly described.

2. Methodology

2.1 Desk review

The following key resources were analysed to inform the baseline description of the site and surrounding environment:

- Aerial imagery (Bing, Google Earth, ESRI).
- Environmental Protection Agency (EPA) rivers and water quality data Water Framework Directive (WFD) status online at https://gis.epa.ie/EPAMaps/ (accessed November 2022).
- Mapping of European site boundaries available online at www.npws.ie (accessed November 2022).
- Protected species data from the National Biodiversity Data Centre online at http://www.biodiversityireland.ie/ (accessed November 2022).
- National Parks and Wildlife Service (2019a). The Status of EU Protected Habitats and Species in Ireland. Volume 1: Summary Overview. Unpublished NPWS report. Edited by: Deirdre Lynn and Fionnuala O'Neill.
- National Parks and Wildlife Service (2019b). The Status of EU Protected Habitats and Species in Ireland. Volume 2: Habitat Assessments. Unpublished NPWS report. Edited by: Deirdre Lynn and Fionnuala O'Neill.
- National Parks and Wildlife Service (2019c). The Status of EU Protected Habitats and Species in Ireland. Volume 3: Species Assessments. Unpublished NPWS report. Edited by: Deirdre Lynn and Fionnuala O'Neill.
- National Parks and Wildlife Service (2021). Rye Water Valley/Carton SAC 001398. Conservation Objective Series, version 1.
- Online data available on Natura 2000 sites as held by the National Parks and Wildlife Service (NPWS) from www.npws.ie including: the Natura 2000 network Data Form; Site Synopsis; Generic Conservation Objective data.
- Other open-source information available online regarding fisheries (e.g., www.salmonireland.com and www.fishingireland.info).
- Protected and invasive species data from the National Biodiversity Data Centre (NBDC) online at http://www.biodiversityireland.ie/ (accessed December 2022).

2.2 Site visits

Site visits along the route of the proposed cable were undertaken by experienced Jacobs ecologists multiple times in 2021 and 2022 beginning on 11/10/2021. The study area extent varied across the Proposed Development according to the infrastructure associated with the scheme and its likely ecological impacts. Surveys included wintering and breeding birds, mammals, fish invertebrate and habitats.

During the visits, habitats within the sites were assessed for their potential to support rare or protected species and/or qualifying interests (Annex I habitats or Annex II species) associated with European sites. The distance of the habitat assessed from the Proposed Development ranged from immediately adjacent up to 150m from it. Visual watercourse assessments were up to 150m from cable crossing points and a minimum of 100 m to either side where possible. The assessment of protected species and habitats and/or invasive species was undertaken in line with the following guidelines and informed this AA NIS:

- A Guide to Habitats in Ireland. The Heritage Council (Fossitt, 2000).
- Article 17 reports (NPWS, 2019a, 2019b, and 2019c).
- CIEEM Good Practice Guidance for Habitats and Species (CIEEM, 2021).
- CIEEM Guidelines for Preliminary Ecological Appraisal. Second Edition (CIEEM, 2017).

- CIEEM Guidelines for Ecological Impact Assessment in the UK and Ireland (CIEEM, 2018).
- Ecological Surveying Techniques for Protected Flora and Fauna (Nationals Road Authority, 2009)
- Interpretation Manual of European Habitats (European Commission DG Environment, 2013)
- National Roads Authority (NRA) Guidelines on The Management of Noxious Weeds and Non-Native Invasive Plant Species on National Roads (NRA, 2010).
- The Irish Vegetation Classification (Perrin *et al.*, 2018)
- Transport Infrastructure Ireland (TII) The Management of Invasive Alien Plant Species on National Roads, Standard (TII, 2020a).
- Transport Infrastructure Ireland (TII) The Management of Invasive Alien Plant Species on National Roads, Technical Guidance (TII, 2020b).

Ecology Surveys and their dates are shown in Table 2.1

Table 2.1, showing all ecological surveys carried out for the Kildare to Meath proposed development.

Species/Habitat	Survey methodology/target species	Survey date(s)
Habitat Survey	Habitat classification (Fossitt, IVC etc.)	June 2022 – October 2022 (Week commencing: 06.06.2022, 27.06.2022, 11.07.2022, 18.07.2022, 22.08.2022, 05.09.2022, 26.09.2022, 12.10.2022)
Habitat Suitability Assessment	Reptile and amphibian	December 2021 – June 2022 (weeks commencing 13.12.21; 27.6.22)
	Terrestrial invertebrate (Marsh fritillary)	December 2021 – April 2022 weeks commencing 13.12.21; 27.6.22
	Fish white-clawed crayfish	June 2022 – October 2022 (Week commencing: 06.06.2022, 27.06.2022, 11.07.2022, 18.07.2022, 22.08.2022, 05.09.2022, 26.09.2022, 12.10.2022)
Mammal Survey	Mammal species other than bats i.e., otter, badger, red squirrel etc.	October 2021 – April 2022
Birds	Winter Bird Surveys	October 2021 – April 2022 (Week commencing: 11.10.2021, 01.11.2021, 06.12.2021, 10.01.2022, 07.02.2022, 07.03.2022, 11.04.2022)
	Hen harrier winter roost surveys	October 2021 – March 2022 (Week commencing 11.10.2022, 18.10.2022, 01.11.2021, 06.12.2021, 10.01.2022, 07.02.2022, 07.03.2022)
	Breeding bird surveys	March – May 2022 (Week commencing: 28.03.2022, 25.04.2022, 23.05.2022, 30.05.2022)
Bats	Identification of potential roost features (PRFs) in trees/buildings	February 2022 – September 2022 (week commencing 21.2.22; 21.3.22; 6.6.22; 15 .7.22; 22.8.22; 5.9.22;
	Static detector surveys	May 2022 – August 2022 (Week commencing 16.05.2022, 23.05.2022, 30.05.202, 06.06.2022, 27.06.2022,

Species/Habitat	Survey methodology/target species	Survey date(s)
		04.07.2022, 18.07.2022, 25.07.2022, 01.08.2022, 08.08.2022)
	Emergence/re-entry surveys (structures and trees)	May 2022 – July 2022 (Week commencing 16.05.2022, 23.05.2022, 30.05.2022, 06.06.2022, 17.06.2022, 18.07.2022, 25.07.2022)
Fish	eDNA Sampling for Atlantic salmon and European eel	August 2022 – September 2022 (Week commencing: 08.08.2022, 19.09.2022)
Invertebrates	eDNA Sampling for white-clawed crayfish	August 2022 – September 2022 (Week commencing: 08.08.2022, 19.09.2022)
Smooth newt	eDNA Sampling for smooth newt at WB19 and WB05.	August 2022 – October 2022 (Week commencing: 08.08.2022, 19.09.2022, 10.10.2022)

2.3 Consultation

In February 2023, the project team met with National Parks and Wildlife Service (NPWS) with respect to the Proposed Development. In January 2023, the project team has also met with Inland Fisheries Ireland to discuss the approach to watercourse crossings.

2.4 Guidance documents

This NIS was undertaken in-line with the following guidance:

- Appropriate Assessment of Plans and Proposed Schemes in Ireland. Guidance for Planning Authorities (Department of Environment, Heritage and Local Government (DoEHLG), 2010).
- Assessment of Plans and Projects Significantly Affecting Natura 2000 Sites – Methodological Guidance on the Provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC (EC, 2021a).
- Communication from the Commission on the Precautionary Principle (EC, 2000).
- Guidance Document on Article 6(4) of the 'Habitats Directive' 92/43/EEC. Clarification of the concepts of: Alternative Solutions, Imperative Reasons of Overriding Public Interest, Compensatory Measures, Overall Coherence, Opinion of the Commission (EC, 2007).
- Guidance Document on Assessment of Plans and Projects in relation to Natura 2000 sites - A Summary (EC, 2022).
- Managing Natura 2000 sites: The provisions of Article 6 of the 'Habitats' Directive 92/43/EEC (EC, 2018).
- Guidance document on the strict protection of animal species of Community interest under the Habitats Directive (EC, 2021b).
- Office of the Planning Regulator (2021). Appropriate Assessment Screening for Development Management. OPR Practice Note PN01.

2.5 Appropriate Assessment methodology

Following screening and where the potential for LSEs identified (or could not be exclude) the assessment is progressed to the next step, known as AA. This step considers whether a project or plan, either alone or in-combination with other projects or plans, could have adverse effects on (European) site integrity. The information

collected (both field and desk based) and outlined in this NIS aimed to determine the potential for adverse effects on site integrity from the Proposed Development by:

- Providing an overview of the European sites identified at risk, including information on their conservation objectives and an understanding of current factors which either maintain or threaten those conservation objectives.
- Assessing aspects of the project proposals which could undermine the conservation objectives and integrity of European sites.
- Where potential adverse effects are identified provide specific mitigation measures that will be implemented to ensure adverse effects on European sites can be excluded.

Describing the project proposals and other plans or projects that may have an in-combination effect on any European sites. This NIS contains a complete, precise and definitive findings beyond all scientific reasonable doubt on any AESIs on any European sites.

The process is shown in Image 2, below:

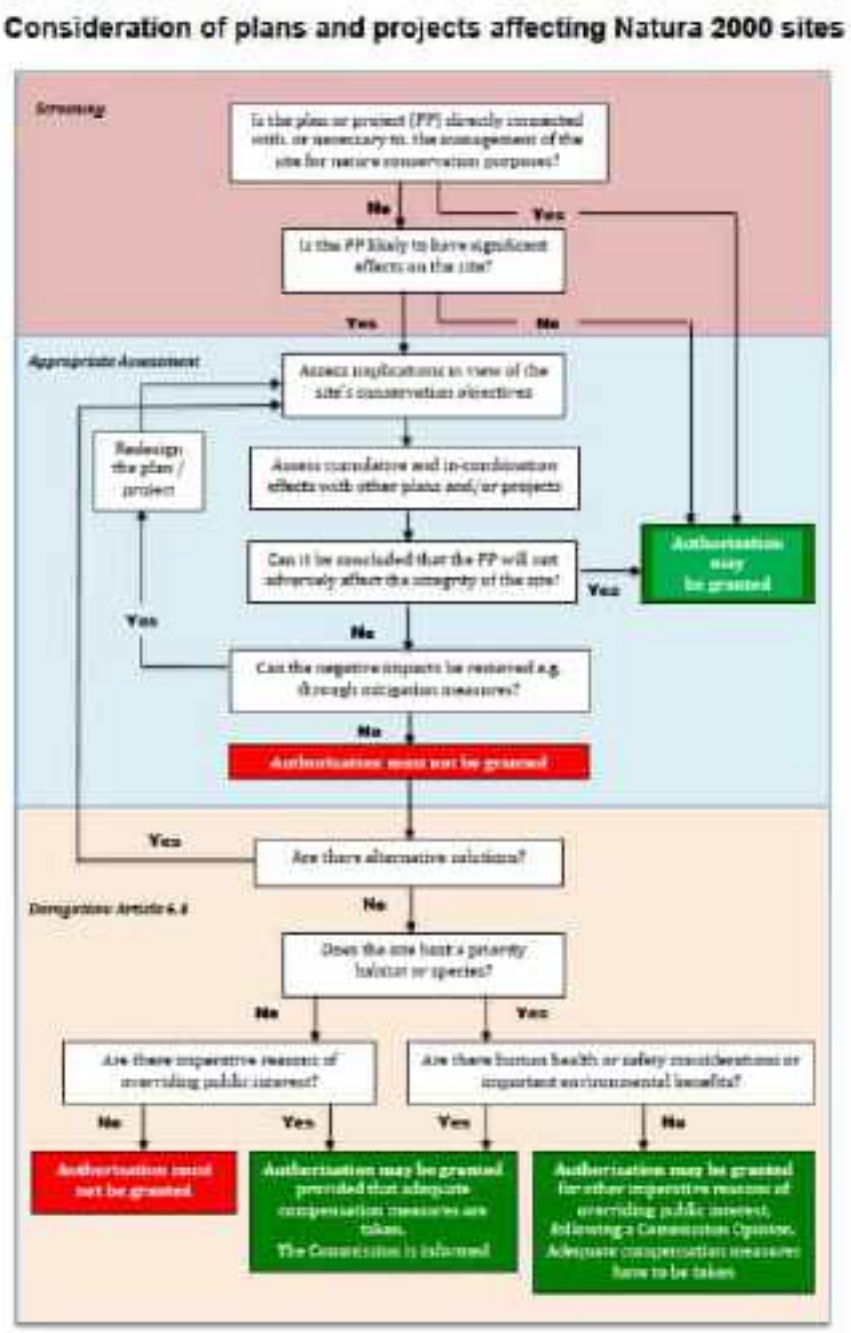

Image 2. Flow chart of Article 6 (3) and (4) procedure (European Commission, 2018).

3. Baseline characterisation

3.1 Receiving Environment

The results of the desk-based review of Rye Water/Carton SAC are presented in this section.

The only European site within the ZoI of the Proposed Development is the Rye Water Valley/Carton SAC. The location of this SAC is shown in Figure 1 (321084AH-JAC-ZZ-XX-DR-K-3036), Appendix A. The Proposed Development will be 6.2km west at its closest distance from the SAC (at Dolanstown). The shortest hydrological distance between the Proposed Development and this SAC is 8.15km, commencing at Kilcock (Rye Water, WB13, as shown in Figure 2 (321084AH-JAC-ZZ-XX-DR-K-3037), Appendix B).

The Rye Water Valley/Carton SAC is located between Leixlip and Maynooth, in Counties Meath and Kildare, and extends along the Rye Water, a tributary of the River Liffey. The site is a SAC selected for the following habitats and species on Annex I/II of the EU Habitats Directive. The numbers in brackets are Natura 2000 codes:

- Petrifying Springs [7220];
- Narrow-mouthed whorl snail (*Vertigo angustior*) [1014]; and
- Desmoulin's whorl snail (*Vertigo moulinsiana*) [1016].

The following site description is from the synopsis for the site – "The Rye Water in Carton Estate is dammed at intervals, creating a series of lakes. Reed Sweet-grass (*Glyceria maxima*) is frequent around the lakes, along with Yellow Iris (*Iris pseudacorus*), Reed Canary-grass (Phalaris arundinacea), Bulrush (*Typha latifolia*), Water Forget-me-not (*Myosotis scorpioides*), Marsh-marigold (*Caltha palustris*) and starworts (*Callitriche* spp.). Along the remainder of the site the river has been dredged and much of the reed fringe removed.

To the north-west of Carton Bridge a small clump of willows (*Salix* spp.), with dogwood (*Cornus* sp.), Alder (*Alnus glutinosa*), Ash (*Fraxinus excelsior*) and Elder (*Sambucus nigra*) occurs. The ground flora found here includes Golden Saxifrage (*Chrysosplenium oppostifolium*), Meadowsweet (*Filipendula ulmaria*), Common Valerian (*Valeriana officinalis*), Wavy Bitter-cress (*Cardamine flexuosa*) and Bittersweet (*Solanum dulcamara*).

The marsh, mineral spring and seepage area found at Louisa Bridge supports a good diversity of plant species, including stoneworts, Marsh Arrowgrass (*Triglochin palustris*), Purple Moor-grass (*Molinea caerulea*), sedges (*Carex* spp.), Common Butterwort (*Pinguicula vulgaris*), Marsh Lousewort (*Pedicularis palustris*), Grass-of-parnassus (*Parnassia palustris*). The mineral spring found at the site is of a type considered to be rare in Europe and is a habitat listed on Annex I of the E.U. Habitats Directive. The Red Data Book species Blue Fleabane (*Erigeron acer*) is found growing on a wall at Louisa Bridge.

The rare Narrowmouthed Whorl Snail and Desmoulin's Whorl Snail occur in marsh vegetation near Louisa Bridge. Both are rare in Ireland and in Europe and are listed on Annex II of the E.U. Habitats Directive. The scarce dragonfly, *Orthetrum coerulescens*, has also been recorded at Louisa Bridge.

The conservation importance of the site lies in the presence of several rare and threatened plant and animal species, and the presence of petrifying springs, a habitat type listed on Annex I of the E.U. Habitats Directive. (NPWS, 2013a).

3.1.1 Qualifying Interest Habitats - Rye Water Valley/Carton SAC

Petrifying springs are lime rich water sources which deposit tufa. The emerging spring water is rich in carbon dioxide and dissolved calcium carbonate. On contact with the atmosphere, carbon dioxide is outgassed and calcium carbonate is deposited as tufa. The resulting ecological conditions, with high pH and constant inundation by water and deposition of precipitated calcium carbonate, constitute a challenging environment for plants and animals to colonise and the communities associated with petrifying springs are therefore highly specialised. The ecological significance of petrifying springs is seldom confined to a point source; rather there is often a continuum of intergrading hydrological conditions from the spring head, through a flushed slope and into small streams.

Spring head may be distinct point locations giving rise to small streams immediately below the point of emergence or water may seep to the surface in a more diffuse pattern over a larger area (Lyons and Kelly, 2016).

Irish petrifying spring vegetation has been classified into eight plant communities. The spring vegetation at Louisa Bridge within Rye Water Valley/Carton SAC lies within Group 6: *Carex lepidocarpa* small sedge springs. This species-rich site contains a complex of springs, flushes and pools with paludal tufa, oncoids/ooids and marl. Tufa-forming springs and flushes are generally dominated by graminoid species, especially *Carex lepidocarpa C. panicea* and *Festuca rubra*, along with *Carex flacca, C. dioica, Eleocharis quinqueflora, Eriophorum angustifolium, Juncus articulatus* and *J. inflexus*. Bryophytes are abundant and locally dominant, with *Palustriella commutata, P. falcata, Scorpidium cossonii, Campylium stellatum, Fissidens adianthoides, Bryum pseudotriquetrum, Aneura pinguis* and *Riccardia chamedryfolia*. Forbs include *Anagallis tenella, Pinguicula vulgaris, Parnassia palustris, Samolus valerandi, Triglochin palustris, Crepis paludosa, Mentha aquatica* and *Succisa pratensis* (Lyons and Kelly, 2016).

The main area of petrifying springs with tufa formation within Rye Water Valley/Carton SAC is at Louisa Bridge and is estimated to have an area of 1250m^2 (Lyons, 2015). This seepage complex is irrigated by two independent spring systems which differ in the chemical composition of the spring waters (Lyons, 2015; Lyons and Kelly, 2016). The separate water sources comprise a deeper, older and warmer artesian groundwater system with high concentrations of sodium and chloride, and a more recent, shallow alkaline groundwater system (Kuczynska and Bartley, 2008). The water from the two sources mixes as it trickles down the hillside towards the Water River, creating a series of shallow pools and paludal habitats (Lyons, 2015).

At Louisa Bridge, the main vegetation community was long stalked yellow sedge (*Carex lepidocarpa)* small sedge springs (NPWS, 2021). Two indicators of local distinctiveness were present, narrow mouthed whorl snail and Desmoulin's whorl snail. These are also QI species of this SAC and are described below.

3.1.2 Qualifying interest species – Rye Water Valley/Carton SAC

Desmoulin's whorl snail

Desmoulin's whorl snail is known from one site in Rye Water Valley/Carton SAC, at Louisa Bridge (NPWS, 2021). All whorl snails favour damp or wet habitats where they live mostly in moss, leaves and decaying vegetation. They live on living and dead stems and leaves of tall wetland plants and feed on bacterial films and decaying vegetation. They require tall, structured vegetation containing tall riparian grasses and sedges, particularly reed sweet grass, common reed, greater pond sedge and *Cladium*. Sites are usually at the end of hydroseral succession and unmanaged, allowing the build-up of litter. As well as tall vegetation structure it requires stable hydrology with the water table at or slightly above the ground surface for much of the year and low amplitude seasonal flooding. It climbs tall vegetation in the summer autumn but in severe conditions aestivates on the lower leaves of plants. In winter it descends to the leaf litter and becomes less active (NPWS, 2019c).

Narrow-mouthed whorl snail

Narrow mouthed whorl snail was last recorded at Rye Water Valley/Carton SAC in 1997, within the same 1km grid square as Desmoulin's whorl snail, N9936. Further work is required to definitively establish the status of the species at this SAC (NPWS, 2021). All whorl snails favour damp or wet habitats where they live mostly in moss, leaves and decaying vegetation. They feed on bacterial films and decaying vegetation. They are sensitive to changes in hydrology and dampness of the habitat. Habitats they occupy include dunes, damp grassland, fen and marsh, salt marsh and flood plain. Occupied habitats may be elongated narrow zones in wetlands or extensive dune and coastal grassland sites (NPWS, 2019c).

3.1.3 Aquatic Environment

Waterbodies (WB) crossed by the Proposed Development with connectivity to Rye Water Valley/Carton SAC are shown in Table 3.1 Waterbodies crossed by the Proposed Development with connectivity toand in Figure 2 (321084AH-JAC-ZZ-XX-DR-K-3037), Appendix B.

Table 3.1 Waterbodies crossed by the Proposed Development with connectivity to the Rye Water Valley/Carton SAC

Waterbody number (WB)	Waterbody name (WFD)	Waterbody location – Grid reference	EU Code	WFD status 2016 - 2021	Risk rating
WB03	Rye Water_030	N 93930 45180	IE_EA_09R010400	Poor	At risk
WB04	Jenkinstown Stream_010	N 91730 45313	IE_EA_09J010950	Moderate	At risk
WB07	Jenkinstown Stream_010	N 89775 43468	IE_EA_09J010950	Moderate	At risk
WB08	Jenkinstown Stream_010	N 89661 43153	IE_EA_09J010950	Moderate	At risk
WB09	Unassigned stream	N 89419 43023	Unassigned stream	Unassigned stream	Unassigned stream
WB10	Rye Water_020 (Brides Stream)	N 89243 42178	IE_EA_09R010300	Good	Under review
WB12	Rye Water_010	N 88410 40767	IE_EA_09R010300	Good	Under review
WB13	Rye Water_010	N 88065 40613	IE_EA_09R010100	Moderate	At risk
WB14	Royal Canal	N 87874 40210	IE_09_AWB_RCMLE	Good	Under review

A number of drainage ditches, some wet and some dry at time of survey, were identified predominantly along field boundaries in the vicinity of the scheme.

4. Description of the Proposed Development

4.1 Construction

The Proposed Development is a 52.9km underground cable (UGC) between Dunstown substation in Kildare and Woodland substation in Meath (as shown in Image 1), of which 9.5km (18%) is off-road and 43.3km (25%) is in-road. The 400 kV UGC is proposed to be sited within the existing roads and will be in a trench excavated to 1.3m deep and 1.5m wide running the full length of the scheme. Approximately every 750m (on average) the cables will be joined together at a 'joint bay', of which there will be 70 in total. Joint bays are pre-cast concrete underground chambers approximately 2.5m wide by 10m long by 2m deep with two associated manhole covers to the side of the chamber. There are 31 off-road and 39 in-road joint bays. Where the joint bays are off road a permanent hard standing area in a 3m radius around the joint bay will be provided. At joint bays, there will be additional land take to facilitate construction. At each joint, except for those which are off-road, there will be provision for cars to pass around it at a passing bay. Passing bays are temporary structures, which may be in place for up to two years. Each temporary passing bay will be on average 5.5m wide with length of 100m (exact length to be determined by engineering constraints). Passing bays will be reinstated post-construction.

The routing of the cable and associated jointing and passing bays took into consideration the location of mature trees along the route. The route and bay positions were moved to avoid mature trees where possible. However, due to narrow treelined roads in several locations and the requirement for set distances between jointing bays, avoidance of vegetation loss was not possible in all areas and to accommodate the trenches for the UGC there will need to be significant removal of hedgerows, trees, including mature trees, which are lining the road network where the development is proposed to be. The other habitats which are impacted to the greatest extent by area comprise arable and pastural land, dry calcareous grassland, immature woods at the north of the scheme at Woodland substation. Refer to the Planning and Environmental Considerations Report (Jacobs, 2023) for further details of these habitats.

Six temporary construction compounds are proposed, each approximately one hectare in size. All temporary construction compounds will be secured with hoarding/ fencing around their perimeter as appropriate. Temporary construction compounds will include facilities such as construction phase car parking and welfare facilities and temporary material storage areas as necessary.

Access tracks comprise both temporary and permanent tracks. Where a permanent access track is required to access off-road joint bays, this will comprise of approximately 300mm of fill material and finished to approximately 100mm above ground level. The access track will remain in place to allow access to cables should future maintenance works be required. The permanent access track will be designed and constructed to accommodate heavy plant (5t axel loading) movement. Where a temporary construction road is required, engineering stone fill will be laid and compacted and maintained as required for the duration of the works. Once the works are completed, the engineered stone fill will be removed, and the land will be reinstated to its original condition.

Horizonal directional drilling (HDD) is proposed at major watercourse crossings or where there are significant constraints. There will be a 'launch' and 'reception' pit either side of the drilling and those temporary HDD compounds will be within the planning application boundary. There are six HDD proposed along the cable route including at Rye Water (WB13) which is approximately 6km direct distance over land and approximately 8km hydrologically, at the closed point.

Programme and Timing of Works

Subject to the grant of statutory approvals, it is anticipated that the construction phase will commence in Quarter 2, 2025 with the underground cable element of the Proposed Development becoming fully operational after construction and testing in Quarter 3, 2028.

The works at the Woodland substation are expected to last approximately 24 months while the works at Dunstown substation are expected to last approximately 12 months and will run concurrently with the cabling works.

Construction activities will gradually phase out from pre-construction to predominantly civil activities followed by commissioning and testing.

In general, it is anticipated that construction will occur during normal working hours i.e. Monday to Friday 7 am to 7 pm and Saturday from 7 am to 2 pm. There may be localised instances where night-time working is required to facilitate traffic management, however, should working outside these hours / days be required they will only be undertaken with prior agreement with Meath and Kildare County Councils.

Clearance of hedgerow, treeline or scrub vegetation, where required, will take place after 31 August and before 1 March in order to protect breeding birds, (i.e. outside of the bird breeding season). Clearance may take place during the restricted period, if a suitably qualified ecologist has determined that nesting birds and other protected species are absent. Enabling works have been provisionally programmed for Q1 2025.This allows sufficient time for habitat clearance outside of the breeding season. This would increase the construction period to 45 months if it is required.

Any element of the scheme requiring instream works in watercourses with fisheries value will be restricted to the fisheries open season (i.e. will only take place during the period July to September), unless with the agreement of IFI.

Table 4.1 Indicative Preliminary Construction Programme

Description	Est. Construction Programme (Months)	2025				2026				2027				2028			
		Q 1	Q 2	Q 3	Q 4	Q 1	Q 2	Q 3	Q 4	Q 1	Q 2	Q 3	Q 4	Q 1	Q 2	Q 3	Q 4
Proposed Development - Construction Duration																	
Overall Construction Duration	42																
Enabling Works	1 or 2 months*																
Phase 1: Installation of joint bay and passing bays structures	36																
Phase 2: Excavation and installation of cable ducts	24																
Phase 3: Installation and Jointing of Cables	21																
Substation works	24																
Testing & Commissioning	9																
Energisation and permanent works construction complete	3																

*Enabling works have been provisionally indicated in Q1 2025 if required to allow for habitat clearance outside of the nesting season.

Indicative durations for the proposed works are detailed in Table 4.1. Subject to the grant of consents, it is anticipated that installation of the underground cable will take approximately 42 months in total. Safety requirements for the installation operations / procedures, detailed design considerations and weather condition will however ultimately dictate the final programme.

The majority of the construction activities are not dependent on outages on the existing transmission system, however, specific activities associated with the connection at the existing Woodland and Dunstown substations on to the existing transmission infrastructure will be planned and programmed into EirGrid's multi-year outage programme. This is because the existing live infrastructure needs to be switched off during such connection activities. EirGrid, as Transmission System Operator, develops a detailed plan for such outages each year to ensure the undertaking of the safe and efficient construction and maintenance activities involving or in proximity to existing infrastructure.

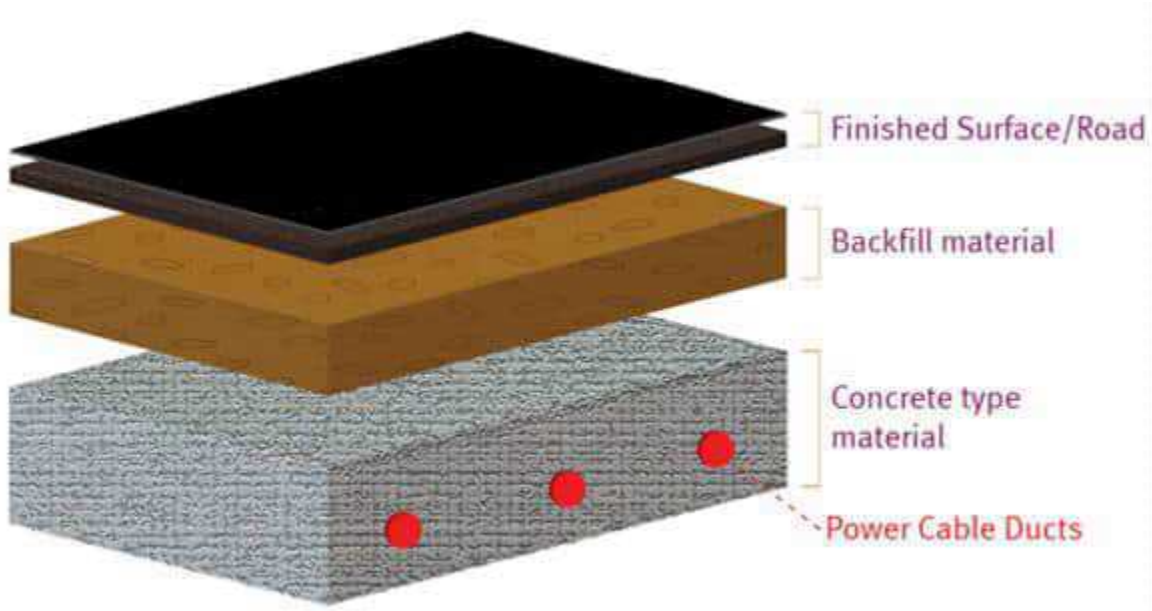

Image 3. Proposed Cable Design

The width and depth of the cable trench can vary for crossing of watercourses or crossings of utilities and other technical reasons.

4.1.1 Watercourse crossings

Several watercourse crossings will be required along the cable route. These crossings will be facilitated by either horizonal directional drilling (HDD) or open cut trenches, both of which are described in Section 6.3.

HDD, also known as directional boring, is a minimal impact trenchless method of installing underground utilities, including cables, in a relatively shallow arc along a prescribed underground path using a surface-launched drilling rig. HDD offers environmental advantages over open trench excavations and is used when conventional trenching is not practical or when minimal surface disturbance is required. Competent specialist contractors will be appointed to undertake the work.

Open cut trenches at water crossings have the potential to generate silt and suspended solids. In agreement with Inland Fisheries Ireland (sixteen) watercourses will be crossed using open cut trenching. To reduce the risk of discharging sediment, it is proposed to carry out all these works in a dry works area. The dry works area will be isolated by installing an impermeable barrier between the watercourse and the works area. The impermeable barrier will be tailored to the watercourse in question. If required by IFI, in-stream trenching works will not be carried out during extreme rainfall or high flow events. Met Éireann provides a 5-day weather forecast via its website (www.met.ie) and works will not take place during yellow, orange and red weather warnings. Unless otherwise agreed with IFI, any element of the works requiring in-stream trenching works will be restricted to the fisheries open season (i.e., restricted to July to September inclusive). Further details are described in Section 6.3.1.

5. Conclusion of Screening for Appropriate Assessment

An AA Screening report was prepared for the Proposed Development (Jacobs 2023b) and is summarised below. The assessment of likely significant effect is summarised in Table 5.1. Following a review of the relevant information including the nature of the Proposed Development, the surveys were carried out (shown in Table 2.1) and the likelihood of significant effects on any European site and applying the precautionary principle it is the professional opinion of the authors that on the basis of objective information it was not possible to exclude that the Proposed Development would have a significant effect on the following European site, either alone or in combination with other plans or projects:

- Rye Water Valley/Carton SAC (Site code 001398).

It was therefore recommended that a Stage 2 Appropriate Assessment (AA) of the Proposed Development be undertaken by a competent authority, informed by a Natura Impact Statement. The AA is required to determine if the Proposed Development could have adverse effects on the integrity of Rye Water Valley /Carton SAC either alone or in-combination with other plans or projects, considering the sites' conservation objectives. The information presented in the NIS should provide sufficient information for the relevant competent authority to carry out the AA.

The connectivity of all water crossings of the Proposed Development to European sites was assessed using Environmental Protection Agency maps (https://gis.epa.ie/EPAMaps/). The watercourses which have connectivity to Rye Water Valley/Carton SAC are shown in Table 5.2.

Table 5.1: European sites with the potential for LSEs from the Proposed Development

European site name and code	Distance of site from projects	Conservation Objectives and Qualifying Interests	Pathway	Potential for Likely Significant Effects (LSEs)
Special Area of Conservation (SAC)				
Rye Water Valley /Carton SAC (Site code 001398) v1. NPWS (2021)	Nearest distance as the crow flies is 6.2km (see table 5.2 below) The shortest hydrological distance between the Proposed Development and this SAC is 8.15km,	**Conservation Objectives** To restore to favourable condition the SAC's QI, as listed below: **Annex I habitat** Petrifying springs with tufa formation (Cratoneurion) [7220] **Annex II species:** Narrow mouthed whorl snail (*Vertigo angustior*) [1014] Desmoulin's whorl snail (*Vertigo moulinsiana*) [1016]	Water pollution	Yes. Site screened in for all the QI features due to their potential to be impacted by a pollution event at water crossings with connectivity to the SAC.

Table 5.2. Watercourse crossings along the Kildare to Meath Proposed Development with hydrological linkage to Rye Water Valley/Carton SAC (identified using water features tab on EAP maps and shown in Figure 2 (321084AH-JAC-ZZ-XX-DR-K-3037), Appendix B).

Waterbody number (WB)	Waterbody name (WFD)	Waterbody location – Grid reference	EU Code	Chainage	Type of water crossing
WB03	Rye Water_030	N 93930 45180	IE_EA_09R010400	3615	Diversion from in-road to off-road trench
WB04	Jenkinstown Stream_010	N 91730 45313	IE_EA_09J010950	6000	Diversion from in-road to off-road trench
WB07	Jenkinstown Stream_010	N 89775 43468	IE_EA_09J010950	10700	Diversion from in-road to off-road trench
WB08	Jenkinstown Stream_010	N 89661 43153	IE_EA_09J010950	111880	Diversion from in-road to off-road trench
WB09	Unassigned stream	N 89419 43023	Unassigned stream	11400	Diversion from in-road to off-road trench
WB10	Rye Water_020 (Brides Stream)	N 89243 42178	IE_EA_09R010300	12370	Diversion from in-road to off-road trench
WB12	Rye Water_010	N 88410 40767	IE_EA_09R010300	14400	Diversion from in-road to off-road trench
WB13	Rye Water_010	N 88065 40613	IE_EA_09R010100	15050	HDD
WB14	Royal Canal	N 87874 40210	IE_09_AWB_RCMLE	15400	HDD

6. Information for Appropriate Assessment

6.1 Rye Water Valley/Carton SAC

6.1.1 Summary of European site

Rye Water Valley/Carton SAC is located between Leixlip and Maynooth, in Counties Meath and Kildare, and extends along the Rye Water, a tributary of the River Liffey. The conservation importance of the site lies in the presence of two Annex II snail species, and the presence of petrifying springs, a habitat type listed on Annex I of the E.U. Habitats Directive. Further information on the European site is presented in Section 3.1.

6.1.2 Qualifying Interests potentially exposed to risk

6.1.2.1 Petrifying Springs

Petrifying springs are springs that typically form small calcareous or 'tufa' deposits. On contact with the atmosphere at the spring head, carbon dioxide is lost from calcium saturated water to the atmosphere or is depleted by the photosynthetic activities of plants. This results in the precipitation of a calcium carbonate marl or tufa. Seepage flow rates are crucial for the development of tufa. Further information on the petrifying springs at Rye Water Valley/Carton SAC is presented in Section 3.1.2.

6.1.2.2 Desmoulin's whorl snail

Desmoulin's whorl snail is known from one site in Rye Water Valley/Carton SAC, at Louisa Bridge (NPWS, 2021). All whorl snails favour damp or wet habitats where they live mostly in moss, leaves and decaying vegetation. They live on living and dead stems and leaves of tall wetland plants and feed on bacterial films and decaying vegetation. Further information on Desmoulin's whorl snail at this SAC is presented in the baseline, Section 3.1.3.

6.1.2.3 Narrow-mouthed whorl snail

Narrow mouthed whorl snail was last recorded at Rye Water Valley/Carton SAC in 1997, within the same 1km grid square as Desmoulin's whorl snail, N9936. Further work is required to definitively establish the status of the species at this SAC (NPWS, 2021). Further information on narrow-mouthed whorl snail at this SAC is presented in the baseline, Section 3.1.3.

6.1.3 Conservation status of Qualifying Interests of Rye Water Valley/Carton SAC

The conservation status of Rye Water Valley/Carton SAC QI at national level, key conditions underpinning favourable conservation status, attributes and threats to key conditions are presented in Table 6.1. The overall aim of the Habitats Directive is to maintain or restore the favourable conservation status of Annex I habitats and Annex II species of community interest for which the site has been designated.

Table 6.1: Conservation status and key conditions of Qualifying Interests of Rye Water Valley/Carton SAC potentially exposed to risk (NPWS 2019a; NPWS, 2019b, NPWS 2019c and NPWS 2021).

QI	National Conservation Status (NPWS 2019a and b)	Site Level Status (NPWS 2021)	Key conditions supporting favourable conservation status	Main pressures and threats	Mapping available for QI
Annex I habitat Petrifying springs with tufa formation (Cratoneurion) [7220]	Inadequate	Unknown	Permanent irrigation from upwelling groundwater	Abandonment of grassland management Over and/or under grazing Roads, paths railways Recreation/human disturbance Mixed source pollution to surface and groundwaters Drainage Modification of hydrological flow Natural succession	Yes Ireland distribution shown in NPWS 2019b, page 893. Location of petrifying springs within Rye Water Valley/Carton SAC shown in NPWS, 2021.
Annex II species: Narrow mouthed whorl snail (*Vertigo angustior*) [1014]	Inadequate	Unknown	Stable overall hydrological conditions. Permanently moist litter providing humid conditions, shaded by herbaceous or grassy vegetation but in overall open condition. Habitat must not be subject to inundation. In damp or wet habitat, this species is associated with decaying vegetation in the litter layer or damp moss in open unshaded habitats, where the openness is maintained by wetness or grazing levels.	Abandonment of grassland management Over and/or under grazing Recreation/human disturbance Development of recreational infrastructure	Yes Ireland distribution shown in NPWS 2019c, page 182 Location within Rye Water Valley/Carton SAC shown in NPWS, 2021.
Desmoulin's whorl snail (*Vertigo moulinsiana*) [1016]	Inadequate	Unknown	Stable overall hydrological conditions. Tall growing vegetation such as tall Carex species, sometimes with black bog rush, common reed. Wet habitat – water rises under light pressure. Prefers calcareous habitat. Water table at or slightly above the ground surface and low seasonal flooding. Dispersal	Natural succession resulting in species composition change Abiotic natural processes (e.g., erosion, drying-up, salinization) Abandonment of management Over and/or under grazing	Yes Ireland distribution shown in NPWS 2019c, page 197. Location within Rye Water Valley/Carton SAC shown in NPWS, 2021.

QI	National Conservation Status (NPWS 2019a and b)	Site Level Status (NPWS 2021)	Key conditions supporting favourable conservation status	Main pressures and threats	Mapping available for QI
			requires water-borne transportation		

To determine how the project would affect Rye Water Valley/Carton SAC's QIs, this assessment has focused on the effects that may possibly occur that could undermine the conservation objectives for the site. Table 6.1 shows the QI habitat and species and associated conservation objectives of relevance to the Proposed Development. One QI habitat, i.e., petrifying springs, and two QI species i.e., narrow mouthed whorl snail and Desmoulin's whorl snail potentially exposed to risk from the Proposed Development.

Locations of QI features within Rye Water Valley/Carton SAC 001398 (Conservation Objectives Series, NPWS 2021, v1), all of which are downstream of the hydrological connection to the Proposed Development:

- Petrifying springs are found near to Lousia Bridge, with an area estimated to be 1250m^2. Further unsurveyed areas may be present in the SAC. These petrifying springs have a hydrological distance of 14.29km from the Proposed Development (WB13)

- Narrow-mouthed whorl snail was last recorded at one site near Louisa Bridge within the 1km grid square N9936. It was not found in 2006, 2010 or 2016 (NPWS, 2021). Louisa Bridge has a hydrological distance of 14.52 to the Proposed Development (WB13)

- Desmoulin's whorl snail is known from one site in the SAC at Louisa Bridge, within the 1km grid square N9936. It was last recorded in 2018 (Long and Brophy, 2019). Louisa Bridge has a hydrological distance of 14.52 to the Proposed Development (WB13)

6.1.4 Conservation objectives

The overall aim of the Habitats Directive is to maintain or restore the favourable conservation status of annexed habitats and annexed species for which an SAC has been designated. To determine how the project would affect the SAC's QIs, this assessment has focused on the effects that may possibly occur that could undermine the conservation objectives for the habitats and species.

The conservation objectives for the Rye Water Valley/Carton SAC (NPWS, 2021) are as follows:

- To restore the favourable conservation condition of petrifying springs with tufa formation (*Cratoneurion*);
- To restore the favourable conservation condition of narrow-mouthed whorl snail; and
- To maintain the favourable conservation condition of Desmoulin's whorl snail.

Conservation objective attributes and targets for Rye Water Valley SAC 001398 v1 are shown in Table 6.2. In this table, those attributes and targets directly related to water quality and flow are considered to have potential to undermine the conservation objectives. In contrast, those attributes and targets not directly related to water quality and flow are considered not to have the potential to undermine the conservation objectives.

Table 6.2: Conservation objective attributes and targets for Rye Water Valley SAC 001398 v1 (NPWS, 2021). Light green fill indicates potential to undermine the conservation objective of the QI.

QI	Attribute/ target	Potential to undermine conservation objectives
Petrifying springs with tufa formation	Habitat area: area stable or increasing	No. The proposed water crossings will not have an impact on the water supply to the petrifying springs.
	Habitat distribution: no decline, subject to natural processes	Yes. The Proposed Development must avoid pollution of connecting watercourse crossings to avoid any potential changes to natural processes at the SAC.
	Hydrological regime: maintain appropriate hydrological regime	No. The Proposed Development will not alter the flow regime to the petrifying springs.
	Water quality: maintain nitrate levels at less than 10mg/l; restore phosphate level to less than 15µg/l	No. This attribute relates to fertiliser run-off from agriculture, so is not specifically relevant to the SAC. However, to maintain water quality, the Proposed Development must not pollute the watercourse.
	Vegetation composition; community diversity: maintain variety of vegetation communities, subject to natural processes.	Yes. The Proposed Development has the potential to affect natural process by polluting connecting waterbodies from bentonite/drilling fluid break-out and/or sediments entering the connected waterbodies.
	Vegetation composition, positive/negative indicator species	No. Works will not affect botanical diversity.
	Vegetation composition: algal cover less than 2%.	No. This attribute relates to fertiliser run-off from agriculture, so is not specifically relevant to the SAC
	Vegetation structure: sward height	No. Works will not affect sward height at SAC.
	Physical structure: trampling/dung	No. Works will not affect livestock at SAC.
	Indicators of local distinctiveness	Yes. Distinct flora and fauna have the potential to be impacted by changes in water quality.
Narrow mouthed whorl snail	Distribution: no decline in number of 1km squares this species occupies in the SAC	Yes. The Proposed Development has the potential to change the snail's distribution in the event of a pollution event in hydrologically connected waterbody.
	Occurrence in suitable habitat: restore to self-sustaining population	Yes. The Proposed Development has the potential to change the occurrence in suitable habitat in the event of a pollution event in a hydrologically connected waterbody.
	Habitat area: restore area of suitable habitat, subject to natural processes	Yes. The Proposed Development has the potential to change the habitat area suitable for this snail in the event of a pollution event in a hydrologically connected waterbody.
	Habitat quality: water levels: restore suitable hydrological regime subject to natural processes	No. The Proposed Development will not alter the hydrological regime.
Desmoulin's whorl snail	Distribution: no decline in number of 1km squares this species occupies in the SAC	Yes. The Proposed Development has the potential to change the snail's distribution in the event of a pollution event in hydrologically connected waterbody.
	Occurrence in suitable habitat: no decline, subject to natural processes.	Yes. The Proposed Development has the potential to change the occurrence in suitable habitat in the event of a pollution event in a hydrologically connected waterbody.

QI	Attribute/ target	Potential to undermine conservation objectives
	Density within habitat: no decline, subject to natural processes.	Yes. The Proposed Development has the potential to change the density of snails in suitable habitat in the event of a pollution event at a hydrologically connected waterbody.
	Habitat area: area of suitable habitat stable or increasing, subject to natural processes.	Yes. The Proposed Development has the potential to change the area of suitable habitat for this snail in the event of a pollution event in a hydrologically connected waterbody.
	Habitat quality: occupied patches in at least sub-optimal condition: no decline, subject to natural processes.	No. The Proposed Development has no potential to change the sub-optimal condition of the site.
	Habitat quality; soil wetness: no decline subject to natural processes.	No. The Proposed Development has no potential to change the flow regime and therefore the soil wetness.

6.2 Appraisal of potential impacts on Rye Water Valley/Carton SAC

The following section assesses the potential for a pollution event at waterbodies crossed by the Proposed Development to affect the conservation objectives of Rye Water Valley/Carton SAC due to potential impacts on its three QI.

6.2.1 Petrifying springs with tufa formation

6.2.1.1 Potential impact – potential for pollution event at watercourse crossings

Details of the two methods used for watercourse crossings is given in Section 4.1.1. Given the large size of the cable and considering the excavation works required, there is the potential for a pollution event at these watercourse crossings by either in-stream trenching releasing sediments or sediment laden run-off. All the waterbodies in Table 5.2 flow into Rye Water which subsequently flows through Rye Water Valley SAC. At the location of HDD launch and reception sites the sediment is also likely to contain oils and chemicals from the drilling rig at Rye Water, WB13. There is potential for bentonite/drilling fluid breakout from the drilling process to contaminate Rye Water at WB13.

The following three attributes of petrifying springs are considered to relate directly to water quality, which in the absence of mitigation, have potential to adverse effects on this QI. Source pollution to surface and ground waters is listed as a 'high' pressure and a 'high' threat, see Table 6.1 and (NPWS, 2019b).

- Pollutions of surface water is considered to have the potential to alter the spring's distribution as petrifying springs depend on permanent irrigation from upwelling groundwater from natural processes. A pollution event would not be a 'natural process' and would temporarily affect its water quality.
- Pollution of surface water is considered to have the potential to alter the vegetation composition because the plants at the petrifying springs are highly specialised and therefore sensitive to water pollution.
- Pollution of surface water is considered to have the potential to cause a decline in distribution or population size of distinct flora and fauna due to its sensitivity to water quality.

6.2.2 Narrow mouthed whorl snail

6.2.2.1 Potential impact – potential for pollution event at watercourse crossings

For the same reasons as petrifying springs in Section 6.2.1.1, where a watercourse connects to the Rye Water (Table 5.2), in the absence of mitigation there is potential for pollutants (e.g., oil and fuel spillage, drilling fluid) to be subsequently transported to Rye Water Valley/Carton SAC since Rye Water flows through it.

Narrow mouthed whorl snail was last recorded at Rye Water Valley/Carton SAC in 1997. Using the precautionary principle, this snail is assumed to be present within the same 1km as it was last recorded. The following three attributes of narrow mouthed whorl snail i.e., distribution, occurrence in suitable habitat, and habitat area relate directly to water quality and are considered, in the absence of mitigation, to have potential to have adverse effects on this QI. Pollution is not included as a pressure or threat to this species in NWPS's species assessment (2019c), although this species is an indicator of local distinctiveness for which one the conservation objective attributes is 'no decline in distribution or population size of rare threatened or scarce species associated with the habitat AND to maintain features of local distinctiveness, subject to natural processes (NPWS, 2021).

- Pollution of surface water is considered to have the potential to alter distribution of this species because it feeds on bacterial films and decaying vegetation in moss, leaves, and decaying vegetation. Pollution of these food sources by surface water could affect the snail's ability to feed.

- Pollution of surface water is considered to have the potential to affect the occurrence of this species because the snail's food supply could become contaminated and inedible, thus causing the snail to starve.

- Pollution of surface water is considered to have the potential to affect the habitat area suitable for this species by contaminating the area supporting it.

6.2.3 Desmoulin's whorl snail

6.2.3.1 Potential impact – potential for pollution event at watercourse crossings

For the same reasons as presented for petrifying springs in Section 6.2.1.1, where a watercourse connects to the Rye Water (Table 5.2), in the absence of mitigation there is potential for pollutants (e.g., oil and fuel spillage, drilling fluid) to be transported to the SAC since Rye Water flows through it.

Four attributes of Desmoulin's whorl snail i.e., distribution, occurrence in suitable habitat, density within habitat and habitat area are considered to relate directly to water quality and are considered, in the absence of mitigation, to have potential to have adverse effects on this QI. Pollution is not included as a pressure or threat to this species in NWPS's species assessment (2019c), although this species is an indicator of local distinctiveness for which one the conservation objective attributes is 'no decline in distribution or population size of rare threatened or scarce species associated with the habitat AND to maintain features of local distinctiveness, subject to natural processes (NPWS, 2021).

- Pollution of surface water is considered to have the potential to alter distribution of this species because it feeds on bacterial films and decaying vegetation in moss, leaves, and decaying vegetation. Pollution of these food sources by surface water could affect the snail's ability to feed.

- Pollution of surface water is considered to have the potential to affect the occurrence of this species because the snail's food supply could become contaminated and inedible, thus potentially causing the snail to starve.

- Pollution of surface water is considered to have the potential to affect the occurrence of this species because the snail's food supply could become contaminated and inedible, thus causing the snail to starve.

- Pollution of surface water is considered to have the potential to affect the density of the species within the habitat by contaminating the area supporting it and affecting its ability to feed and breed.

6.2.3.2 Potential impact – potential for pollution event

The details of the construction operations require for cable crossing at watercourse crossing were unknown at the time of writing this NIS. However, given the large size of the cable and considering the excavation works required, there is potential for a pollution event at these watercourse crossings. For the same reasons as for petrifying springs, narrow mouthed whorl snail, and Desmoulin's whorl snail, where a watercourse connects to Rye Water (Table 5.2), in the absence of mitigation there is potential for pollutants (e.g., oil and fuel spillage, drilling fluid) to be transported to the SAC since Rye Water flows through it.

6.3 Mitigation measures

6.3.1 Ecological Clerk of Works

An on-site Ecological Clerk of Works will be on site for any works deemed sensitive i.e. within or in proximity to protected European sites or watercourses linked to such sites. Where sensitive habitats or species could be impacted the ECoW will be on site to implement all mitigation measures as described below. The ECoW will demonstrate experience and will be a member of a profession body such as CIEEM or similar.

The ECoW will oversee implementation of the mitigation by the Contractor, and advise of adaptive mitigation where required

6.3.2 Pollution

Potential pollution impacts from construction are via the following pathways: transport of pollutants into Rye Water Valley/Carton SAC from watercourses crossed by the Proposed Development either by in-stream trenching or HDD. Considering the potential for effects resulting from pollution and sediment laden run-off, control measures have been developed to ensure that the activities do not adversely impact upon the surface water environment. Measures to mitigate pollutants entering the watercourse during construction of the Proposed Development, and potentially affecting the QI of the site, are outlined below.

Measures set out herein will be implemented to ensure that there will be no pollution of surface water during the undertaking of the Proposed Development. The measures will be incorporated into the contractor's Construction Environmental Management Plan (CEMP) and the CEMP will be developed in accordance with the following guidance documents:

- CIRIA C532: Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors (Masters-Williams *et al.*, 2001);
- CIRIA C648 Control of Water Pollution from Linear Construction Projects: Technical Guide (Murnane *et al.*, 2006a);
- CIRIA C649 Control of Water Pollution from Linear Construction Projects: Site Guide (Murnane *et al.*, 2006b);
- CIRIA C692: Environmental Good Practice on Site (Audus *et al.*, 2010);
- Guidelines for the Crossing of Watercourses during the Construction of National Road schemes (NRA, 2005); and

<u>Horizontal Directional Drilling</u>

The launch and reception pits for the drilling rig require the temporary installation of a level hardstanding area on a geotextile base. A pilot hole will be drilled from one side of the crossing to the other side while supporting the bored hole with bentonite. The drill bit will be oriented by the surveyor, and the driller will push the drill string into the ground to maintain the bore path. A steering system will be used by the surveyor to navigate the bores.

The drilled cuttings will then be flushed back by the drill fluid flowing via nozzles in the drill bit, to the surface, where they will be separated from the fluid fraction for disposal. A comprehensive closed-loop drilling fluid mixing

and circulation system with recycling capability will be utilised to minimise the volume of fluids required on site. As there is potential for bentonite break out to contaminate Rye Water (WB13), mitigation for this will be needed (see below).

Open-cut trenches at watercourse crossings

Open cut water crossings, in-stream trenching, have the potential to generate silt and suspended solids. To reduce the risk of discharging sediment into the watercourse, all these works will be carried out in a dry works area.

The dry works area will be isolated by installing an impermeable barrier between the watercourse and the works area. The impermeable barrier will be tailored to the watercourse in question. Techniques that will be employed include the use of inflatable dams, frame dams or, in smaller watercourses, sandbags (double-bagged and underfilled; containing only clean washed sand).

Water pumped from the dry works area will be treated using settlement tanks to remove sediment prior and allowed to filter back to the watercourse, rather than discharging directly back into the watercourse, thereby avoiding scouring. In consultation with Inland Fisheries Ireland (IFI), greater filtration of silt may be achieved prior to discharge, through proposed use of silt de-watering bags which trap silt and expel only clean water and can be left to biodegrade on riverbanks as a habitat enhancement measure.

Water will be conveyed over the isolated section of channel by pumping or the use of a temporary diversion. Where sufficient capacity is available, and there is no risk of excessive scour, the diversion will be within the footprint of the existing channel.

The existence of a temporary impermeable barrier within the channel, will have a direct impact on the cross section of the channel and is expected to give rise to localised changes in water depth, velocities, and sediment erosion / deposition.

Where in-stream trenching is proposed, site restoration works will be carried out following completion of the crossing, in agreement with IFI. These works will include riverbank stabilisation, gravel replacements etc. In all cases, the site will be restored post installation.

If required by IFI, in-stream trenching works will not be carried out during extreme rainfall or high flow events. Met Éireann provides a 5-day weather forecast via its website (www.met.ie) and works will not take place during yellow, orange and red weather warnings.

Unless otherwise agreed with IFI, any element of the works requiring in-stream trenching works will be restricted to the fisheries open season (i.e. restricted to July to September inclusive).

Mitigation for accidental pollution

Mitigation measures with respect to accidental pollution are focused on prevention and safeguarding the approach to the storage and handling of materials and managing vehicles during the temporary construction phase.

The following measures will be implemented on site for the storage of materials:

- No oil, diesel or other fuels will be stored outside of any construction compound location and will be at least 30 m from any watercourse, drainage ditch, or surface water drains.
- Spill kits and drip trays will be provided for all equipment and at locations where any liquids are stored and dispensed.
- Storage areas for solid materials, including waste soils, will be designed and managed to prevent deterioration of the materials and their escape (via surface run off or wind blow).
- Storage areas will be kept secure to prevent acts of vandalism that could result in leaks or spills.
- All containers of any size will be correctly labelled indicating their contents and any hazard warning signs.

The following measures will be implemented on site for the prevention of spills:

- Fuel tanks, drums and mobile bowsers (and any other equipment that contains oil and other fuels) will have a secondary containment, for example, double skinned tanks. All tanks, drums and mobile bowsers will be located in a sealed impervious bund with sufficient capacity to contain at least 25% of the total volume of the containers or 110% of the largest container, whichever is the greatest;
- Any discharges from temporary welfare facilities will be connected to a sealed holding tank to be emptied and disposed of off-site by a licensed contractor to an approved licensed facility, located in the wider area.
- Storage areas will be covered, wherever possible, to prevent rainwater filling the bunded areas;
- Fuel fill pipes will not extend beyond the bund wall and will have a lockable cap secured with a chain.
- Where fuel is delivered through a pipe permanently attached to a tank or bowser:
  - Any pipe will be fitted with a manually operated pump or a valve at the delivery end which closes automatically when not in use;
  - Any pump or valve will be fitted with a lock;
  - Any pipe will be fitted with a lockable valve at the end where it leaves the tank or bowser;
  - Any pipework will pass over and not through bund walls; tanks and bunds will be protected from vehicle impact damage;
  - Tanks will be labelled with contents and capacity information;
  - All valves, pumps and trigger guns will be turned off and locked when not in use. All caps on fill pipes will be locked when not in use.
- Suitable precautions will be taken to prevent spillages from equipment containing small quantities of hazardous substances (for example, chainsaws and jerry cans) including:
  - each container or piece of equipment will be stored in its own drip tray made of a material suitable for the substance being handled; and
  - containers and equipment will be stored on a firm, level surface.
- For deliveries and dispensing activities, it will be ensured that:
  - site-specific procedures are in place for bulk deliveries;
  - delivery points and vehicle routes are clearly marked; and
- Emergency procedures are displayed, and a suitably sized spill kit is available at all delivery points, and staff are trained in these procedures and the use of spill kits.

The following measures will be implemented to reduce the risk of fuel and oil leaks from vehicles and plant:

- Vehicles and plant provided for use on the site will be in good working order to ensure optimum fuel efficiency, and are free from leaks;
- All machinery will be fully compliant with the relevant standards and requirements to reduce the potential for leaks;
- Sufficient spill kits will be carried on all vehicles;
- Vehicles and plant will be regularly maintained to ensure that they are working at optimum efficiency and are promptly repaired when not in good working order;
- Vehicles and plant will not park near or over drains and will be washed in accordance with the commitments set out above; and
- Refuelling of vehicles and plant will be carried out on hard standing, using drip trays to ensure no fuel can contaminate the ground outside of the bunded areas.

The following measures will be implemented to reduce the risks associated with drilling fluid release:

- An Emergency Incident Response Plan will be developed in consultation with IFI. This will be provided to effectively address inadvertent releases of sediment through frac-outs, or other releases of sediment laden water from the project site. The plan shall clearly outline the steps that the contractor is to take in the event of a sediment release or other type of spill. The plan will clearly outline the steps involved to mitigate an inadvertent return or frac out after it occurs and should not rely solely on the contractor to take all necessary steps to minimize the impacts. Contingency Plans will include the provision of a vacuum truck, or alternative means of containing or cleaning up a sediment release, at the time of construction in sensitive areas. If vacuum trucks are to be utilized, they should be on-site during construction, and be ready to contain any spill, as it occurs, before it enters a surface water feature. If a sediment spill occurs within the watercourse, adequate isolation of the release will be provided to contain the sediment, and the vacuum truck be ready to remove the drilling fluid and any other frac out soil. Additional measures may include having a supply of products that can be used to stop a frac-out, such as 'Poly Swell', or equivalent. This product can be mixed into both water and filling mud to seal or fill fractures. All products used on site are to be environmentally safe. Frac mitigation wells may also be considered to relieve drilling pressures. The Contingency Plan should indicate if, and when, HDD activities are to resume;
- When using HDD, the drilled cuttings will then be flushed back by the drill fluid flowing via nozzles in the drill bit, to the surface, where they will be separated from the fluid fraction for disposal. A comprehensive closed-loop drilling fluid mixing and circulation system with recycling capability will be utilised to minimise the volume of fluids required on site;
- The shaft and borehole will be kept a minimum of 50m away from any watercourse where possible. However, given that the shaft will be kept as short as possible to reduce the risk of the drilling machine becoming stuck, it may not be possible to keep 50m from a watercourse. In this case a bunded area will be created around the temporary working space to prevent slurry washing into the SAC in the case of accidental release;
- Breakout will be mitigated through management of pressures;
- Use will be constantly monitored by the contractor through materials balance calculations, pressure monitoring in the lines and above ground visual assessment of the works. The pressure will be lowered, if necessary, to prevent a breakout. Any sudden drop in pressure which could indicate a bentonite breakout will result in immediate cessation of bentonite pumping;
- Appropriate drilling mud formulation and management for the conditions and appropriate drilling practices will be adhered to by the contractor at all times; and
- The contractor will prepare an emergency action plan (in-line with the measures presented in the CEMP for the Proposed Development) which will include containment, control and clean-up measures in the event of drilling fluid release into the environment. Containment measures include the installation of interception devices (e.g., silt fence, staked straw bales, sediment curtains, collection sumps).

The following methods will be implemented to maintain fish passage when dry cutting waterbodies:

- Map fish habitat prior to works;
- Remove fish removed prior to dewatering;
- Secure bunded area preventing fish entering works area;
- Use silt fencing and over pumping;
- Facilitate fish passage by using two flumes;
- Retain vegetation up/ downstream of works;
- Use a temporary access bridge across river to prevent workers walking across riverbed;
- Define the works area; and
- Compact bare earth to reduce run-off.

If silt laden run off is formed on site, the following measures will be implemented to prevent silt laden surface water flowing into surface water receptors

- Silt fences are required between works areas and water features to prevent potentially contaminated surface water run-off from works areas reaching the surface water feature.
- Silt fences will be installed downgradient of the potential source of the silt/ sediment;
  - The silt curtain will contain the area where silted waters are being generated and shall terminate on high ground;
  - They will be constructed using permeable filter fabric (Hy-Tex Terrastop silt fence or similar) rather than a mesh material;
  - The vegetated turves will be peeled back and not detached from the ground, the materials inserted and the turves replaced to hold the base in place;
  - The silt fence will be inspected regularly by the EcCoW and contractor during the working day and weekly during construction, and in particular following heavy rainfall;
  - Silt fences will remain in-situ until the vegetation on the disturbed ground is re-established;
  - The fence will not be pulled from the ground, but cut at ground level and the stakes/ posts removed;
  - Should water build up behind the fences, the sediment will settle to the bottom. Water can be released, but sediments will remain;
  - Two lines of silt fencing will be installed in sensitive areas. This will follow a judgement call by the ECoW; and
  - A record of its installation, inspection and removal must be maintained by the EcCoW

The following measures will be implemented to reduce risks associated with concrete pouring:

- A suitable risk assessment for wet concreting will be completed prior to works being carried out and this will include measures to prevent discharge of alkaline waste waters or contaminated storm water to the underlying subsoil.
- When working in or near the surface water and the use of introduced materials e.g. oil cannot be avoided, the use of alternative materials such as biodegradable oils shall be used.
- Placing of concrete in or near watercourses will be carried out only under the supervision of the Ecological Clerk of Works (ECoW)
- There will be no hosing of concrete, cement, grout or similar material spills into surface water drains. Such spills shall be contained immediately, and runoff prevented from entering the watercourse;
- Concrete waste and wash-down water will be contained and managed on-site to prevent pollution of all surface watercourses; and
- Washout from concrete lorries will not be permitted on-site and will only take place at the batching plant (or other appropriate facility designated by the manufacturer).
- Construction vehicles will be sent back to the construction compound for wash down as per CIRIA C648 recommendations.
- Silt fencing will be installed along watercourses adjacent where works are proposed, in some instances double silt fencing may be required. This includes areas where concrete pouring is to be undertaken and where there is a risk to European designated sites.

The following measures will be implemented to ensure reinstatement of land and vegetation to protect watercourses:

- For off-road surfaces, land will be reinstated to its baseline condition, in so far as possible. The reinstatement operation will start with restoration of the subsoil by scarifying / ripping it with flat lift rippers, pulled by a bulldozer to a minimum uniform depth of 300mm, with care taken to prevent

damage to field drainage and other services. The depth of ripping will be selected to scarify / loosen any material compacted during construction. In all cases the depth of ripping will exceed the depth of subsoil compaction. All surface stones and roots over 150mm in diameter will be picked up and removed. Re-grading subsoil using excavators / graders will be carried out and will include side slopes, where applicable;

- For off-road surfaces the spreading of subsoil and later topsoil will be carried out during favourable weather conditions when the soil is drier and more friable. The subsoil stockpiled for reinstatement will be pulled back from the fence line using excavators to allow bulldozers to push it evenly back across the corridor and leaving it generally level. Then the separately stockpiled topsoil will be pulled back from the fence line using excavators to allow bulldozers to push it evenly back across the corridor and leaving it generally level so as to present a neat and level appearance (the level of the trench area shall be the same as that of the undisturbed surrounding ground around one year after restoration is completed);
- For off-road surfaces, reseeding will then be carried out on completion of the topsoil spreading, if required. The rate of seeding, time and method of sowing, including the application of fertiliser will be undertaken in agreement with an experienced ecologist and will follow the regulations for the protection of watercourses (S.I. No. 40/2020 - European Union [Good Agricultural Practice for Protection of Waters] [Amendment] Regulations 2020) and guidance on reseeding (Teagasc, 2014);
- As part of the CEMP there will be a toolbox talk given to all site personnel to highlight any environmental sensitivities and the boundaries of sensitive habitats; and
- Post construction off road sites, the site will be revegetated.

7. In-combination assessment

To take account of in-combination effects, plans, and projects that are completed, approved but uncompleted, or proposed (but not yet approved) have been considered in the appropriate assessment (EC, 2001). Therefore, in the case of projects, only those that have been submitted for planning have been included. A search of the National Planning Application Database (NPAD) (DoHLGH, accessed March 2023) in the vicinity of the Proposed Development in the last five years has been undertaken to identify other projects that may result in cumulative impacts. The majority of recent planning applications in the vicinity of the Proposed Development are small scale domestic and commercial applications, whose codes and date of submission are shown below. The NIS contains information which the competent authorities, may consider in making its own complete, precise and definitive findings and conclusions and upon which it is capable of determining that all reasonable scientific doubt has been removed as to the effects of the Proposed Development, alone or in-combination with any other plan or project, on the integrity of the relevant European sites.

The planning applications that have been proposed or granted permission in the nearby vicinity which constitute significant works are presented below in Table 7.1. The majority of recent planning applications in the vicinity of the Proposed Development are small scale domestic and commercial applications.

Table 7.1 Plans and developments in the vicinity of the Proposed Development.

Planning ref.	Planning Authority	Project Description	Comment
N/A	Meath County Council	Meath County Development Plan 2021-2027. A Natura Impact Report was prepared (Scott Cawley, 2021) in support of The Meath County Development Plan 2021-2027. This report assessed potential impacts arising from the Meath County Development Plan 2021-2027 (Meath County Council, 2021). No adverse effects on site integrity were identified from the mitigated plan on any of the European sites identified within the ZoI or the vicinity of the Proposed Development. As such, no in-combination effects are anticipated between the Proposed Development and the Meath County Development Plan 2021-2027.	No in-combination effects are anticipated.
N/A	Kildare County Council	Kildare County Development Plan 2017-2023. A Natura Impact Report was prepared (CAAS, 2017) in support of the Kildare County Development Plan 2017-2023. This report assessed potential impacts arising from the Kildare County Development Plan 2017-2023 (Kildare County Council, 2017). No impacts were identified on any of the European sites identified within the ZoI or the vicinity of the Proposed Development. As such, no in-combination effects are anticipated between the Proposed Development and the NIS prepared in support of the Kildare County Development Plan 2017-2023.	No in-combination effects are anticipated.
N/A	Kildare County Development Plan 2023-2029	Kildare County Development Plan 2023-2029. A Natura Impact Report was prepared (Arup, 2022) in support of the Draft Kildare County Development Plan 2023-2029. This report assessed potential impacts arising from the Draft Kildare County Development Plan 2023-2029. The EirGrid	No in-combination effects are anticipated.

Planning ref.	Planning Authority	Project Description	Comment
		Transmission Development Plan 2020-2029 was included in the assessment. No impacts were identified on any of the European sites identified within the ZoI or the vicinity of the Proposed Development. As such, no in-combination effects are anticipated between the Proposed Development and the Kildare County Development Plan 2023-2029.	
N/A	EirGrid Grid Implementation Plan 2017-2022	The policies, objectives and projects within EirGrid's Grid Implementation Plan were screened for their potential to have Likely Significant Effects (LSEs) on European sites and five projects identified with the potential for LSE. These were assessed in the NIS for the plan. No impacts were identified on any of the European sites identified within the ZoI or the vicinity of the Proposed Development. As such, no in-combination effects are anticipated between the Proposed Development and the NIS prepared in support of the Grid Implementation Plan 2017-2022.	No in-combination effects are anticipated.
201143	Kildare County Council	Conditional permission granted for a proposed extension to a Distribution Centre of height 19 m to comprise of a: warehouse extension (approx. 11,82 m^2), main office extension over two storeys; dispatch and extension goods-in office over two storeys; new one storey transport office; and vehicle maintenance unit extension. The gross floor area of the premises will increase from 29,106 m^2 to 41,891 m^2, an increase of 12,785 m^2. Some demolition will be required. Additional new vehicle parking areas will be provided including a new HGV parking area located to the east of the Distribution Centre and a new additional car parking area to the south of the Distribution Centre, on the south side of the R148. Provision of 172 no. car parking spaces; 175 no. HGV trailer parking spaces; 27 no. tractor (HGV cab) parking spaces; and 128 no. bicycle parking spaces and associated infrastructure. The development will involve minor alterations to the existing entrance at R148 which will provide vehicular, pedestrian and cyclist access and egress to the Distribution Centre. An additional new vehicular, pedestrian and cyclist access and egress will be provided off R148 to a new car parking area to the south of the main Distribution Centre site. A pedestrian crossing over this road will be provided connecting the southern car park to the main site. The associated site and infrastructural works include provision for all landscaping works; boundary treatment; internal roads and footpaths; PV panels and electrical services. The Proposed Development will involve modifications to a previous permission - Planning Register Reference 02/1561.	An Environmental Impact Assessment Report (EIAR) and Natura Impact Statement (NIS) were submitted to the Planning Authority with the planning application (Scott Cawley, 2020). This NIS concluded that 'the Proposed Development will not adversely affect (either directly or indirectly) the integrity of any European site, either alone or in combination with other plants or projects and there is no reasonable scientific doubt in relation to this conclusion.

Planning ref.	Planning Authority	Project Description	Comment
		Project has hydrological connectively with Rye Water Valley /Carton SAC and lies 9.1km from it.	
20840	Kildare County Council	Conditional permission granted for the construction of a 5627 m^2 Specialist Packaging Single Storey High Level Manufacturing Facility with Three Storey Head office incorporating administration, sales, design, research and development departments, staff changing room, staff canteen, car parking, bicycle parking, ESB sub station, two storey services plant room, loading bay, entrance gates, pedestrian gate, building signage, landscaping, extension to existing estate service road and all associated siteworks on a site of 2.5672 ha. KCC (20840) does not cross a watercourse. The nearest watercourse to the Proposed Development is the Grand Canal which lies approximately 70 m to its east and has no connectivity with Rye Valley/Carton SAC.	No in-combination effects are anticipated.
18303023	Kildare County Council	Conditional permission granted for a strategic housing development (SHD) (ABP Decision) consisting of 125 no. new residential units. Provision of a total of 251 no. car parking spaces, including 228 no. spaces serving the residential units and 23 no. visitor spaces are dispersed throughout the scheme. The Proposed Development includes all ancillary and associated site and infrastructural works, including an extension of the access road permitted under KCC Reg Ref 15/848 (ABP Reg Ref PL09.246859) to provide pedestrian / cycle and vehicular access to the application site from the R448 Kilcullen Road. KCC (18303023) does not cross any watercourse and has no hydrological connectivity with Rye Valley/Carton SAC.	No in-combination effects are anticipated.
19305701	Kildare County Council	Conditional permission granted for a strategic housing development (SHD) (ABP Decision) involving the demolition of an existing dwelling and agricultural buildings on the subject site and the construction of a residential development of 314 no. dwellings, a crèche, and retail unit. Demolition of 1 no. existing single storey house required as well as derelict unroofed agricultural buildings. Ancillary landscape works with public lighting, planting and boundary treatments including re-grading / re-profiling of site where required as well as provision of cycle paths and pedestrian connections and landscaping integrated with Rathasker Road and pedestrian bridge over Yeomanstown Stream (also known as Rathasker Stream) required. Vehicular and pedestrian access from 2 no. existing access points from the constructed Devoy Link Road for Area A and use of existing entrance to Elsmore Phase 1 for Area	No in-combination effects are anticipated.

Planning ref.	Planning Authority	Project Description	Comment
		B (from the Devoy Link Road), 578 no. car parking spaces and 159 no. cycle parking spaces (including single storey bin / cycle stores) will be provided. KCC (19305701) has no connectivity with Rye Valley/Carton SAC.	
22837	Meath County Council	GDA Energy 4 Ltd Battery Storage Park- planning permission has been consented to a third party for an energy park to the north of the existing Woodland substation The Proposed Development is immediately adjacent to the Proposed Development. An AA screening report has been submitted as part of that application and has concluded that there are no likely significant effects for that application. Based on that conclusion and the nature the Proposed Development, it is concluded that there is no potential for LSEs in-combination with the Proposed Development.	No in-combination effects are anticipated.
N/A	Meath County Council/Fingal County Council	CP1021: EirGrid - A project which will add a high-capacity electricity connection between Belcamp substation in Dublin and Woodland substation in Meath. The need for the project is integration of generation and an increase in demand on the east coast. The project is currently in the design stage and so a planning application has not been submitted as yet. However, the study area within which the preferred option will be defined does not overlap the Liffey WFD catchment in which the Rye Water is located. EirGrid is including European sites as a key environmental consideration in the (Step 4) optioneering of CP1021 routes, the project will be subject to its own AA Screening (and if necessary, AA).	No in-combination effects are anticipated.
221550	Meath County Council	CP1194: EirGrid Woodland 400 kV Extension Project. The northern end of the Kildare Meath Grid Upgrade project connects to the Woodland substation. EirGrid is proposing to upgrade and expand the Woodland substation in order to accommodate potential future upgrades to the electricity network in Meath. The Woodland station is outside the Liffey WFD Catchment, in which the Rye Water SAC is located. An AA screening report has been submitted as part of that application and has concluded that there are no likely significant effects for that application. Based on that conclusion and the nature the Proposed Development, it is concluded that there is no potential for LSEs in-combination with the Proposed Development.	No in-combination effects are anticipated.

Planning ref.	Planning Authority	Project Description	Comment
211175	Kildare County Council	EirGrid Dunstown 400 kV series Compensation project. The southern end of the Kildare Meath Grid Upgrade project connects to the Dunstown substation. Permission was granted for development on lands to the west of the Dunstown substation within the townland of Dunstown, Brannockstown, Naas, Co. Kildare. The Proposed Development will consist of an extension to the western boundary of the existing Dunstown substation to allow connection of series compensation equipment to the Dunnstown-Moneypoint 400 kV circuit. The AA screening report has been submitted as part of that application and has concluded that there are no likely significant effects on European sites for that application. Based on that conclusion and the nature the Proposed Development, it is concluded that there is no potential for LSEs in-combination with the Proposed Development.	No in-combination effects are anticipated.
N/A	Various including County Meath	North-South 400 kV Interconnection Development EirGrid plc (EirGrid) and System Operator Northern Ireland Ltd (SONI) (the respective applicants)1 are jointly planning a major cross-border electricity transmission development between the existing high-voltage transmission networks of Ireland2 and Northern Ireland. The overall interconnection project is a 400 kV overhead line (OHL) circuit linking the existing substation in Woodland, County Meath with a planned substation in Turleenan, County Tyrone. The proposed interconnector will provide a second high-capacity electricity interconnector between Ireland and Northern Ireland. The existing interconnector is a 275 kV double circuit OHL which connects the existing Tandragee and Louth substations. The proposed interconnector is planned to traverse the counties of Tyrone, Armagh, Monaghan, Cavan and Meath	No effects are likely on the Rye Water /Carton SAC from the Interconnector Development as there is no hydrological linkage to the SAC.
22314564	Kildare County Council	Proposed development (30,839 m^2 GFA) will consist of the demolition of a detached, vacant cottage (gfa 69 m^2) and the construction of 272 residential units (149 no. houses, 65 apartments and 58 duplexes), childcare facility and foul pumping station along with associated ancillary works and site works. The 149 no. dwellings consist of: • 40 no. 4 bed 2 storey houses (House Type A1, A2, A3, A4, A5) • 8 no. 4 bed 3 storey houses (House Type E1, E2) • 90 no. 3 bed 2 storey houses (House Type B1, B2, B3, C1, C2)	An AA screening Report carried out by Niamh Ní Bhroin in 2022 for the planning application Ltd. found no likely significant effects were no LSE therefore no in combination effects are possible

Planning ref.	Planning Authority	Project Description	Comment
		• 11 no. 2 bed 2 storey houses (House Type D1) The proposed apartments and duplexes are provided in 7 no. blocks (Blocks A, B, C, D, E, F, G) ranging in height from 3 to 4 storeys, with the exception of 1 no. Duplex Block (Type N1), which is a 3 storey, end of terrace unit. Block A and Block B contain Rooftop terraces at 4th floor level. The Duplex Blocks (Type J1, Type, J2, Type J3, Type J4, Type K1, Type L1, Type M1, Type N1) are all 3-storey and contain 58 units divided as follows: • 6 no. 1 bed ground floor apartment units (Units L1-A) • 23 no. 2 bed ground floor apartment units (Units J1-A, J2-A, J3-A, J4-A, K1-A, M1-A, N1-A) • 1 no. 2 bed duplex unit (two-storey unit) (Units K1-B) • 25 no. 3 bed duplex units (two-storey units) (Units J1-B, J2-B, J3-B, J4-B, L1-B) • 3 no. 4 bed duplex units (two-storey units) (Units M1-B, N1-B) The 65 apartments are located within Blocks A, B, C and D divided as follows: - • 17 no. 1 bed units (Type F1, Type F2, Type F3, Type F4, Type F5, Type F6) • 37 no. 2 bed units (Type G1, Type G2, Type G3, Type G4, Type G5-A, Type G5-B, Type G6, Type G7, Type G8) • 11 no. 3 bed units (Type H1, Type H2) Block D also contains a childcare facility (gfa.526.2 m^2) and includes a dedicated outdoor play area (c.210 m^2). Ancillary works including 1 no. vehicular entrances off the R148 to the north and 1 no. vehicular entrance off the R158 to the west, a spine road which will link with the permitted spine road on the adjoining lands to the south-east under PL09.306826, internal roads, footpaths, cycle lanes, car parking (465 no. spaces), cycle storage/parking (426 no. spaces), 2 no. bus stops, bin storage, public open space, hard and soft landscaping, natural play area, play equipment, boundary treatments, public lighting, 3 no. substations (14 m^2 each) and controlled pedestrian crossing on the R148.	
2043	Kildare County Council	Project involves the demolition of an existing building on site and recladding the shared gable to match the remaining neighbouring building. The construction of a new three storey over basement mixed use development consisting of a basement car park and plant room, pharmacy unit, convenience store unit	No potential for in combination effects given the scale and location of the project.

Planning ref.	Planning Authority	Project Description	Comment
		and retail unit at ground floor, 4 No. units of medical consultation suites at first floor and 1 unit of medical consultation suites. Ancillary works include office space at second floor, car-parking, boundary treatments, new site entrances and siteworks.	
22325	Kildare County Council	Project involves the installation of new external steel racking to the existing materials yard (the racking is to be mounted on top of the existing concrete hard standings) and all associated site works. AASR carried out and no potential for significant negative environmental effects were identified.	No potential for in combination effects given the scale and location of the project.
20597	Kildare County Council	Project involves the side and front boundary wall piers increasing in height from circa 0.8 m to circa 2 m, a wrought iron railing between piers, a wrought iron sliding gate and all associated site works. AASR carried out and no potential for significant negative environmental effects were identified.	No potential for in combination effects given the scale and location of the project.
21386	Kildare County Council	Project involves (a) Erection of a single storey type house; (b) Garage/fuel store for domestic use; (c) Installation of septic tank and percolation area; and (d) Upgrading of existing agricultural entrance to a new recessed vehicular entrance and all associated site works. AASR carried out and no potential for significant negative environmental effects were identified.	No potential for in combination effects given the scale and location of the project.
191291	Kildare County Council	Project involves conversion and alterations of an existing workshop/office to create a two storey two-bedroom dwelling. New roof and raising of overall height of workshop, new doors and windows are proposed to the existing building. 2 no. new vehicular entrances, new wastewater treatment system for dwelling and associated works. Relocation of the parents' wastewater treatment system. AASR carried out and no potential for significant negative environmental effects were identified.	No potential for in combination effects given the scale and location of the project.
18502	Kildare County Council	Project involves alteration works to an existing bungalow on the grounds of Painestown House (Protected Structure Ref. No. B14-30). The works include the construction of a single and two storey extension circa 73 m^2, a detached single storey shed and carport, landscaping around the house, new treatment plant, percolation area and all associated ancillary works. Painestown House is also a recorded monument, NIAH No. KD010-034. No works proposed directly affect Painestown House. AASR	No potential for in combination effects given the scale and location of the project.

Planning ref.	Planning Authority	Project Description	Comment
		carried out and no potential for significant negative environmental effects were identified.	
19154	Kildare County Council	Project involves (1) Upgrade of existing farm entrance to modern day safety standards as detailed on drawing No. E3639-5, Commercial-Agricultural Entrance, as published by the Roads Department of Kildare County Council. (2) To carry out realignment works to the existing fence line on the north side of the proposed upgraded entrance for the purpose of attaining safe sightlines as required by the Roads Department of Kildare County Council. The above upgrading and improvement works are to be carried out to facilitate the safe operation of modern-day machinery while entering and exiting farm. AASR carried out and no potential for significant negative environmental effects were identified.	No potential for in combination effects given the scale and location of the project.
191303	Kildare County Council	Project involves constructing a one and half storey type house, detached domestic garage, recessed vehicular entrance, effluent treatment system, and all associated ancillary site-works. Revised by Significant Further Information which consists of a revised Site Layout Plan and amendment to planning application boundary to facilitate the relocation of entrance to provide a dual entrance with the adjoining dwelling.	No potential for in combination effects given the scale and location of the project.
223	Kildare County Council	Project involves alterations and extension to existing dormer style dwelling. The application will include the following: (a) Single storey extensions to the rear and side of the dwelling to provide new living room and utility room. (b) New entrance porch to the front of the dwelling. (c) Alterations to the elevational treatment of the dwelling, along with all associated site development and facilitating works including site landscaping. AASR carried out and no potential for significant negative environmental effects were identified.	No potential for in combination effects given the scale and location of the project.
181214	Kildare County Council	Project involves retention permission for 4 no. existing booths (used for drying, shotblasting and painting) and ancillary storage rooms (476.9 m^2 combined), standalone office (21 m^2) along with the change of use of the cottage to office / storage unit (136 m^2). Planning permission is sought to: • Demolish domestic garage (25 m^2). • Construct an extension to the north side of the shot blasting booth in order to contain all dust associated with shotblasting (37 m^2) • Construct a new shed structure to the front of the existing workshop (414 m^2.) in order	No potential for in combination effects given the scale and location of the project.

Planning ref.	Planning Authority	Project Description	Comment
		to protect trailers from the weather during shotblast / repainting process and also, critically, to prevent dust emissions. The shed will have a maximum ridge height of 6.38 m high and will be enclosed on 3 sides with the south elevation open to allow trailers to enter. It includes a new doorway connection to the existing cottage building. • Alter the access arrangements to provide single access to the business and family dwelling and significantly improve sightlines and safety (includes new gates and dwelling). • Create new ordered trailer parking area to the rear of the workshop (significantly smaller area than previous application – approximately one third the size) including a dedicated turning area. • Provide new lined car parking for staff and visitors (12 spaces) and dedicated HGV parking (12 spaces) • Decommission the existing on-site treatment system and percolation area and provide new high specification on-site foul treatment system at a location to the rear of the site. • Provide new surface water drainage infrastructure. • Provide new landscaping with significant screening planting along the front boundary with family dwelling. • Carry out all associated site works.	
211814	Kildare County Council	Project involves the construction of an agricultural style building to be used to the storage of vintage cars for hobby purposes and all associated site works. AASR carried out and no potential for significant negative environmental effects were identified.	No potential for in combination effects given the scale and location of the project.
21846	Kildare County Council	Project involves extensions to the rear and side of 123 m^2. Retention of change of use from garage to habitable space of 23 m^2. Retention of removal of block archways to the front elevation and retention of new septic tank and percolation area to existing detached bungalow. AASR carried out and no potential for significant negative environmental effects were identified.	No potential for in combination effects given the scale and location of the project.
20974	Kildare County Council	Project involves 1) the extension to existing house will comprise of a bathroom and access corridor area 18.4 m^2. 2) The conversion of an existing domestic garage, area c65 m^2, providing a one-bedroom family flat comprising of; living room, kitchen, storage,	No potential for in combination effects given the scale and location of the project.

Planning ref.	Planning Authority	Project Description	Comment
		bathroom and bedroom and all associated site works. AASR carried out and no potential for significant negative environmental effects were identified.	
RA200481	Meath County Council	Project involves a two-storey dwelling house, domestic garage, waste-water treatment system and percolation area, vehicular entrance onto public road and all associated site works. Significant further information/revised plans submitted on this application. AASR carried out and no potential for significant negative environmental effects were identified.	No potential for in combination effects given the scale and location of the project.
RA201288	Meath County Council	Project concerns a storey and a half type dwelling house, domestic garage, waste-water treatment system and percolation area, vehicular entrance onto public road and all associated site works.	No potential for in combination effects given the scale and location of the project.
RA190130	Meath County Council	Project involves the construction of a two-storey dwelling and detached domestic garage, the installation of a proprietary domestic effluent system, new site entrance and all associated site works. AASR carried out and no potential for significant negative environmental effects were identified.	No potential for in combination effects given the scale and location of the project.

8. Conclusion

This NIS examined the potential for changes in the baseline conditions from the Proposed Development against the conservation objectives of relevant European sites including the Rye Valley/Carton SAC 001398. The NIS details water pollution mitigation measures which have been prescribed to ensure the Proposed Development will not result in adverse effects on European site integrity either alone or in-combination with other plans or projects.

Based on the best available information, it is considered that with the mitigation measures detailed above, there will be no adverse effects on the integrity of Rye Valley/Carton SAC, or any other European sites alone or in-combination with other plans or projects considering the site's conservation objectives. The NIS contains information which the competent authorities, may consider in making its own complete, precise and definitive findings and conclusions and upon which it is capable of determining that all reasonable scientific doubt has been removed as to the effects of the Proposed Development, alone or in-combination with any other plan or project, on the integrity of the relevant European sites.

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Appendix A. Figure 1 (321084AH-JAC-ZZ-XX-DR-K-3036). Cable route, with nearest European sites and Watercourses

River Boyne and River Blackwater SPA

River Boyne And River Blackwater SAC

MEATH

Rye Water Valley/Carton SAC

KILDARE

Ballynafagh Lake SAC

Ballynafagh Bog SAC

Mouds Bog SAC

Pollardstown Fen SAC

DUBLIN

WICKLOW

Wicklow Mountains SAC

Wicklow Mountains SPA

Poulaphouca Reservoir SPA

Down
Longwood
Broadford
Clonicurry
Cadamstown
Johnstown Bridge
Newtown
Carbury
Derrinturn
Staplestown
Summerhill
Batterstown
Kilcock
Maynooth
Leixlip
Lucan
Celbridge
Kilcloone
Dunboyne
Clonee
Blanchardstown
Ashtown
Palmerston
Chapelizod
Ballyfermot
Ronanstown
Dolp
Fox & Geese
Cloondalkin
Greenhills
Tymon North
Tallaght
Bally
Rockb
Newcastle
Straffan
Clane
Blackwood
Prosperous
Allenwood
Robertstown
Kilmeage
Ballins
Kill
Johnstown
Kilteel
Carragh
Rathangan
Naas
Rathmore
Milltown
Newbridge
Two Mile House
Hillsborough
Kildare
Curragh Camp
Athgarvan
Blessington
Kilbride
Drogheda
Navan
Skerries
Dublin
Bray
Naas
Kildare
Athy
Edenderry

N
W
E
S

0 1 2 4
Kilometers

Appendix A; Figure 1

Legend

- Proposed Cable Route
- County Boundary
- Watercourses

European sites

- Special Area of Conservation (SAC)
- Special Protection Area (SPA)

Rev.	Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
01	Apr 2023	Final	PM	SJ	FL	FB

Client: EirGrid

Jacobs
Merrion House, Merrion Road, Dublin, D04 R2C5, Ireland.
www.jacobs.com

Project: Kildare-Meath Grid Upgrade

Drawing Title: Proposed cable route and nearby European Sites

Drawing Status: Final

Scale @ A3	1:150,000	DO NOT SCALE
Jacobs No.	321084AH	
Client No.	CP966	

Drawing No. 321084AH-JAC-ZZ-XX-DR-K-3000

Appendix B. Figure 2 (321084AH-JAC-ZZ-XX-DR-K-3037). Waterbodies with connectivity to Rye Water Valley/Carton SAC

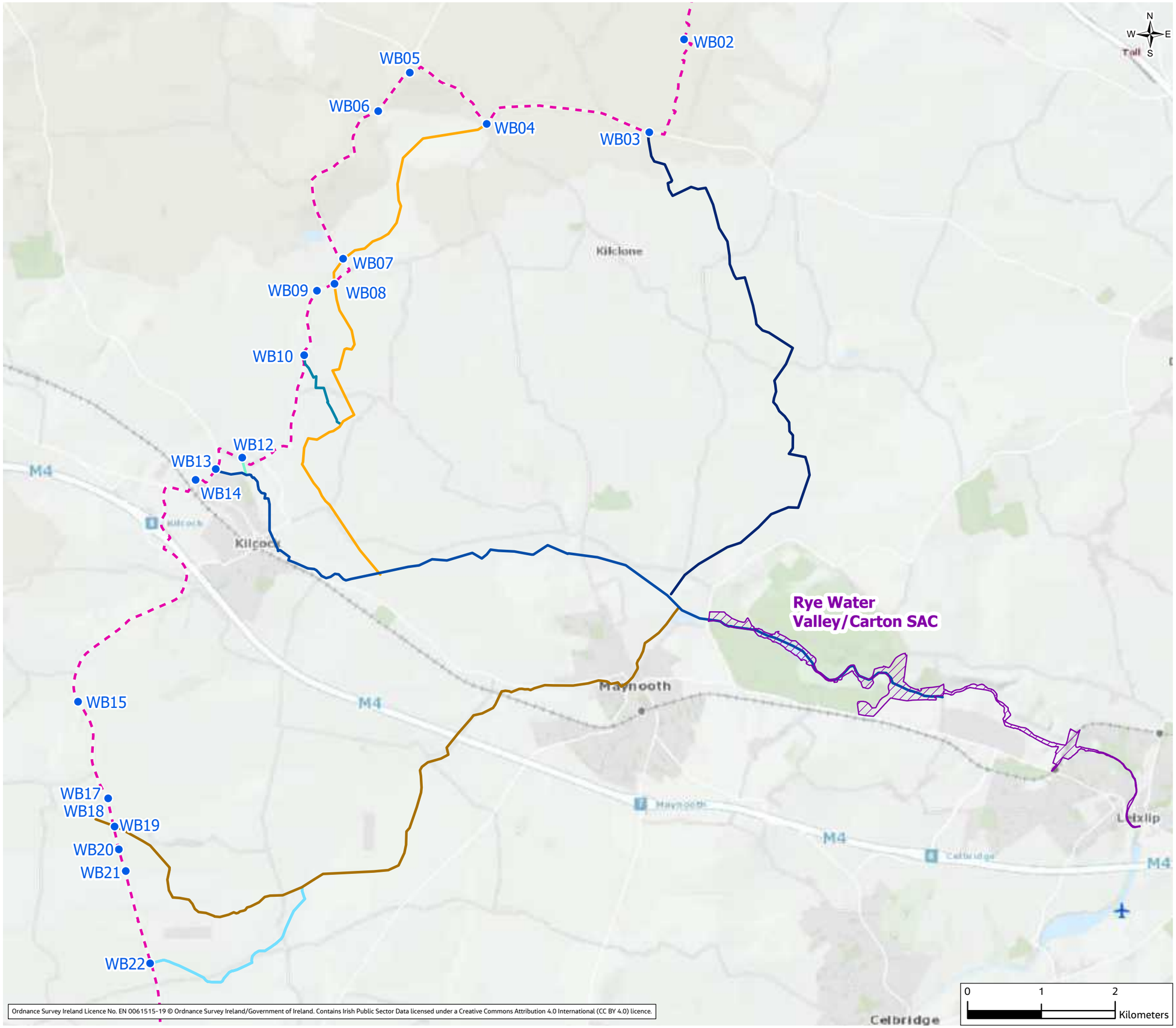

Figure 2

Legend

- Proposed Cable Route
- Waterbody (WB) Cable Crossing Number

Waterbodies

- Rye Water

Tributaries of Rye Water

- Baltracey River flows into River Lyreen
- Bride Stream
- Cullendrach
- Jenksinstown Stream
- River Lyreen
- Baltracey River
- Unnamed drain into Lyreen River
- Unnamed flows into Rye Water
- Unnamed stream into Rye Water

European sites

- Special Area of Conservation (SAC)

Rev.	Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
	Mar 2023	Final	PM	SJ	FJ	FB

Client: EirGrid

Jacobs
Merrion House, Merrion Road, Dublin, D04 R2C5, Ireland.
www.jacobs.com

Project: Kildare-Meath Grid Upgrade

Drawing Title: Waterbodies with connectivity to Rye Water Valley/Carton SAC

Drawing Status: Final

Scale @ A3	1:50,000	DO NOT SCALE
Jacobs No.	321084AH	
Client No.	CP966	

Drawing No.: 321084AH-JAC-ZZ-XX-DR-K-3036

Appendix C. Appropriate Assessment Screening Report

Available at www.eirgridkildaremeath.ie

Appendix 3.1 An Bord Pleanála Letter

Our Case Number: ABP-314112-22

An Bord Pleanála

EirGrid Plc
The Oval
160 Shelbourne Road
Dublin 4
D04 FW28

Date: 16 March 2023

Re: Development of a 400 kV underground cable between Dunstown 400 kV substation in the townland of Dunnstown, Co. Kildare and Woodland 400 kV substation in the townland of Woodland, Co. Meath known as the 'Kildare-Meath Grid Upgrade'
Dunnstown, Co. Kildare and Woodland, Co. Meath

Dear Sir / Madam,

Please be advised that following consultations under section 182E of the Planning and Development Act, 2000, as amended, the Board hereby serves notice that it is of the opinion that the proposed development falls within the scope of section 182A of the Planning and Development Act, 2000 as amended. Accordingly, the Board has decided that the proposed development would be strategic infrastructure within the meaning of section 182A of the Planning and Development Act, 2000, as amended. Any application for approval for the proposed development must therefore be made directly to An Bord Pleanála under section 182A(1) of the Act.

Please also be informed that the Board considers that the pre-application consultation process in respect of this proposed development is now closed.

In accordance with section 146(5) of the Planning and Development Act, 2000, as amended, the Board will make available for inspection and purchase at its offices the documents relating to the decision within 3 working days following its decision. This information is normally made available on the list of decided cases on the website on the Wednesday following the week in which the decision is made.

The attachment contains information in relation to challenges to the validity of a decision of An Bord Pleanála under the provisions of the Planning and Development Act, 2000, as amended.

If you have any queries in relation to the matter please contact the undersigned officer of the Board.

Please quote the above mentioned An Bord Pleanála reference number in any correspondence or telephone contact with the Board.

Teil	**Tel**	(01) 858 8100
Glao Áitiúil	**LoCall**	1800 275 175
Facs	**Fax**	(01) 872 2684
Láithreán Gréasáin	**Website**	www.pleanala.ie
Ríomhphost	**Email**	bord@pleanala.ie

64 Sráid Maoilbhríde
Baile Átha Cliath 1
D01 V902

64 Marlborough Street
Dublin 1
D01 V902

Yours faithfully,

Eimear Reilly
Executive Officer
Direct Line: 01-8737184

VC11

Teil	**Tel**	(01) 858 8100
Glao Áitiúil	**LoCall**	1800 275 175
Facs	**Fax**	(01) 872 2684
Láithreán Gréasáin	**Website**	www.pleanala.ie
Ríomhphost	**Email**	bord@pleanala.ie

64 Sráid Maoilbhríde
Baile Átha Cliath 1
D01 V902

64 Marlborough Street
Dublin 1
D01 V902

Application documentation should be forwarded to the following prescribed bodies:

- Meath County Council
- Kildare County Council
- Minister for Housing, Local Government and Heritage
- Minister for the Environment, Climate and Communications
- Commission for the Regulation of Utilities (CRU)
- An Taisce
- Heritage Council
- Comhairle Ealaíon
- Failte Ireland
- Córas Iompair Éireann
- Irish Rail
- Commission for Railway Regulation
- TII
- Minister for Transport, Tourism and Sport
- Uisce Éireann
- Waterways Ireland
- Inland Fisheries Ireland
- Office of Public Works

Teil	**Tel**	(01) 858 8100
Glao Áitiúil	**LoCall**	1800 275 175
Facs	**Fax**	(01) 872 2684
Láithreán Gréasáin	**Website**	www.pleanala.ie
Ríomhphost	**Email**	bord@pleanala.ie

64 Sráid Maoilbhríde
Baile Átha Cliath 1
D01 V902

64 Marlborough Street
Dublin 1
D01 V902

Judicial review of An Bord Pleanála decisions under the provisions of the Planning and Development Acts (as amended).

A person wishing to challenge the validity of a Board decision may do so by way of judicial review only. Sections 50, 50A and 50B of the Planning and Development Act 2000 (as substituted by section 13 of the Planning and Development (Strategic Infrastructure) Act 2006, as amended/substituted by sections 32 and 33 of the Planning and Development (Amendment) Act 2010 and as amended by sections 20 and 21 of the Environment (Miscellaneous Provisions) Act 2011) contain provisions in relation to challenges to the validity of a decision of the Board.

The validity of a decision taken by the Board may only be questioned by making an application for judicial review under Order 84 of The Rules of the Superior Courts (S.I. No. 15 of 1986). Sub-section 50(7) of the Planning and Development Act 2000 requires that subject to any extension to the time period which may be allowed by the High Court in accordance with subsection 50(8), any application for judicial review must be made within 8 weeks of the decision of the Board. It should be noted that any challenge taken under section 50 may question only the validity of the decision and the Courts do not adjudicate on the merits of the development from the perspectives of the proper planning and sustainable development of the area and/or effects on the environment. Section 50A states that leave for judicial review shall not be granted unless the Court is satisfied that there are substantial grounds for contending that the decision is invalid or ought to be quashed and that the applicant has a sufficient interest in the matter which is the subject of the application or in cases involving environmental impact assessment is a body complying with specified criteria.

Section 50B contains provisions in relation to the cost of judicial review proceedings in the High Court relating to specified types of development (including proceedings relating to decisions or actions pursuant to a law of the state that gives effect to the public participation and access to justice provisions of Council Directive 85/337/EEC i.e. the EIA Directive and to the provisions of Directive 2001/12/EC i.e. Directive on the assessment of the effects on the environment of certain plans and programmes). The general provision contained in section 50B is that in such cases each party shall bear its own costs. The Court however may award costs against any party in specified circumstances. There is also provision for the Court to award the costs of proceedings or a portion of such costs to an applicant against a respondent or notice party where relief is obtained to the extent that the action or omission of the respondent or notice party contributed to the relief being obtained.

General information on judicial review procedures is contained on the following website, www.citizensinformation.ie.

Disclaimer: The above is intended for information purposes. It does not purport to be a legally binding interpretation of the relevant provisions and it would be advisable for persons contemplating legal action to seek legal advice

Teil	**Tel**	(01) 858 8100
Glao Áitiúil	**LoCall**	1800 275 175
Facs	**Fax**	(01) 872 2684
Láithreán Gréasáin	**Website**	www.pleanala.ie
Ríomhphost	**Email**	bord@pleanala.ie

64 Sráid Maoilbhríde
Baile Átha Cliath 1
D01 V902

64 Marlborough Street
Dublin 1
D01 V902

Appendix 3.2 Letters of Consent

Comhairle Chontae na Mí
Teach Buvinda, Bóthar Átha Cliath, An Uaimh,
Contae na Mí, C15 Y291
Fón: 046 – 9097000/Fax: 046 – 9097001
R-phost: customerservice@meathcoco.ie
Web: www.meath.ie
Uimhir Chláraithe: 00172770

Meath County Council
Buvinda House, Dublin Road, Navan,
Co. Meath, C15 Y291
Tel: 046 – 9097000/Fax: 046 – 9097001
E-mail: customerservice@meathcoco.ie
Web: www.meath.ie
Registration No.: 00172770

2nd March 2023

Re: EirGrid Kildare Meath Grid Upgrade Project
440 kV Underground cable project

To Whom It Concerns

Meath County Council hereby consents to the making by EirGrid of this application for Statutory Approval insofar as it concerns lands in the ownership or control of the County Council.

Yours faithfully

Martin Murray
Director of Service

Comhairle Contae Chill Dara
Kildare County Council

04 April 2023

EirGrid plc,
The Oval,
160, Shelbourne Road,
Ballsbridge,
Dublin 4,
D04 FW28

Re: EirGrid Kildare-Meath Grid Upgrade (Capital Project 966)

In accordance with the provisions of Article 22(2)(g) of the Planning and Development Regulations 2001 (as amended), Kildare County Council hereby gives its written consent to make the planning application for the Kildare-Meath Grid Upgrade project.

It should be noted that this letter does not constitute an agreement in principle or otherwise, with Kildare, in respect of the lands.

Sonya Kavanagh
Chief Executive

Energy for generations

esb.ie

27 Sráid Mhic Liam Iochtarach
Baile Átha Cliath, D02 KT92, Éire
Fón +353 1 676 5831

27 Lower Fitzwilliam Street
Dublin, D02 KT92, Ireland
Phone +353 1 676 5831

Kildare County Council
Planning Department
Head Office
Devoy Park
Naas
Co Kildare
W91 X77F

13 October 2022

Re: Kildare – Meath New Cable Circuit

Dear Sirs,

The Electricity Supply Board (hereinafter referred to as the 'ESB') of 27 Lower Fitzwilliam Street, Dublin 2, D02 KT92 was constituted by the Electricity Supply Act 1927. ESB is the licensed Transmission System Owner for Ireland pursuant to Section 14 of the Electricity Regulation Act 1999.

EirGrid plc is a public limited company established pursuant to Regulation 34 of the European Communities (Internal Market in Electricity) Regulations 2000 (S.I. No 445/2000) and is the licensed Transmission System Operator for Ireland pursuant to Section 14 of the Electricity Regulation Act 1999. Pursuant to Regulation 8(1)(a) of S.I. No 445/2000, EirGrid plc has the exclusive function to operate and ensure the maintenance of and, if necessary, develop a safe, secure, reliable, economical and efficient electricity transmission system.

Pursuant to Regulation 18.1(a) of S.I. No. 445/2000, ESB and EirGrid are required to enter into an agreement for the purpose of enabling EirGrid as Transmission System Operator discharge its functions under S.I. No 445/2000. On 16th March 2006 ESB and EirGrid accordingly entered into this agreement, known as the Infrastructure Agreement.

Pursuant to clause 7.6 of the Infrastructure Agreement, all activities connected with seeking and obtaining planning permission/approval (if needed) and any other consents required by the Transmission System Operator to discharge its functions as such shall be the sole responsibility of the Transmission System Operator, i.e. EirGrid plc.

ESB is obliged under the legislation and the Infrastructure Agreement cited above to facilitate EirGrid's planning intentions in the furtherance of its functions as Transmission System Operator. In order therefore not to impede the discharge by EirGrid of those functions, ESB, as the licensed Transmission System Owner and the person with sufficient legal interest in the property the subject matter of the attached application for the purposes of the Planning and Development Act 2000 (as amended), hereby conveys its consent to the making by EirGrid of this application for planning permission/approval which EirGrid considers necessary.

In the interest of clarity, ESB must nonetheless draw to the attention of the Planning Authority that this consent does not relate to the merits or any aspect of this application by EirGrid as ESB may not have had sight of this application prior to the issue of this letter, and separate submissions in respect of planning issues may be made if requested by the Planning Authority or if necessary in ESB's view.

Yours Faithfully

Marie Sinnott

Marie Sinnott
Company Secretary

Appendix 5.1 Traffic Management Plan

Kildare-Meath Grid Upgrade – Traffic Management Plan

KMGU-JAC-TN-0090-Traffic Management Plan | P03

April 2023

EirGrid Group

Kildare-Meath Grid Upgrade

Project No:	321084AH
Document Title:	Kildare-Meath Grid Upgrade – Traffic Management Plan
Document No.:	KMGU-JAC-TN-0090-Traffic Management Plan
Revision:	Final
Document Status:	Final
Date:	April 2023
Client Name:	EirGrid Group
Client No:	CP966
Project Manager:	Andrew Power
Author:	Elliot Neale
File Name:	KMGU-JAC-TN-0090-Traffic Management Report Rev.3

www.jacobs.com

Document history and status

Revision	Date	Description	Author	Checked	Reviewed	Approved
Final			R. Konstanta	E. Neale	E. Casey	Fay Lagan

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Executive Summary

This document reviews the required traffic management during the implementation of proposed cable route as part of the Kildare-Meath Grid Upgrade Project (hereafter referred to as the "Proposed Development"). The traffic management plan identifies the relevant legislation and regulations and proposes the required control measures.

A traffic management plan for the full route for each phase of the construction is provided, breaking the route down into 31no. sections. The sections allow for refinement in the proposed temporary traffic management, with the aim to reduce impact to road users. The plan considers the spatial requirements for the construction and the application of relevant legislations and guidance.

The proposed construction sequence to support the Temporary Traffic Measures for the in-road sections of the cable route as follows:

- **Phase 1 – Installation of passing bay and joint bay structure:** The construction of the passing bays (where required) at the joint bay locations. On completion of the passing bay, it would be proposed that the joint bays are installed at the same period of time.

- **Phase 2 – Excavation and installation of ducts:** A trench will be dug along the cable route, ducts installed, and the road surfacing will be restored.

- **Phase 3 – Installation of cables:** The cables will be installed at joint bay locations within the ducts. The cables will then be jointed (connected) at each the joint bay location to allow the installation of a continuous circuit.

Further detail is provided in Chapter 5 of the Planning and Environmental Considerations Report for the Proposed Development.

The scale and nature of the Temporary Traffic Measures will likely vary from Phase to Phase because of the different effects. Works during Phases 1 and 3 are discrete locations along the cable route, whereas Phase 22 would potentially be a rolling working area as the trench will run the entire length of the Proposed Development.

In Phases 1 and 3, the proposed traffic management solutions that will be implemented are as follows:

- Single lane closure: Where the road width at the location of the joint bay is greater than 10.5m, a passing bay would not be required and only a single lane closure required.

- Passing bay with single lane closure: Where the road width is less than 10.5m and where there is suitable space to construct a passing bay, a passing bay with single lane closure will be used; and

- Full road closure (with local access arrangements): Where the road width is less than 10.5m and where there is insufficient space to construct a passing bay, a road closure with local access arrangements will likely be required to be provided for the affected area with signposted diversions.

In Phase 2, the following proposed measures will be applied:

- Full road closure (with local access arrangements): Where the residual open carriageway is less than 2.5m the road will be required to be closed, with local access arrangements where necessary. Allowing vehicles to pass on a carriageway less than this width would pose an increase in risk to road users and the construction delivery teams. Please note that the length of road that will be closed will be minimised and made appropriate to the area of the works. The closed section will be based on the nearest diversion point and the works required in that area.

- Lane Closure with Heavy Goods Vehicles (HGV) Diversion: Where the residual open carriageway is between 2.5m and 3m the road will be required to be closed to HGVs but open to Light Goods Vehicles (LGVs e.g., Ford Transit vans) and cars. All HGVs would be required to utilise the diversion route, this would require signage to mitigate the risk of HGVs passing the works sites.

- Lane Closure: Where the residual open carriageway is greater than 3m, it is proposed to keep the road open to all road users utilising automated stop / go traffic signals. Automated signalling to account for the traffic flow and demand will reduce waiting times. The lane closures would remain during the entirety of the section of works (i.e., out of hours included) to ensure safety to all road users and delivery teams.

Section 4 details the proposed Temporary Traffic Measures that will likely be required for the Proposed Development. The cable route has been divided into a number of sections because of the different sections being in-road or off-road, the nature of the proposed works in the that area, difference in road widths, and other factors.

Diversions have been identified and calculated on a like-for-like basis e.g., where a regional road is affected by the Proposed Development, the proposed diversion only uses regional roads and does not include local roads in the area. In some areas, this approach could significantly increase the length of the diversion.

Further details on the proposed Temporary Traffic Measures are included in the main body of this report and its appendices. The assessment of the effects of these measures are contained in the Planning and Environmental Considerations Report for the Proposed Development.

The Contractor will update this TMP with details of the plans and procedures for their specific activities on site, including method statements, within the requirements set out in this TMP unless otherwise agreed with the relevant local authority. Such plans and procedures will, where applicable, adhere to the requirements as delineated in this TMP.

As such this TMP will be understood as being an iterative document; while significant and adequate information is included herein to ensure a comprehensive understanding of proposed traffic management measures that are proposed in respect of the development. It is further acknowledged that these might be refined in ongoing collaboration with the Roads Authorities in the post-consent detailed design process, or indeed in response to any Condition(s) of Approval from the Consenting Authority. It is possible that the Contractor will provide additional innovations to the approach to traffic management that will further minimise traffic disruption within the requirements of this TMP or as otherwise agreed with the relevant local authority.

1. Introduction

1.1 Purpose and Objectives

This Traffic Management Plan (TMP) has been prepared to present the approach and application of traffic management and mitigation measures for the construction of the Proposed Development. It aims to ensure that adverse effects from the construction phase of the Proposed Development, on the road network and the local communities, are avoided or minimised.

The purpose of this TMP is to document and describe the main activities that will likely be undertaken to facilitate the Proposed Development and to provide a framework of traffic management measures that could be implemented prior to commencement of, and throughout the duration of the construction of the Proposed Development.

The Proposed Development will be undertaken by a Contractor appointed by ESB. The contractor will be responsible for updating the TMP for approval by ESB and agreement with the planning authority (in this case, Kildare County Council and Meath County Council), prior to the commencement of works. In the event that planning approval is given, any condition(s) relating to a TMP which may be attached to such an approval, will be implemented in accordance with the requirements of the condition. The Contractor will update this TMP with details of the plans and procedures for their specific activities on site, including method statements. Such plans and procedures will, where applicable, adhere to the requirements as delineated in this TMP.

As such this TMP will be understood as being an iterative document; while significant and adequate information is included herein to ensure a comprehensive understanding of proposed traffic management measures that are proposed in respect of the development. It is further acknowledged that these might be refined in ongoing collaboration with the Roads Authorities in the post-consent detailed design process, or indeed in response to any Condition(s) of Approval from the Consenting Authority. However, it is considered that this document is robust and appropriate for inclusion in the consent application. The plan has identified the underground cable (UGC) route as a key component of the Proposed Development which requires traffic management. The cable commences at the Woodland Substation and finishes at the Dunstown Substation, a route of 53 km in total length. The works requires the laying of 400 kV cables in roadways and across private lands with cable joint bays at defined locations. There will potentially be a requirement for significant temporary works along the route including site setups and storage areas as well as the crossing of motorways, railways, and watercourses.

The contractor's Method Statements will be prepared in acknowledgment of this TMP. The updated TMP will set out the detailed approach and methodology which the contractor will follow in scheduling and undertaking the work. The Method Statements will also incorporate the control measures detailed in the TMP in addition to specified conditions that may be prescribed in any approval from An Bord Pleanála for the Proposed Development and measures provided in the Planning and Environmental Considerations Report (PECR).

The subsequent sections provide the basis for the management of traffic expected during construction of the Kildare-Meath Grid Upgrade, on the basis of the designs shown in the planning documents. The Traffic Management Plan shall be developed by the appointed contractor during detailed design into a more detailed Construction Traffic Management Plan based on their specific design proposals.

The role of Project Supervisor Design Process (PSDP) may be taken over by the contractor and as such a Traffic Management Plan for their proposed design will be prepared in accordance with this TMP but can be revised as necessary in consultation with Transport Infrastructure Ireland (TII) and Kildare and Meath County Councils. The Temporary Traffic Management Designer will prepare Detailed Temporary Traffic Management Design for all locations where Works are planned on, or impact on a public road. The Temporary Traffic Management Designer will have overall responsibility for the Temporary Traffic Management Plan, appointed by the Contractor.

Prior to commencing the works, the safe works plan will be developed into an Operational Traffic Management Plan by the Project Supervisor Construction Stage (PSCS). The appointed PSCS/Contractor of the Proposed Development is required to carry out the Safety Audit on Operational Traffic Management Plans prior to commencing the works. The PSCS will co-ordinate the implementation of the developed Traffic Management Plan during construction of the works.

The developed Traffic Management Plan requirements will include the provision of facilities for the safe passage of pedestrian and vehicular traffic and measures to keep the impact of the works on the roads, and local communities and road users, to a minimum. All traffic management controls proposed by the Contractor will be in accordance with the documents referenced. It is possible that the Contractor will provide additional innovations to the approach to traffic management that will further minimise traffic disruption. Such measures could include restrictions on the timing of proposed works in sensitive areas, additional use of roadside verges within the planning application boundary for the Proposed Development, etc. Discussions with the Local Authorities have determined that roadworks are currently sometimes undertaken at night time to reduce the impact to road users. It is not currently proposed that night time working would be undertaken from the Proposed Development but it is an innovation that could be discussed with the Local Authorities in order to reduce the impacts.

1.2 Details of scheme

The cable route typically is situated 'in-road' for 43.6km within a trench of 1.5m width and 1.3m depth. There are areas where the cable route is situated within agricultural 'off-road' sections (9.3km). Along the route there are 17no. watercourse crossing and 6no. horizontal directional drill (HDD) locations.

As part of the cable design, joint bays are approximately every 750m. The joint bays are typically precast concrete units 10m in length and 2.5m wide. There are a total of 70no. joints bays, 33no. are 'off-road' and 37no. are 'in-road'. At each 'in-road' joint bay suitable temporary traffic management is required, either localised lane closure, passing bay or road closure.

It is envisaged that the route requires installation of temporary infrastructure to be put in place to allow the works to be completed efficiently. This has been listed below:

- Main site welfare / office / storage area
- Satellite site welfare / office(s) along the route
- Storage compounds with material handling facilities for removed fill along the route
- Storage compounds for cable drums
- Storage compounds for plant, vehicles, and traffic management equipment
- Temporary access roads and other associated temporary works

The current programme duration is estimated to be three and a half years for the full route to be constructed, tested, and commissioned into service.

1.3 Challenges and considerations

The major challenge on the Proposed Development is maintaining the flow of all public traffic during the works. This will be especially prevalent during the construction of the cable trench in the road network where lane and road

closures will be required to allow construction to proceed while also protecting the workforce. This is the main reason that this Traffic Management Plan has been produced.

Linked to this will be the challenge to maintain access to all properties and businesses along the route during the construction works and especially with regards to the lane and road closures.

Due to the proposed construction methodology and the long distance within the road network there is an additional challenge of how long the works will take and the subsequent duration requirements for traffic management to be in place. This disruption will be mainly felt by the residents, local businesses and commuters who would normally use these routes daily.

2. Traffic Management Assessment

2.1 Guidance documentation

The Contractor will comply with the requirements of:

- Traffic Signs Manual – Chapter 8 – Temporary Traffic Measures and Signs for Roadworks, Department of Transport, Tourism and Sport, August 2019 (Department of Transport, Tourism and Sport, 2019)
- Guidance for the Control and Management of Traffic at Road Works, Department of Transport, Health and Safety Authority, National Roads Authority and Local Government Management Services Board, second edition 2010 (Department of Transport, Tourism and Sport, 2010)
- Guidelines for Managing Openings in Public Roads (Guidelines for the Opening, Backfilling and Reinstatement of Openings in Public Roads), Department of Transport, Tourism and Sport, second edition April 2017 (Department of Transport, Tourism and Sport, April 2017)
- Guidelines for Working on Roads, Health and Safety Authority, 2009 (Health and Safety Authority, 2009)

These Guideline documents will typically be read in conjunction with primary Safety, Health and Welfare at Work legislation, including the Safety, Health and Welfare at Work Act 2005, the Construction Regulations 2013, and any amendment to them.

2.2 Design reference documentation

The assessment of the TTM is based on the following issued design reference documentation:

- Cable joint bay design as per PE424-D7001-013-002-000 (Issued by ESB)
- Cable drum description/properties: 4.3m external diameter, 4.0m barrel length and 35.4t (As detailed by Jacobs Cable Designer)
- Passing bay proposed details 229100428-MMD-00-XX-DR-E-4119 Rev PL1
- It is assumed that the 400kV cables is most onerous construction case with regards to the largest spatial requirements.

2.3 Assessment Process

TII Chapter 8 are the base standards that are used as part of the design of the construction space proofing for the passing bays at the joint bay locations. By using existing typical layouts from the standards, combined with route specific parameters, the traffic management solution can be detailed to provide space proofing diagrams. Figure 2-1 shows the TTM design process used as part of the traffic management assessment.

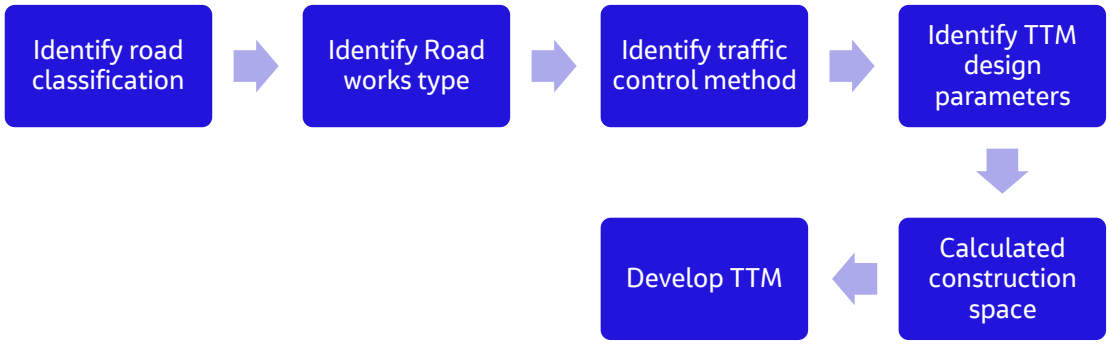

Figure 2-1 TTM Design Process

2.3.1 Road Classification

Table 2-1 identifies the road classification dividing them into two levels; main and sub. Identifying the road classification is of particular importance as this defines the TTM parameters (i.e., extent of space required for the TTM).

The main levels are defined as follows:

a) Level 1 – Urban and Low Speed Roads

b) Level 2 – Rural Single Carriageway Roads

c) Level 3 – Dual Carriageways and Motorways

The Proposed Development cable alignment is predominantly along Regional, 'r' roads, with a speed limit of 80km/hr. The majority of roads on the route are classed as Level 2(i). It is permissible to justify a lower-level classification provided permission from the relevant local authority for a temporary construction speed limit.

Clause 8.2.3.10 states "The speed limit chosen typically will not be more than two speed limit steps below the permanent posted speed limit and will be appropriate to the speed at which a vehicle could drive through the roadworks with reasonable safety". Therefore, in compliance with Clause 8.2.3.10 it is assumed the local authority would approve a reduced speed limit and that the classification of the roads can be reduced to Level 1 (iii).

Table 2-1 Road Classifications (Extract of TII Chapter 8 Table 8.2.1.1)

Level		Carriageway Type	Speed / Speed Limit (km/h)
Main	Sub		
Level 1	i	Single	≤ 30
	ii	Single	40
	iii	Single	50
	iv	Single	80
		Multi-Lane / Dual	≤ 60
Level 2	i	Single	80
	ii	Single	100
Level 3	i	Dual and Motorway	80
	ii	Dual and Motorway	≥ 100

2.3.2 Road Works Type

The roadworks types are defined in Figure 2-2. All construction works as part of the Proposed Development are assumed to require the conditions of that of Static Type A. The defining parameter being the requirement for full time temporary traffic management where works are expected to be greater duration than 12hours.

TTM Type	Description	Traffic Flow Conditions	Visibility Conditions	Planned Duration
Static Type A	Works requiring full time Temporary Traffic Management (TTM)	All	All	Permitted for any duration but required for durations in excess of 12 hours
Static Type B	Works that normally involve the use of one or two vehicles in the operation. This type of work is typically maintenance and repair type operations, including maintenance of utilities or street furniture.	Unrestricted by either traffic volume or weather conditions	All	Permitted for a duration of up to 12 hours
Static Type C	Works at a discrete location that are of a short duration (excluding signage setup/removal).	Unrestricted by either traffic volume or weather conditions	Good	Permitted for a duration of up to 15 minutes
Semi Static Operation (SSO)	Works where the operations are mobile or making short duration stops continuously along a road where static warning signs are used. SSO is only suitable on Level 1 and 2 roads.	Unrestricted by either traffic volume or weather conditions	Good	Permitted for stop durations of up to 15 minutes
Mobile Lane Closure (MLC)	Works where the operations are mobile or making short duration stops continuously along a road where mobile warning signs and Impact Protection Vehicles (IPV) are used. MLC is only suitable on Level 3 roads.	Unrestricted by either traffic volume or weather conditions	Good	Permitted for stop durations of up to 15 minutes*

Note:
- Particular works may have several phases of TTM which may fall under different TTM types. For example, footway works may require different phases.
- * For MLC the permitted duration may be extended by agreement with the overseeing organisation.

Figure 2-2 TTM Roadworks Types (Extract of TII Chapter 8 Table 8.2.1.2)

2.3.3 Traffic control method

Figure 2-3 shows the expected traffic management required for the Proposed Development. The traffic management utilises temporary traffic controls (i.e., traffic lights), to allow one directional traffic at any given time. The key design parameters are shown within Figure 2-3. These include and are defined as:

- *Cumulative Distance*
    - Distance from the first sign (Roadworks Ahead) to the start of the taper.
- *Taper Length*
    - The required length for the reduction in width of a single lane or hard willer.

- *Longitudinal safety zone*
    - Measured from the end of the taper to the start of the works area. It provides a clear area for an errant vehicle to come to a stop before reaching the works area.
- *Lateral Safety Zone*
    - Measured from the trafficked edge of the cone or barrier to the edge of the works area. This area must be kept free of all operations, stationary vehicles, materials, and personnel thus ensuring a clear safe distance back from the edge of the live traffic.
- *Minimum lane width*
    - The minimum width of traffic lane to be maintained at all times for use by the road user. This may vary depending on the characteristics of the traffic being catered for.
    - Clause 8.4.3.2 states "the unobstructed road width which forms the traffic lane for one-way traffic will be an optimum width of 3.3m and maximum lane width of 4.3m.

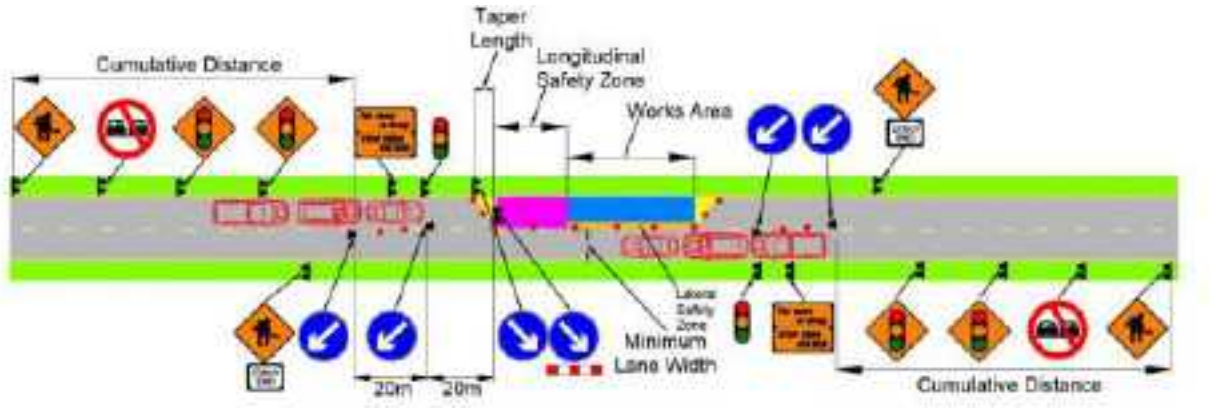

Figure 2-3 Priority Traffic Control (Extract of Figure 8.4.4.3 Chapter 8 TII)

Table 2-2 defines the key design parameters for each of the road levels. Please note that the majority of the roads are classified as Level 2 (i). With the introduction of a reduced speed limit and in compliance with Clause 8.2.3.10, the TTM is designed around the parameter of Level 1(iii).

Table 2-2 Restrictions (Department of Transport, Tourism and Sport, 2019)

Level		Carriageway Type	Speed / Speed Limit (km/h)	Min Lane Width (m)		Lane Taper Rate / Length (m)	Safety Zones	
Main	Sub			HGV	Light Vehicles		Longitudinal (m)	Lateral (m)
Level 1	i	Single	≤ 30	3	2.5	1 in 1	0.5	0.5
	ii	Single	40	3	2.5	1 in 1	0.5	0.5
	iii	Single	50	3	2.5	1 in 5	5	0.5
	iv	Single	60	3	2.5	1 in 10	15	0.5
		Multi-Lane / Dual	≤ 60					
Level 2	i	Single	80	3	2.5	1 in 40	45	1.2
	ii	Single	100	3	2.5	1 in 60	60	1.2
Level 3	i	Dual and Motorway	80	3.3. (Lane 1) 3 (Subsequent Lanes)		180	45	1.2
	ii	Dual and Motorway	≥ 100	3.3. (Lane 1) 3 (Subsequent Lanes)		180	60	1.2

2.3.4 Additional Considerations

2.3.4.1 Construction traffic

The impact of construction traffic on local roads is likely to be of interest to local communities and residents of the areas along the routes. Construction traffic mainly consists of the movement of excavated materials and the delivery of equipment and materials. A summary of the proposed machinery – both Light Goods Vehicle (LGV, less than 3.5t) and Heavy Goods Vehicles (HGV, over 3.5t) – for this Proposed Development is provided in Section 4.3 of this document. Where possible, HGV traffic especially will be directed away from residential communities in the vicinity of the works areas in order to minimise the impact on these communities.

The Contractor will commit to ensuring that the adverse effects of construction traffic are minimised, as far as reasonably practicable. It is the Contractor's responsibility to liaise with the relevant authorities prior to construction, including TII, Kildare and Meath County Councils and the emergency services in order to ensure the Construction Traffic Management Plan (CTMP) accords with their comprehensive Construction Traffic Management Plan (CTMP).

Regarding the timing of material deliveries, the Contractor may schedule the deliveries in such a way that construction activities requiring a greater number of HGVs do not overlap with concentrated delivery activities. In addition, where possible deliveries will be coordinated to avoid coinciding with major events that have potential to generate higher than usual traffic volumes. It is also the Contractor's responsibility to liaise with Kildare and Meath County Councils and the management of other adjacent construction projects to coordinate deliveries appropriately if their construction periods coincide.

The Construction activities necessitate the movement of the workforce who are to deliver the Proposed Development. Due to the rural nature of the sites and the lack of alternative options, it is envisaged that all staff will most likely travel to the site via private vehicles. However, in order to minimise private car movements, the Contractor will prepare appropriate workforce travel plans to reduce the impact of workforce travel on local residents and businesses, where reasonably practicable. The Contractor may plan for construction workers to park their personal vehicles at parking spaces available at each of the construction compounds and then they can travel to their work areas in the minimum number of vehicles required; the plan will take into account that construction staff will not park on public roads other than within the work areas.

Pre- and post-condition surveys will be carried out by the contractor on all roads on which works will be carried out. Following the works, roads shall be returned to their original condition or better. Where necessary, the contractor will carry out road sweeping to remove Proposed Development related debris and materials. During road sweeping, an appropriate TTM will be provided in order to ensure safety of staff and road users.

2.3.4.2 Safety measures

A balance between health and safety for road users, workforce, and local community is required to ensure that all persons are suitably accounted for. The Contractor(s) will develop a safe system of work and ensure a suitable traffic management plan is appropriately implemented and effective in all lighting and weather conditions.

The table below summarises some of the various safety measures that are being included within the traffic management arrangements to protect various groups.

Table 2-3 Safety measures

Road User Group	Safety Measure
Workforce / Road Users / Walkers, Cyclists, and Horse-riders (WCH)	Communication and advance notification of diversions and roadworks through media, social media, existing or portable Variable Message Signs (VMS) assist road user groups with planning their journeys. Clear signage and physical barriers for Walkers, Cyclists, and Horse-riders (WCHs) will be considered to reduce risk of incursion within work zones or live traffic lanes.
	Lane widths and restrictions, length of traffic management and potential diversion routes have been considered as stated within this Traffic Management Plan. However, the Contractor will ensure implementation of the above Traffic Management to ensure safety during construction works.
	Lane closures and narrow lanes have been considered when works are being carried out adjacent to the live carriageway to provide the lateral safety zones.
	Carriageway closures and suitable diversion routes have been considered when activities such as the demolition of old culverts, installation of new culverts etc is being carried out, to protect all road users.
	The maintenance of existing lighting and consideration of appropriate area or task lighting is important for the existing operational network, diversion routes, WCH routes and for the work zones. This is particularly relevant during winter months and during periods of inclement weather and poor visibility.
Workforce / Road Users / WCH / Local Community	Space restrictions will mean adequate safe working zones need to be maintained throughout the construction phases, with a strong emphasis on creating a safe working environment by enforcing health and safety rules and ensuring these rules are upheld. Review of construction methodology and sequence to identify and establish sufficient working space to carry out activities safely with the appropriate plant and equipment and maintaining safe means of access and egress is essential.
Road user	To ensure consistency in the visibility of road markings the Designer will typically remark existing road markings that are retained.
WCH	Primary consideration will be given to the safety of WCH users including pedestrians, for the construction works that will be carried out within all areas. WCH diversion routes will be considered to ensure that this group can traverse the working area safely. The provision of temporary signalised crossing points and ramps will be considered to provide grade separation at areas of high volume WCH traffic.

2.3.4.3 Adjacent roadworks

In order to define a list of all works affecting the road network in the vicinity of the scheme or the associated diversion routes, the Proposed Development team will set up regular liaison meetings with TII and the Kildare and Meath County Councils, to ensure that there are no clashes during full road closures and the impact to the road users is minimised across all networks.

2.3.4.4 Events and Seasonal Traffic

A schedule of Bank Holidays is provided below which indicates when traffic management restrictions are to be minimised where possible.

Table 2-4 Bank Holidays

Bank Holidays	Dates
New Year's Day	01 January (or First Monday of the Month if falling on a weekend)
St Brigid's Day	First Monday in February
St. Patrick's Day	17 March
Good Friday	Friday preceding Easter Sunday (Note this is a bank holiday and not a public holiday)
Easter Monday	Monday (following Easter Sunday)
Early May Bank Holiday	First Monday of May
June Bank Holiday	First Monday of June
August Bank Holiday	Last Monday of August
October Bank Holiday	Last Monday of October
Christmas Day	25 December
St Stephen's Day	26 December

(Subject to change)

During the main period of construction works, it is not envisaged that traffic management arrangements would be removed and reinstalled at Bank Holidays. This could result in creating unsafe environments, as well as be cost prohibitive, time consuming and disruptive to the local stakeholders.

To minimise the impact of traffic management during Bank Holidays, the construction programme will avoid the need to change road layouts unless there is a measurable benefit to the local stakeholders. Lane and full road closures will be avoided during these periods as far as reasonably practicable. To alleviate the local stakeholders' perception of no work taking place, construction works will continue during these periods.

In addition, the following events have been identified as also having an impact on the Proposed Development.

- The seasonal effects of tourism/public holidays.
- Reductions in school/work trips during holiday periods.
- The effect of annual leave on the volume of commuting trips during the summer months.
- Changes in the level of retail activity; and
- Sporting, cultural or community events held on the public road.

Dates for such significant events throughout the construction period will be determined during detailed planning and prior to the start of construction works where possible. The Contractor will ensure that any closures during the construction shall have a minimal impact on public events.

The Contractor, as part of their stakeholder engagement plan, will liaise with the relevant authorities to assess the impact of the various annual events and consider using portable Variable Message Signs (VMS) to alert the road users to the potential of increased traffic flows.

2.3.5 Road closures applications

Applications for Temporary Road Closures will typically be made on the Kildare and Meath County Councils accordingly. The Contractor is entirely responsible for obtaining Road Closures as necessary to enable him to fulfil

his contractual obligations. To comply with statutory requirements, an application for a Temporary Road Closure will be submitted a minimum of 8 weeks in advance. The Gardaí will also be informed in writing. It is worth noting that particular attention will be given to notifying local stakeholders in advance.

2.3.6 Road opening license

All road openings will typically be carried out in accordance with the latest version of the document "Guidelines for Managing Openings in Public Roads (Guidelines for the Opening, Backfilling and Reinstatement of Openings in Public Roads)(Department of Transport, Tourism and Sport, April 2017)

In order to carry out an excavation in a public road, a Road Opening License is required; all Road Opening Licenses will typically be applied through the MapRoad Roadworks Licensing (MRL) system which is managed and facilitated by the Road Management Office (RMO). It is Contractor's responsibility to obtain the Road Opening Licenses.

2.3.7 Public notices

The Contractor will typically liaise with the Roads Authority in respect of any temporary full road closures, lane closures, and other traffic management controls required to be carried out to ensure the safety of the workforce and the public for the period of the works. The advertising of such notices on the local radio, local press, council websites, and leaflet drops will be considered to warn motorists, local businesses and residents of the changes involved and new road layouts to be expected.

2.3.8 Incident management

In accordance with the Clause 4.3.9 of the Guidance for the Control and Management of Traffic at Road Works (Department of Transport, Tourism and Sport, 2010), the requirement of the incident management plan is established early in the design process and would usually include the provision of an incident management system to record and report all site incidents, and, those that are related to traffic management.

The Incident Management Plan will be established and developed by the Contractor. The purpose of this plan is to set out the broad principles of partnership working between the PSCS, Contractor, Temporary Traffic Operations Supervisor and Emergency Responders in terms of carrying out roles and responsibilities of each party for incident management during the construction of the scheme, focusing on incident identification, response, and recovery.

The incident management system adopted will include, but not limited to, an operational structure with a formal reporting system and review meetings, the name of the person with responsibility for record keeping and an outline contingency plan.

During the works, consideration will be given to the possibility of altering or removing the traffic management measures in order to deal with exceptional circumstances, such as high traffic volumes, adverse weather conditions and emergency access.

2.3.9 Communication plan

A communication plan is developed to deliver up to date information about progress and forthcoming full road and lane closures to the public is one of the key drivers to making this a successful scheme.

The Communication Plan will be developed prior to the start of works to include identification of target audiences, key messages, and communication channels. It will typically set out the processes and procedures for communications including reactive communications to deal with incidents and emergencies on the network.

Proposed communication actions prior to traffic management and associated construction works will typically include:

- Placing of the "Roadworks Ahead" warning signs which will be the first temporary sign visible to the road user on the approach to any roadworks
- The local Authority typically will update in writing key stakeholders on timelines and progress as per the Temporary Closing of Roads Regulations, 1956 – S.I. No. 30/1956
- In advance of the works, plans would be communicated through various sources, such as websites, news articles and road signage along the relevant stretch highlighting timelines for works to all affected residents, landowners and business owners.
- The works will be included on the TII roadworks website as this is potentially the first source of information looked at by the public

Proposed communication actions during construction works will be implemented as:

- Roadside signage will be used to inform the road user of changes to traffic management, construction works, operations and possible delays
- Communication and distribution of newsletters to stakeholders (including all affected residents, landowners and business owners) to share the progress on the Proposed Development
- Regular communications to emergency services and breakdown services to ensure they are aware of the changing road network as the scheme evolves
- Publicity of scheme details for road users at leisure venues, petrol filling stations, local supermarkets and other regularly visited domestic type stores
- Continued use of the TII and Council Website
- Press releases to the broadcast media
- Twitter and other social media to share works and delays as well as weekly update roadworks emails
- Weekly traffic management liaison meetings with relevant stakeholders

All local residents and businesses will be included within a single Proposed Development-wide Communication plan to ensure timely, efficient, and effective communication to all parties.

In the preparation of the Construction Stage TMP and during the implementation of the works, the Contractor will typically liaise with the following parties:

- Kildare County Council Roads Department
- Meath County Council Roads Department
- Garda Síochána, ambulance and fire services
- Private and Public Bus Services

The Contractor will typically take into account the impact of the construction works on general traffic, businesses, and local property owners and coordinate the implementation of the developed TMP throughout the duration of the works.

2.3.10 Working hours

Typically, workings hours during construction are expected to be:

- Weekdays 0700hrs to 1800hrs
- Weekends and Bank holidays 0700hrs to 1400hrs

At specific locations where impact to local receptors (i.e., local residents) it is anticipated that there may be a requirement for 24hour working in areas where there would be limited affect to local receptors (i.e., residents, wildlife etc). The ability to work 24hrs would minimise impact during construction of the scheme and facilitate more efficient operations. This would typically be facilitated by two 12hour work shifts.

The ability for 24hour working would not affect the proposed traffic management, but rather reduce the implementation duration, in turn reducing disruption to the road network. This would only be implemented under a full road closure scenario.

3. Construction Methodology

3.1 Sequence of Works

The proposed construction sequence to support the TTM for the in-road sections of the cable route as follows:

- Phase 1 – Installation of passing bay and joint bay structure
    - Early installation of the passing bay would support the excavation and installation of the ducts, facilitating lorry holding areas and safely parking awaiting delivery vehicles in strategic positions.
    - The design of the passing bays is detailed in A.2– Passing Bay Technical Note.
- Phase 2 – Excavation and installation of ducts
    - Assumed to be aligned to the road corridor boundary.
- Phase 3 – Installation of cables
    - All assumptions associated with the installation of the cables are detailed in A.1– Abnormal Load Assessment.

The following aspects are excluded from this traffic management report:

- Compound construction
- Localised utility diversions
- Off-road access points
- HDD access points
- Demobilisation

3.2 Construction Space

3.2.1 Phase 11 – Installation of passing bay and joint bay structure

3.2.1.1 In-road Joint Bay

Phase 11 of the works would most likely include the construction of the passing bays (where required) at the joint bay locations. This provides a strategic advantage for the remainder of the Proposed Development as small areas are developed that could support the construction process. On completion of the passing bay, it would be proposed that the joint bays are installed at the same period of time.

Figure 3-1 and Figure 3-2 shows the plan of the expected site setup during Phase 1. It would be proposed that a localised lane closure would be required to support the installation of both the passing bay and joint bay structure. Although the passing bay would be offline to the live carriageway, suitable precautions will be required for delivery vehicles and material handling.

If these two separate activities are completed independently, the proposed traffic management would remain the same. Please note, the demobilisation of the Proposed Development and the associated removal of the passing bays will likely require the same traffic management as that required in the installation case.

Following review of the required passing bay and construction space proofing, the key parameters of the passing bay as follows:

- Total road width - approximately 10.5m
    - Width of the construction works – a minimum of ~6.4m
    - Minimum open lane width - 3.3m-4.3m

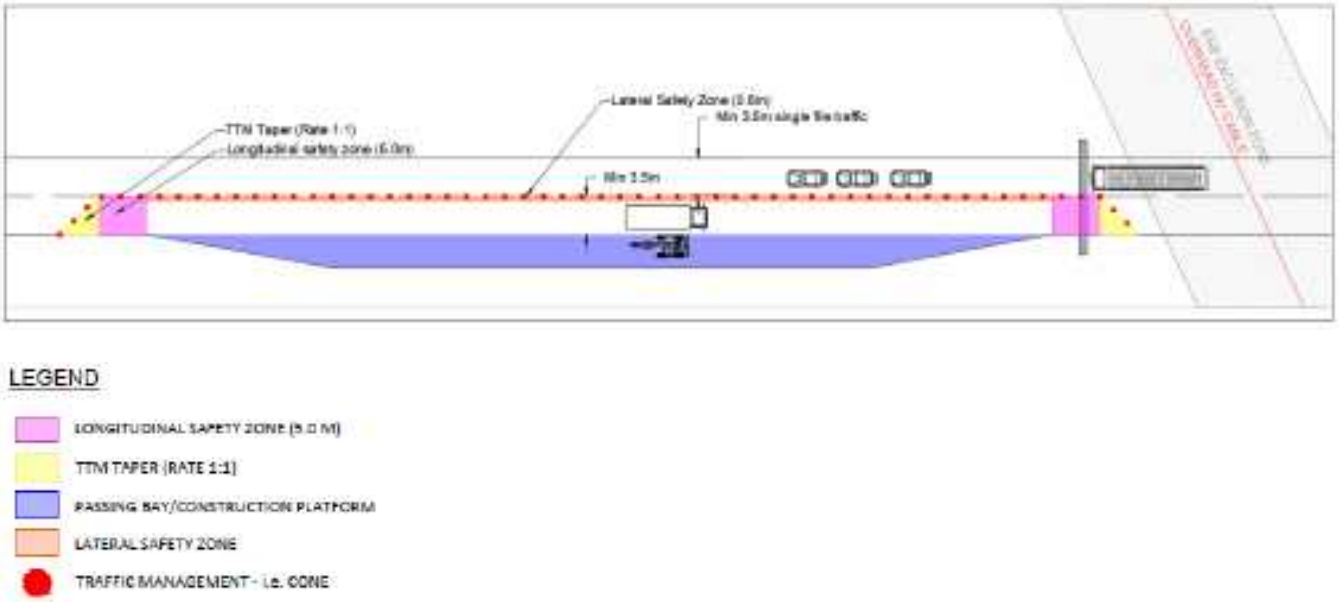

Figure 3-1 Passing Bay Construction

LEGEND

- LONGITUDINAL SAFETY ZONE (5.0 M)
- TTM TAPER (RATE 1:1)
- PASSING BAY/CONSTRUCTION PLATFORM
- LATERAL SAFETY ZONE
- TRAFFIC MANAGEMENT - i.e. CONE

Figure 3-2 Joint Bay Construction

Figure 3-3 shows the installation of the joint bay and the required construction space. A minimum 7.0m width of construction space would be required for the installation of the joint bays. This required 7.0m is calculated assuming the alignment of the joint bay with the road boundary. It will be noted that the delivery vehicle for the precast joint bay would only temporarily be in position for approximately two hours.

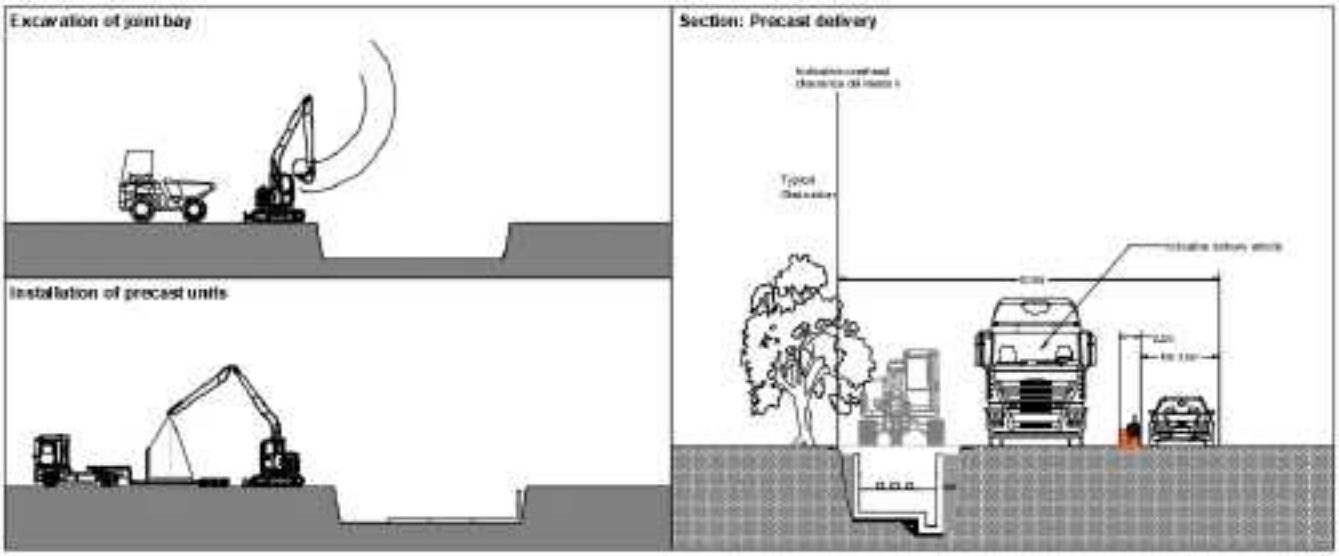

Figure 3-3 Joint Bay Construction (Sections)

3.2.1.2 Off-road/In-verge Joint Bay

There are instances along the route where passing bays may be located adjacent to the road in the verge. A suitable construction platform will be required for the safe delivery of materials and installation of the permanent works. It is recommended a suitable platform is designed and tested to ensure the stability of all plant, equipment, and delivery vehicles.

Figure 3-4 shows the proposed construction platform and associated temporary traffic management.

Following review of the required construction platform and construction space proofing, the key parameters of the passing bay as follows:

- Total road width - approximately 7.5m
    - Width of the construction works – a minimum of 4.0m
    - Minimum open lane width - 3.5m

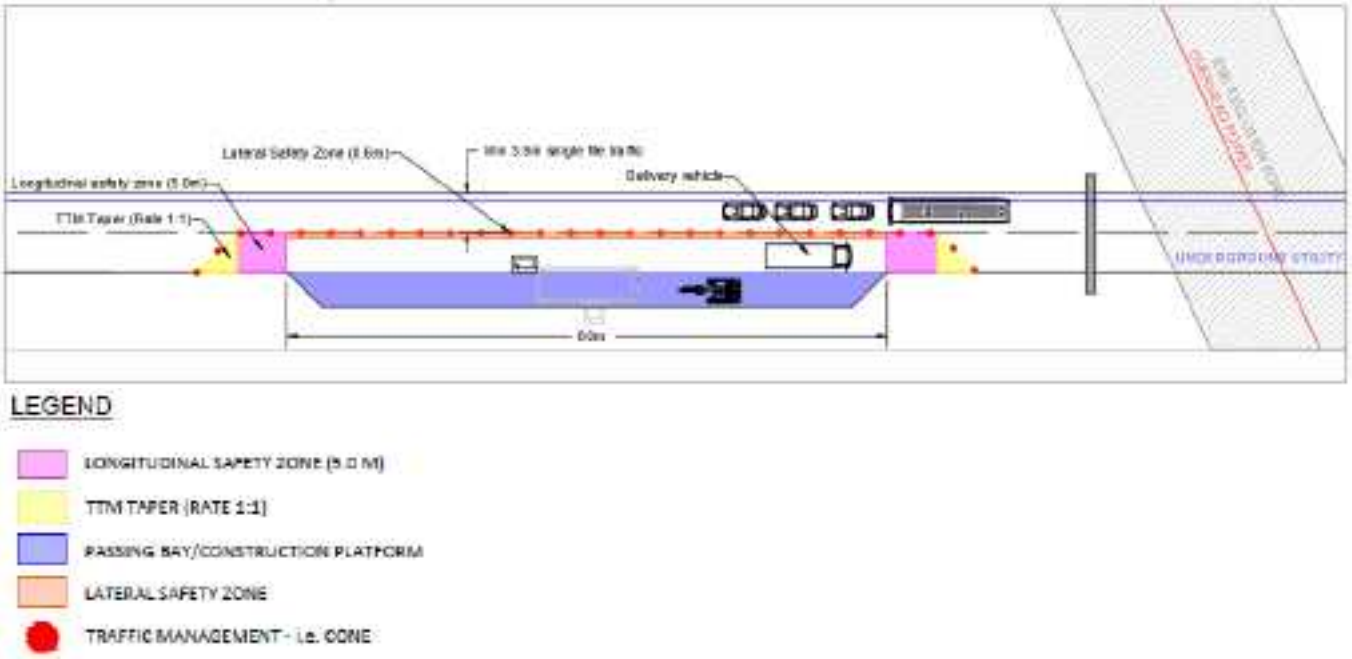

Figure 3-4 In-Verge Joint Bay Construction

3.2.2 Phase 2 – Excavation and installation of ducts

To minimise disruption to road users, it would be preferable to work in a linear corridor approach as shown in Figure 3-5. This approach would not be considerably constrained, as this will create a narrow corridor with live adjacent lanes in operation. This method would have the least impact to the road network.

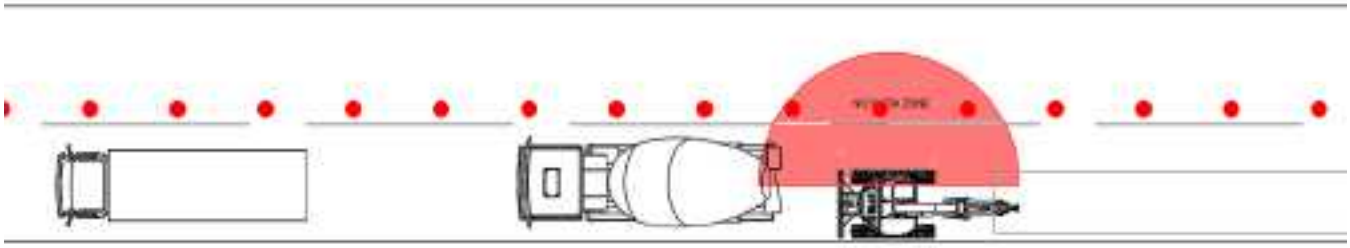

Figure 3-5 Duct installation

Following review of the required construction space proofing, the key parameters of to maintain the road open with a single lane closure as follows:

- Total road width - approximately 7.5m
    - Width of the construction works – a minimum of 4.5m
    - Minimum open lane width - 3.0m

Figure 3-6 shows the construction space proofing for the installation of the ducts and the associated backfill. A minimum construction space width of 4.2m would be required. It will be noted this is considerably constrained and would likely result in reduced output.

In the event that there is an obstruction preventing the excavator slew, a safe system of work will likely be identified by the contractor.

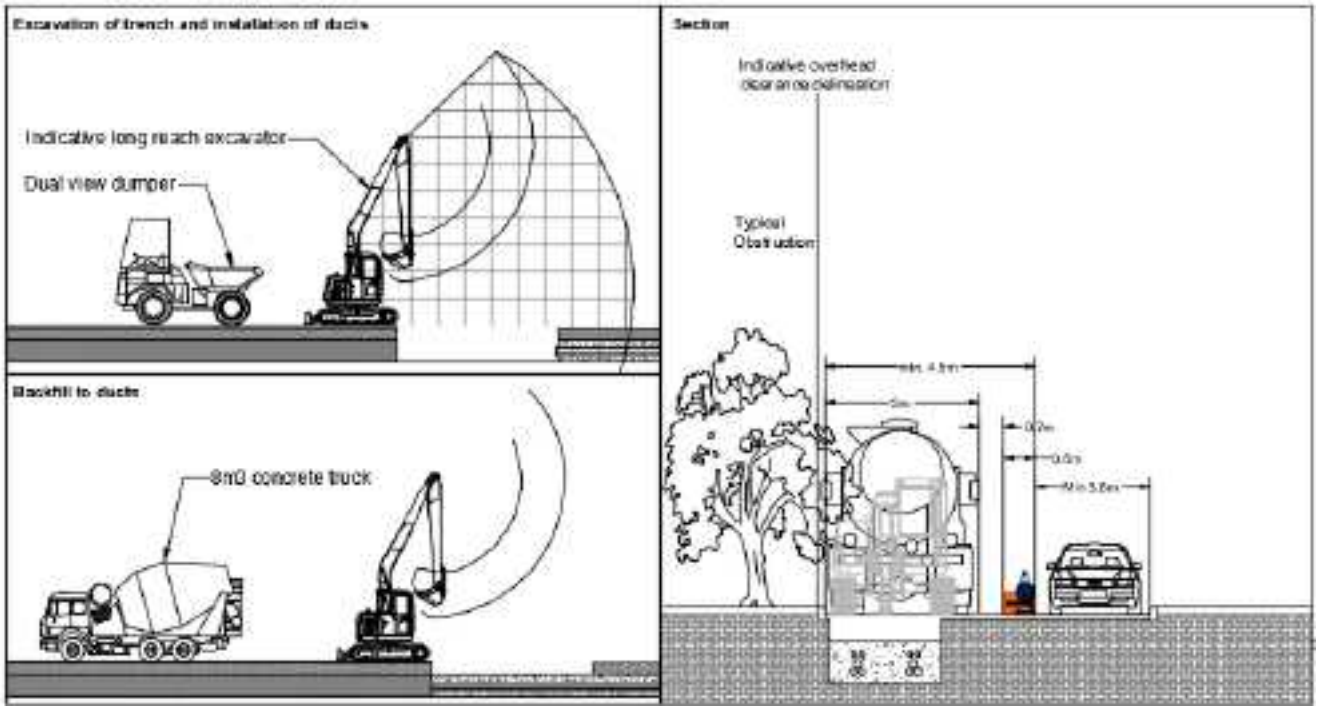

Figure 3-6 Duct Installation (Sections)

Figure 3-7 shows the potential strategic use of the passing bay as a staging area (for example a lorry holding bay). The Contractor will consider the early implementation of the passing bay at the joint bay locations.

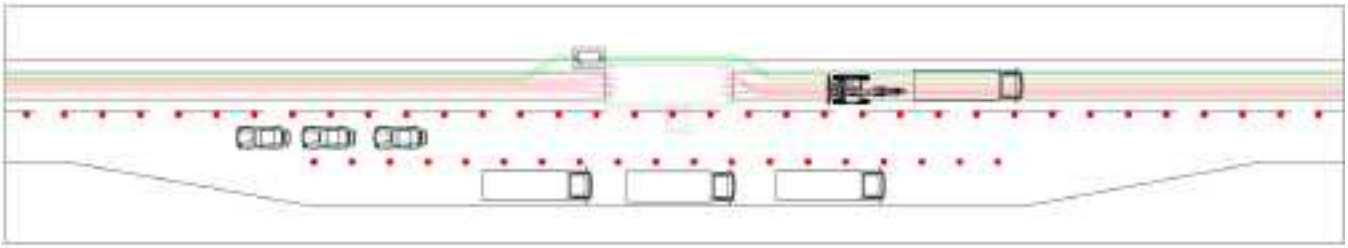

Figure 3-7 Strategic use of passing bay

3.2.3 Phase 3 – Installation, jointing and testing of the ducts

3.2.3.1 In-road Joint Bay

At in-road locations the proposed traffic management is shown in Figure 3-8. The passing bay will facilitate the safe passage of public vehicles whilst the demarcated zone will provide suitable construction space for installation operations.

Figure 3-9 shows a section of the cable installation and anticipated spatial requirements. This is shown to support the required construction space in Figure 3-8.

Note the passing bay shown facilitates dual cable installation, refinement for single cable direction installation is shown in appendix A.2.

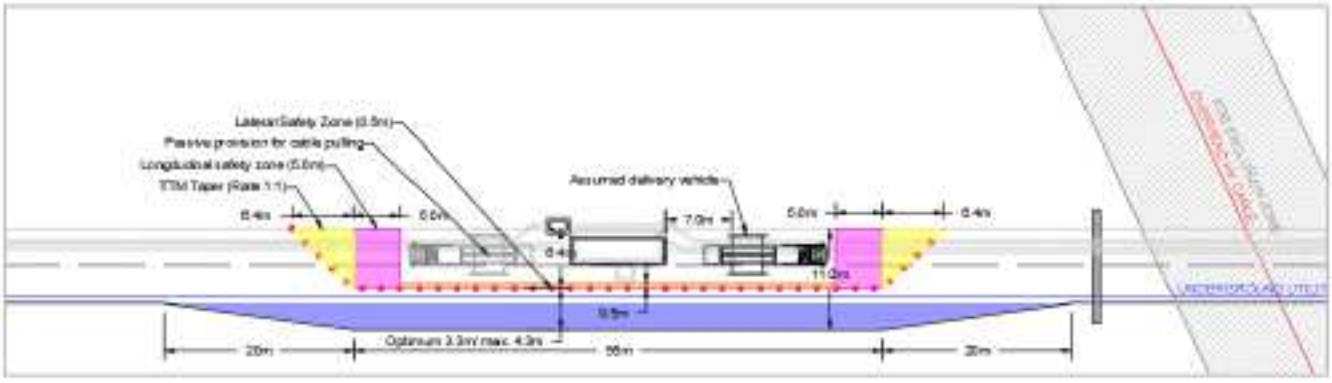

Figure 3-8 In-road cable installation - plan

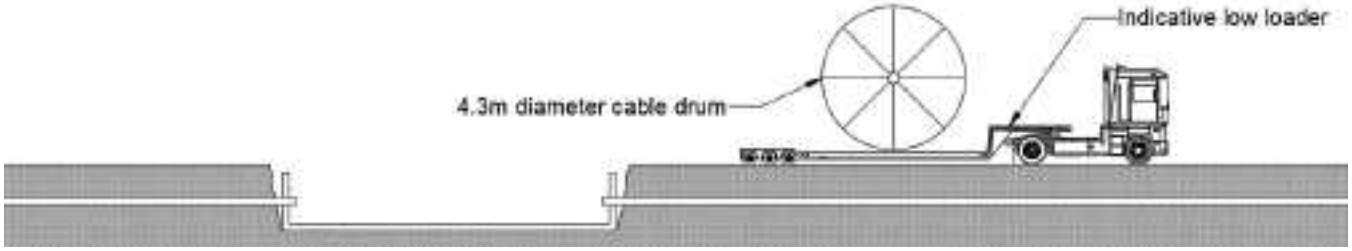

Figure 3-9 In-road cable installation - sections

3.2.3.2 In-verge Joint Bay

At in-verge joint bay locations, the proposed traffic management is shown in Figure 3-10. Although the operations are out of the live traffic flow, the works are still in proximity and consideration to the safety of site staff is required. A lateral safety zone of 0.5m will be required from the working area and suitable access to the construction platform will be required. Due to the slow-moving vehicles, there will be a likely requirement for TTM to ensure the safety of all road users.

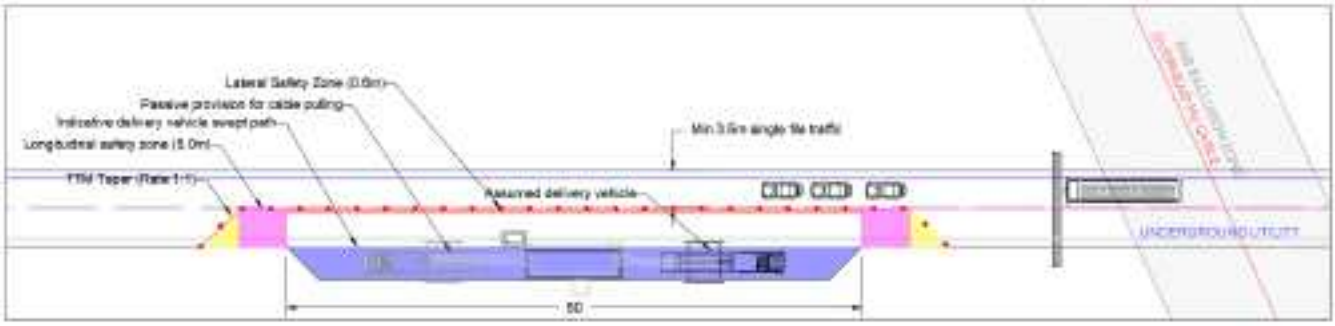

Figure 3-10 In-verge cable installation - plan

4. Proposed Traffic Management Plan

The subsequent sections detail the proposed traffic management sections. Each section builds on the elements discussed in the previous sections and aims to offer a safe solution to all road users in compliance to the relevant guidance and legislative documents.

Table 4-1 Traffic Management Sections

TTM Sections	Name of Section	Length (m)	Start CH	End Ch	Council Authority	Type	No. of Joint Bays
1.01	Woodland	3375	0	3375	Meath	Off-road	4
1.02	R156	3860	3375	7235	Meath	In-road	5
1.03	Mullagh	160	7235	7395	Meath	Off-road	1
1.04	R125 North	3505	7395	10900	Meath	In-road	5
1.05	R125 South	3850	10900	14750	Meath	In-road	5
1.06	R158	235	14750	14985	Kildare/Meath	In-road	0
1.07	Balfeaghan	615	14985	15600	Kildare	Off-road - HDD	1
1.08	R148	545	15600	16145	Kildare	On-road	1
1.09	M4	665	16145	16810	Kildare	Off-road - HDD	0
1.10	R407 North	460	16810	17270	Kildare	In-road	1
1.11	R407	9370	17270	26640	Kildare	In-road	13
1.12	R408	4145	26640	30785	Kildare	In-road	5
1.13	Curryhills	1045	30785	31830	Kildare	Off-road	1
1.14	R403	1170	31830	33000	Kildare	In-road	2
1.15	L2002 North	3190	33000	36190	Kildare	In-road	4
1.16	Millicent Demesne	275	36190	36465	Kildare	Off-road	0
1.17	L2002 South	335	36465	36800	Kildare	In-road	0
1.18	Castlesize	1005	36800	37805	Kildare	Off-road - HDD	2
1.19	Sallins Bypass	2480	37805	40285	Kildare	In-road	3
1.20	Mills	320	40285	40605	Kildare	Off-road	1
1.21	Osberstown Road	60	40605	40665	Kildare	In-road	0
1.22	M7	155	40665	40820	Kildare	Off-road	0
1.23	Millennium Parkway	2330	40820	43150	Kildare	In-road	3
1.24	R409	1215	43150	44365	Kildare	In-road	2
1.25	Grand Canal	385	44365	44750	Kildare	Off-road - HDD	1
1.26	R447	1440	44750	46190	Kildare	In-road	2
1.27	R448	5260	46190	51450	Kildare	In-road	7
1.28	R448 South	440	51450	51890	Kildare	In-road	0
1.29	Stephenstown	250	51890	52140	Kildare	Off-road	1
1.30	R412	310	52140	52450	Kildare	In-road	0
1.31	Dunstown	450	52450	52900	Kildare	Off-road	0

4.1.1 Phase 1 Proposed Traffic Management

The decision flow chart is shown in Figure 4-1 for Phase 1. The following traffic management solutions will be implemented:

- In-road Joint Bays
    - Single lane closure
        - Where the road width at the location of the joint bay is greater than 10.5m, a passing bay would not be required and only a single lane closure required.
    - Passing bay with single lane closure
        - Where the road width is less than 10.5m and where there is suitable space to construct a passing bay as shown in Figure 3-2, the proposed TTM is a passing bay with single lane closure.
    - Full road closure (with local access arrangements)
        - Where the road width is less than 10.5m and where there is insufficient space to construct a passing bay as shown in Figure 3-2, the proposed TTM is a full road closure with local access arrangements
- In-verge Joint Bays
    - Construction Platform with suitable access TTM
        - Where the road width at the location of the joint bay is greater than 7.5m, a construction platform will be required as shown in Figure 3-4, however no lane restrictions would be required. TTM to protect the workforce and accessing the platform would be required.
    - Construction Platform with single lane closure
        - Where the road width at the location of the joint bay is less than 7.5m, a construction platform will be required as shown in Figure 3-4 with a single lane restriction.

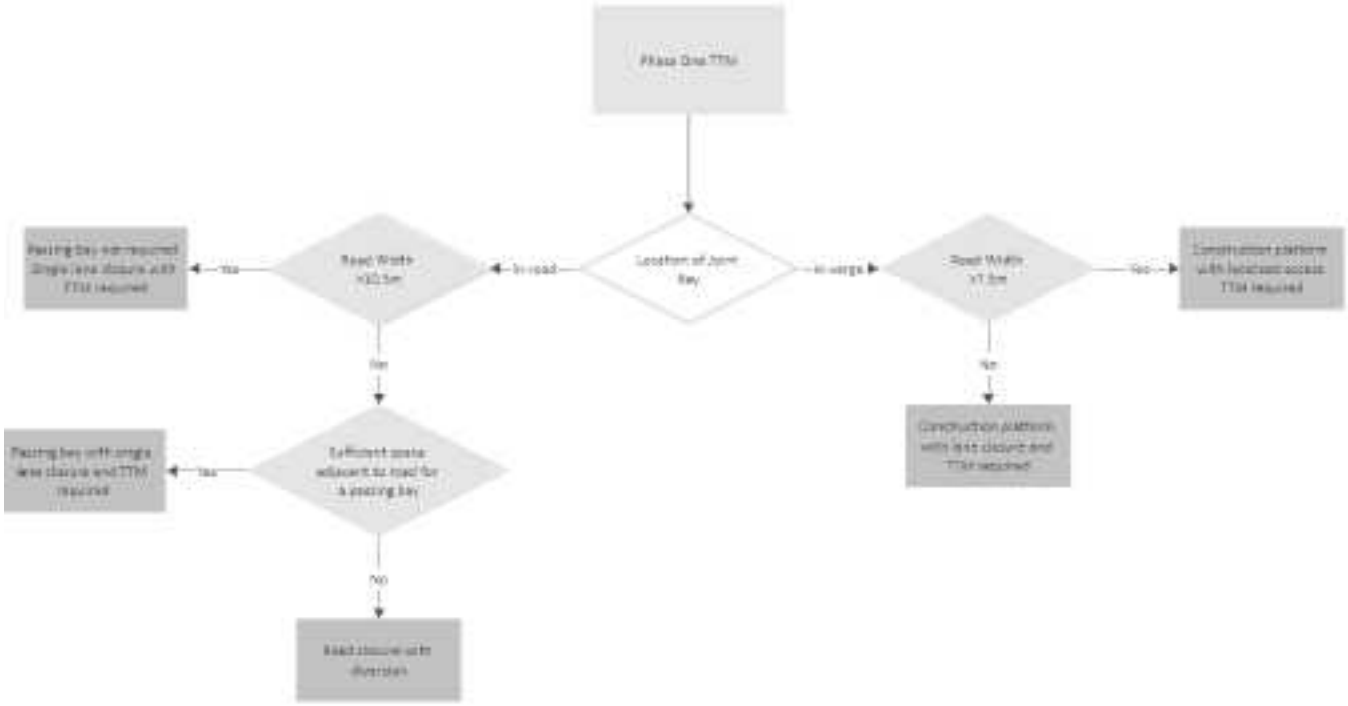

Figure 4-1 Phase 1 – TTM Decision Flowchart

Table 4-2 Traffic Management Phase 1

TTM Sections	Road	Joint Bay	Chainage (m)	Position	Road Width (m)	TTM Phase 1
1.02	R156	JB5	3750	In-road	7.4	Passing Bay – single lane closure
		JB6	4521	In-road	6.4	Passing Bay – single lane closure
		JB7	5190	In-road	6.5	Passing Bay – single lane closure
		JB8	5904	In-verge	7.0	Temporary construction platform – single lane closure
		JB9	6629	In-road	7.0	Passing Bay – single lane closure
1.04	R125 North	JB11	8028	In-road	6.6	Passing Bay – single lane closure
		JB12	8585	In-verge	7.3	Temporary construction platform – single lane closure
		JB13	9144	In-road	4.9	Passing Bay – single lane closure
		JB14	9914	In-road	5.7	Passing Bay – single lane closure
		JB15	10755	In-verge	5.9	Temporary construction platform – single lane closure
1.05	R125 South	JB16	11495	In-road	5.8	Passing Bay – single lane closure
		JB17	12294	In-road	5.5	Passing Bay – single lane closure
		JB18	13036	In-road	6.3	Passing Bay – single lane closure
		JB19	13893	In-verge	5.5	Temporary construction platform – single lane closure
		JB20	14746	In-verge	14.4	Temporary construction platform
1.08	R148	JB22	16130	In-verge	8.5	Temporary construction platform
1.10	R407 North	JB23	16885	In-verge	9.0	Temporary construction platform
1.11	R407	JB24	17555	In-verge	4.7	Temporary construction platform – single lane closure
		JB25	18296	In-road	6.8	Passing Bay – single lane closure
		JB26	19172	In-road	9.8	Passing Bay – single lane closure

TTM Sections	Road	Joint Bay	Chainage (m)	Position	Road Width (m)	TTM Phase 1
		JB27	20010	In-road	9.0	Passing Bay – single lane closure
		JB28	20759	In-road	8.6	Passing Bay – single lane closure
		JB29	21507	In-road	7.9	Passing Bay – single lane closure
		JB30	22288	In-verge	6.7	Temporary construction platform – single lane closure
		JB31	23010	In-verge	6.0	Temporary construction platform – single lane closure
		JB32	23770	In-road	10.3	Passing Bay – single lane closure
		JB33	24439	In-road	7.0	Passing Bay – single lane closure
		JB34	25265	In-verge	7.0	Temporary construction platform – single lane closure
		JB35	25950	In-road	7.5	Passing Bay – single lane closure
		JB36	26640	In-verge	11.1	Temporary construction platform
1.12	R408	JB37	27380	In-road	6.0	Passing Bay – single lane closure
		JB38	28196	In-road	6.0	Passing Bay – single lane closure
		JB39	29029	In-road	6.0	Passing Bay – single lane closure
		JB40	29824	In-road	6.0	Passing Bay – single lane closure
		JB41	30656	In-road	6.0	Passing Bay – single lane closure
1.14	R403	JB43	32062	In-road	6.5	Passing Bay – single lane closure
		JB44	32878	In-verge	9.0	Temporary construction platform
1.15	L2002 North	JB45	33656	In-road	6.5	Passing Bay – single lane closure
		JB46	34466	In-road	6.3	Passing Bay – single lane closure
		JB47	35221	In-road	5.7	Passing Bay – single lane closure
		JB48	36000	In-road	6.1	Passing Bay – single lane closure

TTM Sections	Road	Joint Bay	Chainage (m)	Position	Road Width (m)	TTM Phase 1
1.19	Sallins Bypass	JB51	38250	In-verge	15.0	Temporary construction platform
		JB52	38920	In-verge	12.0	Temporary construction platform
		JB53	39675	In-verge	12.0	Temporary construction platform
1.23	Millennium Parkway	JB55	41165	In-road	9.0	Local road widening – single lane open
		JB56	41800	In-road	9.0	Local road widening – single lane open
		JB57	42744	In-road	9.0	Local road widening – single lane open
1.24	R409	JB58	43433	In-verge	8.9	Temporary construction platform
		JB59	44073	In-verge	11.5	Temporary construction platform
1.26	R447	JB61	45373	In-road	9.8	Local road widening – single lane closure
		JB62	46109	In-road	15.7	Lane Closure
1.27	R448	JB63	46876	In-road	6.5	Road Closure
		JB64	47635	In-road	8.0	Passing Bay – single lane closure
		JB65	48392	In-road	6.0	Passing Bay – single lane closure
		JB66	49176	In-road	6.0	Passing Bay – single lane closure
		JB67	49915	In-road	6.5	Passing Bay – single lane closure
		JB68	50689	In-road	6.0	Passing Bay – single lane closure
		JB69	51366	In-verge	6.0	Temporary construction platform – single lane closure

4.1.2 Phase 2 Proposed Traffic Management

The decision flow chart is shown in 4 for Phase 2. The following traffic management solutions will be implemented for this phase:

- Full road closure (with local access arrangements)
    - Where the residual open carriageway is less than 2.5m the road will be required to be closed, with local access arrangements where necessary. Allowing vehicles to pass on a carriageway less than this width would pose considerable risk to road users and the delivery teams. Refer to Clause 8.4.3.1 to 8.4.3.3 TII Chapter 8 (Department of Transport, Tourism and Sport, 2019)
- Lane Closure with HGV Diversion
    - Where the residual open carriageway is between 2.5m and 3m the road will be required to be closed to HGVs but open to LGVs / cars. All HGVs would be required to utilise the diversion route, this would require VMS and signage to mitigate the risk of HGVs passing the works sites. Refer to Clause 8.4.3.1 to 8.4.3.3 TII Chapter 8 (Department of Transport, Tourism and Sport, 2019)
- Lane Closure
    - Where the residual open carriageway is greater than 3m, it is proposed to keep the road open to all road users utilising automated stop / go signals. Consideration to use of automated signalling to account for the predominant flow direction. These would remain during the entirety of the section of works (i.e., out of hours included) to ensure safety to all road users and delivery teams. Refer to Clause 8.4.3.1 to 8.4.3.3 TII Chapter 8 (Department of Transport, Tourism and Sport, 2019)

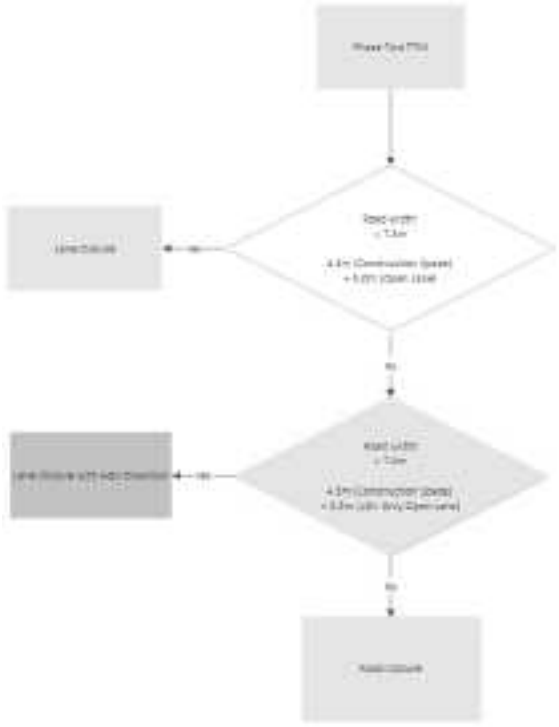

Figure 4-2 Phase 2 – TTM Decision Flowchart

The proposed traffic management for Phase 2 is shown in Table 4-3. For clarity off road sections have been omitted.

Table 4-3 Proposed Traffic Management – Phase 2

TTM Sections	Name of Section	Length (km)	Average Road Width (m)	TTM Phase 2	Diversion Length (km)	Diversion Council Authority
1.02	R156	3.9	7.0	Lane Closure with HGV diversion	27.4	Meath
1.04	R125 North	3.5	5.7	Full Road Closure	21.5	Kildare/Meath
1.05	R125 South	3.9	5.9	Full Road Closure	18.7	Meath
1.06	R158	0.2	7.7	Lane Closure	3.6	Kildare/Meath
1.08	R148	0.5	7.8	Lane Closure	5.0	Kildare
1.10	R407 North	0.5	8.2	Lane Closure	3.9	Kildare
1.11	R407	9.4	7.6	Lane Closure	17.1	Kildare
1.12	R408	4.1	6.1	Full Road Closure	9.6	Kildare
1.14	R403	1.2	6.9	Full Road Closure	12.5	Kildare
1.15	L2002 North	3.2	5.4	Full Road Closure	6.7	Kildare
1.17	L2002 South	0.3	5.6	Full Road Closure	9.5	Kildare
1.19	Sallins Bypass	2.5	15.0	Lane Closure	5.6	Kildare
1.21	Osberstown Road	0.1	5.2	Full Road Closure	4.8	Kildare
1.23	Millennium Parkway	2.3	9.0	Lane Closure	5.7	Kildare
1.24	R409	1.2	11.6	Lane Closure	2.8	Kildare
1.26	R447	1.4	11.2	Lane Closure	2.0	Kildare
1.27	R448	5.3	6.7	Full Road Closure	21.2	Kildare
1.28	R448 South	0.4	6.9	Full Road Closure	14.1	Kildare
1.30	R412	0.3	5.3	Full Road Closure	14.2	Kildare

4.1.3 Phase 3 Proposed Traffic Management

The decision flow chart is shown in Figure 4-3 for Phase 3. The following traffic management solutions will be implemented for this phase:

- In-road Joint Bays
    - Single lane closure
        - Where the road width at the location of the joint bay is greater than 10.5m, a passing bay would not be required and only a single lane closure required.
    - Passing bay with single lane closure
        - Where the road width is less than 10.5m and where there is suitable space to construct a passing bay as shown in Figure 3-2, the proposed TTM is a passing bay with single lane closure.
    - Full road closure (with local access arrangements)
        - Where the road width is less than 10.5m and where there is insufficient space to construct a passing bay as shown in Figure 3-2, the proposed TTM is a full road closure with local access arrangements
- In-verge Joint Bays
    - Construction Platform with suitable access TTM
        - Where the road width at the location of the joint bay is greater than 7.5m, a construction platform will be required as shown in Figure 3-4 however no lane restrictions would be required. TTM to protect the workforce and accessing the platform would be required.
    - Construction Platform with single lane closure
        - Where the road width at the location of the joint bay is less than 7.5m, a construction platform will be required as shown in Figure 3-4 with a single lane restriction.

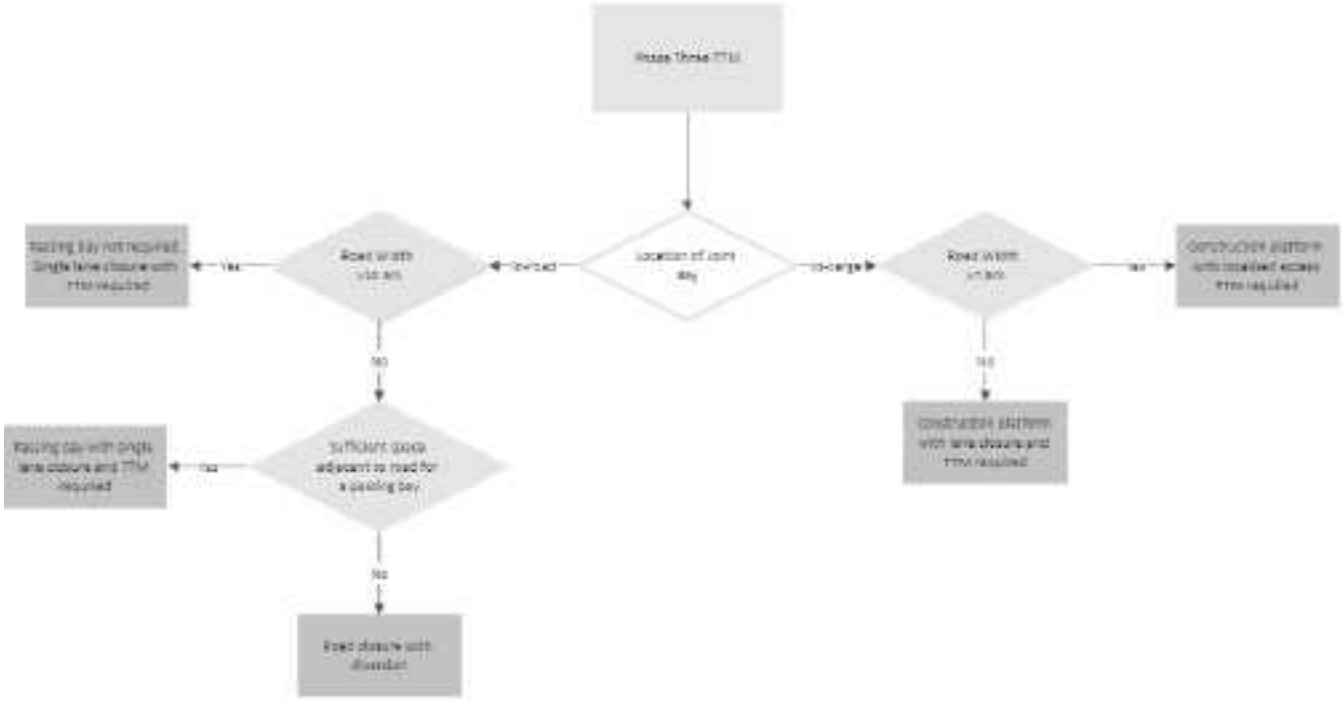

Figure 4-3 Phase 3 – TTM Decision Flowchart

The proposed traffic management for Phase 3 is shown in Table 4-4. For clarity off road sections have been omitted.

Table 4-4 Proposed Traffic Management – Phase 3

TTM Sections	Road	Joint Bay	Chainage (m)	Position	Road Width (m)	TTM Phase 3
1.02	R156	JB5	3750	In-road	7.4	Passing Bay – single lane closure
		JB6	4521	In-road	6.4	Passing Bay – single lane closure
		JB7	5190	In-road	6.5	Passing Bay – single lane closure
		JB8	5904	In-verge	7.0	Temporary construction platform – single lane closure
		JB9	6629	In-road	7.0	Passing Bay – single lane closure
1.04	R125 North	JB11	8028	In-road	6.6	Passing Bay – single lane closure
		JB12	8585	In-verge	7.3	Temporary construction platform – single lane closure
		JB13	9144	In-road	4.9	Passing Bay – single lane closure
		JB14	9914	In-road	5.7	Passing Bay – single lane closure
		JB15	10755	In-verge	5.9	Temporary construction platform – single lane closure
1.05	R125 South	JB16	11495	In-road	5.8	Passing Bay – single lane closure
		JB17	12294	In-road	5.5	Passing Bay – single lane closure
		JB18	13036	In-road	6.3	Passing Bay – single lane closure
		JB19	13893	In-verge	5.5	Temporary construction platform – single lane closure
		JB20	14746	In-verge	14.4	Temporary construction platform
1.08	R148	JB22	16130	In-verge	8.5	Temporary construction platform
1.10	R407 North	JB23	16885	In-verge	9.0	Temporary construction platform
1.11	R407	JB24	17555	In-verge	4.7	Temporary construction platform – single lane closure
		JB25	18296	In-road	6.8	Passing Bay – single lane closure

TTM Sections	Road	Joint Bay	Chainage (m)	Position	Road Width (m)	TTM Phase 3
		JB26	19172	In-road	9.8	Passing Bay – single lane closure
		JB27	20010	In-road	9.0	Passing Bay – single lane closure
		JB28	20759	In-road	8.6	Passing Bay – single lane closure
		JB29	21507	In-road	7.9	Passing Bay – single lane closure
		JB30	22288	In-verge	6.7	Temporary construction platform – single lane closure
		JB31	23010	In-verge	6.0	Temporary construction platform – single lane closure
		JB32	23770	In-road	10.3	Passing Bay – single lane closure
		JB33	24439	In-road	7.0	Passing Bay – single lane closure
		JB34	25265	In-verge	7.0	Temporary construction platform – single lane closure
		JB35	25950	In-road	7.5	Passing Bay – single lane closure
		JB36	26640	In-verge	11.1	Temporary construction platform
1.12	R408	JB37	27380	In-road	6.0	Passing Bay – single lane closure
		JB38	28196	In-road	6.0	Passing Bay – single lane closure
		JB39	29029	In-road	6.0	Passing Bay – single lane closure
		JB40	29824	In-road	6.0	Passing Bay – single lane closure
		JB41	30656	In-road	6.0	Passing Bay – single lane closure
1.14	R403	JB43	32062	In-road	6.5	Passing Bay – single lane closure
		JB44	32878	In-verge	9.0	Temporary construction platform
1.15	L2002 North	JB45	33656	In-road	6.5	Passing Bay – single lane closure
		JB46	34466	In-road	6.3	Passing Bay – single lane closure
		JB47	35221	In-road	5.7	Passing Bay – single lane closure

TTM Sections	Road	Joint Bay	Chainage (m)	Position	Road Width (m)	TTM Phase 3
		JB48	36000	In-road	6.1	Passing Bay – single lane closure
1.19	Sallins Bypass	JB51	38250	In-verge	15.0	Temporary construction platform
		JB52	38920	In-verge	12.0	Temporary construction platform
		JB53	39675	In-verge	12.0	Temporary construction platform
1.23	Millennium Parkway	JB55	41165	In-road	9.0	Local road widening – single lane open
		JB56	41800	In-road	9.0	Local road widening – single lane open
		JB57	42744	In-road	9.0	Local road widening – single lane open
1.24	R409	JB58	43433	In-verge	8.9	Temporary construction platform
		JB59	44073	In-verge	11.5	Temporary construction platform
1.26	R447	JB61	45373	In-road	9.8	Local road widening – single lane closure
		JB62	46109	In-road	15.7	Lane Closure
1.27	R448	JB63	46876	In-road	6.5	Road Closure
		JB64	47635	In-road	8.0	Passing Bay – single lane closure
		JB65	48392	In-road	6.0	Passing Bay – single lane closure
		JB66	49176	In-road	6.0	Passing Bay – single lane closure
		JB67	49915	In-road	6.5	Passing Bay – single lane closure
		JB68	50689	In-road	6.0	Passing Bay – single lane closure
		JB69	51366	In-verge	6.0	Temporary construction platform – single lane closure

4.2 TTM Sections

4.2.1 Section 1.01 - Woodland 400kV Substation to R156

Figure 4-4 shows the section from Woodland 400kV substation to R156. This section is off-road and therefore the temporary traffic management is not assessed.

Figure 4-4 Section 1.01

Table 4-5 shows a summary of the route section.

Table 4-5 Proposed Traffic Management - Section 1.01

Section Length	3.4km
Location	Off-road

4.2.2 Section 1.02 R156 to Mullagh

Figure 4-5 shows the section from R156 to Mullagh. This in-road section is on a regional road and has 5no. joint bays along the alignment. There are no alternative diversion routes suitable during the works phase.

Figure 4-5 Section 1.02

Table 4-6 shows a summary of the route section.

Table 4-6 Proposed Traffic Management - Section 1.02

Section Length	3.9km
Location	In-road
Phase 2 TTM	Lane Closure with HGV diversion (Local access arrangements to be provided)
Diversion Length	27.4km

4.2.3 Section 1.03 – Mullagh to R125 North

Figure 4-6 shows the section from Mullagh to R125 North. This section is off-road and therefore the temporary traffic management is not required.

Figure 4-6 Section 1.03

Table 4-7 shows a summary of the route section.

Table 4-7 Proposed Traffic Management - Section 1.03

Section Length	0.2km
Location	Off-road

4.2.4 Section 1.04 – R125 North to R125 South

Figure 4-7 shows the section from R125 North to R125 South. This in-road section is on a regional road and has 5no. joint bays along the alignment. There are no alternative diversion routes suitable during the works phase.

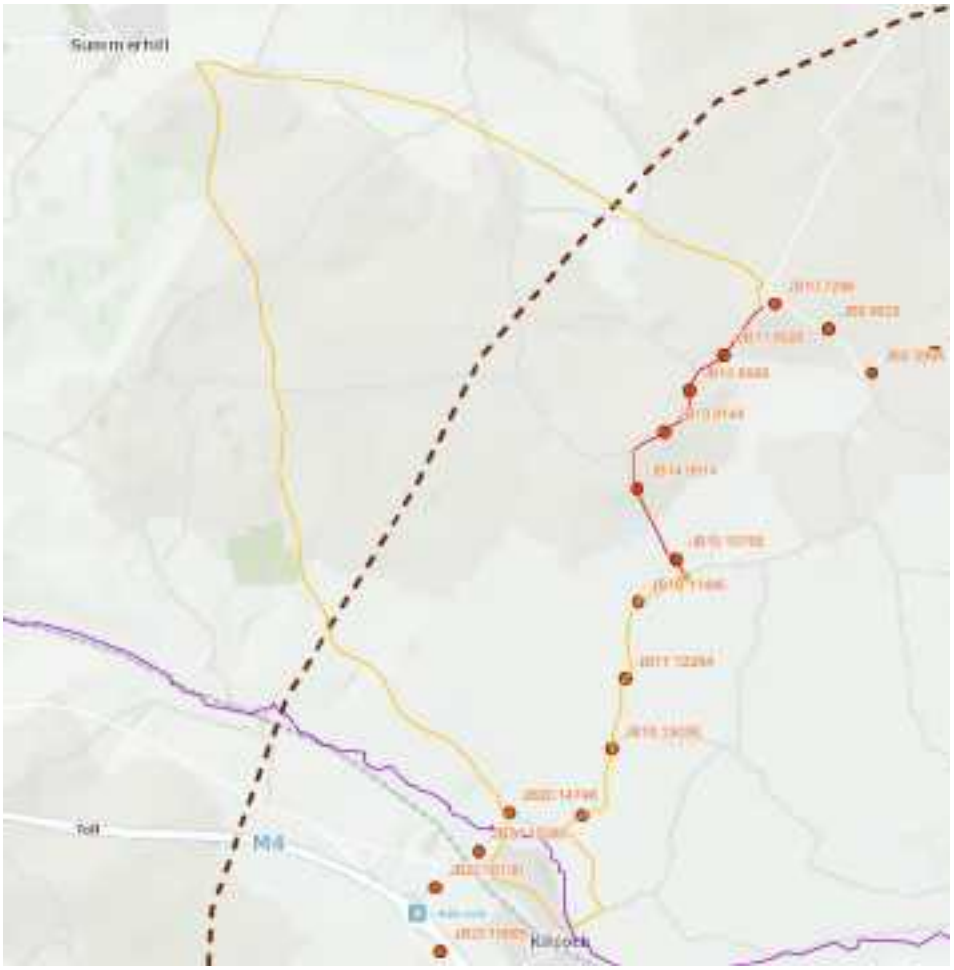

Figure 4-7 Section 1.04

Table 4-8 shows a summary of the route section.

Table 4-8 Proposed Traffic Management - Section 1.04

Section Length	3.5km
Location	In-road
Phase 2 TTM	Full Road Closure (with local access arrangements)
Diversion Length	21.5km

4.2.5 Section 1.05 – R125 South to R158

Figure 4-8 shows the section from R125 South to R158. This in-road section is on a regional road and has 5no. joint bays along the alignment. There are no alternative diversion routes suitable during the works phase.

Figure 4-8 Section 1.05

Table 4-9 shows a summary of the route section.

Table 4-9 Proposed Traffic Management - Section 1.05

Section Length	3.9km
Location	In-road
Phase 2 TTM	Full Road Closure (with local access arrangements)
Diversion Length	18.7km

4.2.6 Section 1.06 – R158 to Balfeaghan

Figure 4-9 shows the section from R158 to Balfeaghan. This in-road section is on a regional road and has no joint bays along the alignment. There are no alternative diversion routes suitable during the works phase.

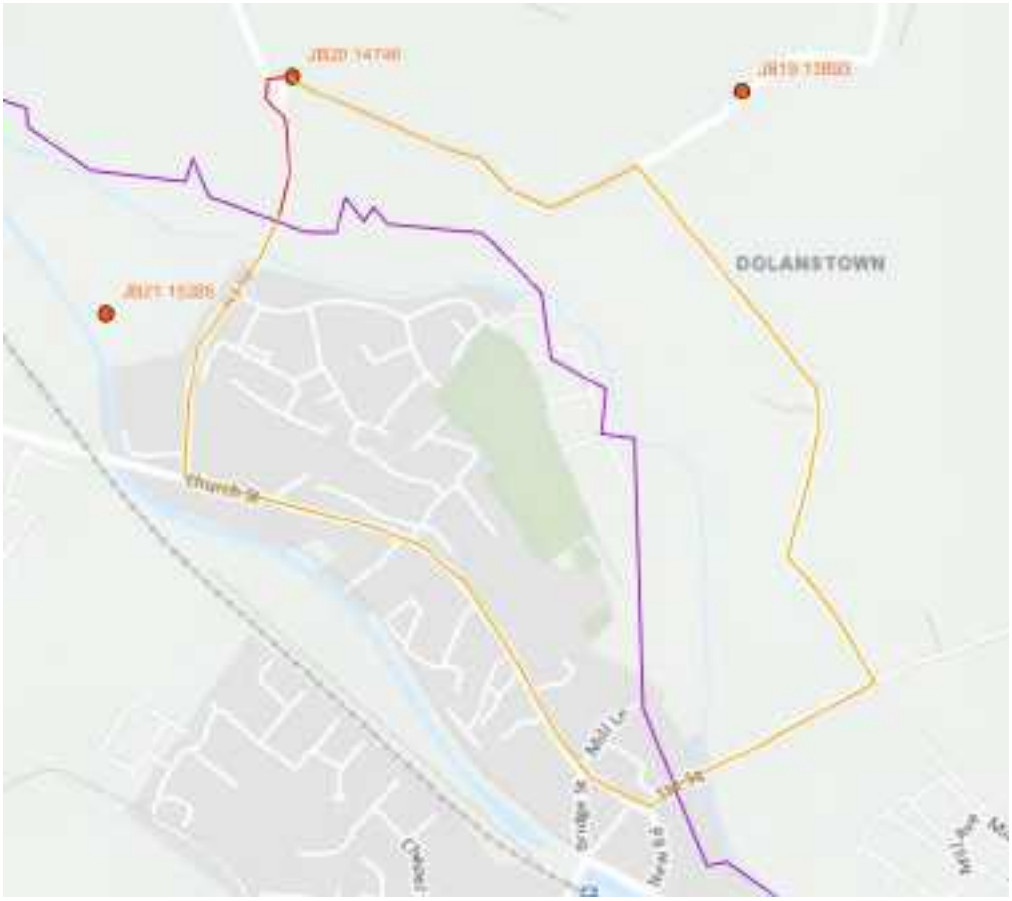

Figure 4-9 Section 1.06

Table 4-10 shows a summary of the route section.

Table 4-10 Proposed Traffic Management - Section 1.06

Section Length	0.2km
Location	In-road
Phase 2 TTM	Lane Closure
Diversion Length	3.6km

4.2.7 Section 1.07 – Balfeaghan to R148

Figure 4-10 shows the section from Balfeaghan to R148. This section is off-road and therefore the temporary traffic management is not required.

Figure 4-10 Section 1.07

Table 4-11 shows a summary of the route section.

Table 4-11 Proposed Traffic Management - Section 1.01

Section Length	0.6km
Location	Off-road

4.2.8 Section 1.08 – R148 to M4

Figure 4-11 shows the section from R148 to M4. This in-road section is on a regional road and has 1no. joint bay along the alignment. There are no alternative diversion routes suitable during the works phase.

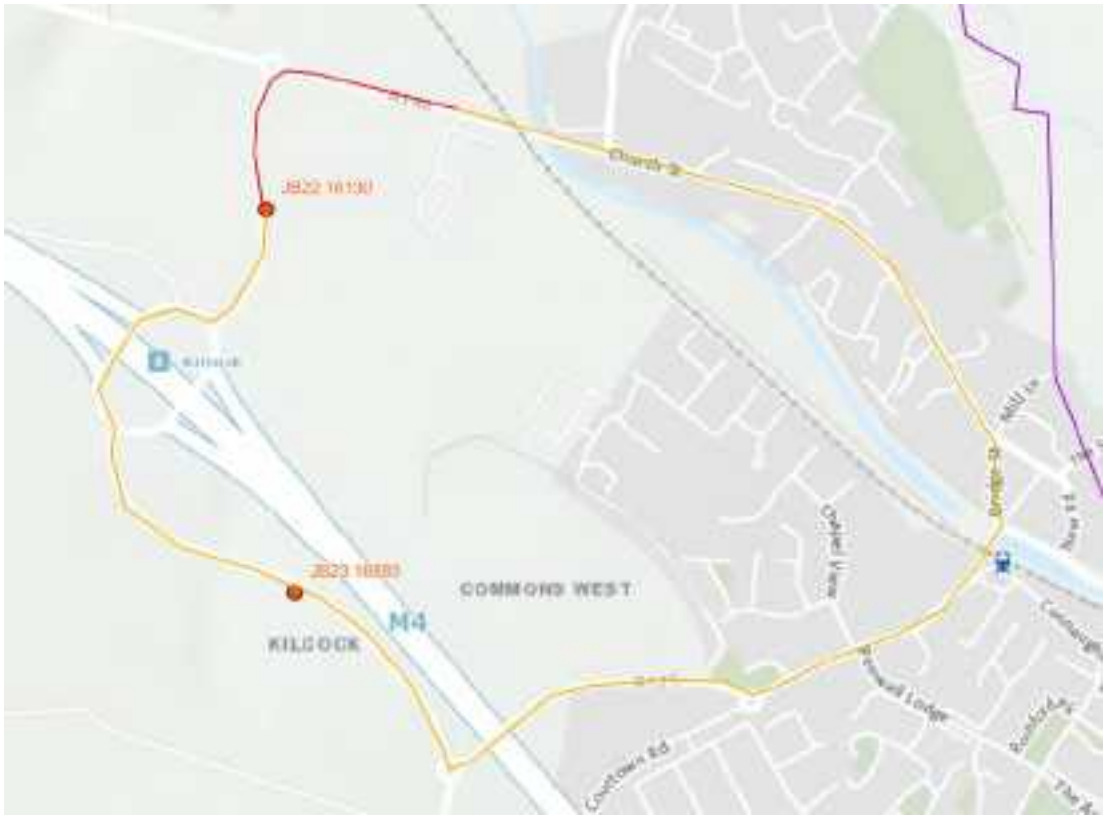

Figure 4-11 Section 1.08

Table 4-12 shows a summary of the route section.

Table 4-12 Proposed Traffic Management - Section 1.08

Section Length	0.5km
Location	In-road
Phase 2 TTM	Lane Closure
Diversion Length	5.0km

4.2.9 Section 1.09 – M4 to R407 North

Figure 4-12shows the section from M4 to R407 North. This section is off-road and therefore the temporary traffic management is not required.

Figure 4-12 Section 1.09

Table 4-13 shows a summary of the route section.

Table 4-13 Proposed Traffic Management - Section 1.09

Section Length	0.7km
Location	Off-road

4.2.10 Section 1.10 – R407 North to R407

Figure 4-13 shows the section from R407 North to R407. This in-road section is on a regional road and has 1no. joint bay along the alignment. There are no alternative diversion routes suitable during the works phase.

Figure 4-13 Section 1.10

Table 4-14 shows a summary of the route section.

Table 4-14 Proposed Traffic Management - Section 1.10

Section Length	0.5km
Location	In-road
Phase 2 TTM	Lane Closure
Diversion Length	3.9km

4.2.11 Section 1.11 – R407 to R408

Figure 4-14 shows the section from R407 to R408. This in-road section is on a regional road and has 13no. joint bays along the alignment. There are no alternative diversion routes suitable during the works phase.

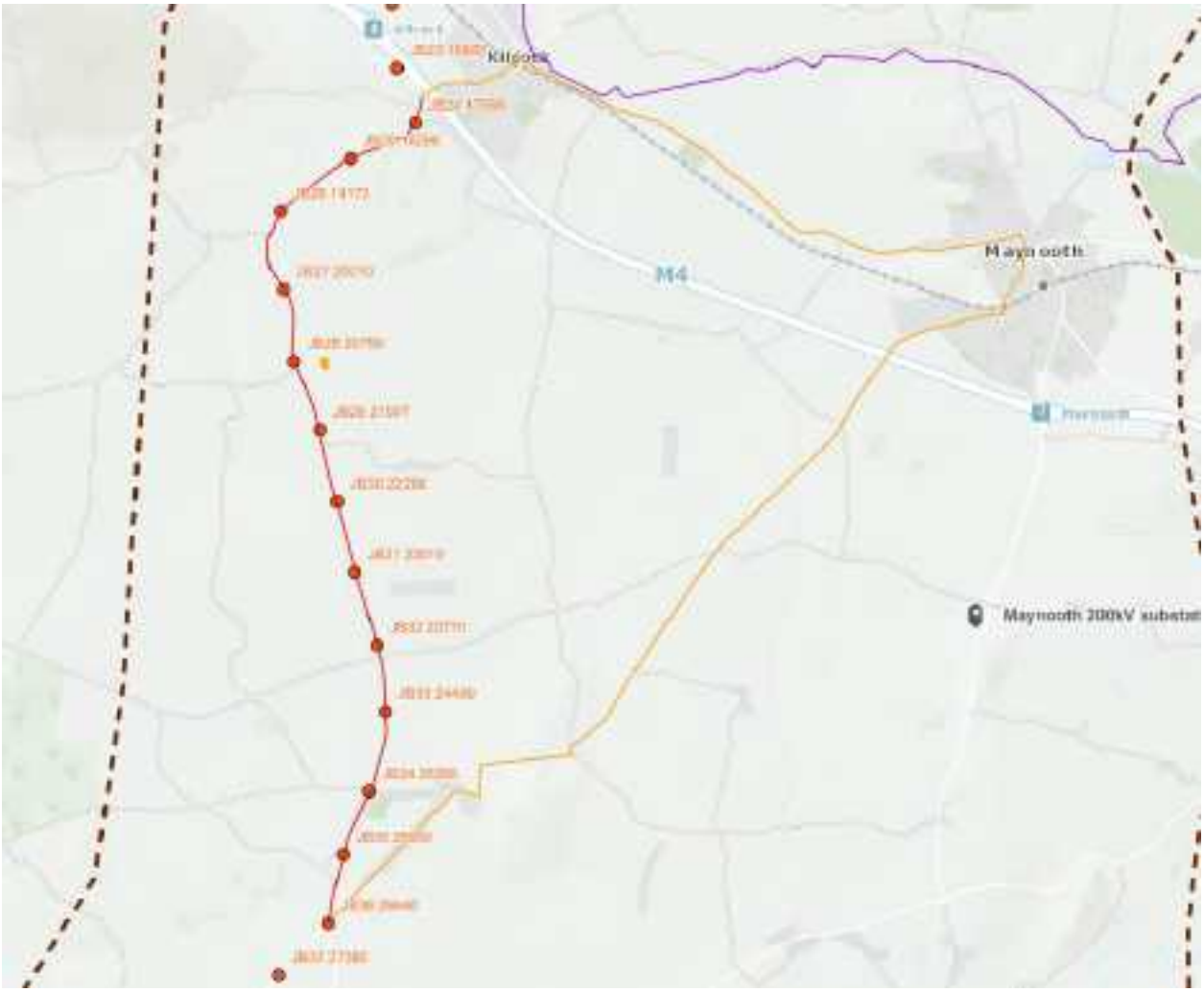

Figure 4-14 Section 1.11

Table 4-15 shows a summary of the route section.

Table 4-15 Proposed Traffic Management - Section 1.11

Section Length	9.4km
Location	In-road
Phase 2 TTM	Lane Closure
Diversion Length	17.1km

4.2.12 Section 1.12 – R408 to Curryhills

Figure 4-15 shows the section from R408 to Curryhills. This in-road section is on a regional road and has 5no. joint bays along the alignment. There are no alternative diversion routes suitable during the works phase.

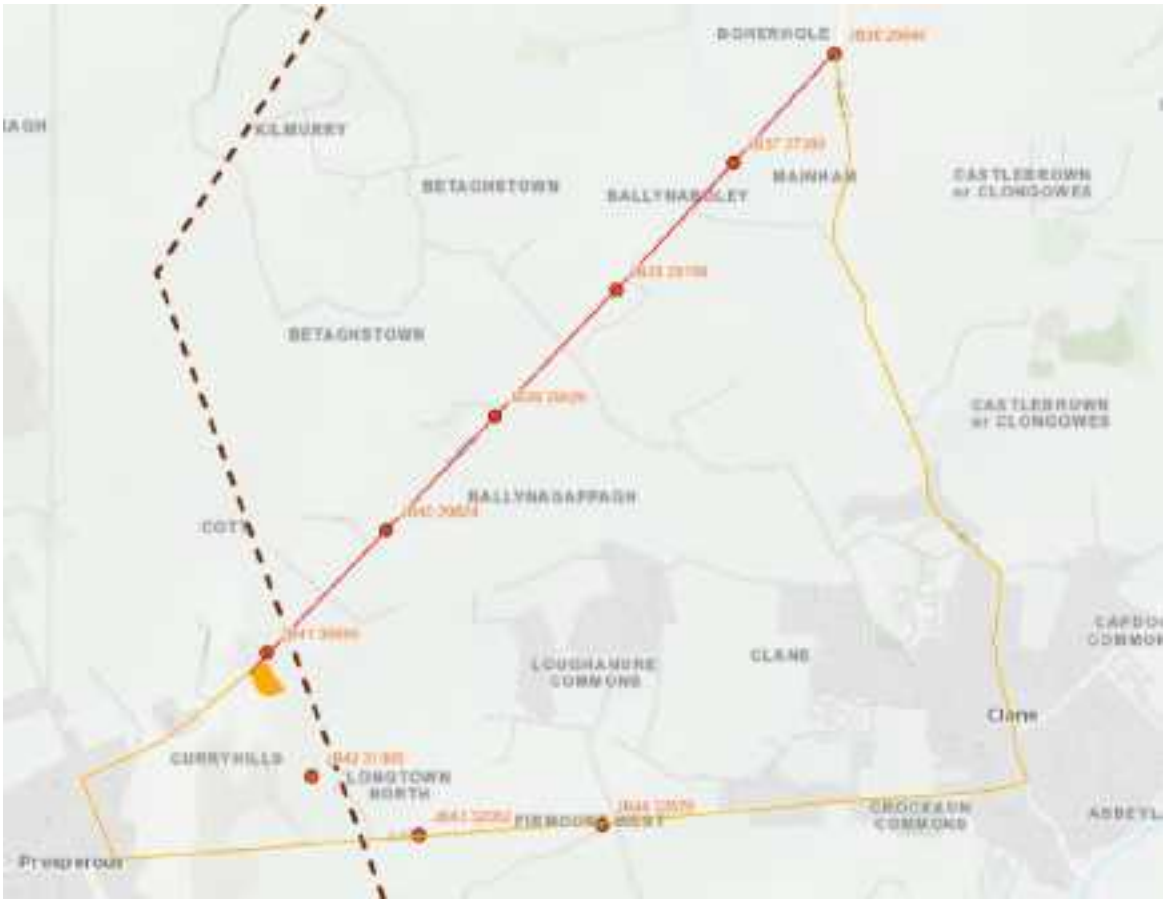

Figure 4-15 Section 1.12

Table 4-16 shows a summary of the route section.

Table 4-16 Proposed Traffic Management - Section 1.12

Section Length	4.2km
Location	In-road
Phase 2 TTM	Full Road Closure (with local access arrangements)
Diversion Length	9.6km

4.2.13 Section 1.13 – Curryhills to R403

Figure 4-16 shows the section from Curryhills to R403. This section is off-road and therefore the temporary traffic management is not required

Figure 4-16 Section 1.13

Table 4-17 shows a summary of the route section.

Table 4-17 Proposed Traffic Management - Section 1.13

Section Length	1.0km
Location	Off-road

4.2.14 Section 1.14 – R403 to L2002 North

Figure 4-17 shows the section from R403 to L2002 North. This in-road section is on a regional road and has 2no. joint bays along the alignment. There are no alternative diversion routes suitable during the works phase.

Figure 4-17 Section 1.14

Table 4-18 shows a summary of the route section.

Table 4-18 Proposed Traffic Management - Section 1.14

Section Length	1.2km
Location	In-road
Phase 2 TTM	Full Road Closure (with local access arrangements)
Diversion Length	12.5km

4.2.15 Section 1.15 – L2002 North to Millicent Demesne

Figure 4-18 shows the section from L2002 North to Millicent Demesne. This in-road section is on a local road and has 4no. joint bays along the alignment. There are no alternative diversion routes suitable during the works phase.

Figure 4-18 Section 1.15

Table 4-19 shows a summary of the route section.

Table 4-19 Proposed Traffic Management - Section 1.15

Section Length	3.2km
Location	In-road
Phase 2 TTM	Full Road Closure (with local access arrangements)
Diversion Length	6.7km

4.2.16 Section 1.16 – Millicent Demesne to L2002 South

Figure 4-19 shows the section from Millicent Demesne to L2002 South. This section is off-road and therefore the temporary traffic management is not required.

Figure 4-19 Section 1.16

Table 4-20 shows a summary of the route section.

Table 4-20 Proposed Traffic Management - Section 1.16

Section Length	0.3km
Location	Off-road

4.2.17 Section 1.17 – L2002 South to Castlesize

Figure 4-20 shows the section from L2002 South to Castlesize. This in-road section is on a local road and has no joint bay along the alignment. There are no alternative diversion routes suitable during the works phase.

Figure 4-20 Section 1.17

Table 4-21 shows a summary of the route section.

Table 4-21 Proposed Traffic Management - Section 1.17

Section Length	0.3km
Location	In-road
Phase 2 TTM	Full Road Closure (with local access arrangements)
Diversion Length	9.5km

4.2.18 Section 1.18 – Castlesize to Sallins Bypass

Figure 4-21 shows the section from Castlesize to Sallins By-pass. This section is off-road and therefore the temporary traffic management is not required.

Figure 4-21 Section 1.18

Table 4-22 shows a summary of the route section.

Table 4-22 Proposed Traffic Management - Section 1.18

Section Length	1.0km
Location	Off-road

4.2.19 Section 1.19 – Sallins Bypass to Mills

Figure 4-22 shows the section from Sallins Bypass to Mills. This in-road section is on a regional road and has 3no. joint bays along the alignment. There are no alternative diversion routes suitable during the works phase.

Figure 4-22 Section 1.19

Table 4-23 shows a summary of the route section.

Table 4-23 Proposed Traffic Management - Section 1.19

Section Length	2.5km
Location	In-road
Phase 2 TTM	Lane Closure
Diversion Length	5.6km

4.2.20 Section 1.20 – Mills to Osberstown Road

Figure 4-23 shows the section from Mills to Osberstown Road. This section is off-road and therefore the temporary traffic management is not required.

Figure 4-23 Section 1.20

Table 4-24 shows a summary of the route section.

Table 4-24 Proposed Traffic Management - Section 1.20

Section Length	0.3km
Location	Off-road

4.2.21 Section 1.21 – Osberstown Road to M7

Figure 4-24 shows the section from Osberstown Road to M7. This in-road section is on a local road and has no joint bays along the alignment. There are no alternative diversion routes suitable during the works phase.

Figure 4-24 Section 1.21

Table 4-25 shows a summary of the route section.

Table 4-25 Proposed Traffic Management - Section 1.21

Section Length	0.1km
Location	In-road
Phase 2 TTM	Full Road Closure (with local access arrangements)
Diversion Length	4.8km

4.2.22 Section 1.22 – M7 to Millennium Parkway

Figure 4-25 shows the section from M7 to Millennium Parkway. This section is off-road and therefore the temporary traffic management is not required.

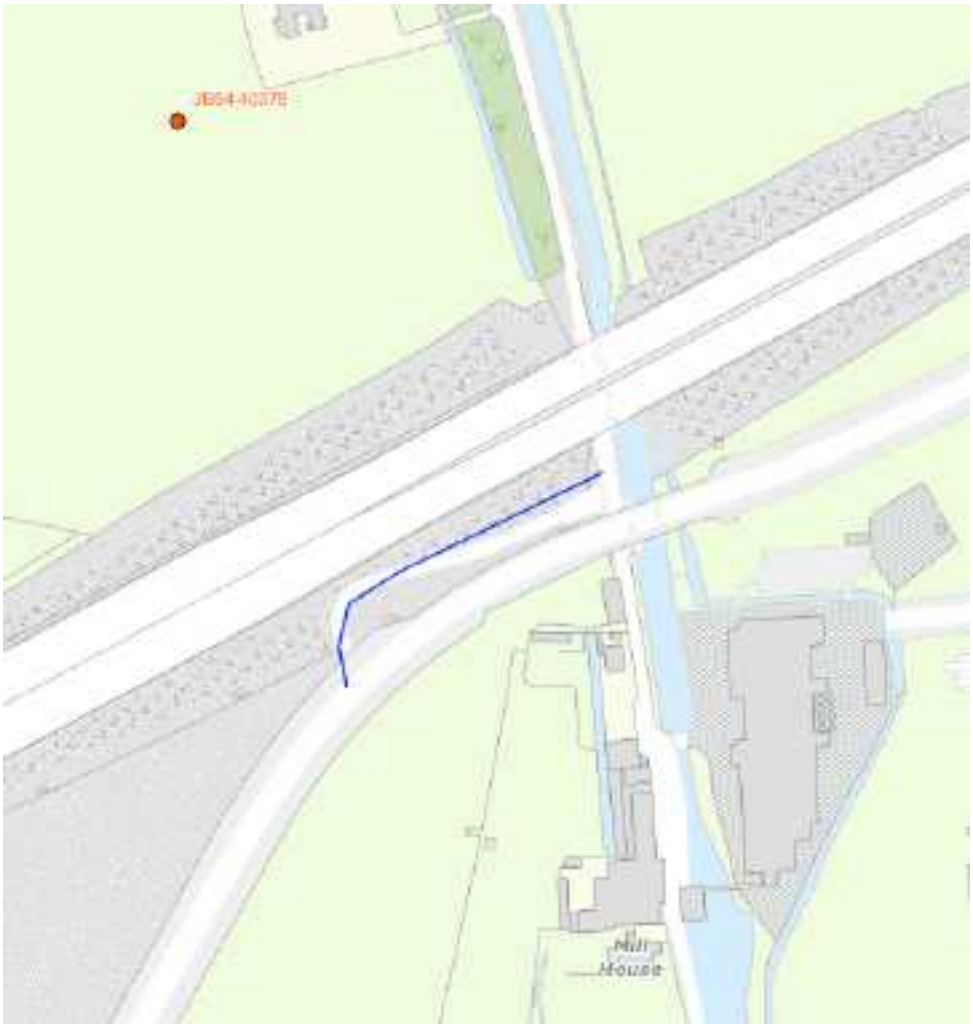

Figure 4-25 Section 1.22

Table 4-26 shows a summary of the route section.

Table 4-26 Proposed Traffic Management - Section 1.22

Section Length	0.2km
Location	Off-road

4.2.23 Section 1.23 – Millennium Parkway to R409

Figure 4-26 shows the section from Millennium Parkway to R409. This in-road section is on a regional road and has 3no. joint bays along the alignment. There are no alternative diversion routes suitable during the works phase.

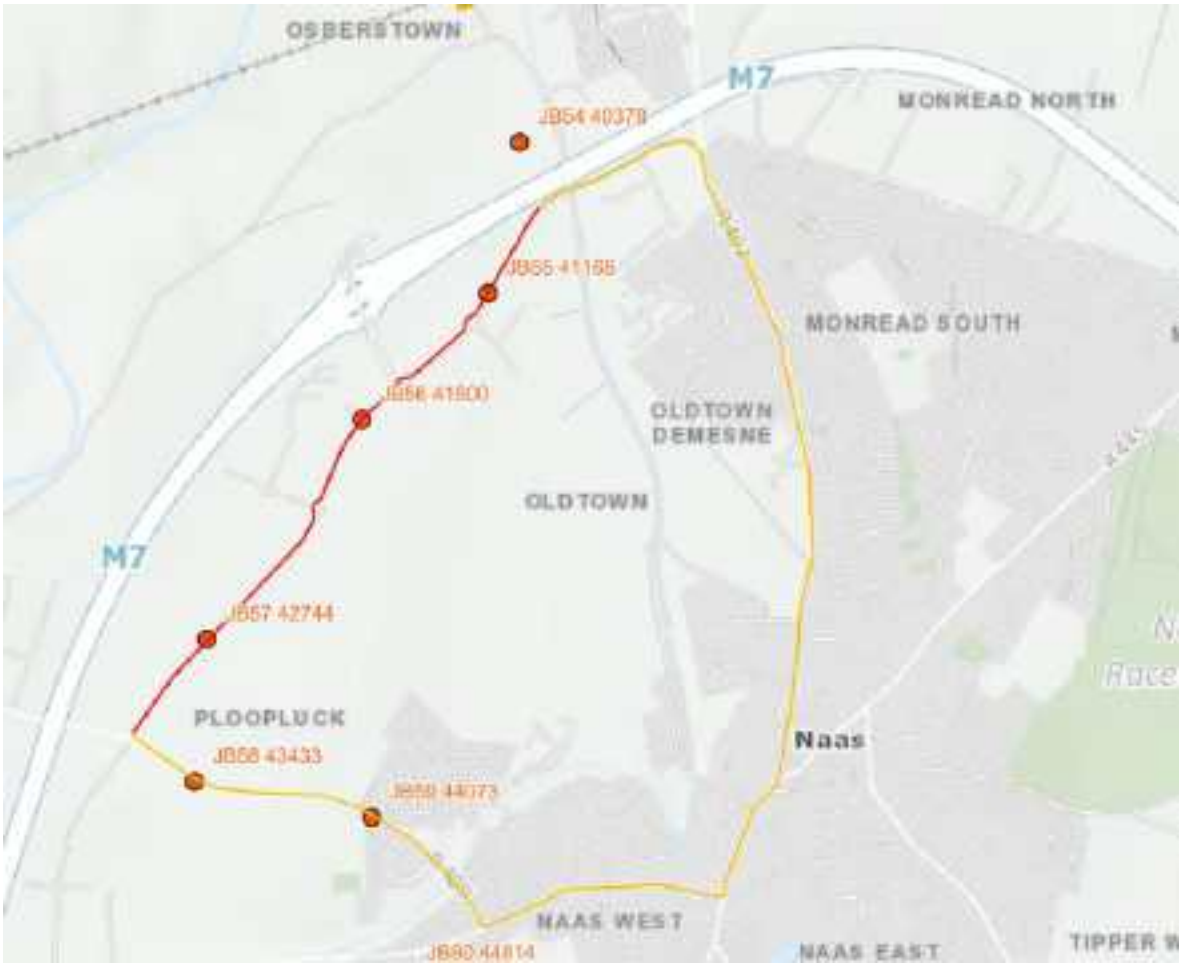

Figure 4-26 Section 1.23

Table 4-27 shows a summary of the route section.

Table 4-27 Proposed Traffic Management - Section 1.23

Section Length	2.3km
Location	In-road
Phase 2 TTM	Lane Closure
Diversion Length	5.7km

4.2.24 Section 1.24 – R409 to Grand Canal

Figure 4-27 shows the section from R409 to Grand Canal. This in-road section is on a regional road and has 2no. joint bays along the alignment. There are no alternative diversion routes suitable during the works phase.

Figure 4-27 Section 1.24

Table 4-28 shows a summary of the route section.

Table 4-28 Proposed Traffic Management - Section 1.24

Section Length	1.2km
Location	In-road
Phase 2 TTM	Lane Closure
Diversion Length	2.8km

4.2.25 Section 1.25 – Grand Canal to R447

Figure 4-28 shows the section from Grand Canal to R447. This section is off-road and therefore the temporary traffic management is not required.

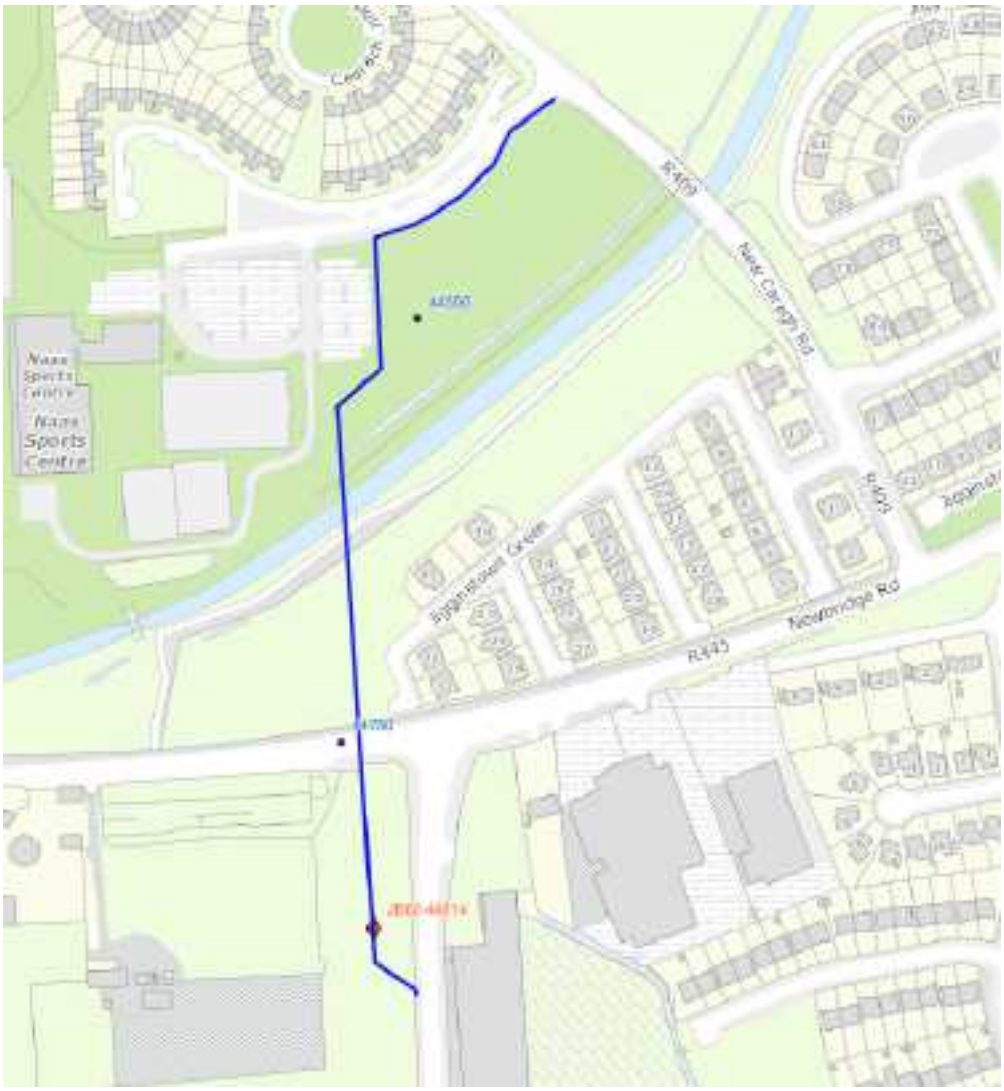

Figure 4-28 Section 1.25

Table 4-29 shows a summary of the route section.

Table 4-29 Proposed Traffic Management - Section 1.25

Section Length	0.4km
Location	Off-road

4.2.26 Section 1.26 – R447 to R448

Figure 4-29 shows the section from R447 to R448. This in-road section is on a regional road and has 2no. joint bays along the alignment. There are no alternative diversion routes suitable during the works phase.

Figure 4-29 Section 1.26

Table 4-30 shows a summary of the route section.

Table 4-30 Proposed Traffic Management - Section 1.26

Section Length	1.4km
Location	In-road
Phase 2 TTM	Lane Closure
Diversion Length	2.0km

4.2.27 Section 1.27 – R448 to R448 South

Figure 4-30 shows the section from R448 to R448 South. This in-road section is on a regional road and has 7no. joint bays along the alignment. There are no alternative diversion routes suitable during the works phase.

Figure 4-30 Section 1.27

Table 4-31 shows a summary of the route section.

Table 4-31 Proposed Traffic Management - Section 1.27

Section Length	5.3km
Location	In-road
Phase 2 TTM	Full Road Closure (with local access arrangements)
Diversion Length	21.2km

4.2.28 Section 1.28 – R488 South to Stephenstown

Figure 4-31 shows the section from R488 South to Stephenstown. This in-road section is on a regional road and has no joint bays along the alignment. There are no alternative diversion routes suitable during the works phase.

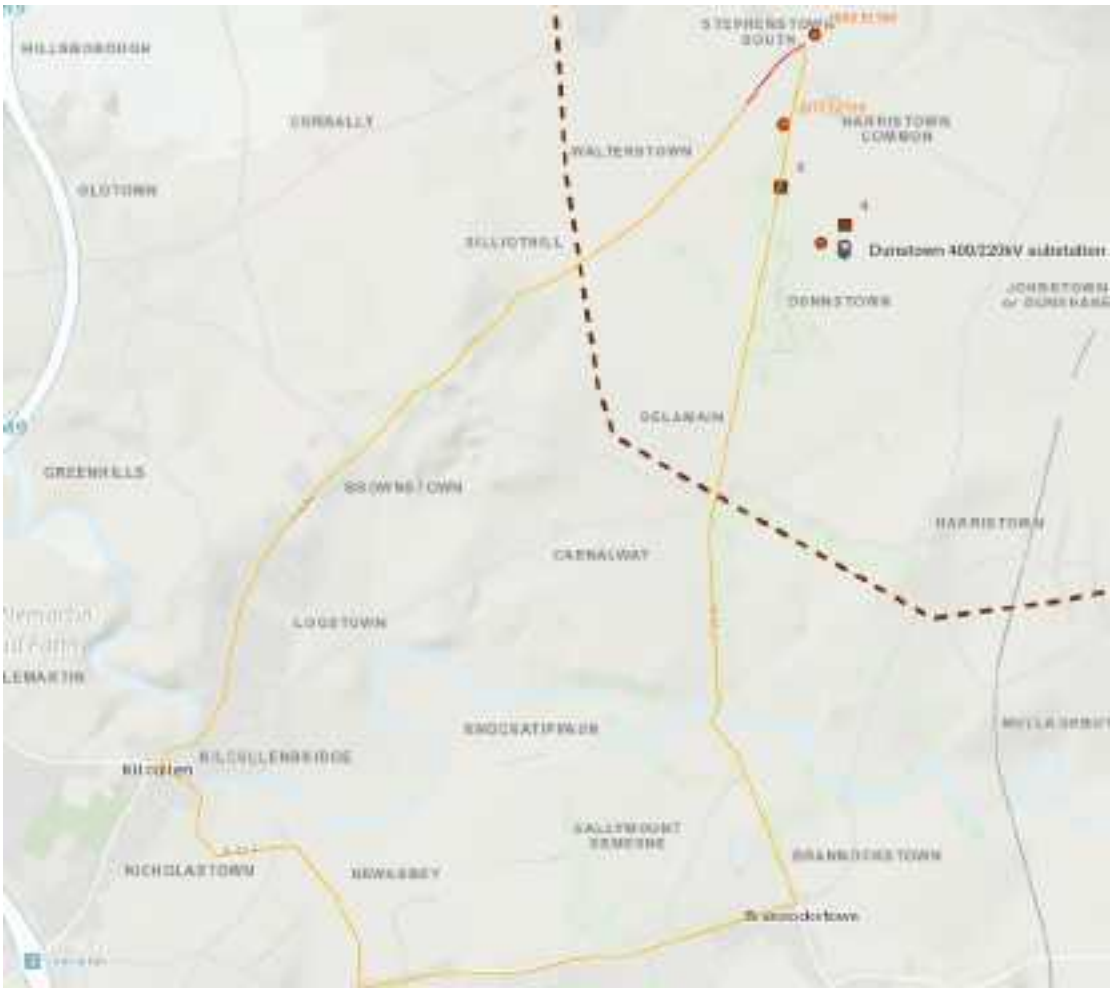

Figure 4-31 Section 1.28

Table 4-32 shows a summary of the route section.

Table 4-32 Proposed Traffic Management - Section 1.28

Section Length	0.4km
Location	In-road
Phase 2 TTM	Full Road Closure (with local access arrangements)
Diversion Length	14.1km

4.2.29 Section 1.29 Stephenstown to R412

Figure 4-32 shows the section from Stephenstown to R412. This section is off-road and therefore the temporary traffic management is not required.

Figure 4-32 Section 1.29

Table 4-33 shows a summary of the route section.

Table 4-33 Proposed Traffic Management - Section 1.29

Section Length	0.3km
Location	Off-road

4.2.30 Section 1.30 – R412 to Dunstown

Figure 4-33 shows the section from R412 to Dunstown. This in-road section is on a regional road and has no joint bays along the alignment. There are no alternative diversion routes suitable during the works phase.

Figure 4-33 Section 1.30

Table 4-34 shows a summary of the route section.

Table 4-34 Proposed Traffic Management - Section 1.30

Section Length	0.3km
Location	On-road
Phase 2 TTM	Full Road Closure (with local access arrangements)
Diversion Length	14.2km

4.2.31 Section 1.31 – Dunstown to Dunstown Substation

Figure 4-34 shows the section from Dunstown to Dunstown Substation. This section is off-road and therefore the temporary traffic management is not required.

Figure 4-34 Section 1.31

Table 4-35 shows a summary of the route section.

Table 4-35 Proposed Traffic Management - Section 1.31

Section Length	0.5km
Location	Off-road

4.3 Proposed Construction Machinery

It is expected as part of the installation of the cable into the roads, standard construction machinery will be utilised with minimal reliance on specialist equipment. It would not be foreseeable for the requirement of custom machinery.

Table 4-36 provides a summary of the proposed machinery, itemised by Proposed Development activity. The associated quantity is indicative and allocated per gang. The number of working gangs is dictated by the proposed scheme implementation period. Consideration to small tools has not been assessed.

- Phase 1 – Installation of passing bay and joint bay structure
- Phase 2- Excavation and installation of ducts
- Phase 3 – Installation of cables

Table 4-36 Proposed Machinery

Phase	Activity	Proposed Machinery	Task	Approximate Quantity
All phases	**Site Setup/ Support**	Traffic Management Lorry	Setup and removal of designed traffic management scheme.	2no.
		Site Vehicles	Required for personnel access from compound to sites.	Various
		Welfare Units	Required for on-site working, minimising travel times.	1no.
		HIAB Lorry	Delivery of various tools, equipment and material within the compound.	1no.
		HGV Recovery Vehicle	Required for any breakdowns within traffic management zone or contractors' equipment.	1no.
		LGV Recovery Vehicle	Required for any breakdowns within traffic management zone or contractors' equipment.	1no.
		Towable CCTV Unit	Required for safety and protection of road users and workers.	2no.
		Towable Tower lights	Required for safety and protection of road users and workers.	4no.
Phase 1 – Installation of passing bays and joint bays	**Passing Bay**	10t long reach excavator	Excavation with obstruction within slew zone.	1no.
		9t dual view dumper	Removal of excavation material	3no.
		8-wheel tipper	Removal of excavation material	2no.
		Remote controlled compaction equipment	Compaction of fill within excavated trench.	1no.
		Asphalt Tipper	Delivery of asphalt road surfacing material.	1no.
		Asphalt Paver	Laying of road surface.	1no.
		Roller	Compaction of road surface	1no.

Phase	Activity	Proposed Machinery	Task	Approximate Quantity
		Articulated Lorry	Delivery of plant and materials to the works site	Various
	Joint Bay	10t long reach excavator	Excavation with obstruction within slew zone.	1no.
		9t dual view dumper	Removal of excavation material	3no.
		8-wheel tipper	Removal of excavation material	2no.
		Articulated Lorry	Delivery of plant and materials to the works site	Various
Phase 2 - Excavation and installation of ducts	**Excavation**	Road Planner	Removal of asphalt road surface for re-use.	1no.
		10t long reach excavator	Excavation with obstruction within slew zone.	1no.
		8t excavator	Excavation with no obstructions.	1no.
		9t dual view dumper	Removal of excavation material	3no.
		8-wheel tipper	Removal of excavation material	2no.
	Duct/jointing bay Installation	Articulated Lorry	Delivery of plant and materials to the works site	Various
		8t excavator	Lifting and installation of ducts/jointing bays	1no.
	Backfilling	Concrete Delivery Vehicle	Delivery of concrete – suggested 8m^3 vehicles.	Various
		10t long reach excavator	Moving concrete from vehicle into trench	1no.
		8t excavator	Loading dumper with material from stockpile for backfill.	1no.
		9t dual view dumper	Moving material from stockpile location to backfill location.	2no.
		Remote controlled compaction equipment	Compaction of fill within excavated trench.	1no.
	Road Reinstatement	Asphalt Tipper	Delivery of asphalt road surfacing material.	1no.
		Asphalt Paver	Laying of road surface.	1no.
		Roller	Compaction of road surface	1no.
Phase 3 - Installation of Cables	**Cable installation**	Oversized vehicle	Delivery of cables to jointing bays.	Various
		Articulated Lorry	Delivery of plant and materials to the works site	Various
		Cable Winch(s) and pulling equipment	Installation of cables through ducting.	1no.

Please note that the quantity of vehicles is not the same as vehicle loads/movements. It is the expected quantity of plant associated with each activity.

4.4 Risks and assumptions

Table 3-2 highlights the assumptions and risks with regards to the proposed traffic management requirements and the associated indicative high-level programme and the mitigation that will be implemented should the hazard arise.

Table 4-37 Risks & Assumptions

No.	Assumption		Hazard	Mitigation
1	Consent and License Approval	It is assumed that the relevant authorities will permit the detailed traffic management along designed route. The aspect of road user safety is highlighted but the duration of impact and disruption is not accounted for at this stage.	Consent for the required traffic management is not permitted and an alternative solution is required.	Engagement with consenting authorities required.
2	Cable Alignment	It is assumed that the cable is aligned to one side of the road to minimise the working zone and the associated road network. The alignment is unlikely to be aligned to a curb line due to the likely presence of utility services, tree roots. The alignment will also need to account for cable radius in reference to the position of the carriageway.	The alignment of the cable route away from the outer edge of the carriageway will increase the working zone, in turn reducing the open carriageway. This will increase the likelihood of a road closure.	Further detailed design of the cable alignment and associated profile.
3	Diversion Routes	It is assumed, in accordance with 8.2.4.6 of Chapter 8 that any diversion route will have the same characteristics of the road that is closed. In effect, the closure of a regional road will require the diversion to follow a regional road.	Extensive diversions highlighted in section 4.2.	In accordance with 8.2.4.6 (c) the shortest possible route will be used. To maintain safety of all road users, alternative solutions need to ensure compliance with 8.2.4.7, stating use of junction improvement, signal alterations, road markings or convoys may be permissible.
4	Ground Conditions	It is assumed that the ground is suitable for re-use and that the ground is of suitable for basic shoring/trenching techniques.	Extreme ground conditions (i.e., rock, weak or high-water table) requiring specialist remediation requirements. Increase in imported backfill requirement's	Detailed ground investigation to identify the suitably of the ground.
5	Uncontaminated Ground	It is assumed the ground is uncontaminated and that all removed subsoil can be re-used, subject to chemical and physical testing.	Excessive contaminated ground, requiring suitable stockpiling and remediation.	Detailed ground investigation to identify the risk of ground contamination.
6	Utilities	It is assumed that the location of services is accounted for in the design and do not hinder the installation process.	Alignment in close proximity to sensitive/high risk services that require specialist support and delay progress.	Requirement for GPR surveys identify existing services and any detectable watercourse crossings. Required for inclusion within the design assessment.

5. Case Study – Naas Utilities

During the traffic management survey for the Option "A" route, the team encountered a small utilities project replacing a foul water main run in the R407 road on the outskirts of Naas. The trench width was approximately 1.7m and required an excavation between 2.0m and 4.5m deep over and overall length of approximately 200m.

The process being utilised to install the sewage pipes followed the same principles as being proposed for running the 400kV cables in the roads for the Kildare-Meath Grid Upgrade. The team engaged with the site manager for the project and with his permission took the photos shown below of the works in progress. Please note, specific details regarding EirGrid, including the client's name was not exchanged during conversation with the site team.

Figure 5-1 shows the location of the works with the required road closure and associated diversion route. The contractor had agreed with the local council to close the road to enable the delivery of this project safely.

Figure 5-1 Utilities location and diversion

Figure 5-2 shows the preparation required to remove the wearing course from the road surface. This utilised saw cuts in the road to the width of the trench width. The size of the machine enabled the excavator to site its tracks either side of the trench to allow for the breaking out of the road surface.

Figure 5-2 Preparation for removal of wearing course

With the site setup shown there is enough space to position a tipper wagon adjacent to the excavator which can only be achieved with full road closures. However, when lane closures are employed then the tipper wagon would need to be positioned behind the excavator and provision will need to be made for the arm and bucket of the excavator to swing round 180 degrees. This will mean that time needs to be built into the traffic signals to allow a clear space in traffic, reducing the efficiency of the excavation time and increasing the manpower on site to watch for the traffic to be out of the hazard zone.

Figure 5-3 and Figure 5-4 show the use of trench boxes to safeguard operatives working in the trench. A singular trench box is used and follows a drag box style of work. Note the requirement for pumping in the excavation, it was unclear if this was high ground water, seepage or run-off driven.

The use of trench boxes or alternative ground retention methods would be is dictated by the makeup of the ground. It is likely that these type of trench boxes may also be required for the Proposed Development, but this are dependent on the ground conditions and suitable temporary works assessments by the contractor.

Figure 5-3 Excavation with trench box support

Figure 5-4 Excavation and backfill operations

Figure 5-5 shows the excavator bucket width is the same as that of the trench. The removes the requirement for the excavator to move position to dig the width of the trench. In comparison to the proposed scheme, a 2.1m width bucket is available, however this could potentially require a suitably sized machine, in turn increasing the working width and increasing the amount of road closures.

Figure 5-5 22t excavator

Figure 5-6 shows the completed backfill works completed to underside of the wearing course. Ironmongery is visible in this figure. It is evident that upon completion of the section, the wearing course will be installed in one operation.

Figure 5-6 Resurfacing and backfill

The following assets were identified upon review of the site:

- 1no. 22.5t excavator
- 1no. 18t excavator
- 2no. Trench boxes (1no. for chamber, 1no. pipe run)
- 9t Open-cab Dumper
- 1no. Twin drum vibratory roller
- 1no. fuel bowser
- 1no. Towable mobile welfare
- 1no. tractor and trailer unit (note this follows HGV legislation under these conditions)
- Lighting columns
- Fencing panels
- Submersible pumps and generator supply
- Traffic management signage (including VMS systems)

6. Mitigation

To enable successful implementation of the proposed scheme, the following aspects will be implemented to improve programme and budget assurance:

1) Agreement of cable alignment

   As advised in Section 4.4 the cable alignment is key to providing an accurate assessment of the required traffic management scheme. The current proposed traffic management plan is a best-case scenario and relies on the cable alignment being tight to the nearside curb line. If the cable alignment is to move away from the curb line, this will increase the working room, in turn reducing the live carriageway width. This effect will most likely increase the number of road closures required.

2) Procurement of specific oversized load vehicles

   Use of specialist equipment with up-front investment will reduce site operations and increase efficiency when installing the cables. This could be with the side loader or the turntable option. These vehicles have the ability to be used on subsequent projects.

3) Early engagement with consenting authorities

   Early engagement with the consenting authorities will support the permitting of the abnormal load and provide assurance to the programme. The engagement will highlight areas of concern and provide the client/contractor the ability to address these.

7. References

Department of Transport, Tourism and Sport. (2010). Guidance for the Control and Management of Traffic at Roadworks. Department of Transport.
Department of Transport, Tourism and Sport. (2019). Chapter 8 Temporary Measure and Signs for Road Works . Transport Ireland.
Department of Transport, Tourism and Sport. (April 2017). Guidelines for Managing Openings in Public Roads. Department of Transport.
Health and Safety Authority. (2009). Guidelines for working on roads.

A.1 Abnormal Load Assessment

Kildare-Meath Abnormal Load Assessment

Revision no: P01

EirGrid Plc

Kildare to Meath
1 November 2022

Kildare-Meath Abnormal Load Assessment

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Project name:			
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Jacobs U.K. Limited

2nd Floor, Cottons Centre
Cottons Lane
London SE1 2QG
United Kingdom

T +44 (0)203 980 2000
www.jacobs.com

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1. Introduction

1.1 Scope

This report assesses the deliverability and logistics associated with the installation and jointing of the cables on the Kildare to Meath Power Upgrade project Route A. The assessment considers the required logistics machinery and vehicles to transport the cables from the chosen Port to the project work site.

This assessment is to be reviewed in conjunction with the independent specialist abnormal load assessment who have undertaken visual analysis along the route and identified potential risks and opportunities associated with the movement of the cable drums.

1.2 Design Information

The construction and logistics assessment of the cable jointing bay is based on the following;

- Cable joint bay design as per PE424-D7001-013-002-000 (Issued by ESB)
- Cable drum size: 4.3m external diameter, 4.0m barrel length and 35.4t
- Passing bay proposed details 229100428-MMD-00-XX-DR-E-4119 Rev PL1
- Communication cables are assumed to be delivered and installed with readily available equipment. It is assumed that the 400kV cables is the onerous case.

2. Abnormal Load Requirements

2.1 Local Authorities

2.1.1 County Councils - Kildare, Meath, Kilkenny, and Carlow

According to the County Councils requirements, a load is considered abnormal when the weight or any dimensions exceeds the maximum permitted for the particular type of vehicle as defined in the S.I. No. 5/2003 - Road Traffic (Construction and Use of Vehicles) Regulations 2003 (Irish Statute Book, 2003). Specifically, a load is considered abnormal when:

- Length - exceeds 16.5m in the case of an articulated vehicle, or
- Width - exceeds 2.55m, or
- Height - exceeds 4.65m (subject to Regulation 2(2) of S.I. No. 366/2008 - Road Traffic (Construction and Use of Vehicles) (Amendment) Regulations 2008 (Irish Statute Book, 2008)), or
- Weight of any axle exceeds the limits stated in S.I. No 5 of 2003.

Application for permit is required in order to authorise transporting abnormal loads on public roads maintained by the Councils. Applicants are required to give 4 working days' notice to Councils prior to the date of the proposed journey to allow for processing of permit.

Applicants shall also give notice in writing, not less than 4 working days before applying for a Permit, to the Commissioner of Garda Síochána enclosing a copy of the application.

Prior to moving abnormal loads over or under structures on the National Road network, applicants are required to pre-consult with the Bridge Management Section of Kildare National Roads Office and obtain authorisation in principle.

2.1.2 City Council - Dublin

According to Dublin City Council requirements, a load is considered abnormal if its weight or any of its dimensions exceeds the following limits.

- Length - exceeds 16.5 metres
- Width - exceeds 2.9 metres
- Weight - exceeds 44.0 tons

Application for permit is required in order to authorise transporting abnormal loads on public roads maintained by Dublin City council.

The application must be submitted to Dublin City council at least 30 working days prior to the date of the proposed journey. The permit expires three months after the date of issue, and as there are no automatic renewals, an application must be submitted every time a new permit is required.

Applicants shall also give notice in writing to the Commissioner of Garda Síochána and the local authorities for any other areas of Dublin, e.g., Fingal County Council, Dun Laoghaire - Rathdown County Council and South Dublin County Council, through which the abnormal load will be transported.

2.2 Dublin Tunnel

According to the Dublin Tunnel requirements, a load is considered abnormal if any of its dimensions exceeds the following limits.

- Width - exceeds 2.9 metres
- Length - exceeds 25.0 metres

The Dublin Tunnel is subject to a maximum permitted vehicle height of 4.65 meters.

A minimum of 48 hours' notice is required in order to authorise transporting abnormal loads through the Dublin Tunnel. Abnormal loads will only be allowed for movement between 2200hrs and 0500hrs. Hauliers are required to provide their own escort vehicle(s), which will be accompanied by a Dublin Tunnel Authorized Officer.

2.3 Garda Síochána

In accordance with S.I. No. 147/2009 - Road Traffic (Specialised Vehicle Permits) Regulations 2009 (Irish Statute Book, 2009), and S.I. No. 461/2010 - Road Traffic (Specialised Vehicle Permits) (Amendment) Regulations 2010 (Irish Statute Book, 2010), Garda Síochána administrated a permit system and list of Designated Routes for the movement of loads not exceeding 27.4 metres in length and 4.3 metres in width on the major inter-urban routes and to Cork, Rosslare and Ringaskiddy Ports.

As per Garda Síochána requirements, an abnormal load must also comply with the weight and height restrictions specified by the S.I. No. 5/2003 - Road Traffic (Construction and Use of Vehicles) Regulations 2003 and the S.I. No. 366/2008 - Road Traffic (Construction and Use of Vehicles) (Amendment) Regulations 2008, respectively.

A Permit for Specialised Vehicles application must be submitted to and signed by the Garda Síochána Permits Officer in order to grant permission for the movement of abnormal loads as defined by the above Regulations, on inter-urban routes specified in the Schedule of Designated Roads. The application for a permit shall be submitted at least 5 working days prior to the date of the proposed journey.

Each vehicle, which operates under this system, travelling on:

- National Primary or National Secondary route shall have an escort vehicle to the front with a flashing amber light(s) and a 'Wide Load' sign visibly displayed
- Dual carriageway or Motorway shall have an escort vehicle to the back with a flashing amber light(s) and a 'Wide Load' sign visibly displayed

Loads in excess of 4.65 meters in height, 4.3 meters in width and 27.4 metres in length are not covered under the remit of this Permit and independent authorisation from the Local Authority concerned and/or Minister for Transport is required.

2.4 ESB Networks

The Road Traffic (Construction and Use of Vehicles) (Amendment) Regulations 2008 defines a high load as any load that is higher than 4.65 metres at its highest point. ESB Networks standard clearances for electricity lines on designated local high load routes that cross public roads are designed to enable loads up to 4.65 metres high to pass safely. It is the responsibility of high load transporters to plan and implement a safe system of work.

According to the ESB Networks Code of Practice (CoP) for Avoiding Danger from Overhead Electricity Lines (ESB Networks, 2019), a lateral area near an overhead electricity line must also be isolated from the work site by physical barriers. The dimensions of this hazard zone are related to the voltage of the overhead line. For 110kV and above, the minimum horizontal safe distance between the plant /machinery and the overhead line is 10 meters plus the falling distance of the fully extended boom (Figure 2.1).

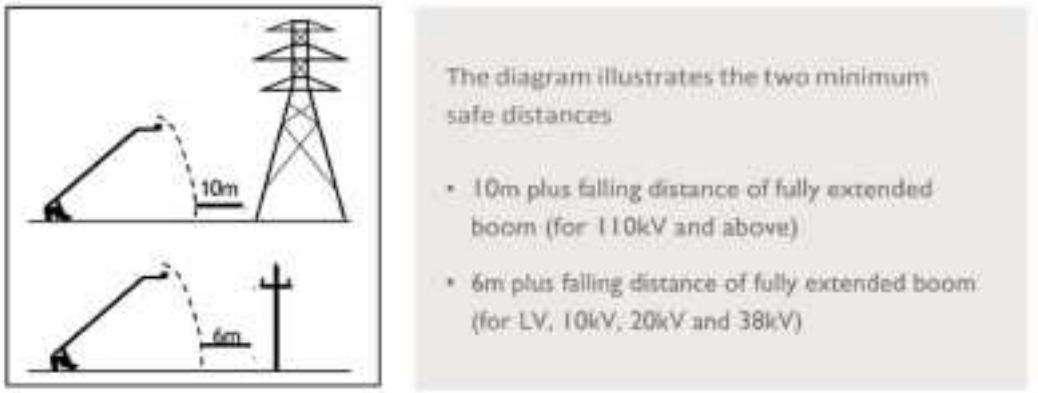

Figure 2-1 Plant and machinery minimum safe distance (ESB)

In addition, ESB Networks CoP defines an exclusion zone around a live overhead electricity line which must never be breached in order to avoid electrical arcing or flashover. The dimensions of this exclusion zone for operating plant and machinery are determined by the voltage of the overhead electricity line; for 400kV, the exclusion zone must be eight meters (Figure 2.2).

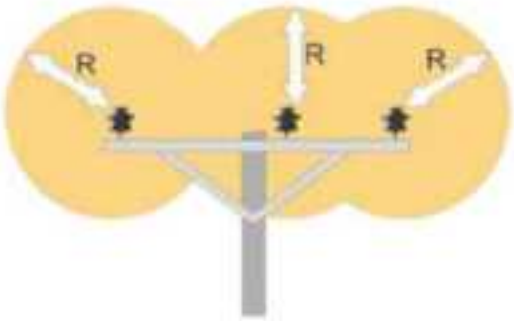

Figure 2-2 Exclusion zone (ESB)

A road transport operator must notify ESB Networks of their intention to move a high load under or close to ESB Networks overhead electricity lines or equipment, providing accurate information on the high load. A road transport operator shall also comply with all precautions and control measures advised by ESB Networks and with all directions given by any ESB Networks staff that escort the high load.

3. Logistics Strategy

This section considers the key decisions that will influence the logistics and handling methodology, including; port selection, movement sequence and transportation method. Each option within this section has significant advantages and disadvantages and will require the client and contractor to identify key implementation drivers to support the decision making process. As the project develops, further consultation with stakeholders, consenting authorities a preferential option will likely develop.

Two key logistical hubs, Dublin and Belview port, are identified for the purposes of delivery of the cable drums to Ireland. These two ports serve the project best with key access routes for all abnormal loads. Both ports are suitable for the handling of the required plant and materials and have a suitable road network links, familiar to local abnormal load planners and hauliers. There are alternative ports available however the distances are significantly greater and will likely increase the overall project programme and cost. Section 3.2 explains further the port options and the expected transportation routes.

Following delivery of the cables to the chosen port, there are two cable drum handling methods; direct delivery from the port to work site or delivery to interim storage and a second movement to the works site. Figure 3-1 and Figure 3-2 provide a visualisation of the two options available, each blue dot indicates an abnormal load movement. Please note that the removal of the empty cable drum will remain as an abnormal load due to the height and wdith.

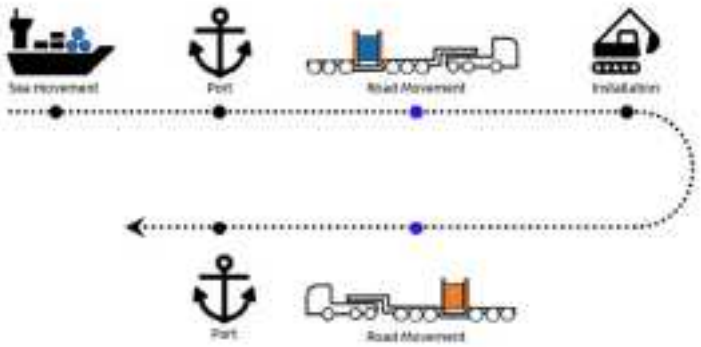

Figure 3-1 Logistics Options – Direct Delivery

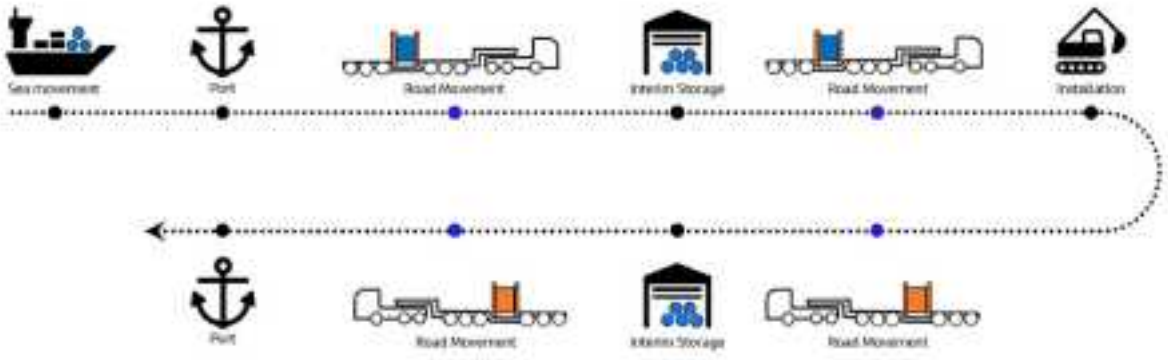

Figure 3-2 Logistics Options – Interim Compound

The direct delivery option requires less abnormal load permits and associated escorts, however, this could present a supply and efficiency risk. The interim compound solution provides better material supply assurance, however both options present inherent risks and opportunities that would need to be agreed between the client and the contractors. Table 3.1 provides a high level comparison of the two distinct handling options.

Table 3.1 Logistics Option Comparison

Delivery Option	Minimum Abnormal Load Movements	Advantages	Disadvantages
Direct delivery i.e. Port to Cable Jointing Bay	Port – Site – Port (2no.)	Reduced number of abnormal load movements Reduced transportation risk – singular movement to site Reduced reliance on escort vehicles	Transportation and cable installation solution to be integrated Increased number of specialist transportation vehicles Increased port storage
Two-stage delivery i.e. Port to Compound, Compound to jointing bay	Port – Compound – Site – Compound – Port (4no.)	Greater site flexibility, ability to create capacity in compounds to mitigate external factors (i.e. port loading) Local specialist vehicles movements, long distance movements with traditional low loaders	Increased number of vehicle movements and associated risk of damage Increased requirement for lifting and handling equipment (i.e. cranes) Increased reliance on escort vehicles

3.1 Compound Strategy

To support the abnormal load assessment, a key component is the compound strategy. Both Dublin and Belview Port have secure compound storage, albeit at a premium. If an interim compound solution is required, i.e. a two stage deliver process, the positioning of the compounds will be key for success. As part of the excavation and duct installation assessment, it would be recommended there would be between five and six compounds. The substations are already ESB/EirGrid assets and therefore demarcating suitable space within the substation for construction compounds would be recommended. Considering proportionate spacing along the cable route, it would be recommended that each compound would support approximately 7km of route.

Assuming each compound supports 7km of route, a total of 30no. cable drums would require storage. This would require approximately 400-500m^2 of storage space, further space would be required for delivery vehicles (with adequate swept path clearance), offloading machinery (i.e. crawler cranes), welfare and car parking. Approximately 10,000m^2 would be required at each compound to support both the cable installation and earthworks aspects of the project.

Figure 3-3 shows proposed compound locations, each compound would be recommended to be positioned near a key logistical corridor, i.e. N and M roads. The compound at M4 Kilcock would be suitable for both cable logistics and the proposed HDD. An additional compound has been shown in the Millicent area due to the complexity associated with the local area.

Figure 3-3 Proposed Compound Locations

3.2 Port Options

3.2.1 Option 1 – Dublin Port

Dublin Port is the closest to the project area, with a distance of 41km to Woodland Station and 67km to Dunstown Substation. Road access is supported via the M50 with access points to various key points along the route utilising the N7, N4 and M3. All vehicle movements out of the port are between 2200hrs and 0500hrs. As identified in Section 0, the Dublin tunnel is subject to a maximum height of which the cable drum surpasses this limit. Therefore, a suitable overground diversion will be required to avoid the Dublin Tunnel. All loads will typically be under Garda escort, increasing external interface and the associated cost impact.

All vehicle movements out of Dublin port will require oversize load permits from Dublin City, Fingal, Meath, South Dublin and Kildare. There is no impact to overbridges along this route, on the assumption the cable drum diameter does not increase.

Figure 3-4 Logistics Option 1 - Dublin Port

3.2.2 Option 2 – Bellview Port

Belview Port is part of the Port of Waterford, approximately 130km South of the project area. All abnormal loads travelling from Belview Port would require oversize load permits from Kilkenny, Carlow, Kildare and Meath. If the M50 is utilised for transportation along the route, South Dublin and Fingal would be required to issue permits. As advised by the abnormal load specialist, all overbridges along the route have clearance for loads up to 5.0m.

Following consultation with the abnormal load specialist, it was advised that although Belview Port is greater distance from the project area than Dublin Port, there are considerable benefits. The key benefits as follows;

- Minimal time restriction on vehicle movements

  All vehicles will be permitted to use the port location on a 24-hour basis. It would not be recommended to move vehicles during daytime due to the disruption to local traffic. The 24-hour basis of the port does permit vehicles to attend the Port earlier than 2200hrs and load within the cable drums within the port maximising the period of movement.

- No requirement for Garda escort vehicles

  Due to the location of Port, there is a negligible requirement for Garda escort, therefore removing interface and resource demands, providing greater assurance to the delivery programme.

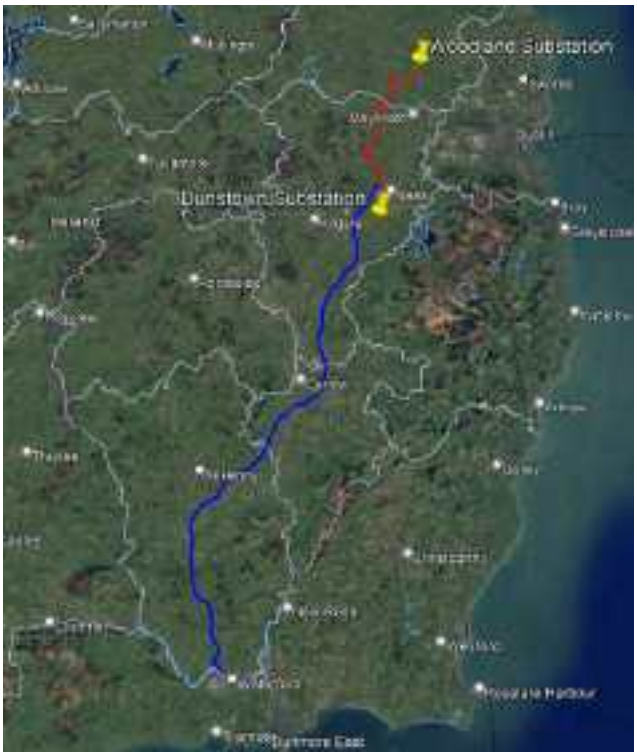

Figure 3-5 Logistics Option 2 - Belview Port

3.3 Delivery Options

3.3.1 Option 1 – Direct Delivery

3.3.1.1 Option 1.1 - Low loader with mobile crane

This option utilises a truck with a low loader trailer to be loaded at the port. The vehicle will then travel to the specific jointing bay under the support of escort vehicles. Once at the jointing bay the low loader will be off-loaded using a mobile crane, rigged in the closed section of road. During offloading, the low loader will be parked in the passing bay, utilising a statics type C road closure (i.e. less than 15mins). The crane will lift the cable drum onto an un-winding rig to secure the cable drum. Once in position, the low loader will then leave the working area and the road re-open under the temporary traffic management conditions. The site setup is shown in Figure 3-6.

Offloading the cable drum onto an unwinding machine (see Appendix A for further details) would be recommended as opposed to simple jack system. The route is not flat and there are sections on inclines. The use of the unwinding machine will prevent the drum from coming free and posing a risk to site operatives and the public. Great control can be applied to the unwinding through using a turn assist and braking system to ensure the integrity of the cable.

The option utilises readily available equipment and machinery without the requirement for custom fabrication or procurement of assets. Due to the size of the drums, it would be recommended that a mobile crane of approximately 250t be utilised. This would be suitable for the outriggers half extended to minimise the footprint and full ballast as part of the rigging. The mobile crane will require an abnormal load permit to travel to the worksite and will be supported by approximately 3no. articulated lorries with the ballast on board. A mobile crane of this size would be approximately €1,500 per day. Assuming 3no. cables could be installed per day (i.e. one jointing bay per day, plus ½ day to rig and ½ day to de-rig), the hire costs of the crane would be €3,000. A Broshuis low loader trailer costs approximately €190,000, it would be recommended that more than 1no. trailer is in operation under this scenario.

Figure 3-6 shows the required exclusions to ensure the safety of the machinery and those working on site. This creates considerable constraint as a significant number of roads are lined with overhead LV infrastructure. In addition, consideration to ground pressures need to be accounted for and the potential impact to underground utilities.

To provide a safe working area for the installation team, a passing bay of 140m in length would be required. This accounts for a lateral safety zone, longitudinal safety zone and a cone taper zone. It is assumed that the space proofing to the left of the bay is the same as that to the right of the passing bay.

Although this option negates the requirement for specialist equipment, it requires considerable site setup and careful assessment to ensure the stability of the crane. This does minimise the quantity of abnormal loads and associated escort vehicles for moving the cable drums. Of the four options, this would be one of the least favourable due to the risk and required quantity of space.

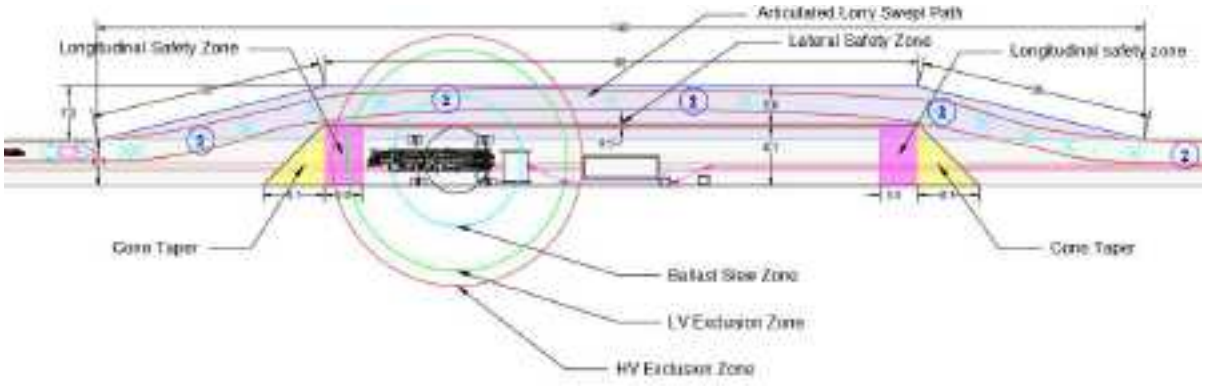

Figure 3-6 Site Layout - Low loader with mobile crane

3.3.1.2 Option 1.2 - Bespoke turntable trailer

As with the other direct delivery options the process will commence at the port with the drum being loaded to the trailer to be transported to the required joint bay under the support of escort vehicles.

As described by the title this solution utilises a purpose-built turn table fitted to the trailer which is used to mount the cable drum and allow it to be rotated through 90 degrees. When loaded for transport the drum can be loaded with its longest dimension parallel to the carriageway providing the benefit of a reduction to the overall width of the load during transport.

When the delivery vehicle arrives at the specific joint bay location it will park on the existing carriageway then utilising the turn table the drum will be rotated through 90 degrees which will then enable the drum to be unwound directly off the back of the trailer into the joint bay. During this operation it is possible to maintain 1 way traffic via the passing bay which will be controlled with appropriate traffic management. The delivery vehicle will remain on site until the drum has been emptied then will leave the site transporting the empty drum to be off loaded at the designated area, see Figure 3-8 for the indicative site layout. Note the traffic management for the working area is the same for Option 1.1.

This option does utilise specialist equipment however offers several benefits, in addition to this if the equipment were purchased it may be required on future project such that, the benefit of such investment of an asset maybe recoverable transfer. One benefit of this option is that as previously stated it allows the width of the load to be reduced which will improve navigating the route especially on the narrower sections of highway. This option further negates the need for any lifting equipment at the joint bay locations due to unwinding off the back of the trailer. This not only reduces craneage costs, working platforms and the risk profile of the task but also allows for traffic flows to be maintained throughout the works. Whilst this option will still require abnormal load permits for the delivery vehicle this will have considerably less vehicle movements than the option with the crane.

The disadvantage of this option is that only one cable drum can be transported per vehicle at a time and the next cable drum cannot then be collected from the port until the empty drum has been offloaded in the designated area.

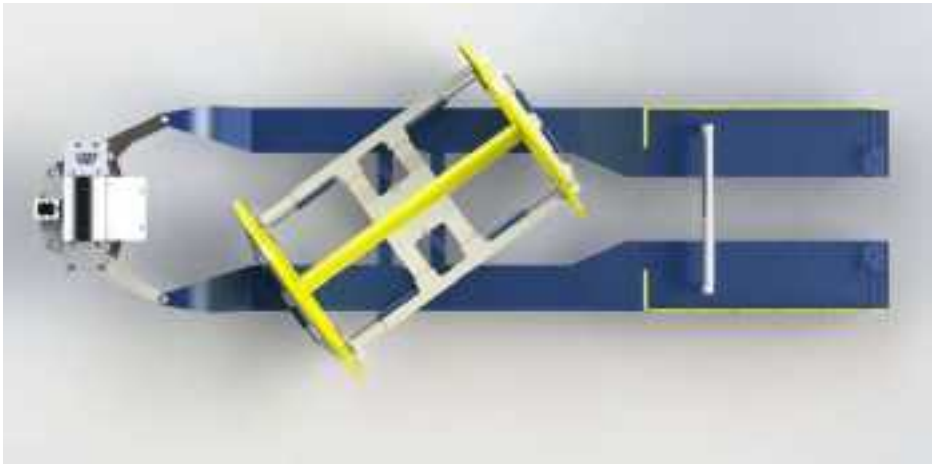

Figure 3-7 Plan view of specialist trailer

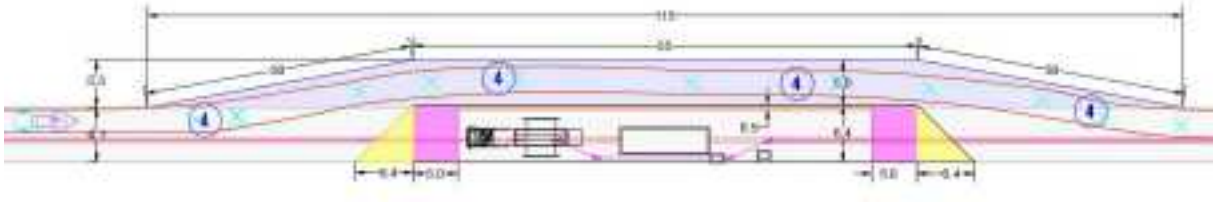

Figure 3-8 Site Layout - Bespoke turntable trailer

3.3.1.3 Option 1.3 - Side-loader trailer

Again, this option starts by having the side loader trailer loaded with a cable drum at the port. This option has a lot of similarity to Option 1.1 however utilises purpose-built equipment and rather than requiring separate cranage this option utilises a self-offloading trailer i.e. a trailer mounted crane a system often used for self-offloading shipping container trucks.

This option requires the drum to be transported with the drum's largest dimension perpendicular to the carriageway making the overall transport width wider than Option 1.2. Once at the specific joint bay location the vehicle will be required to park in the passing bay utilising a statics type C road closure (i.e. less than 15mins). The trailer will then self-offload using the trailer mounted crane and will lift the cable drum onto an un-winding rig to secure the cable drum. Once in position, the low loader will then leave the working area and the road re-open under the temporary traffic management conditions. The site setup for delivery and installation is shown in Figure 3-10 and Figure 3-11. The traffic management arrangement for the work area for installation is the same as Option 1.1 and 1.2 however, can be reduced in size slightly. Once the cable drum has been emptied the delivery vehicle will return to site to reload the empty drum and transport to the designated area, again because the trailer is self-offloading this will not require any further craneage at the designated area.

The benefits to this option include, similarly to Option 1.2 the specialist equipment purchased could be used on future project of a similar nature, it eliminates use of separate craneage so reduces the requirement for working platforms subject to the load requirements of the side loader trailer. It also has a reduced number of vehicle movements to Option 1.1 relating to the crane set up.

Disadvantages are that during the offloading process the road will have to be closed, due to the vehicle and trailer leaving site it will need a location it can park up in close in proximity to each joint bay, ready for collection of the empty drum.

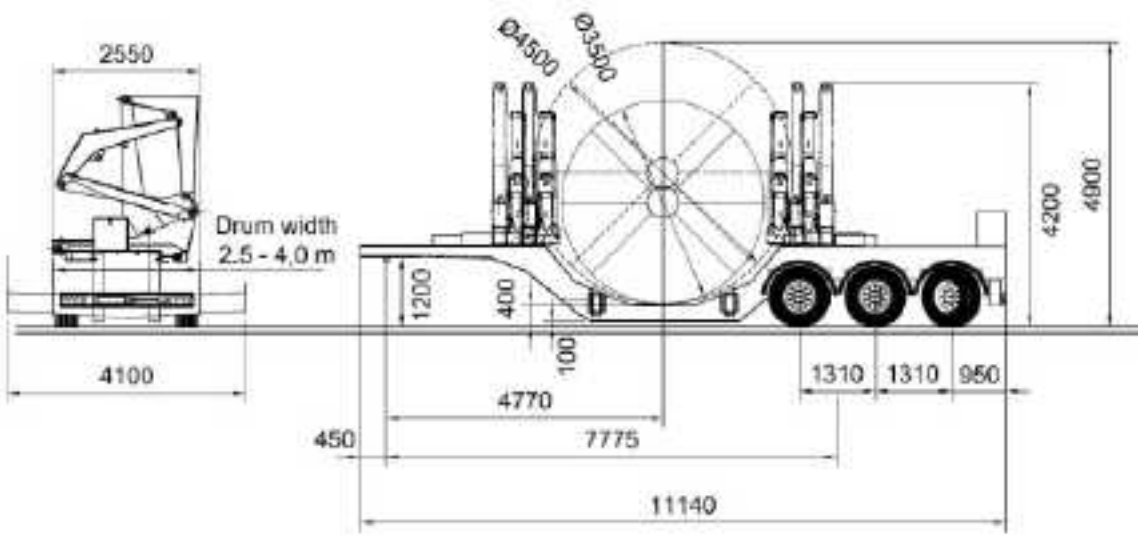

Figure 3-9 Hammar Side Loader

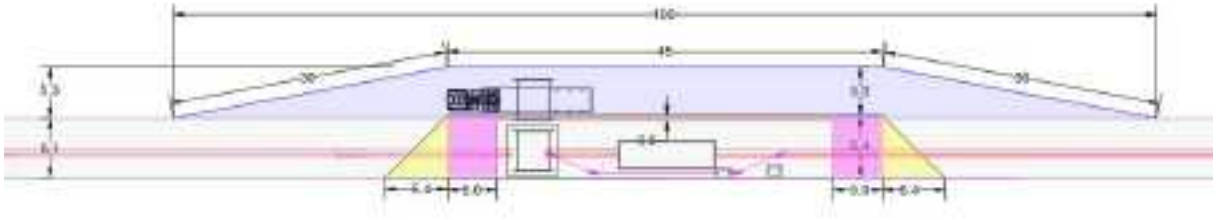

Figure 3-10 Site Layout – Side-loader trailer (Delivery)

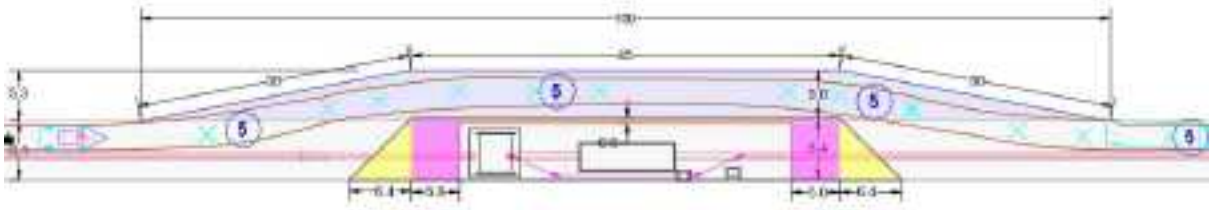

Figure 3-11 Site Layout – Side-loader trailer (Installation)

Option 2 – Two Stage Delivery

3.3.1.4 Option 2.1 - Low loader with secondary trailer

The two-stage delivery approach required a series of storage compounds to be set up at strategic locations along the route which would need establishing first, allowing the drums to be transported from the port and distributed to the storage compounds. This would most likely be done using a method similar to Option 1.1 utilising low loaders and mobile or crawler cranes.

This option utilises an adjustable cable drum trailer towed by an articulated tractor unit from the storage locations. This would require the cable drum to be loaded onto the trailer at the storage areas using a mobile or a crawler crane and then be transported to the specific jointing bays. Once at the works location the vehicle would park in the carriageway and the cable would be unwound from the trailer into the joint bay. Similar traffic management as per the previous options would be required due to the vehicle remaining on site for the installation. The length of the TM would be longer than the options where the vehicle is taken off site after offloading. This option does not require a road closure and can maintain one way traffic under the appropriate traffic management. Once the cable drum is empty it would be removed from the joint bay back to the designated area using the trailer.

Benefits of this is that on site it requires no lifting at each joint bay so experiences the same benefits as above Option 1.2.

Disadvantages include the transport width is wider than the options that allow for the drum to be rotated. Also, this requires agreement of multiple land takes and liaison with 3rd parties to find suitable locations for the storage compounds. Also, the cost of setting up the storage compounds, double handling of the drums and additional craneage required at each location needs to be considered. Due to the nature of the cable trailer, it can only travel up to 10km/hr so could impact on the time take to deliver the drum to the joint bays and would also influence the number of storage compound required to keep production efficiency.

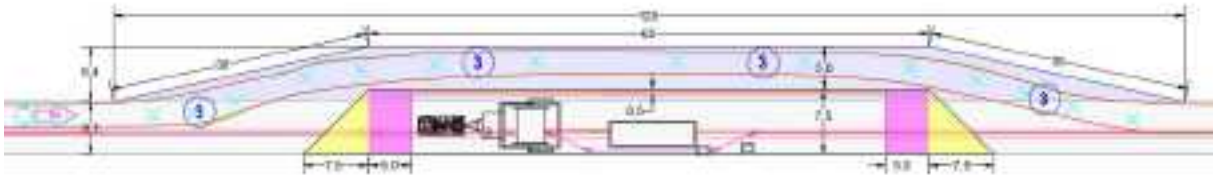

Figure 3-12 Site Layout - Low Loader with secondary trailer

3.4 Summary

In summary, there are a number of options available to the client and contractor, this includes choice of port, delivery option and vehicle type. The vehicle selection affects the installation methodology of the cable and the abnormal load requirements. An integrated vehicle approach will avoid multiple vehicle movements and will reduce the quantum of handling, in turn reducing the risk to the integrity of the cable. Table 3.2 provides a comparison of the various options, an approximate cost and a high-level rating. All costs are subject to change and contractual agreement between supply and purchasing parties.

In consultation with the abnormal load specialist, there is currently no requirement for significant enabling works along the transport routes identified on the provision that the assumed vehicle transport does not significantly differ. Expected enabling works for all options including adjustment of overhead cable and localised tree/vegetation pruning.

Table 3.2 Logistics Option Comparison

Delivery Option	Methodology	Approximate Construction Zone Length/width	Approximate Passing Bay Length/Area	Approximate Cost	Minimum Abnormal Load Movements	Preference Rating
Option 1 Direct delivery i.e. Port to Cable Jointing Bay	Low loader with crane offload at jointing bay	70m/7.5m	140m/770m^2	Low loader trailer €180,000 plus truck Site and port/compound mobile crane required	Port – Site – Port 2no.	Low
	Side-loader trailer	35m/6m	115m/380m^2	Side Loader trailer €310,000 plus truck Unwinder - €170,000	Port – Site – Port 2no.	Moderate-high
	Bespoke turntable trailer	45m/6m	100m/450m^2	Bespoke turntable trailer €450,000 plus truck Mobile crane in compound/port required	Port – Site – Port 2no.	High
Option 2 Two-stage delivery i.e. Port to Compound, Compound to Jointing Bay	Low loader to Compound Secondary towed cable drum trailer	55m/7m	125m/600m^2	Low loader trailer €180,000 plus truck Secondary trailer €180,000 plus truck	Port – Compound – Site – Compound – Port 4no.	Low-Moderate

4. Temporary Traffic Management

4.1 Overview

The subsequent sections provide the basis for the management of traffic expected during construction and operation of the Kildare-Meath Grid Upgrade project, on the basis of the designs shown in the planning documents. The Traffic Management Plan shall be developed by the appointed Contractor during detailed design into a more detailed Construction Stage Traffic Management Plan based on their specific design proposals. The role of Project Supervisor Design Process (PSDP) may be taken over by the Contractor and as such a Traffic Management Plan for their proposed design must be prepared in consultation with Transport Infrastructure Ireland (TII) and Kildare and Meath County Councils. The Temporary Traffic Management Designer shall prepare Detailed Temporary Traffic Management Designs for all locations where Works are planned on, or impact on, any public road.

Prior to commencing the works, the plan must be developed into an Operational Traffic Management Plan by the Project Supervisor Construction Stage (PSCS). The appointed PSCS/Contractor of the project is required to carry out the Safety Audit on Operational Traffic Management Plans prior to commencing the works. The PSCS shall co-ordinate the implementation of the developed Traffic Management Plan during construction of the works.

The developed Traffic Management Plan requirements will include the provision of facilities for the safe passage of pedestrian and vehicular traffic and measures to keep the impact of the works on the roads, and local communities and road users, to a minimum. All traffic management controls proposed by the Contractor must be in accordance with the documents referenced herein.

4.2 Guidance documentation

The Contractor shall comply with the requirements of:

- Traffic Signs Manual – Chapter 8 – Temporary Traffic Measures and Signs for Roadworks, Department of Transport, Tourism and Sport, August 2019 (Department of Transport, Tourism and Sport, 2019)
- Guidance for the Control and Management of Traffic at Road Works, Department of Transport, Health and Safety Authority, National Roads Authority and Local Government Management Services Board, second edition 2010 (Department of Transport, Tourism and Sport, 2010)
- Guidelines for Managing Openings in Public Roads (Guidelines for the Opening, Backfilling and Reinstatement of Openings in Public Roads), Department of Transport, Tourism and Sport, second edition April 2017 (Department of Transport, Tourism and Sport, April 2017)
- Guidelines for Working on Roads, Health and Safety Authority, 2009 (Health and Safety Authority, 2009)

These Guideline documents shall be read in conjunction with primary Safety, Health and Welfare at Work legislation, including the Act 2005, the Construction Regulations 2013, and any amendment to them.

4.3 Cable Drum Movement Traffic Management

Following consultation with the abnormal load specialist, during the movement of the cable drums from the Port to the compound cable jointing bay, it is likely required that escort vehicles will be required. The escort vehicles will support the oversized load vehicle by ensuring a suitable safe zone by adjusting the position, speed, or direction of traffic by other road users. The escort vehicles act primarily in the safety function, to ensure the safety of all road users but also to support the oversized load vehicle with overcoming particular obstructions.

At this stage it is not foreseen that specific road closures will be required, but rather the loads will be supported by escort vehicles. The requirement and number of escort vehicles and Garda support is at the discretion of the Permits Officer for each Council or consenting authority along the route. Without engagement at this stage, the quantity of escort vehicles cannot be confirmed, however, it is expected to be between 2-4 vehicles per load. The detailed requirements for the escort vehicles are detailed in Section 2.3. On agreement of the final cable drum and specific oversized load vehicle, the consenting authorities can be engaged and the exact requirements for the oversized load permit can be jointly agreed.

5. Risks and Opportunities

This section provides an assessment of the potential risks and opportunities associated with the movement of the cable drum. Each identified risk and opportunities consider the overall logistics strategy, this is separate to the hazard risk register which is captured in a separate document. Table 5.1 provides the identified deliverability risks, Table 5.2 identifies the deliverability opportunities. As the detailed design progresses, this will need to be reviewed and updated.

Table 5.1 Deliverability Risks

#	Risk	Description	Potential mitigations
1	**Design and construction programme – interface between cable manufacturer, logistics and civils contractor**	The design, construction and cable manufacture/installation programmes are highly interdependent. Cable installer and civils may not be same contracting organisation, creating interfaces that could be difficult to project manage	A baseline programme to understand these interfaces (including EirGrid governance/design/long lead in items) could be developed and QSRA applied to understand risks. Procurement strategy should reflect risks
2	**Third party approvals of abnormal load permits**	Extensive approval process for abnormal load permits complicated by potential high numbers of movements	Early engagement with issuing authority (Garda and Local Authorities). 'Season ticket' strategy if possible to reduce admin. Digital solutions by cable installer/contractor
3	**Physical obstructions (overheads, low structures)**	Low overhead structures preventing movement of cable drum, requiring excessive diversions	Overhead infrastructure survey including vertical clearances.
4	**Poor ground conditions not able to support crane/ weak structures limiting maximum axle loading**	Insufficient capacity in existing structures to support vehicles. Inadequate ground to support crane/winching operations	Survey to identify structures along transportation route. Identify structures at risk and assess load capacity. Review of GI survey data with geotechnical temporary works engineer
5	**Insufficient working space/turning clearances**	Insufficient space to manoeuvre all construction vehicles to facilitate the movement and installation of the cables.	Swept path analysis with selection of haulage and logistics vehicles to identify constraints. Diversions and alternatives likely to be required.
6	**Extensive cable logistics enabling works in cost/schedule or planning**	Enabling works may be required to facilitate the offload of the cable drums. This could include; crane platforms, road widenings, utility diversions etc.	Development of cable bay strategy to support logistics assessments

Table 5.2 Deliverability Opportunities

#	Opportunity	Description
1	**Investment in specialist equipment to integrate lifting and installation**	Use of specialist equipment with up-front investment will reduce site operations and increase efficiency when installing the cables. This could be with the side loader or the turntable option. These vehicles have the ability to be used on subsequent projects.
2	**Early submission of trial abnormal load permits**	The abnormal load specialist is able to submit oversized load permits to the relevant authorities at an early design stage to understand the likelihood of permission being granted. There would be no requirement to transport the load, but rather provide assurance that the proposed solution is transportable.
3	**Early engagement with Port authorities**	Early engagement with the port authorities will support the logistics assessment and provide reassurance to cost and programme. This will further support the business case for the quantity of specialist transportation vehicles and compound strategy. If the port authorities provide strict operating time frames, this will provide less flexibility to the contractor and increase risk to the programme.
4	**Early engagement with consenting authorities**	Early engagement with the consenting authorities will support the permitting of the abnormal load and provide assurance to the programme. The engagement will highlight areas of concern and provide the client/contractor the ability to address these.
5	**Primary initial route overhead cable survey**	It has been identified the risk of low cables along the route. An early assessment of the low cables will provide key information and allow scoping and planning as to the extent of alterations required.

6. Conclusion

In conclusion, the proposed cable drum is suitable for transportation and installation on the Kildare to Meath project. Specialist engagement has been undertaken with the abnormal load supplier and suitable vehicles for transportation solutions have been identified. It must be identified that an element of enabling works will be required, this is expected to be vegetation trimming (within the permissible environmental timeframes) and raising any low overhead cables. There is no requirement to undertake significant diversions (other than potentially the Dublin Port Tunnel) during the transportation of the cable drums.

It is recommended that the Client and Contractor commence early engagement with the relevant consenting authorities to ensure that permits are able to be issued during the implementation phase. It is evident that investment in specialist vehicles is required to support the installation of the cables at the joint bay site. The market engagement requires development with regards to proposed installation equipment suitable for the corridor nature of the work. It is evident that specialist logistics trailers will need to be procured for this project and other projects planned by ESB/EirGrid.

7. References

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Appendix A. Supplier Datasheet

BROSHUIS HOLLAND

3-axle low loader

Trailer specifications

Dimensions and weights

Weights in kg	Netherlands		Germany		England	
	C & U	Special types	C & U	Special types	C & U	Special types
Maximum fifth wheel load	35000	35000	35000	35000	35000	35000
Maximum bogie load	27000	30000	24000	30000	24000	37500
Gross load capacity	62000	65000	59000	65000	59000	72500
Tare weight, app.	21500	21500	21500	21500	21500	21500
Net load capacity, app.	40500	43500	37500	43500	37500	51000

Your benefits

Premium quality

Optional complete metalized

Low tare weight

Transport of 30 ft and 40 ft containers

Neck

- Single beam hydraulic pivoting and detachable neck. Maximum fitfth wheel load is 35 T.
- Fifth wheel height 1320 mm
- Neck width 2530 mm
- Rear swing cleareance 2500 mm
- Hard wood floor of 28 mm thick
- 3,5" Kingpin, fitted under a ball bearing turntable. The turntable is connected to two double action hydraulic steering rams. Holder is suitable for mounting a 2" kingpin
- A air stinger is provided with 2 separate operable cilinders to support the neck whilst removing the gooseneck.
- 10T certified lashing rings (max. Load 5T) . According NEN12640
  TÜV Certificate
- 32 mm holes in the side rave, to use as lashing point
- Divided at the side raves of the neck, dim. 96x66x6mm, suitable for stakes of 81x51mm
- Spare wheel carrier at front of the gooseneck. Suitable for one spare wheel.
- Alu cover plate placed in the floor between the beams of the neck

Floor

- 1x extendible
- Bed height 390 mm (loaded). Beam height 300 mm
- With main beams of high tensile steel
- Split at front side of the bed
- Width of loading area 2750 mm
- No floor fitted between the beams to increase loading area. The under flange is prepared for a detachble floor
- Preparation for swing-out outriggers in the outer spine
- All air and service lines are located in an energy chain within the central main beam. Resulting in improved ground clearance and reduced maintenance
- Retaining nuts M24 fitted to the inner beam suitable for 8 T lashing rings.
- 13.4T certified lashing rings divided in the side rave of the loading floor, placed every approx. 1.2 meter, according EN12650 with TÜV Certificate

Axle bogie

- Gigant 12T axles
- Axle quantity: 3
- The axles are fitted with hydraulic suspension, the hydraulic cilinders are fitted in front of the axle for maximum protection. Left and right side can be adjusted separetly.
- Broshuis hydraulic steering system, consists of two fully independent circuits.
  - Butterfly section, with adjustable conical bearing, resulting in extremely low maintenance,
  - Adjustable steering rods, to correct axle alignment tracking to compensate for wear during the life of the trailer.
  - Air, electrical and hydraulic service lines are housed inside the central spine(s) in an energy chain
- All axles are hydraulic steered
- Distance between axles is 1360 mm
- 10T certified lashing rings. According to EN12640, TÜV Certificate
- 32 mm holes in the side rave, to use as lashing point
- Width of loading area 2750 mm
- A raise and lower valve is fitted to the hydraulic suspension for ease of loading or unloading. The left and right floor height can be operated seperatly. 2 LED indicators are installed to set the correct floor height. Operation from the neck.
- Manual override steering with 3kW electrical pump
- Electrical hydraulic override steering system, to allow the axles to steer independently of the tractor unit, by means of buttons. Butterfly section, with adjustable conical bearing, extremely low maintenance - adjustable steering rods, to correct axle alignment tracking to compensate for wear during the life of the trailer. Air, electrical and hydraulic service lines are housed inside the central spine(s) in an energy chain
- Two air line Wabco brake system, EC-approved design with an automatic load sensing device. Spring type chambers fitted to two axles for the hand brake. Incl. EBS
- An hydraulic pressure gauge is connected to the suspension for determing the axle loads
- Tyre brand to choice of Broshuis (Continental, Goodyear or comparable). 285/70 R19.5
- A troughs in the centre of the lower deck for an excavator arm, width 724 mm

Lights

- Lights are complete in LED
- 2 pairs of 3-chambers rear lights and Led side-marker-lights. Conform EU-specifications
- One fog light
- One rear flashing beacon connection at the rear side
- On each side at the neck and axle bogie a connector fitted with holder for extendible marker board lights
- Connector for over width marker board lights: 3 pin plug

Accessories

- Spare wheel 1x
- EBS connector
- Connectors at the front: Dual 7 pin SAE plugs
- Air couplings palm type

- A 35mm2 cable between truck and trailer for the use of any electrical power supply
- 24V power connector NATO
- Mudguard under the light bar
- The chassis is equipped with white reflective tape on sides and red reflective tape on the back

Paintwork

- Finished in one colour. (non-metallic)
- After chassis assembly, the support brackets for valves, air tanks and pipe and wiring runs are fitted. The completed chassis is then shot blasted and immediately painted according to the Broshuis 2K paint system. The final fitting of all the components is carried out after the chassis has been through the preservation process
- Supplied Axles are painted black, for better rust prevention

Datum
Date
2022-09-02

Beteckning
Our ref.
Offer No.
225092

Er beteckning
Your ref.

Jacobs
Att: Elliot Neale
Cotton Centre,
Cottons Lane
London, SE1 2QG
United Kingdom

Dear Elliot,
Please find this offer for our Hammar DrumLoader with accessories for your consideration.

Drumloader

Item	**1**	HAMMAR 155 H-35 “Cable Drum solution”
Item	**2**	Radio Remote Control
Item	**3**	Central lubrication

Operation

Item	**4**	Separate engine on the HAMMAR

Others

Item	**5**	Handling of various drum sizes
Item	**6**	Top Spreader
Item	**7**	Spare wheel incl. winch
Item	**8**	20’ container handling
Item	**9**	Freight from Sweden to UK

Address
Hammar Maskin AB
Buagärde 36
SE-517 95 OLSFORS
Sweden

Phone
+46-(0)33 29 00 00
Fax
+46-(0)33 29 00 01

Web
www.hammar.eu
E-mail
info@hammar.eu

VAT No.
SE556282502501
Reg. No.
556282-5025

Item 1 **HAMMAR 155 H-35**

One HAMMAR 155 H with fix chassis and fix cranes for transport and handling of cable drums with maximum fixed diameter of 4,5m and maximum fixed width of 4,0m. Maximum weight of drums is 35t.
Size and weight of actual drums to be specified.
The HAMMAR has 3 axles and is suitable for a 3-axle tractor unit.

General about HAMMAR 155

The HAMMAR 155 model is based on our advanced high-performance model 151, with the difference that it incorporates our “MegaTransfer” ™ step over type stabiliser legs.
The stabiliser leg reaches over a normal width companion trailer or truck and rests on the ground on the other side. With its extreme outreach of 3,1m the HAMMAR becomes extremely stable in all type of handling.
This is a HAMMAR with great handling area and with a number of benefits such as being a master of transferring to and from other chassis

Advantages

- Stabiliser outreach 3,1 metres
- High lifting capacity
- Great handling area
- Extremely flexible supportlegs

The HAMMAR 155 H-35

- Capacity of handling and transporting cable drums up to Ø 4,5m and up to 4,0m width to and from ground and other trailers.
- Has a total height of 4,7m with a turntable height of 1200mm (1265+25mm rising) and with a cable drum of Ø 4,0m loaded.
- Have hydraulically extendable sideway beams for the cable drum to rest on. Normal vehicle width is 2550mm, with widening possibilities to maximum 4,0m. The beams are lockable in its inner position and in an outer transport positon.
  The beams on the lifting side are extendable 100mm extra and the drum stoppers are also foldable, all to make it safe and easy to load and unload. The distance between the beams lengthwise is 2,1m.
- Have a ground clearance, in the normal transport position, of approx. 100mm. Maximum ground clearance, with raised air suspension, is approx. 250mm

- Has two pair anchor lashings on the lover frame. LC 10 000 daN/pcs
- Is equipped with HAMMAR patent pending stabiliser legs reaching over trailers, truck frames or rail wagons and rests on the ground on the other side.
- Have two, fully hydraulic operated, extra support leg on the non-lifting side for extra stability.
- Have chain spreader to keep chains apart when handling the cable drums.
- Remote emergency shut down as standard
- is, on customer request, left or right-hand side lifting.
- is equipped with the HAMMAR Safety Lifting Hooks.

Weights	**Technical**
Max SWL (Safe Working Load)	**35.0** tonnes
Max bogie pressure	36.0 tonnes
Max King Pin pressure	18.0 tonnes
Unladen weight of HAMMAR 155 H	12.7 tonnes

The HAMMAR 151 H is equipped with:

Axles:	BPW 3 x 12 tonnes, third axle self steering and to be locked from inside the cabin when reversing. Installations in the tractor are not included.
Bogie:	BPW air suspension type SL 1310 + 1310 mm with raise and lowering function.
Tyres:	6 pcs 425/65R22.5 with coarse pattern (10t load).
Rims:	Steel.
King Pin:	2" JOST.
Brake system:	WABCO two circuit. EBS 4S/3M, with four sensors and three modulators. Power supply via ISO 7638. The EBS-system is featuring RSS - Roll Stability Support.
Parking brake:	Automatic with spring brakes, manually operated
Wheel brakes:	Disc brakes on all axles.
Landing leg:	JOST, with two speed operation, especially developed for trailers with air suspension. The feet allow a movement of 125 mm lengthwise.

Twistlocks:	4 pcs. HAMMAR/BLAIR
Directional valves	*Fully hydraulic operating system. The inlet section in the valves incorporate an emergency stop - the HAMMAR will be emergency stopped independently of the tractor unit. The accuracy of the hydraulic system enables a fast, safe and exact operation of the HAMMAR.*
Operating system:	Remote control by cable, joystick. Prepared for rpm-control of the truck engine. Installations in the tractor are not included.
Working lights:	One LED on each crane and 2 LED in the rear.
Support pads:	2 pair of composite support pads to be used under stabiliser foot to reduce ground pressure when needed.
Width marking:	Illuminated width markings front and rear, extendable out to 4,0m, designed to local legal requirements.
Flatbed cover:	I-beams and alloy checker plates on the low bed is fitted with a rubber mat to protect if cable is hanging down.
Camera system:	Rear camera is mounted and one camera is also mounted on the side for positioning the HAMMAR next to a cable drum. Operator will see when he is in right position to the cable drum from a display. Colour LCD display is supplied but mounting in your truck cab is not included.
UK Service:	HAMMAR has a well-trained and skilled Service Agent covering Great Britain. Service Agent has parts in stock and parts from Sweden HQ are supplied within 24 hours.

Weight: 13 000 kg

Price: SEK 3 322 000

Item 2 **Radio Remote Control**

Cordless radio remote, Scanreco, for all functions on the HAMMAR Sideloader. The portable transmitter is a one hand unit. The operator can overlook the operation from any position suitable. The transmitter has symbols that show each function. The control buttons have two modes -a light pressure gives "low speed", a harder provide "high speed" on the crane movements. It has a display where the shift position, battery voltage and legs-on-the-ground are being indicated.
Three rechargeable batteries (AA) and a 24V plug-in charger are included. The unit complies with all pertinent EU standards.
Our standard cable remote control, with joysticks, is also included in the delivery and can be plugged in within seconds, should the need arise.
Weight: 6 kg

Price: SEK 34 100

Item 3 **Central lubrication**

Complete installation of an automatic centralised lubrication system with an air pressure driven piston pump mounted on the HAMMAR supplying all grease points on the cranes, as well as on the trailer. Gives exact dosage and distribution of the lube with adjustable intervals. The grease reservoir is made of stainless steel. The system is controlled from a user interface mounted on the trailer. The control unit has LED-lights and surveys the pump function, the grease level in the reservoir and also has pressure alarm and low level alarm on lubricant level etc. At power brake (e.g. disconnecting the trailer) the lubrication program will always continue from previous position through memory storage.
Weight: 17 kg

Price: SEK 56 600

Item 4 **Separate engine on the HAMMAR**

One independent Power Pack for drive of the hydraulics on the HAMMAR. The engine is an environmentally sensitive Stage V engine complying with EU latest environmental requirements.

The engine is a four cylinder 2.5 litres common rail KOHLER turbo diesel, with a full **55.4 kW power** @ 2600 rpm and 300 Nm @ 1500 rpm.

The engine is directly driving a hydraulic pump. The Engine is protected from overheating or low oil pressure. **The cranes will have the same speed regardless of the weight lifted**.
The engine is protected against overheating and/or low oil pressure, and is equipped with pre heat injection, to facilitate cold starting. The engine works for surrounding temperature between -40 and 50+ ° C.

The following is included:
4-cylinder water cooled KOHLER common rail turbo diesel engine, twin flow hydraulic piston pump, return oil filter, hydraulic oil tank 160 l, fuel tank 90 l.

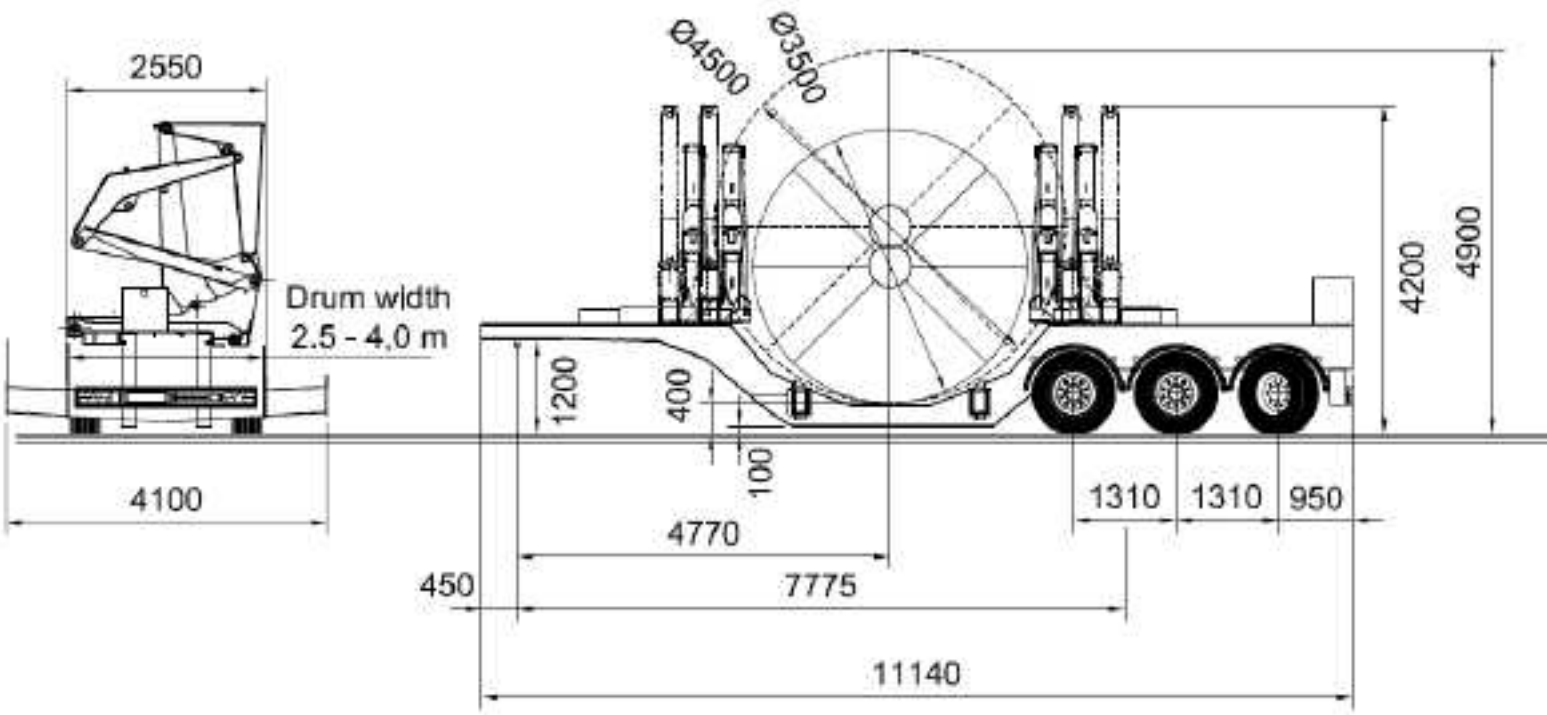
The power pack is completely mounted and built in a rigid frame and with hatches for easy access and service. The hydraulics can be stopped from the portable manoeuvre box. The engine is ADR-equipped.
Weight: 720 kg

Price: SEK 219 100

Item 5 **Handling of various drum sizes**

Capability for handling drums with a various diameter from 4,5m down to 3,5m by sliding the cranes.
This option requires the cranes to be fitted with a special sliding arrangement and an extra 200mm I-beam will be fitted on top if the existing chassis beam.
Please note this affects the total height of the sideloader without load.
Width of the drums can be 2,5m to 4,0m.
Weight: 700kg

Price: SEK 177 200



Item 6 Top Spreader for various drum sizes

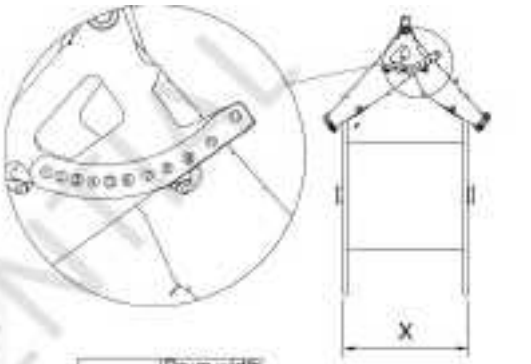
Top spreader for handling drums when container corner castings is not available on a drum or to be flexible in handling any drum by using the centre hollow beam same way as traditional crane lifting.
The spreader is hydraulically operated and can in folded position be placed on the trailer chassis between the cranes during transport. In operation the spreader is folded out over the drum and steel wire ropes are used to loop around the centre beam of the drum.
This new design of Top Spreader is capable of handling different sizes of drums by hydraulically fold/deploy over the drum depending on drum size.

Capacity:
Drum diameter = 3500mm to 4500mm
Drum width = 2270mm to 4000mm
Safe Working Load (SWL) = 35t
Weight: 1 300kg

Price: SEK 414 700

Lifting tool adjustable

Max load (max weight drum)(all sizes)	35T
Drum diameter	3,5-4,5m
Drum width	2270-4000mm (outer flange measurement)



Position	Drum width (X)mm
1	2270-2500
2	2500-2650
3	2650-2800
4	2800-2950
5	2950-3100
6	3100-3250
7	3250-3400
8	3400-3550
9	3550-3700
10	3700-3850
11	3850-4000

Item 7 **Spare wheel incl. winch**

One complete spare wheel 425/65R22.5 with coarse pattern on steel rim with winch mounted on the trailer chassis behind rear crane.
Weight: 181kg

Price: SEK 16 200

Item 8 **20’ container handling**

Capability to handle and carry 20’ ISO container and flats with the drumloader. Crane base and beam adjusted and fitted with twist locks, mounted on the side of the trailer. By sliding the cranes to 20’ distance this option gives the possibility to load, unload and cart fully loaded 20’ container for ie. Installation equipment used at sites.
Please note that this option requires that Item 5 is chosen.
Weight: 100kg

Price: SEK 28 500

Item 9 **Freight from Sweden to UK**

The HAMMAR delivered from factory in Sweden to port of Immingham.
Weight: 0kg

Price: SEK 45 000

Offer overview

Item	Description	Price (SEK)	Weight
Drumloader			
1	HAMMAR 155 H-35	3 322 000	13 000 kg
2	Radio Remote Control	34 100	6 kg
3	Central lubrication	56 600	17 kg
Operation			
4	Separate engine on the HAMMAR	219 100	720 kg
Other			
5	Handling of various drum sizes	177 200	700kg
6	Top Spreader	414 700	1 300 kg
7	Spare wheel incl. winch	16 200	67 kg
8	20’ container handling	28 500	100 kg
9	Freight from Sweden to UK	45 000	0kg

The HAMMAR is designed in close contact with our customers and users, which has resulted in a flexible and highly standardised product with low maintenance costs.

The HAMMAR is adapted to local road regulations, regarding lightning, reflectors, under run protection (rear and lateral), axle pressure and turning radius.

The cranes and the trailer are Swedish quality products. They are manufactured in our own factory in Sweden, using the highest quality Swedish steel, especially prepared to give the best function together.

The HAMMAR is delivered media blasted, primed and top coated. A two-component epoxy primer is used as a base. The top coating is a two-component polyurethane paint.
The cranes are black as standard and the wheels are silver-grey. The under-run protection is made from extruded aluminium, and is not painted. The trailer is painted in a solid colour of your choice. All parts are painted before assembly for the best result.

We educate and train, during one day, one or two operators at our, or the customer's, facilities. This is done in connection with the delivery, and it is a requirement for full validity of the warranty of the equipment.

Service and maintenance agreement is handled separately with our local Service Agent in UK and can be supplied upon your request.

All documents for homologation are included in the delivery.

Prices: .	Per unit and in SEK.
Terms of payment:	30% down payment with the order, 70% before delivery from Hammar Maskin AB, Sweden.
Terms of delivery:	Ex Works, Olsfors, Sweden (INCO-terms 2010). Apart from this *Hammar General Terms and Conditions of Sale 2020-12-07* is valid.
Other terms:	In accordance with *Hammar General Terms and Conditions of Sale 2020-12-07*
Time of delivery:	At present, about 10 months from confirmed order and receipt of down payment.
Warranty:	36 months on cranes and chassis structure including all Hammar fabricated components.12 month on other ancillary equipment i.e. axles, suspension, engine, lighting etc. *Hammar General Terms and Conditions of Sale 2020-12-07* is valid.
Validity:	Our offer is valid one (1) month from the date of the offer.

If I can be of any further assistance, please feel free to contact me.

Yours faithfully,
HAMMAR MASKIN AB

Fred Sandberg

Modern Transport Engineers Australia Pty Ltd

15 Millennium Place Tingalpa Qld 4173 Australia Phone 61-7 3393 5100
Mike Mobile 61 04 47 947444 mike@modtrans.com.au
admin@modtrans.com.au
www.modtrans.com.au
www.modtrans.co.nz

31st August 2022

Jacobs
City Walk
Leeds LS11 9DX
United Kingdom

Phone 1

Mobile +4475 66808278

Email: rafaela.konstanta@jacobs.com

Ref: A200220

Attention: Rafaela Konstanta

Dear Sirs

Further to your inquiry and our subsequent discussions our company is pleased to submit our quotation to you for the following trailer.

Three Rows of Eight Steering Drop-Bed Cable Trailer

Base Model Specifications:

- Special Drop-bed deck design
- Width 2950mm closed - Width 4270mm open.
- Widening by 4 hydraulic rams.
- Hydraulic suspension with NEW low maintenance quick change rams.
- MTE 17.5" ten stud 225PCD Axles, 12-1/4" x 5-1/2" brakes with outboard drums.
- Axle spacing 1830mm - 1830mm.
- Axle Retraction to all axles to facilitate maintenance.
- 215 x 17.5" 16ply tyres on steel wheels.
- Two Spare tyre carriers only vertical mount type.
- Hydraulically adjustable gooseneck.
- 3-1/2" king pin two positions on an oscillating skid plate.
- Hydraulic power source - truck.
- Hella LED lights to ADR 4198 with 1 Rotating light in ramp.
- Capacity GVW - 80,000kg.
- Tare weight from 14,500kg (approx.)
- Two chain bins on spine of trailer.
- Heavy duty Hydraulic landing legs.

Continuation sheet 2

- Fully Enclosed deck over suspension
- Signs supplied “Do not overtake” and “OVERSIZE”.
- Steering axle
- Swivel Frame for unwinding of cable drum
- 50HP Power Pack
- Remote control Proportional .
- Sandblasted, Etch primed and painted in Two-pack to your fleet colours.

Base price:

$658,650 .00 AUD
(Six hundred and fifty-eight thousand six hundred and fifty dollars) CNF AUD - plus GST
(Cost Including Freight landed) Melbourne, Sydney, Brisbane, Perth.

Extras:

Description	Qty.	Price Each (Excl. GST)	Total (Excl. GST)
Extra spare tyre and steel wheel.		$480	
Extra spare tyre and Alloy wheel.		$520	
Aluminium Wheels. (Polished and/or Machined Finish). (12.8kg wheel saves 280kg over trailer set).		$250	
MTE 50mm Drop in King pin		$240	
Gauges for load indication		$650	
3R8 Centralised greasing - brakes and suspension		$10,700	
3R8 Centralised greasing with Timer - brakes and suspension		$12,400	
3R8 Manual Greasing system 8 points per suspension out to a manual block.		$6,200	
Hubodometer.		$120	
Two Tone paint.		$1,550	

Total Price of Extras Taken: $

Terms:
(Quote is valid for 30 days from date of Quote)

10% deposit with confirmed order. Balance prior to the delivery date

Note: Ownership does not pass on until the goods are paid in full. Our company reserves the right to dispose of the said goods if the balance is not paid within 14 days of notified delivery date or completion. Please also note MTE late payment terms.

Delivery:
Delivery by water to Ireland after confirmed order and acceptance of our trading terms. A date will be finalised on order and shipping costs to be added.

Registration:
Registration and stamp duty is not included

Warranty:
As per our "On Highway Warranty Agreement"

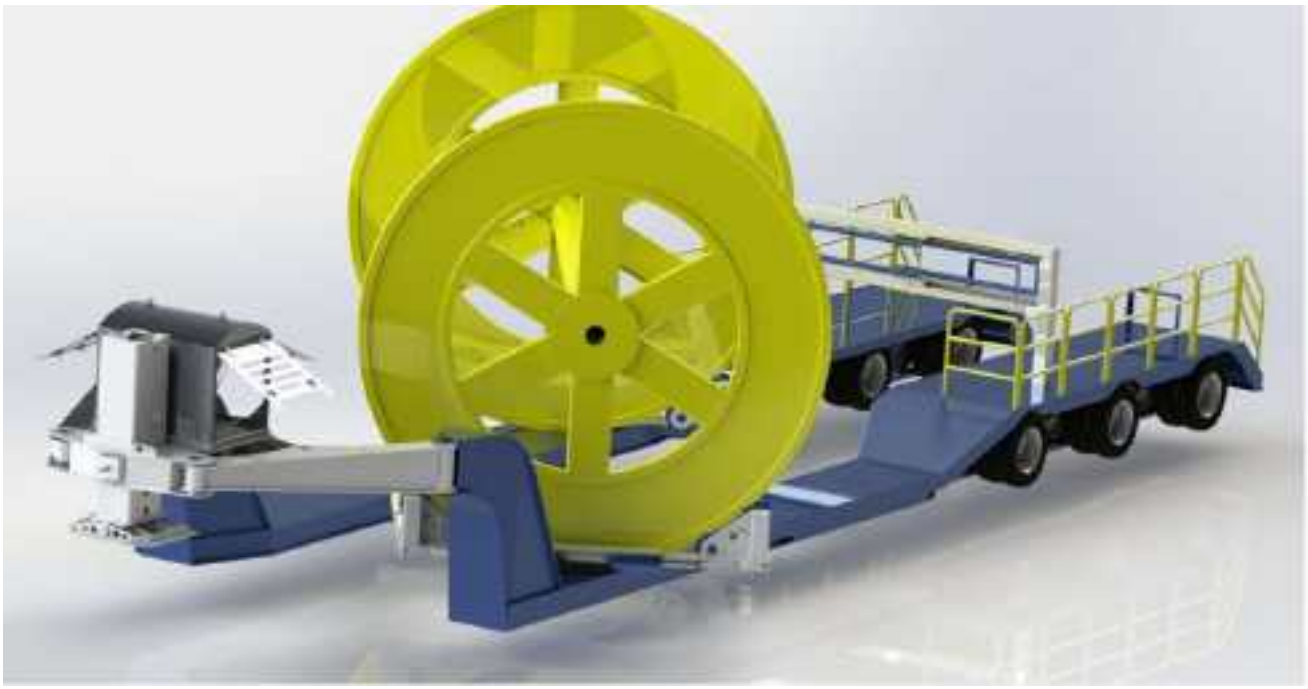
Kind Regards

Allen Caldwell \ National Manager
Modern Transport Engineers Australia Pty Ltd
15 Millennium Place Tingalpa QLD 4173

Modern Transport Engineers Australia Pty Ltd

Ph: 07 3393 5100
F: 07 3393 5122
M: 0424 301 921

al@modtrans.com.au | www.modtrans.com.au | www.mtwtruckandtrailerparts.com.au



A

Technique for cable laying and overhead line construction

- Energy cable laying up to 680 kV
- Fibre optic, mini and micro cables
- Cable winding and length measuring
- Overhead line construction up to 110 kV
- Seminars and product instructions

Cable winding units stationary

Cable winding and unwinding stands, stationary or for mounting on lorries etc. For drums from 20-55 t. See accessories like drum drives, drum brakes etc. Techn. details see table below. Please ask for our more extensive offers.

- Possible configurations:
- Drum flange brakes, one or both sides, breaking force 12,5 resp. 25,0 kN at cable.
- With an additional pre- and emergency brake braking forces to 50,0 kN are possible.
- Drive of the brakes per manual hydraulic pump or by electro-hydraulic drive
- Drum drives one-side or double sides, pulling force 16,0 kN resp. 32,0 kN
- Adjustable on the site to any drum width.

Code	Type	Cap.	Drum-D	Int. width	kg
331736	KTU 20 ST	20 t	2000-3700	any adjustable	1.870,00
331738	KTU 20 ST	20 t	2800-4300	any adjustable	1.880,00
331740	KTU 25 ST	25 t	3600-5100	any adjustable	1.945,00
331750	KTU 55 ST	55 t	3600-5100	any adjustable	1.980,00
331752	KTU 55 ST	55 t	4300-6000	any adjustable	1.980,00

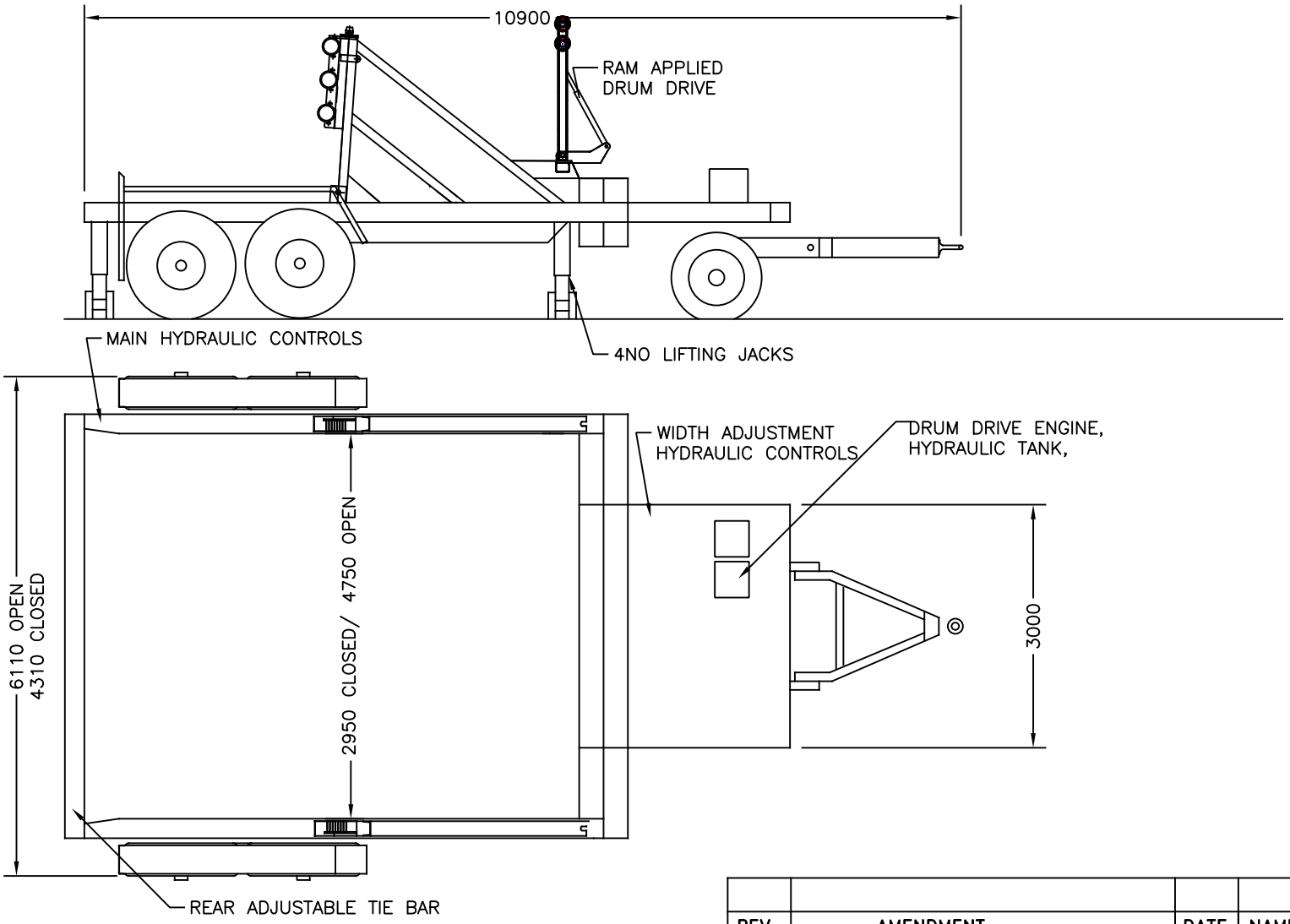
Vetter GmbH Kabelverlegetechnik • Industriestraße 28 • D-79807 Lottstetten
Tel.: +49 7745/9293-0 • Fax +49 7745/9293-499 • info@vetter-kabel.de • www.vetter-kabel.de

ALL DIMENSIONS IN mm U.O.S. | DO NOT SCALE DRAWING

NOTE:– TRAILER IS NOT ROAD LEGAL IN E.E.C COUNTRY'S !

SPECIFICATION

UNLADEN WEIGHT	:–	12750 KGS
GROSS WEIGHT	:–	52750 KGS
AXLE LOAD	:–	18000 KGS
BOGIE LOAD	:–	16750 KGS
PAYLOAD	:–	40000 KGS
O/ALL WIDTH	:–	4310 mm CLOSED
	:–	6110 mm OPEN
MAX DRUM DIA	:–	5000 mm
MIN DRUM DIA	:–	3300 mm
MAX DRUM WIDTH	:–	4600 mm
MIN DRUM WIDTH	:–	2800 mm
PINTLE DIA	:–	152 mm 40T MAX LOAD
REAR TYRES	:–	14.00x24
FRONT TYRES	:–	295x60 R22.5
TOW EYE	:–	76 mm NATO
BRAKES	:–	2 LINE AIR
LIGHTS	:–	SITE ONLY
SPEED	:–	10 km/hr
CONSTRUCTION	:–	ALL STEEL
DRUM LIFT	:–	DIESEL ENGINE POWERED HYDRAULIC C/W FLOW BALANCE VALVE LOCKED MECHANICALLY IN RAISED POSITION & STANDBY HAND PUMP
PAINT	:–	FULL GLOSS



REV	AMENDMENT	DATE	NAME

S.E.B. INTERNATIONAL LTD.
UNITY ROAD,LOWMOOR ROAD INDUSTRIAL ESTATE,
KIRKBY IN ASHFIELD,NOTTS.

TITLE G.A.CD900 AWT C/W DRUM DRIVE SYSTEM ADJUSTABLE WIDTH

NAME	A. SMITH	MAT'L	N/A	DRG No. CD900AWT 4600mm
DATE	10/03/21	SCALE	N.T.S.	

Appendix B. Exceptional Load Services Ltd. Report

Port of Entry & Delivery Route Assessment for Cable Drums

Route Survey & Desktop Assessment

October 2022

Exceptional Load Services Ltd, Ballymoyle, Arklow, Co Wicklow, Ireland

T: +353-402-31229. E. permits@wide-loads.com

Customer	Jacobs
Delivery address	Woodlands – Dunstown Cable Installation.
Survey Date	29/09/2022
Survey Personnel	Edwin Sunderland, ELS accompanied by Elliot Neale, Jacobs Rafaela Konstanta, Jacobs
Load Dimensions	Drums 4.3 x 4.3 x 4 x 35.4t Assumed road transport dimension of 16.5 x 4.3 x 4.8 x 60t
Route Assessed/Surveyed	Local roads between Woodlands, Co Meath and Dunnstown, Co Kildare.
Route Distances	Dublin Port to Woodlands: 41Km Bellview Port to Woodlands: 188km Dublin Port to Dunnstown: 67km Bellview Port to Dunstown: 130km
Route Assesment Criteria	To assess transport requirements on the National Road system for delivery to Woodlands, Dunnstown and various proposed storage compounds from a Port of Entry. To assess Dublin and Bellview Ports and compare distances, access, travel restrictions etc
Route Requirements	Permits are required for entire public road route from ports to storage and from storage to work sites. These are obtained from the relevant Local Authorities through which the loads pass. Local permits are normally available for periods of 3 months. Additional traffic management may be required in conjunction with civil works.

Project Overview

This survey and assessment have established there is a good road network for delivery of the specified cable drums on the National Road network to storage areas and onwards on local roads to work locations.
Any areas of concern for particular vehicle types, like low bed /low ground clearance trailers over bridges etc can be adequately dealt with by way of diversions or use of alternative storage areas for specific deliveries.

Roads

All 'N' and 'R' in the catchment area are usable for inward and outward deliveries.
For the northern section south to Prosperous these roads include: -
M50, M3, N3, R154, R156, R125, R148, M4, R407, R408, R403,
Southern Section roads are: - M7, M9, R445, R448, R412

Local deliveries, especially with specialised equipment would need to be assessed further in conjunction with storage compounds and possible route plans. Traffic management should also be considered depending on type of equipment used as rolling closures may be needed at certain periods during the day.

Local routes from storage to joint bays would need to be assessed for bridges, overhead cables and trees.

It is important to note tree and hedge cutting is not allowed during bird breeding season – March 1st to August 31st as this would be relevant for local roads and storage areas.

Ports Of Entry

Due to a good motorway network a number of ports could be considered.

Dublin Port. (**53.350730, -6.213323)**

Dublin Port is the closest in mileage to the cable route at 41km to Woodlands and 67km to Dunnstown. It has good handling facilities but because it is within the City area there are time restrictions on all oversize loads.
Travel out of the port is only between 23.00 and 06.00h and due to proposed Cable Drum size the Port tunnel cannot be used.
Loads of this size will generally be conditioned with a Garda (police) escort. This has a considerable cost consideration, but more importantly limits the number of movements and availability can be a very limiting factor.

All overbridges on this route would have a clearance for loads up to 5.0m

For the Dublin Route Oversize Load Permits would be required from Dublin City, Fingal, Meath, South Dublin & Kildare.

Belview Port. (52.264320, -7.036994)

Bellview Port at Gurteens, Co Kilkenny is part of the Port of Waterford. It is 188km from Woodlands and 130km from Dunnstown. It has good handling facilities and storage. Due to it's location it has much less time restrictions for road transport and ship offloading to storage outside the port can be carried out on a 24 hour basis. While almost double the distance from Dunnstown the travel time would be very little different and time restrictions are minimal. A workable route should be available from Bellview to Woodlands (assuming use of low bed trailers) avoiding the Greater Dublin area restrictions.

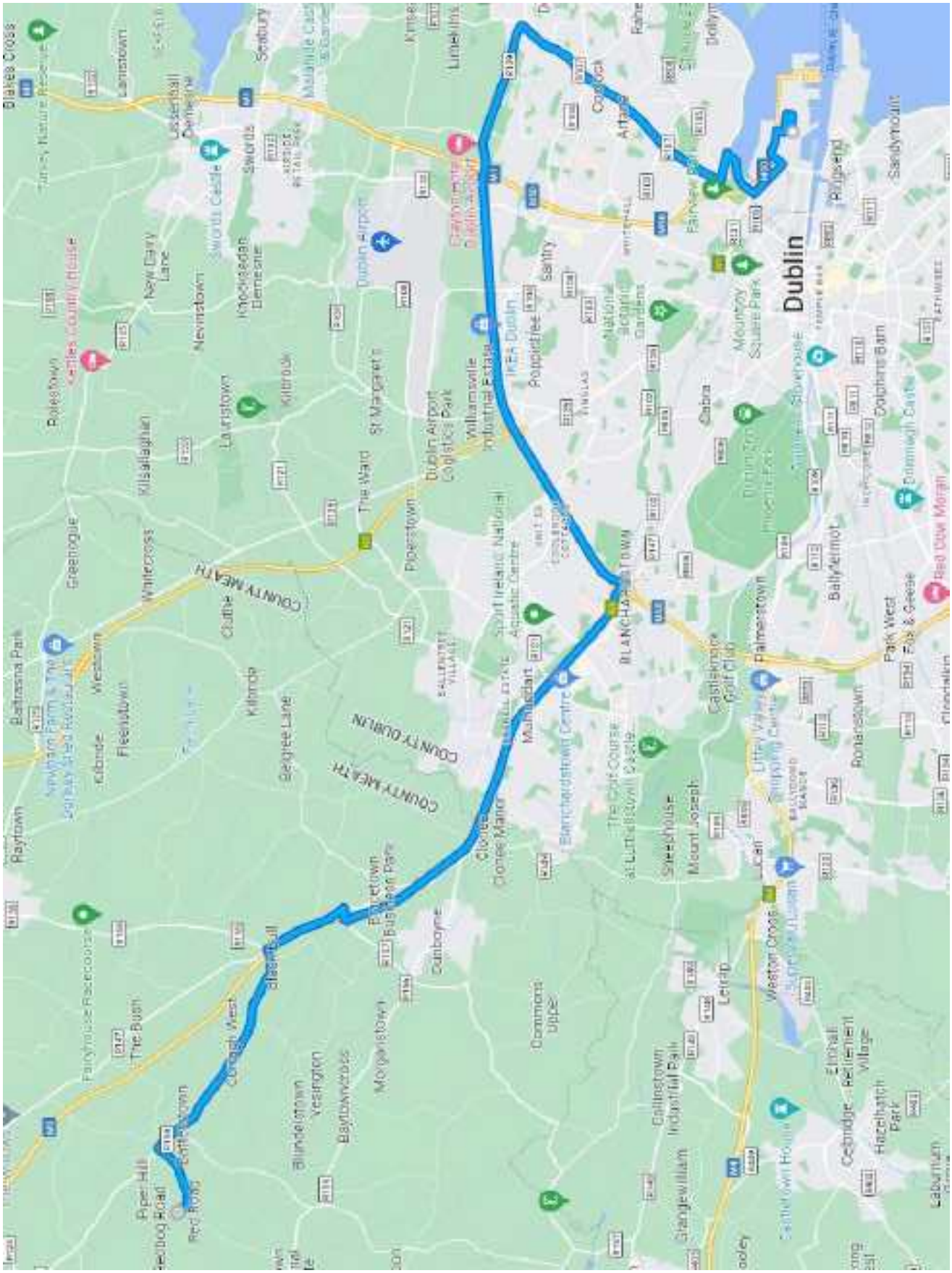
All overbridges on this route would have a clearance for loads up to 5.0m.

Oversize Load Permits would be required from Kilkenny, Carlow, Kildare & Meath + South Dublin & Fingal if the M50 route is used for Woodlands.

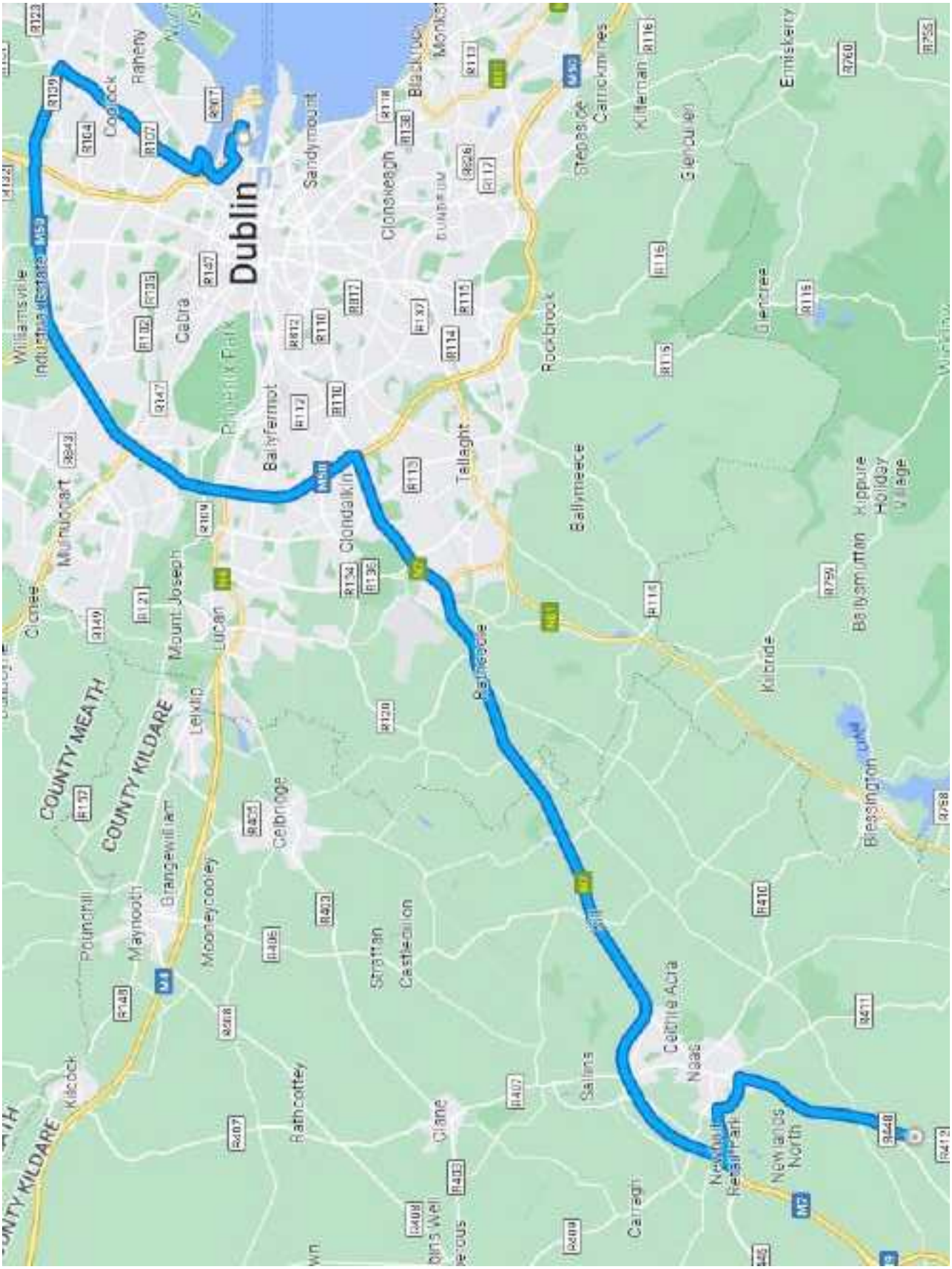
It is important that provision is made for deliveries to all storage areas during night time as this will maximise movements out of ports and cause least disruption to local traffic.

Conclusions	The routes from Dublin and/or Bellview ports should not present any extraordinary requirements or permit conditions for this type and size of load. There is currently no requirement for enabling works on any of the roads listed assuming the transport configurations are broadly in line with the dimensions assessed. *EdwinSunderland* *19/10/2022*

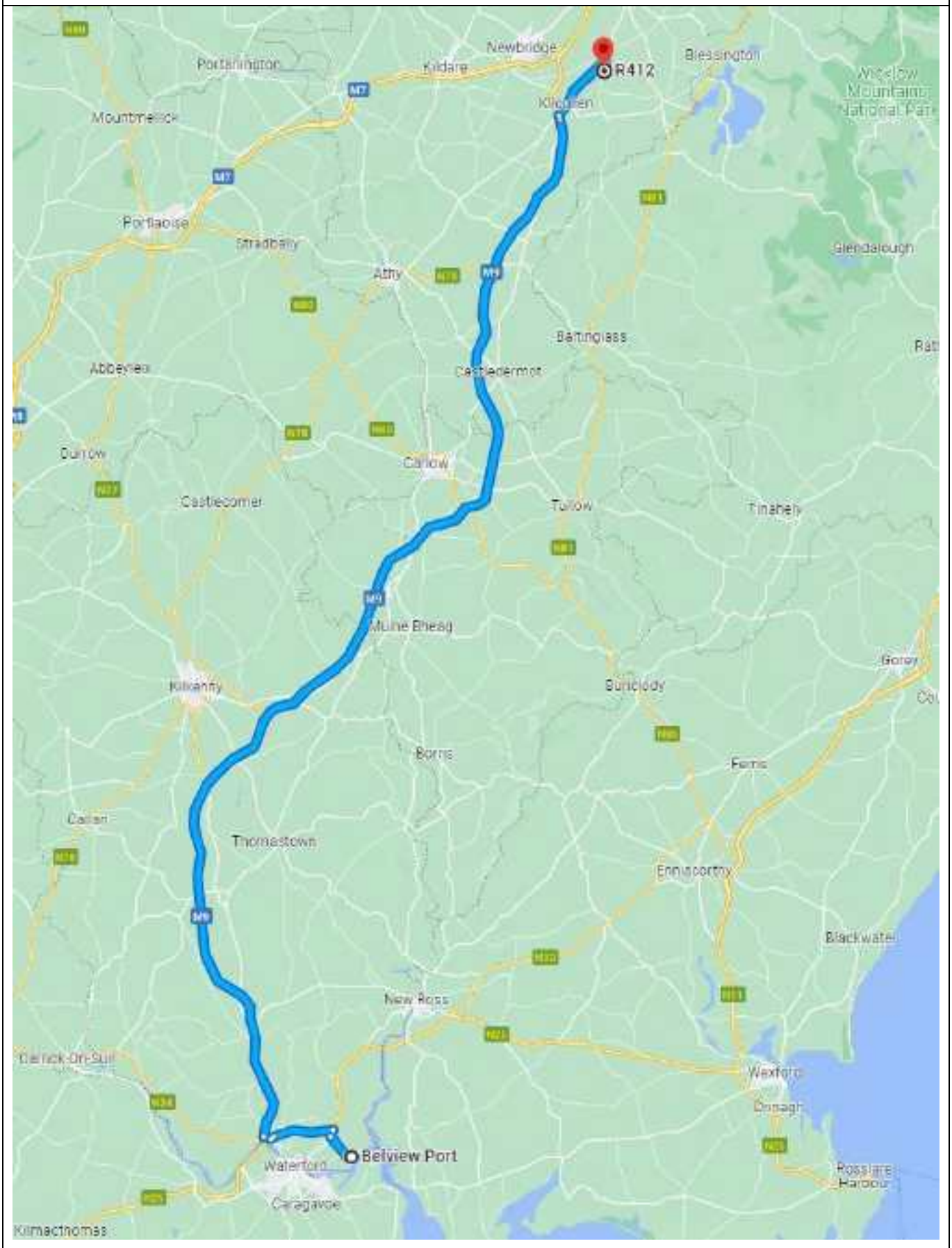
Apendix 1. Dublin Port to Woodlands



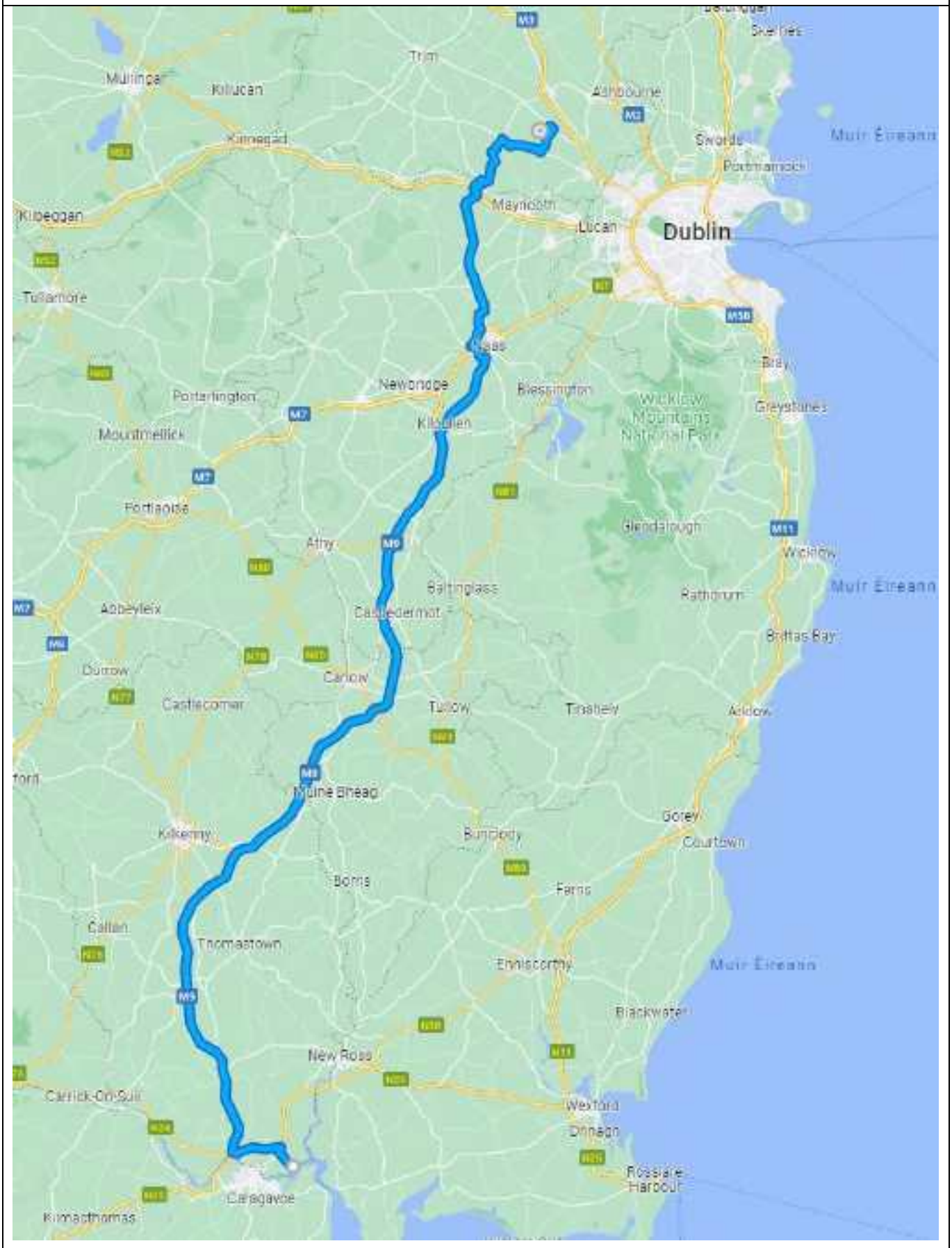
Apendix 2. Dublin Port to Dunnstown



Apendix 3. Belview Port to Dunstown



Apendix 4. Belview Port to Woodlands, via Kilcock



Apendix 5. Belview Port to Woodlands via M50

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A.2 Passing Bay Technical Note

Passing Bay - Construction Space Proofing

Date:	15 November 2022
Project name:	Kildare-Meath Grid Upgrade
Project no:	B321084
Attention:	Fay Lagan
Company:	Jacobs
Prepared by:	Elliot Neale
Reviewed by:	Enda Casey/ Ben Guilbert
Document no:	*[Document number]*
Revision no:	P01
Copies to:	Nigel Edwards/ Rafaela Konstanta

Merrion House
Merrion Road
Dublin 4, D04 R2C5
Ireland
T +353 (0)1 269 5666
F +353 1 269 5497

1. Introduction

1.1 Scope

As part of the CP966 Kildare Meath 400kV Upgrade project, Jacobs are required to provide positions of each jointing bay along the route. As part of the deliverability assessment, the temporary traffic management is considered to ensure the suitability of the design. At each on-road joint bay, where required, a passing bay will be provided to allow public vehicles to pass the worksite.

This technical note details the construction space proofing at the passing bays required during the implementation phase of the project. The technical note draws upon existing industry guidance documentation, issued client drawings and the relevant Jacobs design information. By using existing typical layouts from the relevant standards, combined with route specific parameters, the passing bays can be detailed to provide space proofing diagrams for the construction phase. This is of particular importance, as the client will be required to engage with landowners to agree the permanent and temporary land takes.

As the project develops, the passing bay and temporary traffic management will be required in agreement with the local authority.

1.2 Design information

The assessment of the passing bay is based on the following;

- Cable joint bay design as per PE424-D7001-013-002-000 (Issued by ESB)
- 400kV Cable drum size: 4.3m external diameter, 4.0m barrel length and 35.4t
- Passing bay proposed details 229100428-MMD-00-XX-DR-E-4119 Rev PL1

1.3 Guidance Documentation

This assessment is based on the following guidance documentation:

- Traffic Signs Manual – Chapter 8 – Temporary Traffic Measures and Signs for Roadworks, Department of Transport, Tourism and Sport, August 2019 (Department of Transport, Tourism and Sport, 2019). This is issued by Transport Infrastructure Ireland (TII). This guidance document is referred to as 'TII Chapter 8' within this technical note.
- Guidance for the Control and Management of Traffic at Road Works, Department of Transport, Health and Safety Authority, National Roads Authority and Local Government Management Services Board, second edition 2010 (Department of Transport, Tourism and Sport, 2010)
- Guidelines for Working on Roads, Health and Safety Authority, 2009 (Health and Safety Authority, 2009)
- Jacobs issued Abnormal Load Assessment by Construction Advisory (Issued 3rd November 2022)

1.3.1 Temporary Traffic Management Process

TII Chapter 8 are the base standards that are used as part of the design of the construction space proofing for the passing bays at the joint bay locations. By using existing typical layouts from the standards, combined with route specific parameters, the passing bays will provide space proofing diagrams. Figure 1-1 shows the temporary traffic management (TTM) design process used a part of the passing bay assessment.

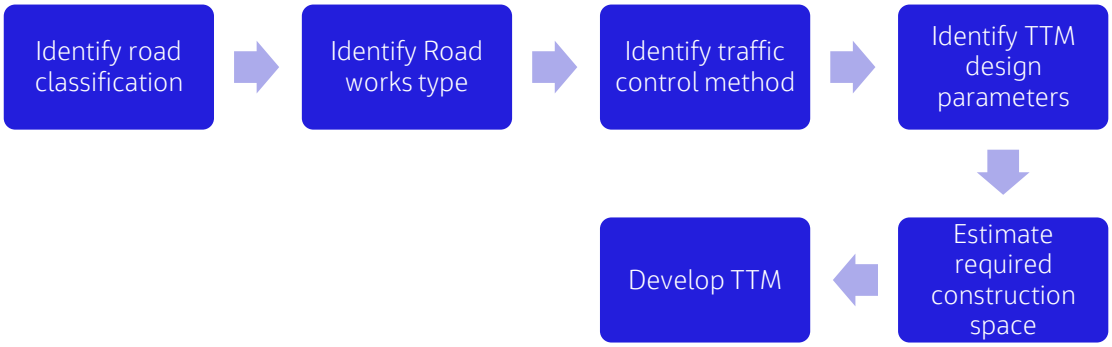

Figure 1-1 TTM Design Process

1.3.1.1 Road Classification

Table 1-1 identifies the road classification dividing them into two levels; main and sub. Identifying the road classification is of particular importance as this defines the temporary traffic management parameters (i.e. extent of space required for the TTM).

The main levels are defined as follows:

- Level 1 – Urban and Low Speed Roads
- Level 2 – Rural Single Carriageway Roads
- Level 3 – Dual Carriageways and Motorways

The project cable alignment is predominantly along Regional, 'r' roads, with a speed limit of 80km/hr. **Table 1-1** identifies the majority of roads as Level 2(i). It is permissible to justify a lower-level classification provided permission from the relevant local authority for a temporary construction speed limit.

Clause 8.2.3.10 states "The speed limit chosen typically should not be more than two speed limit steps below the permanent posted speed limit and should be appropriate to the speed at which a vehicle could drive through the roadworks with reasonable safety". Therefore, in compliance with Clause 8.2.3.10 it is assumed the local authority would approve a reduced speed limit and that the classification of the roads can be reduced to Level 1 (iii).

Table 1-1 Road Classifications (Extract of TII Chapter 8 Table 8.2.1.1)

Level		Carriageway Type	Speed / Speed Limit (km/h)
Main	Sub		
Level 1	i	Single	≤ 30
	ii	Single	40
	iii	Single	50
	iv	Single	60
		Multi-Lane / Dual	≤ 60
Level 2	i	Single	80
	ii	Single	100
Level 3	i	Dual and Motorway	80
	ii	Dual and Motorway	≥ 100

1.3.1.2 Road Works Type

The roadworks types are defined in Figure 1-2. All construction works as part of the project are assumed to require the conditions of that of Static Type A. The defining parameter being the requirement for permanent temporary traffic management where works are expected to be greater duration than 12hours.

TTM Type	Description	Traffic Flow Conditions	Visibility Conditions	Planned Duration
Static Type A	Works requiring full time Temporary Traffic Management (TTM)	All	All	Permitted for any duration but required for durations in excess of 12 hours
Static Type B	Works that normally involve the use of one or two vehicles in the operation. This type of work is typically maintenance and repair type operations, including maintenance of utilities or street furniture.	Unrestricted by either traffic volume or weather conditions	All	Permitted for a duration of up to 12 hours
Static Type C	Works at a discrete location that are of a short duration (excluding signage setup/removal).	Unrestricted by either traffic volume or weather conditions	Good	Permitted for a duration of up to 15 minutes
Semi Static Operation (SSO)	Works where the operations are mobile or making short duration stops continuously along a road where static warning signs are used. SSO is only suitable on Level 1 and 2 roads.	Unrestricted by either traffic volume or weather conditions	Good	Permitted for stop durations of up to 15 minutes
Mobile Lane Closure (MLC)	Works where the operations are mobile or making short duration stops continuously along a road where mobile warning signs and Impact Protection Vehicles (IPV) are used. MLC is only suitable on Level 3 roads.	Unrestricted by either traffic volume or weather conditions	Good	Permitted for stop durations of up to 15 minutes*

Note:
- Particular works may have several phases of TTM which may fall under different TTM types. For example, footway works may require different phases.
- * For MLC the permitted duration may be extended by agreement with the overseeing organisation.

Figure 1-2 TTM Roadworks Types (Extract of TII Chapter 8 Table 8.2.1.2)

1.3.1.3 Traffic control method

Figure 1-3 shows the expected traffic management required for the project. The traffic management utilises temporary traffic controls (i.e. traffic lights), to allow one directional traffic at any given time. The key design parameters are shown within Figure 1-3. These include and are defined as:

- *Cumulative Distance*
    - Distance from the first sign (Roadworks Ahead) to the start of the taper.
- *Taper Length*
    - The required length for the reduction in width of a single lane or hard shoulder.
- *Longitudinal safety zone*
    - Measured from the end of the taper to the start of the works area. It provides a clear area for an errant vehicle to come to a stop before reaching the works area.
- *Lateral Safety Zone*
    - Measured from the trafficked dedge of the cone or barrier to the edge of the works area. This area must be kept free of all operations, stationary vehicles, materials and personnel thus ensuring a clear safe distance back from the edge of the live traffic.
- *Minimum lane width*
    - The minimum width of traffic lane to be maintained at all times for use by the road user. This may vary depending on the characteristics of the traffic being catered for.
    - Clause 8.4.3.2 states "the unobstructed road width which forms the traffic lane for one-way traffic should be an optimum width of 3.3m and maximum lane width of 4.3m.

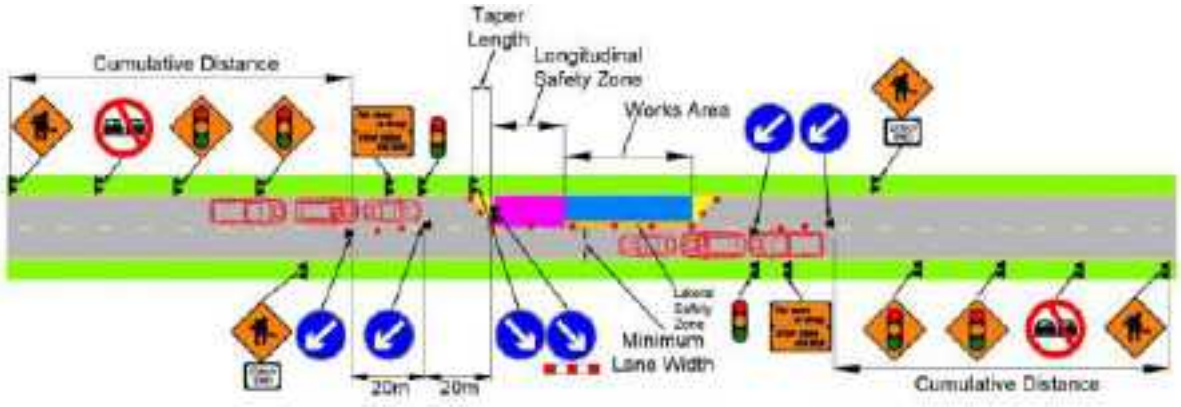

Figure 1-3 Priority Traffic Control (Extract of Figure 8.4.4.3 Chapter 8 TII)

1.3.1.4 TTM Design Parameters

Table 1-2 defines the minimum design parameters using the road classification and road works type. Table 1-2 demonstrates the refinement and reduction in required land take by introducing the construction speed restriction. A temporary construction speed limit would likely be introduced to allow the road to be classified as a Level 1(iii)

Table 1-2 Minimum Design Parameters (Extract Chapter 8 TII of Table 8.2.2.4 and 8.2.2.6)

	Level 1(iii)	Level 2(i)
Cumulative Distance	40m	480m
Lane Taper Rate	1 in 5	1 in 40
Longitudinal Safety Zone	5m	45m
Lateral Safety Zone	0.5m	1.2m

1.3.1.5 Construction Space

With regards to the allowance for the construction space, as per the Abnormal Load Assessment, it is assumed that an adapted low loader trailer with a turntable will be used for the transportation and installation of the cable. It is assumed that a total vehicle length of 15m would be required.

Using the ESB's market engagement as the base case for the cable installation, shown in Figure 1-4. It is assumed that 7m distance is required from edge of drum barrel to edge of pit is required.

The required construction width of 6.4m assumed the joint bay is against the road kerb line. If the joint bay is unable to be positioned against the kerb line, the construction working room will increase and the size of the plan horizontal dimension of the passing bay increased accordingly.

Therefore, the following key input parameters are used as part of the construction space parameters as follows:

- Total construction space ~45m
    - Length of joint bay ~10m
    - Distance from drum to edge of joint bay ~7m
    - Length of delivery vehicle ~15m
    - Access space around the vehicle ~10m (Allowing for lubrication unit, vehicle parking, welfare etc.)
- Construction width min. 6.4m

With regards to the joint bays that are located in the verge or off road, a temporary land take as shown in Section 0 will be implemented. A suitable and stable platform designed to take the axle loadings will be implemented to ensure the safety of the vehicles, site personnel and the public.

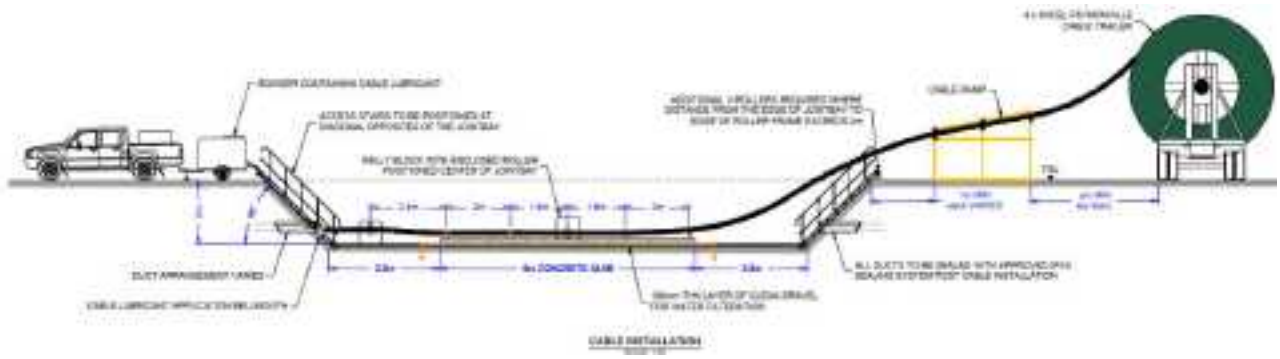

Figure 1-4 Market Engagement Cable Installation Diagram

2. Proposed Design

2.1 On-road Joint Bay (Option 1) – Dual direction cable installation

Figure 2-1 shows the required construction space and associated passing bay if the location is to support cable pulling from both directions. A total of 95m passing bay will be provided to support this solution. Note a 0.5m walking space has been provided around the delivery vehicles to maintain the TII requirements for the lateral and longitudinal safety zone.

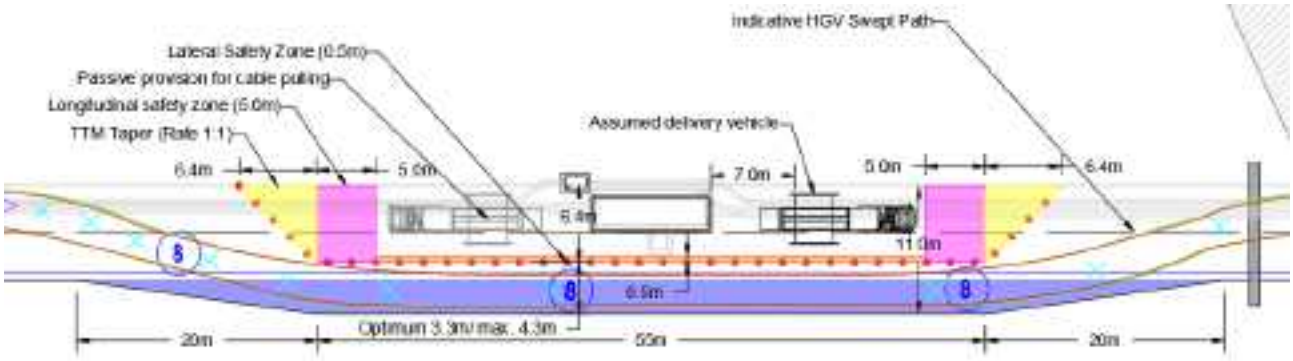

Figure 2-1 On-road joint bay (Option 1)

2.2 On-road Joint Bay (Option 2) – Single direction cable installation

Figure 2-2 shows the required construction space and associated passing bay if the location is to support cable pulling from one direction. A total of 85m will be provided to support this solution. As per the ESB market engagement, provision has been provided for a lubrication and jointing unit on the opposite side of the delivery vehicle.

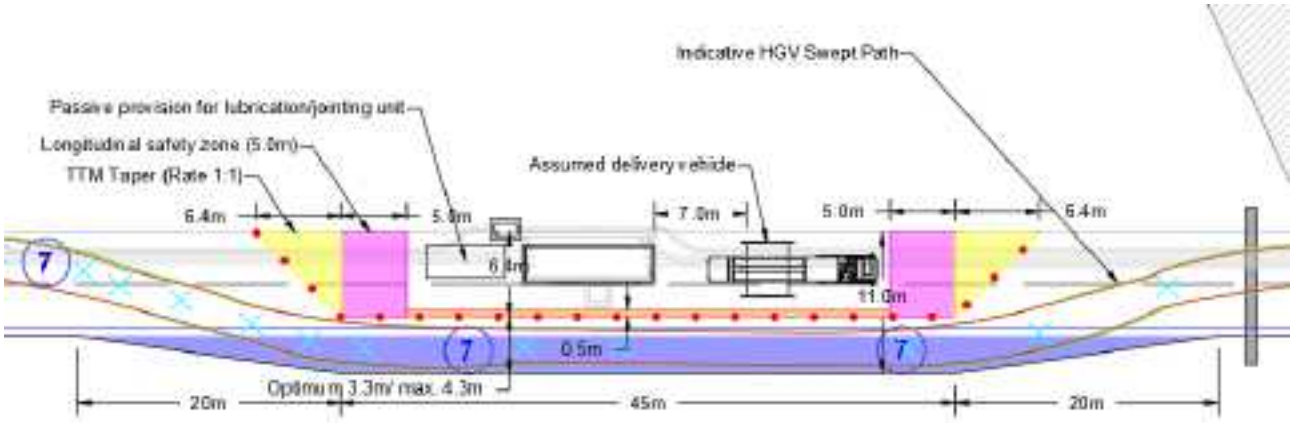

Figure 2-2 On-road joint bay (Option 2)

2.3 All Construction Phases – Off-road

Figure 2-3 shows the required construction passing bay for off-road or 'in-verge' joint bays. To ensure the safety and stability of all construction vehicles, a platform will be provided to be designed and constructed. Without a suitably designed construction platform this could present difficulties installing the cable and further health and safety issues, including vehicles instability, lack of traction, over-turning or utility damage. The proposed passing bay is based on the ESB issued passing bay drawing (229100428-MMD-00-XX-DR-E-4119 Rev PL1).

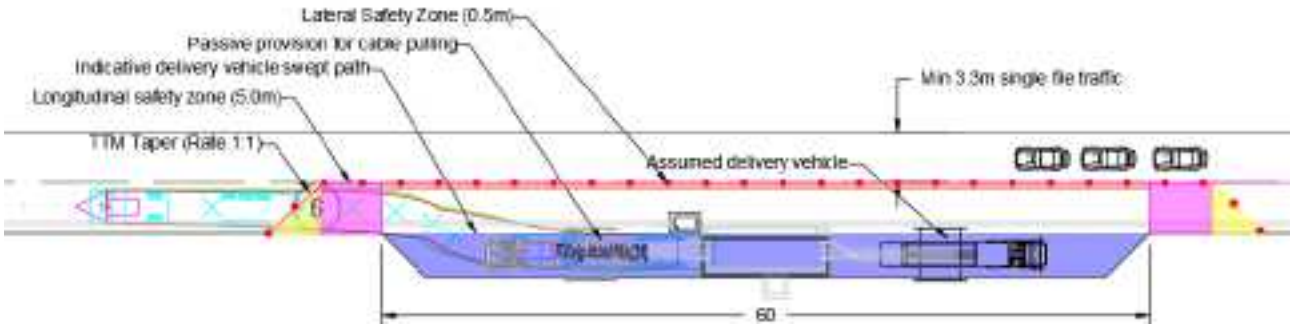

Figure 2-3 Off-road joint bay

3. Summary

Following review of the required passing bay and construction space proofing, the key that will be implemented of the passing bay are as follows:

- Width of the construction works – a minimum of ~6.4m
- Minimum open lane width - 3.3m-4.3m
- Total road width - approximately 11m
- Total passing bay length
    - Single cable pull direction – 85m
    - Dual cable pull direction – 95m
    - In-verge joint bay – 60m

This technical note is to be used to support the design development and planning consenting. It is however subject to review and development by a competent temporary traffic management designer in accordance with the chosen contractors planned construction methodology. This technical note is developed with a series of high-level assumptions and will be subject to review as the design develops. The assessment is based on the presented Proposed Development and current guidance and best practice. The exact methods to be applied will be undertaken in-line with the mitigation measures outlined in the PECR and associated document (e.g. Traffic Management Plan). Any amendments or refinements at the detailed design stage will be agreed with the Local Authorities.

END OF DOCUMENT

Appendix 5.2 Utility Crossings

The following tables identify the crossings of known utility crossings. Please see Chapter 5 of the PECR for further details. Gird Co-ordinates are based on Irish Transverse Mercator. The chainage is relative to the Proposed Development. Further surveys and assessment will be undertaken pre-construction.

Fibre Optics			
X	Y	Chainage	Owner
686672	731032	26662	Aurora
686664	735548	21917	Aurora
686676	735501	21970	Aurora
687589	739121	17401	Aurora
688114	740889	14691	Aurora
687831	720747	41929	ESB

Overhead Lines			
X	Y	Chainage	
691749	745429	5838	110kV OHL
691537	745472	6196	110kV OHL
690587	745997	7444	110kV OHL
690252	745568	7990	220kV OHL
689171	741914	12673	110kV OHL
688794	740902	13883	38kV OHL
686259	737291	20059	220kV OHL
687106	733954	23603	110kV OHL
687244	733188	24392	220kV OHL
684654	728888	29630	220kV OHL
684327	727471	31580	220kV OHL
686483	726326	34401	220kV OHL
688241	724221	37628	110kV OHL
687830	720746	41931	110kV OHL
687955	715153	49652	220kV OHL
687334	712903	52291	220kV OHL

Gas Networks – Medium Pressure		
X	Y	Chainage
685601	727336	32960
688089	718890	44902
688157	719313	44347
688101	718787	45005
688411	718428	45513
684450	727272	31822
688961	717731	46787
688245	718518	45321
688067	718996	44762
687780	720625	42061
688649	718338	45769
687626	740340	15598
688608	716953	47636
688114	718709	45084
689074	718218	46280
688521	721603	40814
689080	718257	46240
688066	719012	44763
689072	718094	46404
687969	720922	41704
689071	718294	46195
688707	717056	47519
688070	719241	44484

Underground Cables			
X	Y	Chainage	Type
690344	745692	7836	Low Voltage Cables
687511	720242	42536	Low Voltage Cables
687578	739318	17197	Low Voltage Cables
687088	734049	23500	Low Voltage Cables
688036	719421	44184	Low Voltage Cables
687836	719530	43955	Low Voltage Cables
688817	717214	47326	Low Voltage Cables
687626	740341	15597	Medium Voltage Cables
686521	738353	18768	Medium Voltage Cables
687725	720492	42205	Medium Voltage Cables
688398	721389	41062	Medium Voltage Cables
689067	718035	46463	Medium Voltage Cables
688099	718801	44991	Medium Voltage Cables
688972	717755	46761	Medium Voltage Cables
688135	718652	45145	Medium Voltage Cables
688406	721403	41045	Medium Voltage Cables
688036	719421	44184	Medium Voltage Cables
688398	721390	41060	Medium Voltage Cables
687899	720853	41803	Medium Voltage Cables
688496	721559	40891	Medium Voltage Cables
688520	721600	40817	Medium Voltage Cables
688402	721396	41054	Medium Voltage Cables
689071	718086	46412	38kV Cables
688892	717470	47058	38kV Cables

Uisce Éireann			
ITM Coordinates	**Trunk/Distribution**	**Material**	**Diameter**
694093mE, 745174mN	Distribution	HDPE	125mm
693894mE, 745196mN	Distribution	HDPE	125mm
693843mE, 745207mN	Distribution	HDPE	125mm
692950mE, 745504mN	Distribution	HDPE	125mm
691720mE, 745363mN	Distribution	HDPE	125mm
691694mE, 745320mN	Distribution	HDPE	125mm
687366mE, 740400mN	Distribution	Ductile Iron	150mm
687342mE, 740401mN	Distribution	UPVC	150mm
687313mE, 740380mN	Trunk	HDPE	250mm
687313mE, 740125mN	Trunk	HDPE	315mm
687591mE, 739126mN	Trunk	Asbestos	406mm
687590mE, 739121mN	Trunk	Asbestos	305mm
686239mE, 738140mN	Distribution	uPVC	150mm
686194mE, 738085mN	Distribution	uPVC	150mm
686108mE, 737891mN	Distribution	uPVC	80mm
686108mE, 737891mN	Distribution	uPVC	150mm
686076mE, 737757mN	Distribution	uPVC	150mm
686095mE, 737575mN	Distribution	uPVC	150mm
686142mE, 737472mN	Distribution	uPVC	150mm
686221mE, 737356mN	Distribution	uPVC	150mm
686266mE, 737279mN	Trunk	Ductile Iron	400mm
686279mE, 737253mN	Trunk	Ductile Iron	400mm
686293mE, 737222mN	Trunk	Ductile Iron	400mm
686323mE, 737144mN	Distribution	uPVC	150mm
686332mE, 736936mN	Distribution	uPVC	150mm
686329mE, 736867mN	Distribution	uPVC	150mm
686363mE, 736551mN	Distribution	uPVC	100mm
686363mE, 736551mN	Distribution	uPVC	150mm
686519mE, 736207mN	Distribution	uPVC	150mm
686538mE, 736154mN	Distribution	uPVC	150mm
686581mE, 735959mN	Distribution	uPVC	150mm
686595mE, 735901mN	Distribution	uPVC	150mm
686610mE, 735831mN	Distribution	uPVC	150mm
686626mE, 735807mN	Distribution	uPVC	100mm
686622mE, 735776mN	Distribution	uPVC	150mm
686667mE, 735553mN	Trunk	Ductile Iron	400mm
686672mE, 735506mN	Distribution	uPVC	150mm
686680mE, 735496mN	Trunk	Ductile Iron	400mm
686691mE, 735482mN	Distribution	uPVC	150mm

Uisce Éireann			
ITM Coordinates	**Trunk/Distribution**	**Material**	**Diameter**
686697mE, 735477mN	Distribution	uPVC	150mm
686708mE, 735419mN	Distribution	uPVC	150mm
686761mE, 735228mN	Distribution	uPVC	150mm
686775mE, 735175mN	Distribution	uPVC	150mm
686943mE, 734528mN	Trunk	Ductile Iron	400mm
686948mE, 734510mN	Trunk	Ductile Iron	400mm
687110mE, 733973mN	Trunk	Ductile Iron	400mm
687127mE, 733918mN	Trunk	Ductile Iron	400mm
687196mE, 733665mN	Distribution	uPVC	250mm
687237mE, 732836mN	Trunk	Ductile Iron	400mm
687098mE, 732349mN	Distribution	uPVC	80mm
687014mE, 732186mN	Trunk	Ductile Iron	400mm
686966mE, 732088mN	Distribution	uPVC	150mm
686959mE, 732072mN	Distribution	uPVC	150mm
686870mE, 731849mN	Distribution	uPVC	150mm
686759mE, 731464mN	Distribution	uPVC	100mm
686683mE, 731043mN	Trunk	Ductile Iron	400mm
686656mE, 731020mN	Distribution	uPVC	100mm
685545mE, 729813mN	Distribution	uPVC	50mm
685374mE, 729637mN	Distribution	uPVC	100mm
683864mE, 728057mN	Distribution	uPVC	75mm
684449mE, 727266mN	Distribution	uPVC	125mm
684537mE, 727270mN	Distribution	uPVC	100mm
685131mE, 727314mN	Distribution	uPVC	100mm
685632mE, 727312mN	Distribution	uPVC	90mm
685648mE, 727262mN	Distribution	uPVC	90mm
685813mE, 726814mN	Distribution	uPVC	25mm
686208mE, 726502mN	Distribution	uPVC	25mm
686843mE, 726097mN	Distribution	uPVC	25mm
687471mE, 725158mN	Distribution	uPVC	50mm
687571mE, 724960mN	Distribution	uPVC	50mm
687617mE, 724935mN	Distribution	uPVC	50mm
688219mE, 722320mN	Pumped Sewer	Asbestos	250mm
688372mE, 721344mN	Gravity Sewer	Unknown	225mm
688365mE, 721332mN	Distribution	Ductile Iron	150mm
688276mE, 721218mN	Distribution	Ductile Iron	200mm
688150mE, 721067mN	Distribution	Ductile Iron	150mm
688107mE, 721033mN	Distribution	Ductile Iron	150mm
687998mE, 720946mN	Distribution	Ductile Iron	300mm

Uisce Éireann			
ITM Coordinates	**Trunk/Distribution**	**Material**	**Diameter**
687973mE, 720926mN	Distribution	Unknown	150mm
687910mE, 720864mN	Distribution	Ductile Iron	150mm
687881mE, 720828mN	Distribution	Ductile Iron	150mm
687832mE, 720748mN	Distribution	Unknown	150mm
687779mE, 720624mN	Distribution	Unknown	150mm
687738mE, 720530mN	Distribution	Ductile Iron	200mm
687460mE, 720190mN	Gravity Sewer	Concrete	225mm
687424mE, 720153mN	Gravity Sewer	Concrete	900mm
687123mE, 719786mN	Distribution	HPPE	225mm
687119mE, 719753mN	Gravity Sewer	Concrete	900mm
687157mE, 719716mN	Trunk	HPPE	355mm
687993mE, 719454mN	Distribution	uPVC	150mm
688007mE, 719446mN	Trunk	HPPE	225mm
688022mE, 719435mN	Trunk	Asbestos	300mm
688054mE, 719411mN	Trunk	Asbestos	300mm
688121mE, 719354mN	Trunk	Asbestos	300mm
688154mE, 719309mN	Gravity Sewer	Concrete	225mm
688071mE, 719182mN	Distribution	uPVC	150mm
688057mE, 719081mN	Gravity Sewer	Concrete	900mm
688064mE, 719030mN	Trunk	HPPE	315mm
688066mE, 719010mN	Pumping Sewer	PE	Unknown
688066mE, 718996mN	Pumping Sewer	Unknown	Unknown
688067mE, 718995mN	Distribution	Cast Iron	125mm
688080mE, 718896mN	Pumping Sewer	PE	150mm
688094mE, 718885mN	Gravity Sewer	Concrete	600mm
688101mE, 718784mN	Distribution	HPPE	160mm
688111mE, 718718mN	Distribution	Ductile Iron	160mm
688341mE, 718475mN	Trunk	HPPE	355mm
688384mE, 718453mN	Trunk	HPPE	355mm
688662mE, 718337mN	Trunk	HPPE	160mm
689057mE, 718300mN	Trunk	HPPE	355mm
689057mE, 718300mN	Gravity Sewer	uPVC	225mm
689065mE, 718297mN	Pumping Sewer	PE	300mm
689079mE, 718278mN	Trunk	HPPE	355mm
689072mE, 718200mN	Gravity Sewer	uPVC	300mm
689073mE, 718127mN	Gravity Sewer	uPVC	225mm
689073mE, 718127mN	Trunk	Asbestos	300mm
689072mE, 718105mN	Gravity Sewer	Concrete	225mm
689072mE, 718089mN	Trunk	Asbestos	300mm

Uisce Éireann			
ITM Coordinates	**Trunk/Distribution**	**Material**	**Diameter**
689040mE, 717910mN	Trunk	Asbestos	300mm
688932mE, 717594mN	Gravity Sewer	uPVC	225mm
688918mE, 717554mN	Distribution	Ductile Iron	200mm
688602mE, 716945mN	Distribution	uPVC	150mm
688252mE, 716519mN	Distribution	uPVC	100mm
688249mE, 716512mN	Distribution	Ductile Iron	150mm
688005mE, 715788mN	Trunk	Asbestos	460mm
688003mE, 715735mN	Trunk	Asbestos	460mm
687870mE, 714475mN	Trunk	Cast Iron	300mm
687448mE, 713502mN	Trunk	Asbestos	460mm
687358mE, 713046mN	Trunk	Asbestos	460mm

Appendix 5.3 Watercourse Crossings

Waterbody Label	Waterbody Name	Chainage	Proposed Crossing	Seasonal Restriction
WB01	Trib of Tolka_020	800	Instream trenching	To be carried out during the period July-September (except in exceptional circumstances and with the agreement of IFI)
WB02	Dunboyne stream_010	1900	Instream trenching	To be carried out during the period July-September (except in exceptional circumstances and with the agreement of IFI)
WB03	Rye Water_030	3615	Diversion from in-road to off-road, by instream trench.	To be carried out during the period July-September (except in exceptional circumstances and with the agreement of IFI)
WB04	Jenkinstown stream_010	6000	Diversion from in-road to off-road, by instream trench.	To be carried out during the period July-September (except in exceptional circumstances and with the agreement of IFI)
WB05	Pond/watercourse	7385	Instream trenching	To be carried out during the period July-September (except in exceptional circumstances and with the agreement of IFI)
WB06	Jenkinstown stream Stream (supplemented by ditches)	8080	Diversion from in-road to off-road, by instream trench.	To be carried out during the period July-September (except in exceptional circumstances and with the agreement of IFI)

Waterbody Label	Waterbody Name	Chainage	Proposed Crossing	Seasonal Restriction
WB07	Jenkinstown stream_010	10700	Diversion from in-road to off-road, by instream trench.	To be carried out during the period July-September (except in exceptional circumstances and with the agreement of IFI)
WB08	Jenkinstown	11180	Diversion from in-road to off-road, by instream trench.	To be carried out during the period July-September (except in exceptional circumstances and with the agreement of IFI)
WB09	N/A	11400	Diversion from in-road to off-road, by instream trench.	To be carried out during the period July-September (except in exceptional circumstances and with the agreement of IFI)
WB10	Rye Water_020 (Brides Stream)	12370	Diversion from in-road to off-road, by instream trench.	To be carried out during the period July-September (except in exceptional circumstances and with the agreement of IFI)
WB11	Newtownmoy Aghy Stream Trib of RYE WATER_020	13650	Not crossed by cable	None
WB12	Rye Water_020 (Padistown)	14400	Diversion from in-road to off-road, by instream trench.	To be carried out during the period July-September (except in exceptional circumstances and with the agreement of IFI)
WB13	Rye Water_010	15050	HDD	None
WB14	Royal Canal	15400	HDD	None

Waterbody Label	Waterbody Name	Chainage	Proposed Crossing	Seasonal Restriction
WB15	Lyreen_010	19920	Affected by passing bay	To be carried out during the period July-September (except in exceptional circumstances and with the agreement of IFI)
WB16	Drainage ditches	20870	Not crossed by cable	None
WB17	Drainage ditches	21250	Diversion from in-road to off-road, by instream trench.	To be carried out during the period July-September (except in exceptional circumstances and with the agreement of IFI)
WB18	Drainage ditches	21300	Diversion from in-road to off-road, by instream trench.	To be carried out during the period July-September (except in exceptional circumstances and with the agreement of IFI)
WB19	Lyreen_010 (Baltracey Trib Lyreen)	21650	Diversion from in-road to off-road, by instream trench.	To be carried out during the period July-September (except in exceptional circumstances and with the agreement of IFI)
WB20	Trib of Liffey_010	22000	HDD	None
WB21	Drainage ditches	22300	Diversion from in-road to off-road, by instream trench.	To be carried out during the period July-September (except in exceptional circumstances and with the agreement of IFI)
WB22	Clonshanbo_010	23620	Diversion from in-road to off-road, by instream trench.	To be carried out during the period July-September (except in exceptional circumstances and with the agreement of IFI)
WB23	Drainage ditches	24150	Not crossed by cable	None

Waterbody Label	Waterbody Name	Chainage	Proposed Crossing	Seasonal Restriction
WB24	Clonshanbo_010	25800	Diversion from in-road to off-road, by instream trench.	To be carried out during the period July-September (except in exceptional circumstances and with the agreement of IFI)
WB25	Kilmurry_010	27300	Diversion from in-road to off-road, by instream trench.	To be carried out during the period July-September (except in exceptional circumstances and with the agreement of IFI)
WB26	Trib of Kilmurry_010	27600	Diversion from in-road to off-road, by instream trench.	To be carried out during the period July-September (except in exceptional circumstances and with the agreement of IFI)
WB27	Liffey_130	30000	Crossed in-road	None
WB28	Trib of Liffey_130	30250	Diversion from in-road to off-road, by instream trench.	To be carried out during the period July-September (except in exceptional circumstances and with the agreement of IFI)
WB29	Liffey_130	30400	Crossed in-road	None
WB30	Trib of SLATE_010	31360	Instream trenching	To be carried out during the period July-September (except in exceptional circumstances and with the agreement of IFI)
WB31	Liffey_130	31360	Not crossed by cable	None
WB32	Longton_Demesne_Trib of Liffey_120	36150	Instream trenching	To be carried out during the period July-September (except in exceptional circumstances and with the agreement of IFI)

Waterbody Label	Waterbody Name	Chainage	Proposed Crossing	Seasonal Restriction
WB33	Drainage ditches	36650	Crossed in-road	None
WB34	Drainage ditches	36900	Instream trenching	To be carried out during the period July-September (except in exceptional circumstances and with the agreement of IFI)
WB35	Liffey_120	37200	HDD	None
WB36	Liffey_120	37900	Crossed by bridge	None
WB37	Liffey_120	39000	Crossed by bridge	None
WB38	Grand Canal	39400	Crossed by bridge	None
WB39	Liffey_110	41510	Crossed in-road	None
WB40	Liffey_110	42300	Crossed in-road	None
WB41	Liffey_110	42900	Crossed in-road	None
WB42	Grand Canal	44600	HDD	None
WB43	LIFFEY_100	45330	Crossed in-road	None
WB44	Drainage ditches	49000	Diversion from in-road to off-road, by instream trench.	To be carried out during the period July-September (except in exceptional circumstances and with the agreement of IFI)
WB45	Dunstown	52700	Instream trenching	To be carried out during the period July-September (except in exceptional circumstances and with the agreement of IFI)
WB46	Trib of Liffey	37600	Not crossed by cable	None

Appendix 5.4 Construction and Environmental Management Plan

Kildare-Meath Grid Upgrade

Construction and Environmental Management Plan (CEMP)

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March 2023

EirGrid

Kildare-Meath Grid Upgrade

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Project Manager: Andrew Power
Author: Caroline Hannan
File Name:

Jacobs Engineering Ireland Limited

Merrion House
Merrion Road
Dublin 4, D04 R2C5
Ireland
T +353 1 269 5666
F +353 1 269 5497
www.jacobs.com

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1. Introduction

1.1 The Purpose of the Construction Environmental Management Plan

This Construction Environmental Management Plan (CEMP) has been prepared to present the approach and application of environmental management and mitigation measures for the construction of the project. It aims to ensure that adverse effects from the construction phase of the project, on the environment and the local communities, are avoided or minimised.

The purpose of this CEMP is to document and describe the main activities that will be undertaken to facilitate the project and to provide a framework of environmental protection measures that will be implemented prior to commencement of and throughout the duration of the construction of the project.

The construction Contractor will be required to update this CEMP with details of the plans and procedures for their specific activities on site, including method statements. Such plans and procedures must adhere to the requirements as delineated in this CEMP representing the minimum standards to which the Contractor must adhere. As such, this CEMP should be understood as being an iterative document that is likely to be subject to further iterations during collaboration between the developer and the Planning Authority, for example on matters of detailed design and/or in response to any relevant Conditions of Approval set by the Consenting Authority.

The project will be undertaken by a Contractor appointed by ESB. The Contractor will be responsible for updating the CEMP for approval by ESB and agreement with the planning authority (in this case, Kildare County Council and Meath County Council), prior to the commencement of works. In the event that planning approval is given, any condition(s) relating to a CEMP which may be attached to such an approval, will be implemented in accordance with the requirements of the condition.

The Contractor's Method Statements will be prepared in accordance with this CEMP. The updated CEMP will set out the detailed approach and methodology which the Contractor will follow in scheduling and undertaking the work. The Method Statements will also incorporate the control measures detailed in the CEMP in addition to specified conditions that may be prescribed in any approval from An Bord Pleanála for the project and measures provided in the Planning and Environmental Considerations Report (PECR) in relation to environmental protection associated with the activities outlined in this CEMP.

1.2 Objectives of the CEMP

The objectives of the CEMP are to:

- Provide a mechanism for ensuring the delivery of mitigation measures to avoid or minimise environmental effects;
- Ensure compliance with legislation and identifying where it will be necessary to obtain authorisation from relevant statutory bodies;
- Provide a framework for compliance auditing and inspection to ensure the agreed environmental aims are being met; and
- Ensure a prompt response to any non-compliance with legislative requirements, including reporting, remediation and any additional mitigation measures required to prevent a recurrence.

The requirements of the CEMP will be implemented in full by the appointed Contractor.

1.3 Compliance with Legislation, Standards and Guidance

There is a broad range of legislation covering the different aspects of environmental protection and requirements for avoidance or mitigation and these are referenced in the PECR for the planning application. These are supported by additional statutory guidance; 'standards', such as Irish Standards or International Standards (ISO); and other 'best practice' guidance, including industry codes of practice. Where applicable, references to specific legislation, standards and guidance are included within each subsequent section of this CEMP.

This CEMP will be kept under review and updated as required as a result of new or amended legislation, standards and guidance subject to approval by the planning authority.

This CEMP summarises the requirements from legislation and Codes of Practice which apply to the works being undertaken. An example non-exhaustive list of such requirements is provided below:

- Safety, Health, and Welfare at Work Act, 2005 (as amended);
- Safety, Health, and Welfare at Work (Construction) Regulations, 2013;
- Safety, Health, and Welfare at Work (General Application) Regulations 2007 (as amended);
- Safety, Health, and Welfare at Work (Confined Spaces) Regulations, 2001;
- European Union (Drinking Water) Regulations 2014;
- European Communities (Surface water) Regulations, 2009 (as amended);
- European Communities (Groundwater) Regulations, 2010 (as amended);
- European Communities (Good Agricultural Practice for Protection of Waters) (Amendment) Regulations, 2011;
- European Communities (Good Agricultural Practice for Protection of Waters) (Amendment) Regulations, 2014;
- Local Government (Water Pollution) Act, 1977 and associated Regulations;
- European Communities (Birds and Natural Habitats) Regulations 2011;
- Wildlife Act 1976 (as amended);
- Best Practice Guidelines on the Preparation of Waste Management Plans for Construction and Demolition Projects (DoEHLG, July 2006);
- Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters (IFI, 2016); and
- CIRIA C648 Control of water pollution from linear construction projects Technical Guidance (CIRIA 2006).

1.4 Supporting Plans

The following reports have been prepared for the Proposed Development and this CEMP should be read in conjunction with these reports:

- Traffic Management Report
- Appropriate Assessment Screening
- Natura Impact Statement;
- Planning and Environmental Considerations Report.
- Construction Resource Waste Management Plan

Table 1.1 lists the plans that will be developed by the Contractor in accordance with the CEMP for each stage of the project to set out in detail the management systems, procedures and approaches that will be implemented during construction to comply with the principles set out in the CEMP.

Table 1.1: Plans to be Prepared by the Appointed Contractor

Plan/Strategy	Description
Environmental Incident Response Plan (EIRP)	A Plan to Establish procedures that could enable personnel to respond to incidents with an integrated multi-departmental effort and in a manner that minimises the possibility of loss and reduces the potential for affecting health, property, and the environment.
Construction Management Plan (CMP)	A detailed construction plan and schedule will be developed for the project to ensure that the construction phasing allows for maximum efficiency while minimising potential for environmental impact.
Safety, Health and Environment (SHE) Plan	Details relevant safety, health and environmental information relating to all construction activities.
Project Environmental Management Plan (PEMP)	Details the environmental mitigation measures that will be implemented during each stage of the construction works and will be in accordance with the CEMP.
Construction Traffic Management Plan (CTMP)	Details the strategy and mitigation measures to be used to limit the impact on existing users of the public highway network.
Dust Management Plan (DMP)	A plan for the management of dust which is likely to arise during the construction phase of the project.
Resource and Waste Management Plan (RWMP)	An action plan for the management of waste which is likely to arise on site during the construction phase of the project.

1.5 Roles and Responsibilities

Establishing roles and responsibilities on site is important to ensure the successful construction of the project, including the implementation of the CEMP. The responsibilities of the personnel who will be responsible for implementing, monitoring, responding to, and updating the CEMP are described in Table 1.2.

1.5.1 Project Supervisor for the Construction Stage

A Project Supervisor for the Construction Stage (PSCS) will be appointed for the Proposed Development when Contractors are appointed to carry out the works. The PSCS will be responsible for developing the construction stage Safety and Health Plan, coordinating the works of Contractors and providing the Project Supervisor Design Process (PSDP) with information required in the Safety File. Upon their appointment, the ESB appointed Contractor will be appointed to the role of PSDP and will take on the role of PSCS

1.5.2 Project Supervisor Design Process

ESB or an ESB appointed Contractor or Designer will be PSDP for the detailed design phase of this project. The PSDP ensures coordination of the work of designers throughout the Proposed Development. This is to ensure they are addressing and coordinating safety and health matters from the very early stages of the Proposed Development.

Table 1.2: Responsibilities of the Likely Environmental Project Construction Team

Role	Responsibility
Senior Project Manager	• Overall responsibility for ensuring conformance with the CEMP; and incident investigation.
Project Supervisor	• Overseeing construction phase health and safety; • Ensuring that all staff, site visitors and delivery drivers receive a relevant project induction as appropriate; • Instigate an investigation into any incident.
EirGrid	• Undertakes a Client Engineering function, including technical oversight of construction in regular liaison with Electricity Supply Board (ESB) Networks. • EirGrid Agricultural Liaison Officers (ALO) and Community Liaison Officers (CLO) will liaise with the landowner and local residents.
ESB Engineering and Major Projects (ESB EMP)	• Project leader for construction of the development will implement a scope of work agreed with EirGrid including environmental mitigation measures. • Discharges the conditions of planning permission, including preparation of any details to be submitted to, and agreed with the planning authorities prior to commencement of the proposed Works. • Appoints Contractor(s) to undertake the construction of the Proposed Development, with the scope of the contract including preparation of the detailed site-level CEMP and associated method statements. The site-level CEMP and method statements will be approved by the ESB and the Project Ecologist prior to the commencement of any works. • Responsible for appointment of a suitably qualified Project Ecologist to ensure that all environmental and ecological mitigation measures detailed in the appointed Contractor site-level CEMP and any associated method statements are implemented in full, as well as on-site monitoring and reporting. • Monitor the Construction Phase of the Proposed Development and ensure works are being carried out in accordance with the

Role	Responsibility
	agreed appointed Contractor's method statement(s), and safety procedures etc. • Technical and Environmental consultants to ESB Networks. Responsible for the provision of methodologies to the appointed Contractor. • Environmental oversight of construction, in liaison with the Project Ecologist, who will liaise with relevant statutory agencies such as the National Parks and Wildlife Service (NPWS), Inland Fisheries Ireland (IFI), Kildare County Council, Meath County Council, and other relevant statutory bodies, as required.
Safety, Health, Environment, Security and Quality (SHESQ) Manager	• Reviewing risk assessments and method statements (RAMS); • Manager of the Safety, Health and Environment (SHE) Plan; • Reviewing, updating and issuing the CEMP; • Incident investigation; • Liaison with the emergency services; • Site inspection; • Reviewing applications for environmental consents and permits; and • Sensible monitoring.
Project Environmental Manager Or Environmental Clerk of Works (EnCoW)	• Site inspection; • Producing and maintaining Consents Register; • Preparing and submitting applications for environmental consents and permits; • Liaison with third parties and licensing authorities; • Organising environmental surveys and monitoring; and • Discharging consent conditions
Waste Manager	• Responsible for the Waste Management Plan; • Ensure objectives and measures contained within this CEMP are transposed and implemented including associated target re-use / recycling rates; • Facilitate effective communication of the waste management objectives with all operatives associated with the project; and • Maintain accurate records on the quantities of waste / surplus materials generated and the cost associated with waste generation and management.
Emergency Response Team	• responsible for coordinating and implementing the Environmental Incident Response Plan. • This team should be trained in emergency response procedures and familiar with the specific environmental risks and hazards associated with the construction project; and • A Lead member of this team should be appointed to be responsible for the management, communications, and reporting during an emergency incident.
Community Liaison Team	• The Contractor will appoint a team, who will be expected to interface with ESB and EirGrid's Community Liaison Team to ensure the successful delivery of the project in so far as communities are concerned.

1.6 Contractor

An appropriate Contractor will be appointed for the project by ESB and will be required to implement the CEMP in full. The Contractor will be responsible for updating and implementing the CEMP through contractual agreements with ESB.

For each work element, the Contractor will prepare the management plans as detailed in Table 1.1. The Contractor will also have consideration of safety, health and environmental management as outlined within this CEMP.

Environmental issues that arise during the construction of the project will be reviewed at the inaugural and subsequent regular meetings held by the Contractor. Daily toolbox talks will be held by the Contractor to inform the construction staff and Subcontractors of any environmental issues and any changes to the CEMP.

EirGrid, ESB, and the Contractor will ensure that all staff and Subcontractors are trained and competent in the management of environmental impacts to a level that is appropriate to their role.

The Contractor's Project Environmental Manager or Environmental Clerk of Works (EnCoW) will have suitable environmental qualifications. The EnCoW will have the necessary experience and knowledge appropriate to the role (including experience of Horizontal Directional Drilling (HDD) and will be a member of a relevant professional body, such as the Institute of Environmental Management and Assessment (IEMA)). The suitability of qualifications/ experience of proposed EnCoW will be confirmed by a senior/ principal environmental / ecologist person from the employer's representative. The EnCoW will be delegated sufficient powers under the construction contract so that they will be able to instruct the Contractor and any Subcontractors to stop works and to direct the carrying out of emergency mitigation / clean-up operations. The EnCoW will also manage consultation with environmental bodies including the National Parks and Wildlife Service (NPWS) and Inland Fisheries Ireland (IFI).

1.7 Structure of the CEMP

The remainder of this CEMP is split into two sections:

Section 2 describes the general principles that will be adopted on the construction site. The general principles cover the following elements:

- Health and safety;
- Construction hours;
- Construction arrangements;
- Site layout and appearance;
- Fencing and other means of enclosure;
- Welfare;
- Pest control and Invasive Species;
- Utility works;
- Reinstatement;

- Consents and licenses; and
- Public Engagement and Communications.

Section 3 describes the mitigation measures that will be adopted during the construction of the project. The mitigation measures that will be implemented to reduce risk on the following environmental aspects:

- Cultural Heritage;
- Biodiversity;
- Landscape and Visual;
- Population and Human Health (including Air Quality and Noise and Vibration);
- Traffic and Transport;
- Material Assets;
- Soils, Geology and Hydrogeology;
- Water; and
- Agriculture.

2. General Site Operations

2.1 Construction Programme

Subject to the grant of statutory approvals, it is anticipated that the construction phase will commence in Quarter 2, 2025 with the underground cable element of the Proposed Development becoming fully operational after construction and testing in Quarter 3, 2028.

The works at the Woodland Substation are expected to last approximately 24 months while the works at Dunstown Substation are expected anticipated to last approximately 12 months and will run concurrently with the cabling works.

Construction activities will gradually phase out from pre-construction commence in 2025 (subject to predominantly civil activities followed by commissioning and testing. a grant of planning consent).

In general, it is anticipated that construction will occur during normal working hours i.e. Monday to Friday 7 am to 7 pm and Saturday from 7 am to 2 pm. There may be localised instances, where night-time working is required to facilitate traffic management, however, should working outside these hours / days be required they will only be undertaken with prior agreement with Meath and Kildare County Councils.

Clearance of hedgerow, treeline or scrub vegetation, where required, will take place after 31 August and before 1 March in order to protect breeding birds, (i.e. outside of the bird breeding season). Clearance may take place during the restricted period, if a suitably qualified ecologist has determined that nesting birds and other protected species are absent. Enabling works have been provisionally indicated in Q1 2025 if required to allow for habitat clearance outside of the breeding season. This would increase the construction period to 45 months if it is required.

Any element of the scheme requiring instream works in watercourses with fisheries value will be restricted to the fisheries open season (i.e. will only take place during the period July to September), unless with the agreement of IFI.

Indicative durations for the proposed works are detailed in Table 5.5. Subject to the grant of consents, it is anticipated that installation of the underground cable will take approximately 42 months in total. Safety requirements for the installation operations / procedures, detailed design considerations and weather condition will however ultimately dictate the final programme.

The majority of the construction activities are not dependent on outages on the existing transmission system, however, specific activities associated with the connection at the existing Woodland and Dunstown substations on to the existing transmission infrastructure will be planned and programmed into EirGrid's multi-year outage programme. This is because the existing live infrastructure needs to be switched off during such connection activities. EirGrid, as Transmission System Operator, develops a detailed plan for such outages each year to ensure the undertaking of the safe and efficient construction and maintenance activities involving or in proximity to existing infrastructure.

Table 2.1 Indicative Preliminary Construction Programme

Description	Est. Construction Programme (Months)	2025				2026				2027				2028			
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Proposed Development - Construction Duration																	
Overall Construction Duration	42																
Enabling Works	1 or 2 months*																
Phase 1: Installation of joint bay and passing bays structures	36																
Phase 2: Excavation and Installation of cable ducts	24																
Phase 3: Installation and Jointing of Cables	21																
Substation works	24																
Testing & Commissioning	9																
Energisation and permanent works construction complete	3																

*Enabling works have been provisionally indicated in Q1 2025 if required to allow for habitat clearance outside of the nesting season.

2.2 Health and Safety

EirGrid and ESB are committed to ensuring the health and safety of persons working on projects and the protection of the environment is maintained in accordance with the Safety, Health and Welfare at Work (Construction) Regulations 2013 (as amended) and the principles and philosophy behind them.

In accordance with these regulations, the Safety, Health, Environment, Security and Quality (SHESQ) Manager will prepare a Construction Phase Safety and Health Plan prior to construction works commencing (see Table 1.1 above). The Plan will ensure that adequate arrangements and welfare facilities are in place to cover:

- The safety of construction staff;
- The safety of all other people working at or visiting the construction site;
- The protection of the public in the vicinity of the construction site;
- Compliance with all Safety, Health, and Welfare legislation listed in Section 1.4, any other relevant legislation, and guidance documents;
- Emergency procedures being defined and adopted;
- Appropriate training and information being provided to personnel;
- The Plan will be reviewed and approved by ESB or their representatives prior to construction commencing. It will be managed and implemented by the Project Supervisor; and
- All staff, site visitors and delivery drivers will receive a relevant project induction by the Project Supervisor, as appropriate, to ensure they are aware of site hazards and health, safety and environmental management requirements. Site staff will be briefed daily prior to work commencing.

2.3 Construction Hours

The typical working hours during the construction phase will be as set out below.

The Contractor will undertake construction works between the following hours:

- Monday to Friday: 07:00-19:00;
- Saturday: 07:00-14:00; and
- Sunday, Bank Holiday or Night time: No construction works to be programmed without prior agreement of planning authority

Sunday and night-time working will not normally be required but may be required for specific works; traffic management reasons, requirement to use certain utility outages; or for other reasons. Where there are instances, that night-time working is required they will only be undertaken with prior agreement with the planning authorities, in this instance Meath County Council and Kildare County Council and with appropriate engagement with any impacted stakeholders such as adjoining residents.

2.4 Construction Arrangements

Crew sizes for the construction of the cable trench, ducts, and the installation of the underground cable is estimated at approximately 10 persons per crew with three crews (teams) working simultaneously (there could be more crews undertaking tasks other than trench work at the same time - all details will be confirmed pre-construction with the Local Authorities). Additionally, it is estimated that there will be approximately up to five traffic management operatives with each crew. The project offices located at the temporary construction compounds will also have approximately 10 staff (engineers, project managers etc.) working at locations along the cable route.

A detailed construction plan and schedule will be developed for the project to ensure that the construction phasing allows for maximum efficiency while minimising potential for environmental impact.

2.5 Construction Site Layout and Appearance including Construction Compounds and Working Areas

The layout, appearance and operation of the construction site, site offices and compounds will be detailed prior to construction commencing and will comply with the commitments in this CEMP.

The compounds will facilitate enabling works, site clearance, materials storage, welfare, structure installation and road surfacing. The setups as a minimum will consist of:

- Site offices;
- Welfare facilities and Changing facilities;
- Suitable parking for site vehicles;
- Secure storage areas and Delivery areas;
- Material lay down area / inspection area; and
- Plant storage and refuelling zones.

In particular, the layout, appearance and operation of the construction site, site offices and compounds will be managed as follows:

- All working areas will be kept in a clean and tidy condition;
- Smoking areas at site offices, compounds and construction sites will be equipped with containers for smoking waste and will not be located at the boundary of working areas or adjacent to neighbouring land;
- All necessary measures will be taken to minimise the risk of fire;
- Workers will always maintain a reasonable and appropriate standard of dress and will not use foul language or display lewd or derogatory behaviour;
- Appropriate measures, such as use of enclosed containers, will be employed to store waste susceptible to spreading by wind or liable to cause litter;

- Fencing and other means of enclosure will be inspected daily, repaired and repainted as necessary;
- Adequate welfare facilities will be provided for all construction staff. All toilets will be serviced and kept clean;
- Good personal hygiene will be promoted by the Contractor for the workforce, particularly when using site canteens or mess facilities;
- Site accesses, accesses to site compounds and roads in the vicinity of site access points will be maintained and kept clean as required;
- Commitments relating to dust, odours and air pollution (see section 3.4.1);
- Commitments relating to noise and vibration (See section 3.4.2);
- Commitments relating to the handling, storage and disposal of materials (see section 3.6) ; and
- A 'wheel washing' station at each site will be established as best practice to avoid unnecessarily soiling the local roads with mud/detritus from the site vehicles. Also, daily road cleaning may be required.

2.6 Fencing and Other Means of Enclosure

The following measures will be implemented:

- Working areas will be appropriately fenced from members of the public and to prevent animals from straying onto a working area; and
- Fencing and other means of enclosure will be inspected daily, repaired and repainted as necessary. Any temporary fencing will be removed as soon as reasonably practicable after completion of the works. On completion of the works, any permanent fencing required to denote the Plant will be constructed in accordance with EirGrid Site Security standards.

2.7 Welfare

No living accommodation will be required on the construction site. Onsite welfare facilities will be provided for all site workers and visitors. Welfare facilities will be kept clean and tidy. Wastewater from welfare facilities will be provided and managed by the Contractor.

2.8 Pest Control and Invasive Species

The risk of infestation by pests or vermin will be reduced by implementing appropriate storage and regular collection of putrescible waste (waste that can rot). If infestation is found, removal and prevention measures will be implemented promptly. Any pest infestation of the construction site will be notified to the local authority as soon as is practicable.

Best Practice as outlined in the TII (2010) Guidelines on The Management of Noxious Weeds and Non-Native Invasive Plant Species on National Roads[1] will be followed. While the project is not a road

[1] https://www.tii.ie/technical-services/environment/construction/Management-of-Noxious-Weeds-and-Non-Native-Invasive-Plant-Species-on-National-Road-Schemes.pdf

scheme, there guidance is considered to be the best available guidance. Please see section 3.2 of the CEMP for further details on invasive species.

2.9 Utility Works

Appropriate schedules will be provided by ESB to the Contractor identifying all known utility infrastructure and any proposed diversions.

2.10 Reinstatement

Following the completion of the construction works for the project, temporary works (including the construction compounds, passing bays, and other temporary works) will be removed from the site. The ground will be returned to the original condition following their removal.

The following enhancement measures will be incorporated into the project:

- Unless otherwise agreed with the Client's Representative and the local authority, the Contractor will re-instate hedgerows, and treelines, to a species-rich condition (i.e. five woody species per 30 m), comprising only native species; and

- All other sites will be returned as close as possible to their pre-existing condition, using the same woody species removed, or similar verge seed mixes, under the supervision and direction of the Contractor's EnCoW.

2.11 Approvals, Consents and Licences

A Consents Register will be maintained by the Project Environmental Manager which will document all existing approvals, consent and licences and their respective conditions, record all new applications for any approval, consent and/or licence made and the status of the applications.

2.12 Public Engagement and Communications

Communication with the public and other stakeholders aim to ensure awareness of the project and to share information. The Contractor will share important information with the public and other stakeholders. The communication strategy will include:

- List of environmental stakeholders;
- Road users – the Contractor will ensure that traffic disruption is minimised during construction;
- Local population – the Contractor will provide the local population and other stakeholders with advance notice of works in the area;
- Method and frequency of communication – this can include personal contact, letter drops, emails, telephone, meetings/presentations; and
- Details of key contacts – Employer, Site Manager, Contractor's EnCoW.

Details of the consultation register – a record will be maintained of all third-party communication and consultation. This includes consultation with statutory and non-statutory organisations, and members of the public.

The Contractor's Community Liaison Team will interface with ESB and EirGrid's Community Liaison Team to ensure the successful delivery of the project in so far as communities are concerned. The Liaison Team will liaise with the local community so that the community has a direct point of contact within the Contractor organisation who they can contact for information purposes or to discuss matters pertaining to the Proposed Development.

The Liaison Team will attend all community forum meetings for the Proposed Development and will provide an email and mobile number for all queries and complaints to be addressed. These contact details will be made available to all affected landowners, residents living adjacent to the Proposed Development, and to key stakeholders. All emails and telephone calls will be responded to within two working day, unless in exceptional circumstances. All communications will be logged in a General Data Protection Regulation (GDPR) compliant matter and shared with ESB on a regular basis and on request. The liaison officer will provide the nature of the compliant to the Project Supervisor and Senior Project Manager; a resolution will be agreed and actioned; and then communicated back to the person that made contact.

A project website, email address, and telephone number will be made available to the public so that members of the public can be kept informed of traffic management, and to provide a point of contact for information on the project, to a place to ask queries and provide feedback. Other measures such as social media will be considered as required. The website will provide weekly updates on the project and will be kept "live" so that current information on traffic management is always available.

3. Environmental Management and Construction Principles

In order to minimise the impacts of the construction works on the surrounding environment, the Contractor will ensure compliance with environmental legislation and planning requirements (Planning and Environmental Considerations Report, Environmental Impact Assessment (EIA) Screening Report, Appropriate Assessment Screening Report, Natura Impact Statement and Planning Conditions). A review of the key environmental risks associated with the construction of the development has been undertaken.

Required environmental measures are laid out under the following headings:

- Cultural Heritage;
- Biodiversity;
- Landscape and Visual;
- Population and Human Health (including Air Quality and Noise and Vibration);
- Traffic and Transport;
- Material Assets;
- Soils, Geology and Hydrogeology;
- Water; and
- Agriculture.

3.1 Cultural Heritage

Archaeological investigations will be implemented post-consent and pre-construction in all off-road sections required for construction, including land required for access tracks, passing bays and joint bays, and HDD and construction compounds to inform the design of mitigation. This will comprise archaeological geophysical survey, archaeological test excavation, palaeoenvironmental assessment, and underwater assessment to inform the design of archaeological excavation and further underwater surveys.

Mitigation measures for known archaeology, architectural heritage and cultural heritage that will be undertaken post-consent but in advance of construction comprise the following:

- Measured survey of upstanding cultural heritage constraints directly impacted by the Proposed Development (LI_015, LI_027, LI_032, LI_042, LI_065, LI_134, and LI_158);
- A photographic and written record of the elements of GDLs (DL_14, DL_15, and DL_17) impacted by the Proposed Development will be undertaken in advance of construction;
- Written and photographic survey will be undertaken for CH_106 prior to its removal. Following construction in this location, the boundary stone will be reinstated in the same location;
- Townland boundary surveys comprising detailed written and photographic survey, and test trenching through boundaries will be undertaken for townland boundaries that will be directly

impacted by construction of the Proposed Development (TB_01, TB_03, TB_08, TB_09, TB_10, TB_12, TB_13, TB_25, and TB_61);

- Archaeological excavation informed by archaeological geophysical survey and archaeological test excavation will be undertaken for 42 constraints (AY_13, AY_51, CH_60, CH_64, CH_66, CH_68, CH_69, CH_74, CH_81, CH_92, CH_94, CH_100, CH_117, CH_118, CH_119, CH_120, CH_121, CH_122 LI_001, LI_006, LI_009, LI_011, LI_015, LI_017, LI_026, LI_027, LI_032, LI_038, LI_042, LI_056, LI_065, LI_092, LI_096, LI_101, LI_113, LI_119, LI_125, LI_134, LI_143, LI_145, LI_156 and LI_158);

- Archaeological wade survey or underwater assessments will be undertaken at the following unmodified watercourses which will be crossed via in-stream trenching:

    - WB01 (tributary of the River Tolka);
    - WB02 (Dunboyne Stream);
    - WB06 (Jenkinstown Stream);
    - WB09 (unnamed stream);
    - WB22 (Baltracey River);
    - WB25 (Gollymochy River).

- Archaeological metal detecting survey will be undertaken of the banks of the remaining watercourses (comprising modified stream and drainage ditches; see Table 13.3) where in-stream trenching is required (WB03, WB04, WB05, WB07, WB08, WB10, WB12, WB17, WB18, WB19, WB21, WB24, WB26, WB28, WB30, WB32, WB34, WB44 and WB45).

The Contractor will be contractually required to allow sufficient time in their programme to allow the mitigation required in advance of construction to be completed.

All mitigation will be carried out by a suitably qualified archaeologist under Licence (where required) granted by the Minister for Housing, Local Government and Heritage and in accordance with the provisions of the National Monuments Acts 1930–2004.

Written reports on the results of all mitigation undertaken will be prepared in accordance with the requirements of the Licence(s) granted by the National Monuments Service.

During construction, the following mitigation will be undertaken:

- archaeological monitoring of on-road work within the Zones of Notification of Recorded Monuments (AY_02, AY_24, AY_26, and AY_58); and

- roadside architectural heritage and cultural heritage features (AH_01, AH_11, AH_12, CH_03, CH_04, CH_06, CH_07, CH_24 and CH_109) and clearly demarcated with temporary fencing to avoid accidental damage and preserve in situ.

If archaeological remains are identified during the archaeological monitoring, and preservation in situ is not feasible, archaeological excavation will be undertaken under an excavation licence granted by the Minister for Housing, Local Government and Heritage and in accordance with the provisions of the National Monuments Acts 1930–2004.

Mitigation will be undertaken in line with the *Code of Practice between the Department of the Environment, Heritage and Local Government and EirGrid* (Department of the Environment, Heritage and Local Government and EirGrid, 2009).

3.2 Biodiversity

3.2.1 Ecological Clerk of Works

An on-site Ecological Clerk of Works (ECoW) will be appointed by the Contractor to carry out pre-construction surveys (see below) to ensure that the baseline is current and, where required, will implement appropriate mitigation measures as needed. The ECoW will be on site for any works deemed sensitive, i.e. within or near protected European sites or watercourses linked to such sites. Where sensitive habitats or species could be impacted, the ECoW will be on site to implement all mitigation measures as described below. The ECoW will have demonstrate experience and will be a member of a professional body such as CIEEM or similar.

3.2.1.1 Pre-construction Surveys

In advance of enabling works, the Contractor's ECoW will complete pre-construction confirmatory surveys of selected ecological features whose distribution is dynamic over time, and which are known to have potential to occur within the ZoI of the PAB. Any of the small number of areas that could not be surveyed during baseline data collection will also be surveyed at this time. These surveys will update the findings of the surveys completed between October 2021 and October 2022 (survey dates as detailed in Table 10.1), and include the following:

- Bat trees previously identified as having roosting potential and within the ZoI;
- Otter breeding/resting sites within the ZoI of the PAB (minimum 50 m, up to150 m at HDD sites, where access allows; noting that guidance recommends 20 m for non-breeding sites);
- Badger setts within the ZoI of the PAB (minimum 50 m, up to 150 m at HDD locations where access allows);
- Squirrel (grey and red), where dreys are identified within trees to be felled within the PAB;
- Amphibians and reptiles: a pre-construction survey will be undertaken by the ECoW of previously identified area suitable to host these species: reptile habitat (dry calcareous grassland, dry meadows and grassy verges and recolonising bare ground) and of amphibian habitat (drainage ditches, wet grassland and reed and sedge swamps) within the PAB. A suitable safe receptor site will be pre-identified, and if amphibians or reptiles are found the ECoW will translocate animals if necessary to the suitable receptor habitat; and
- Invasive species within the PAB.

Bat surveys will be carried out in accordance with guidance from Marnell *et al*. (2022) and NRA (2006a). Surveys may comprise inspection of roost features at height using a mobile elevating work platform and will be carried out by a licensed bat worker where appropriate.

All surveys will be undertaken by suitably qualified ecologists with demonstrable experience in the survey and assessment of the feature.

3.2.1.2 Reporting

The results of pre-construction confirmatory surveys will inform the refinement of mitigation measures (if required) in the Contractor's method statements, and all results will be incorporated into the Contractor's constraint mapping.

Survey reporting and mapping will be provided to the Developer's Ecologist (ESB), EirGrid's Planning and Environmental Unit (PEU) within the Chief Infrastructure Office, and to any prescribed bodies as additionally required by any planning conditions.

3.2.2 Construction Phase

3.2.2.1 Site-Wide Mitigation Measures

A number of site-wide mitigation measures will be applied across the Proposed Development to avoid the impacts associated with pollution of watercourses and impacts to small mammal species, amphibians and breeding bird species. In addition to this, there are mitigation measures specific to the various Proposed Development elements.

The contractor's ECoW will give toolbox talks to all site personnel to highlight any environmental sensitivities and the boundaries of sensitive habitats. Toolbox talks will include findings of pre-construction surveys on baseline changes and any adaptive mitigation measures required. During sensitive works, e.g. in-stream works, the contractor's ECoW will supervise the works and propose adaptive mitigation measures in response to, for instance, extreme weather events (amber and red Met Eireann weather warnings) or new mitigation requirements arising from pre-construction surveys. Method statements in relation to trenched crossings will be agreed with IFI prior to the start of works. No sensitive works will be permitted without the prior approval of the ECoW.

1. Pollution Control

The measures set out below will be implemented to ensure that there will be no pollution of surface water during the construction phase of the Proposed Development. The measures will be incorporated into the contractor's CEMP and developed in accordance with the following guidance documents and legislation:

- CIRIA C532 Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors (Masters-Williams *et al.*, 2001);
- CIRIA C648 Control of Water Pollution from Linear Construction Projects: Technical Guide (Murnane *et al.*, 2006a);
- CIRIA C649 Control of Water Pollution from Linear Construction Projects: Site Guide (Murnane *et al.*, 2006b);
- CIRIA C692 Environmental Good Practice on Site (Audus *et al.*, 2010);
- Guidelines for the Crossing of Watercourses during the Construction of National Road Schemes (NRA, 2005).

Mitigation measures with respect to accidental pollution are focused on prevention, safeguarding the approach to the storage and handling of materials, and managing vehicles during the temporary construction phase.

2. Control of Silt-Laden Runoff

Specific measures to control silt will be implemented at each of the Proposed Development infrastructure sites. Surface water run-off at the construction sites will be managed to prevent silt-laden surface water flowing into surface water receptors:

- The contractor will ensure no deleterious discharges are released from construction sites to the nearby waterbodies during construction. If a discharge to a watercourse is necessary, the water will pass through a swale or silt buster prior to discharge. Levels of suspended solids in any discharge will be no greater than 25 mg/l as per IFI guidance (2016), and flows will be controlled to levels appropriate to the receiving water. It is possible that such a discharge may require a licence under the Water Pollution Acts 1977 & 1990, as amended, and the Arterial Drainage Act 1945 & 1995, as amended. The Contractor will liaise with the regulatory authorities at an early stage to determine the need for licences and include the appropriate application time required in any construction programme;

- Silt fences will be erected along the boundary of water bodies to prevent any silt-laden run-off from impermeable surfaces, temporary or permanent, as well as spoil heaps within the construction working width;

    - double silt fencing will also be applied to areas where concrete pouring is to be undertaken and where there is a risk to European designated sites;

    - silt fences will be installed downgradient of the potential source of the silt/sediment;

    - the silt curtain will contain the area where silted waters are being generated and will terminate on high ground;

    - they will be constructed using permeable filter fabric (Hy-Tex Terrastop silt fence or similar) rather than a mesh material;

    - its base will be embedded at least 15 cm into the ground and staked at 2 m intervals;

    - the vegetated turves will be peeled back and not detached from the ground, the materials inserted and the turves replaced to hold the base in place;

    - the silt fence will be inspected regularly by the ECoW and contractor, and in particular following heavy rainfall;

    - silt fences will remain in situ until the vegetation on the disturbed ground is re-established;

    - the fence will not be pulled from the ground, but cut at ground level and the stakes/posts removed;

    - should water build up behind the fences, the sediment will settle to the bottom. Water can be released, but sediments will remain;

    - two lines of silt fencing will be installed in sensitive areas, based on the ECoW's professional judgement;

    - a record of its installation, inspection and removal will be maintained by the ECoW; and

- Reinstatement of any banks affected by silt-laden run off during construction will be reinstated back to pre-development conditions.

3. Stock piling of Materials

The following measures will be implemented for the stockpiling of materials. During construction, mobilisation sites will either be cleared in stages to prevent bare earth being exposed for prolonged periods, or the bare earth would be immediately covered in a gravel/plastic covering to reduce the likelihood of sediment-laden run-off following rainfall events. Stripped soil will be stockpiled more than 10 m away from the surface interceptor drain. Stockpiles will be in a dry zone that is not subject to flooding (i.e. outside 1:100 flood extent (1% Annual Exceedance Probability)). The following measures will be put in place by the Contractor for stockpiling of material:

- Temporary stockpiles will be located away from drains and watercourses. Stockpiles will not be located within 10 m of a watercourse;
- For watercourse crossings, stockpiles will not be located anywhere within the crossing working area;
- Stockpiles will be managed to prevent siltation of watercourse systems through run-off during rainstorms with the final measures to be determined by the Contractor. These will include the following measures or equivalent measures:
  - Allowing vegetation to establish on the exposed soil;
  - Providing silt fences or straw barriers at the toe of the stockpile to mitigate run-off during rain events;
  - Surrounding stockpiles with cut-off ditches to contain run-off;
  - Directing any run-off to the site drainage system or filter drains along the construction working width and to the settlement pond (or other) treatment systems; and
  - Providing bunds or another form of diversion to keep run-off from entering the stockpile area.

4. Storage of materials

The following measures will be implemented for storage of materials:

- All oil and diesel storage facilities will be at least 30 m from any watercourse, including surface water drains, and outside the 1:100 flood extent (1% Annual Exceedance Probability);
- Spill kits and drip trays will be provided for all equipment and at locations where any liquids are stored and dispensed;
- Storage areas for solid materials, including waste soils, will be designed and managed to prevent deterioration of the materials and their escape (via surface run-off or wind blow);
- Storage areas will be kept secure to prevent acts of vandalism that could result in leaks or spills; and

- All containers of any size will be correctly labelled, indicating their contents and any hazard warning signs.

5. Spills

The following measures will be implemented across the site to prevent spills:

- fuel tanks, drums and mobile bowsers (and any other equipment that contains oil and other fuels) will have a secondary containment, for example double-skinned tanks;
- all tanks, drums and mobile bowsers will be located in a sealed impervious bund with sufficient capacity to contain at least 25% of the total volume of the containers or 110% of the largest container, whichever is the greatest;
- storage areas will be covered, wherever possible, to prevent rainwater filling the bunded areas;
- fuel fill pipes will not extend beyond the bund wall and will have a lockable cap secured with a chain;
- where fuel is delivered through a pipe permanently attached to a tank or bowser:
    - the pipe will be fitted with a manually operated pump or a valve at the delivery end which closes automatically when not in use;
    - the pump or valve will be fitted with a lock;
    - the pipe will be fitted with a lockable valve at the end where it leaves the tank or bowser;
    - the pipework will pass over and not through bund walls;
    - tanks and bunds will be protected from vehicle impact damage;
    - tanks will be labelled with contents, capacity information and hazard warnings; and
    - all valves, pumps and trigger guns will be turned off and locked when not in use. All caps on fill pipes will be locked when not in use.
- suitable precautions will be taken to prevent spillages from equipment containing small quantities of hazardous substances (for example, chainsaws and jerry cans) including:
    - each container or piece of equipment will be stored in its own drip tray made of a material suitable for the substance being handled; and
    - containers and equipment will be stored on a firm, level surface.
- For deliveries and dispensing activities, the Contractor will ensure that:
    - site-specific procedures are in place for bulk deliveries; and
    - delivery points and vehicle routes are clearly marked.
- emergency procedures will be displayed, and suitably sized spill kits will be available at all delivery points, and staff will be trained in these procedures and the use of spill kits.

6. Fuel and oil leaks from vehicles and plant

The use of vehicles and plant poses similar risks to those posed by storage of liquids. Fuel and oil may leak from such equipment which may enter drains and/or watercourses, as well as contaminating the ground itself. The following measures will be implemented to reduce this risk:

- vehicles and plant provided for use on the site will be in good working order to ensure optimum fuel efficiency, and will be regularly inspected to ensure they are free from leaks;
- sufficient spill kits will be carried on all vehicles;
- vehicles and plant will be regularly maintained to ensure that they are working at optimum efficiency and are promptly repaired when not in good working order;
- vehicles and plant will not park near or over drains; and
- refuelling of vehicles and plant will be carried out on hard standing, using drip trays to ensure no fuel can contaminate the ground outside of the bunded areas.

7. Concrete

If concrete is required on site, the following measures will be implemented to reduce risks associated with concrete pouring:

- when working in or near the surface water and the use of introduced materials, e.g. oil, cannot be avoided, alternative materials such as biodegradable oils shall be used;
- placing of concrete in or near watercourses will be carried out only under the supervision of the ECoW;
- there will be no hosing of concrete, cement, grout or similar material spills into surface water drains. Such spills shall be contained immediately, and run-off prevented from entering the watercourse;
- concrete waste and wash-down water will be contained and managed on-site to prevent pollution of all surface watercourses; and
- washout from concrete lorries will not be permitted on-site and will only take place at the batching plant (or other appropriate facility designated by the manufacturer).

8. Nesting birds

Unless suitable mitigation is adopted (see next paragraph), hedgerows, trees and scrub will not be removed within the bird breeding season, generally taken to be between 1 March and 31 August, to avoid impacts on nesting birds.

Where this seasonal restriction cannot be adhered to, habitats that need to be removed will be inspected by a suitably qualified ecologist for the presence of breeding birds prior to clearance. The ecologist will demarcate a suitable buffer around an active nest and clearance within this area will be postponed until the chicks have fledged. A suitable exclusion zone will be established by the ECoW. Bird deterrents (e.g. flicker tape/compact discs will be tied to habitat confirmed without nests and the habitat will be cleared within three days of the inspection; otherwise, repeat inspections will be required to confirm the continued absence of nesting birds. If vegetation is to be cleared in the breeding season (under

supervision of an ecologist), it will be chipped, removed or covered (ideally) on the same day to prevent birds from nesting. Planting of woodland, hedgerow and grassland habitats within the PAB as detailed in the landscape drawings will provide suitable compensatory habitat for the breeding bird species recorded within the study area. Once established, this will provide nesting habitat for breeding birds displaced as a result of the Proposed Development

9. Squirrels

Squirrels breed in winter (young born February to April) when trees are generally proposed to be felled (i.e. outside the bird nesting season). Even if adults vacate their dreys, if present, young could be killed. Dreys are often distinguishable from bird nests as dreys are constructed in the main upper tree trunk (not upper thinner terminal branches). Dreys are not usually in isolated trees, and typically have leaves attached to twigs. Grey squirrels are a scheduled invasive species widespread in the environs of the Proposed Development site. Red squirrels are a nationally protected species with a patchy distribution in the environs of the Proposed Development site.

Where pre-construction surveys identify potential dreys at risk from felling, vantage point watches (for individual trees) or transects (for hedgerows/groups of trees) will be conducted to visualise squirrels and identify if the squirrel is grey (invasive) or red (protected). Surveys are best conducted in the early morning, during the summer months. Where visualisations are inconclusive, hair tube surveys may be required, following the method in NRA (2009). As grey squirrels are a scheduled invasive species, confirmed grey squirrel dreys can be felled without mitigation. In the event that confirmed or suspected red squirrel dreys require felling, felling will only be carried out from October to January, in consultation with the NPWS, who may require a licence, subject to survey findings.

10. Roosting bats

Although no bat roosts were known to be present, to avoid the risk of killing and injuring bats during construction, all trees to be removed will be subject to pre-construction surveys. Any roosts recorded would be felled under a derogation licence, which would require mitigation measures, such as the provision of an alternative roost (bat box) in a suitable, undisturbed location, away from the construction works, either within the Planning Application Boundary where works have been carried out or on third-party lands, and with the agreement of landowners. The loss of trees with high potential for roosting bats will be mitigated for on a 3-to-1 ratio with bat boxes, and moderate potential trees will be mitigated on a 2-to-1 ratio with bat boxes. A range of models will be used, suited to the species recorded within the study area, and for different seasons. The boxes will be erected in a suitable location. It may be necessary for temporary lighting to be provided at construction compounds for security purposes. Temporary lighting would need to be controlled and directed in order to mitigate any potential impacts to bats as advised by the appointed ECoW.

11. Mammals (otter)

Following the pre-construction survey methods, the following general mitigation measures for otter will be implemented:

- any excavations will be covered at night to prevent otter from falling in or becoming trapped;
- should any otter be observed within the PAB or should any evidence of otter activity be found during the works, works must cease immediately and the ECoW contacted for advice;
- should a non-breeding otter holt or rest site be identified, a buffer zone of 30 m will be implemented around the feature. Where a resting place is confirmed to be a natal site this would increase to 150 m; and

- TII's Guidelines for the Treatment of Otters will be followed at all times as necessary.

Further surveys, mitigation and licensing may be required to lawfully proceed if impacts to otter cannot be avoided.

12. Mammals (badger)

Following the pre-construction survey methods, the following general mitigation measures for badger will be implemented:

- any excavations will be covered at night to prevent badger from falling in or becoming trapped;
- if badgers are found to be present, any works within 30 m of a sett will be supervised on-site and full-time by a suitably qualified ecologist (extended to 50 m during the breeding season for a main sett where there is breeding activity);
- breeding setts will not be interfered with or disturbed during the badger breeding season (December to June inclusive);
- only the use of hand tools will be permitted within 20 m of an active sett;
- no heavy machinery will be used within 30 m of a sett except under licence;
- during the breeding season, none of the above works will be undertaken within 50 m of active setts nor blasting (if required) within 150 m of active setts. Should this not be possible, an experienced ecologist will be contacted for advice on how best to proceed;
- night-time working will be restricted as far as possible within 100 m of a sett;
- the use of noisy plant and machinery near badger setts will cease before sunset; and
- any spoil heaps will be sited at a minimum distance of 30 m from setts.

13. Small mammals

Removal and clearance of vegetation may affect small mammal species if present in these habitats. The following measures will be adhered to in order to minimise impacts to small mammal species:

- any excavations will be covered at night to prevent small mammals from falling in or becoming trapped;
- working at night will be prohibited where specific tasks such as vegetation removal and clearance are to be carried out and will be information by the ECoW;
- any lights will be turned off after working hours;
- noise levels will not exceed permissible levels for construction works (70 dB(A)) based on Guidelines for the Treatment of Noise and Vibration in National Road Schemes (NRA, 2004); and
- post construction, the site will be re-vegetated.

14. Amphibians and reptiles

Removal and clearance of vegetation may affect amphibians or reptiles if present in these habitats. The following measures will be adhered to, to minimise impacts on amphibians or reptiles:

- a toolbox talk will be carried out to ensure all site personnel are aware of these protected species and their mitigation requirements;
- vegetation will be cleared in two stages, during the reptile and amphibian active season, following the completion of the toolbox talk:
    1) A hand-search by a licensed ECoW for any animals present within vegetation to be cleared, followed by a first cut of vegetation down to 210 mm above ground-level using hand tools;
    2) A second hand-search of vegetation by an ECoW for any animals present, followed by the second cut of vegetation to ground-level (or as close as practicable).
- if any reptiles are found during pre-construction surveys or during works, they will be captured and translocated by a suitably qualified and experienced ecologist under licence to a previously identified receptor site.
- where practicable in the context of construction, water levels will be maintained in any watercourses potentially used by amphibians; and
- habitat reinstatement will re-create, except in areas of permanent hardstanding, the former habitats within the PAB.

15. Invasive Plant Species

The mitigation measures described below follow the recommendations set out in the *Guidelines on the Management of Noxious Weeds and Non-Native Invasive Plant Species on National Roads* (TII, 2010):

- all staff will be informed of the presence of Himalayan balsam and any other invasive species through toolbox talks;
- exclusion zones will be established where necessary to prevent the spread of invasive species;
- no machinery will be allowed within exclusion zones other than where necessary to undertake treatment measures;
- any plant material and soil-containing plant material must be disposed of in accordance with the TII (2010) guidelines; and
- care will be taken near watercourses to ensure that material that contains flower heads, seeds or cuttings of any invasive species will be disposed of correctly and not enter watercourses.

3.2.3 Specific mitigation measures

3.2.3.1 European designated sites

The NIS for the Proposed Development (Jacobs 2023b) found that, in the absence of mitigation, likely significant effects on the Rye Water Valley/Carton SAC could not be excluded, because this SAC is hydrologically connected to the PAB by the following waterbodies: WB03 (Cullendragh); WB04

(Jenkinstown Stream); WB09 (un-named ditch, flows into Rye Water); WB10 (Bride Stream); WB12 (un-named ditch, flows into Rye Water); WB13 (Rye Water); WB26(un-named ditch, flows into River Lyreen); WB16 (River Lyreen); WB20 (un-named ditch, flows into River Lyreen); WB22 (Baltracey River, flows into River Lyreen).

Mitigation measures to protect the Rye Water Valley/Carton SAC from water pollution are described in the NIS (Jacobs 2023b) and in the site-wide mitigation measures.

3.2.3.2 Nationally designated sites

In addition to the site-wide waterbody mitigation measures, the following mitigation relating to HDD will be put in place where it crosses the Grand Canal pNHA and the Royal Canal pNHA to prevent bentonite drilling fluid release entering these canals:

- when using HDD, the drilled cuttings will be flushed back by the drill fluid flowing via nozzles in the drill bit, to the surface, where they will be separated from the fluid fraction for disposal. A comprehensive closed-loop drilling fluid mixing and circulation system with recycling capability will be used to minimise the volume of fluids required on site;

- the shaft and borehole will be kept at least 50 m away from any watercourse where possible. However, given that the shaft will be kept as short as possible to reduce the risk of the drilling machine becoming stuck, it may not be possible to keep 50 m from a watercourse. In this case, a bunded area will be created around the temporary working space to prevent slurry washing into the SAC in the case of accidental release;

- use will be constantly monitored by the contractor through materials balance calculations, pressure monitoring in the lines and above ground visual assessment of the works. The pressure will be lowered, if necessary, to prevent a breakout. Bentonite pumping will stop immediately if any sudden drop in pressure is detected which could indicate a bentonite breakout;

- biodegradable drilling mud formulation and management for the conditions and best practice drilling practices will be adhered to by the contractor at all times; and

- the contractor will prepare an emergency action plan as part of the CEMP which will include containment, control and clean-up measures in the event of drilling fluid release into the environment. Containment measures include installing interception devices (e.g., silt fence, staked straw bales, sediment curtains, collection sumps).

3.2.3.3 Otter

The mitigation measures described below follow the recommendations set out in the *Guidelines for the Treatment of Otters during the Construction of National Road Schemes* (NRA, 2008)

One potential otter holt was identified within the PAB during the field surveys (see Figure 6, Appendix 10.7). The hole showed no signs of otter use, but due to its location near to the river there was high potential for use.

Prior to the works, the potential holt may become active. To confirm the holt status, the holt will be monitored under licence for a minimum of five days using remote cameras. Should the holt be determined to be inactive, works can proceed under the supervision of an ECoW. Should the holt be determined to be active, a buffer zone will need to be established as agreed with the ECoW.

3.2.3.4 Badger

The mitigation measures described below follow the recommendations set out in the *NRA Guidelines for the Treatment of Badgers during the Construction of National Road Schemes* (NRA, 2006).

During the baseline surveys, it was identified that seven badger setts/potential badger setts could be impacted by the Proposed Development, including five within 50 m of the PAB and two between 61 and 150 m (see Table 10.20 and on Figure 7, Appendix 10.8).

Of the seven setts, there are three active setts: one at 32 m, one at 40 m and one at 150 m from the PAB, and four are inactive (all within 61 m of the PAB).

To determine whether a sett is active or inactive, camera traps will be set up to monitor the entrance to the holes for a minimum of five days. If, after five days, there is no evidence that badgers are using the sett, it is presumed inactive and no further actions are required. However, this would only apply if the monitoring was carried out directly prior to the start of works, meaning there was no change to the baseline. The use of the sett may change over time, so if there is a delay of more than 12 months prior to the commencement of the works from the date of the final camera monitoring, then a further badger survey will be undertaken to determine the status of the hole.

No heavy machinery will be used within 30 m of badger setts (unless carried out under licence); lighter machinery (generally wheeled vehicles) will not be used within 20 m of a sett entrance; light work, such as digging by hand or scrub clearance will not take place within 10 m of sett entrances. During the breeding season (December to June inclusive), none of the above works will be undertaken within 50 m of active setts nor blasting or pile driving within 150 m of active setts.

Where a sett needs to be closed, the measures presented in the NRA guidance (2006) will followed in full.

3.2.3.5 Wintering Birds

Wintering birds recorded at Osberstown Pond could be disturbed if present during works from September to March inclusive, as the pond is within the 300 m distance for noise and visual disturbance as suggested by Cutts *et al*. (2013). The following measures will mitigate disturbance to wintering birds;

- Hoarding/non-transparent visual screening will be erected to hide the construction works. The barrier material will have a mass per unit area exceeding 7 kg/m^2 in accordance with the recommendations of BS 5228 Part 1:2009+A1:2014 Part B.4. Screening will be installed in early September. Erection of fencing later than this could potentially cause further disturbance to the birds. The fencing will be of adequate height to screen the PAB (2–3 m) or as advised by an experienced ecologist and will remain in place for the duration of the works. The ECoW will supervise the erection of the screening (where natural screening cannot be retained) and provide guidance through a toolbox talk ensuring these measures are effective. The ECoW will make regular checks of the screening throughout the works to ensure it is maintained in good condition and working order.

- Habitat disturbance will be limited by controlling the movement of vehicles and personnel. Construction vehicles and personnel will not encroach onto habitats beyond the Proposed Development footprint. To reduce the level of disturbance to wintering birds, construction activities will be restricted to between 07:30 and 19:30 Monday to Friday and between 08:00 and 18:00 on Saturdays.

- All plant used during the construction phase will be the quietest of its type practical for achieving the works. All plant will be operated and maintained in accordance with the manufacturer's recommendations including the use and maintenance of any specific noise reduction measures. At a minimum, the following will be incorporated to reduce the impact further:
    - The use of mufflers on pneumatic tools;
    - Effective exhaust silencers;
    - Sound-reducing enclosures;
    - Pumps and static mechanical plant will be enclosed by acoustic sheds or screens;
    - Machines in intermittent use will be shut down during periods where they are not required.

3.2.3.6 Fish and white-clawed crayfish

The following control measures will be implemented during construction in or adjacent to a watercourse:

- works within and adjacent to watercourses will be conducted during forecast low-flow periods where possible;
- in-stream works will not be carried out in watercourses frequented by salmon or trout during the Annual Close Season. The duration of the season varies regionally within the period from the beginning of October to the end of February, inclusive (IFI, 2016). River and brook lamprey spawn during March to April/May. Translocation (fish rescue) and in-stream works will be undertaken outside of the spawning season for salmonids (salmon and trout) and lamprey (river and brook), generally taken to be summer to early autumn, which would also protect white-clawed crayfish. The timing of works will be considered on a site-specific basis and in agreement with the IFI;
- operation of machinery in-stream will be kept to an absolute minimum. All construction machinery operating in-stream will be mechanically sound to avoid leaks of oils, hydraulic fluid, etc. Machinery will be cleaned and checked prior to commencement of in-stream works;
- the design of temporary settlement ponds, the outfalls from these temporary ponds and the construction method statements for their installation will be agreed with IFI prior to construction;
- the area of disturbance of the watercourse bed and bank will be the absolute minimum required for the installation of outfalls/culverts;
- any dewatering flows will be directed to the construction drainage system and to the settlement pond (or other) treatment system;
- sediment mats/silt traps or similar will be located immediately downstream of the works within and adjacent to the watercourses. These will be inspected daily, maintained and cleaned regularly by the ECoW during the course of site works. Diversion of water to and from a temporary diversion channel will only take place during the period March to September (IFI, 2016) or as agreed with the IFI;

- small check dams will be constructed in the cut-off watercourse to trap any sediment, and a sediment trap will be provided immediately downstream of the diversion to the existing watercourse; and

- where in-stream bed material is to be removed, coarse aggregates, if present, will be stockpiled at least 10 m away from the watercourse for replacement following reinstatement of a watercourse channel.

Watercourse banks affected during construction in/near a watercourse will be reinstated back to pre-development conditions.

Where open trenching is proposed, site restoration works will be carried out following completion of the crossing, in agreement with IFI. These works may include riverbank stabilisation, gravel replacements, etc. In all cases, the site will be restored post-installation. Open cut trenching works will not be carried out during extreme rainfall or high flow events. Met Éireann provides a five-day weather forecast via its website (www.met.ie), and works will not take place during orange and red weather warnings unless agreed with the ECoW. Unless otherwise agreed with IFI (for fish) and/or the NPWS (for white-clawed crayfish), any element of the works requiring in-stream works will be restricted to the fisheries open season (i.e. restricted to July to September inclusive). Where white-clawed crayfish were confirmed as present (WB46 and WB32), works will be carried out under licence.

Additional measures that will be undertaken to protect fish species and white-clawed crayfish are as follows:

- where in-stream trenching is to be carried out, the area will be dewatered to provide a dry working area;

- netting, sandbags and/or dumpy-bags filled with rock will be installed upstream to prevent fish travelling downstream into the working area;

- fish will be removed from the working area through electrofishing and moved upstream of the dammed area;

- hand searches, under licence, will be conducted at WB46 and WB32 where crayfish were confirmed to be present, and any crayfish found will be removed and moved upstream of the dammed area;

- water will then be over-pumped continually to ensure a dry working area. This must be pumped through a silt buster to avoid sediment from becoming suspended within the watercourse; and

- once construction is completed, the watercourse will be re-wetted under the direction of the ECoW. Water will be released slowly, and silt mats, sediment traps and haybales will be used to avoid a sudden influx of sediment to the system. A silt buster will be used where required.

3.2.3.7 Invasive species

Himalayan balsam was present along the route of the Proposed Development between ch 37000 and 37250 at N 87990 24456, approximately 40 m from the HDD launch platform on the west bank of the River Liffey, and at the same location but approximately 70 m south of the PAB at N 87999 24353. These areas will be fenced off and toolbox talks given to raise awareness. Where this is not possible, biosecurity measures must be carried out as presented in the site-wide mitigation measures.

3.2.4 Reinstatement

3.2.4.1 General requirements (all hedgerows)

All planting will be native (only), taking account of the vegetation that has been removed and typical species of the Kildare/Meath landscape.

Unless otherwise agreed with the Developer (ESB) and the local authority, the Contractor will reinstate hedgerows and treelines to a species-rich condition (i.e., five woody species per 30 m), comprising only native species. All other sites will be returned as close as possible to their pre-existing condition, using the same woody species removed, under the supervision and direction of the Contractor's ECoW.

Hedging/hedgerow plants will be planted as a staggered double row, six plants per metre with 330 mm between rows. Suitable individual protection from browsing animals will be provided by tube, spiral or similar held in place with a short cane. Group protection of new planting may be provided by suitable fencing, but individual plant protection of spirals will be provided to protect against browsing animals. Mulch mats or similar weed suppression materials (restricted to a biodegradable specification) will be used to promote successful establishment.

The Contractor will make orders by the scientific name to ensure native plants are delivered and not a cultivated variety.

Nurseries prefer to grow trees to order, so the Contractor will make the order as soon as possible (up to a year in advance) to ensure the required species and stock specification can be secured.

Consideration will be given to the procurement of planting so that there are suitable lead-in times to ensure that plants are of the right age/height required for when they are planted.

The Contractor will manage the establishment phase of planting (1–2 years) in accordance with online Teagasc guidance (Teagasc, 2020), to include watering in, weed suppression (using biodegradable mulches), and (where required) protection from browsing animals.

Thereafter, the Developer (ESB) will manage plantings from years 3-5 in agreement with the landowner.

3.2.4.2 Specific requirements (hedgerows within the cable easement)

At the time of writing, the latest specification (EirGrid, 2021) stated:

"*The easement area shall be cleared, and kept clear, of trees and other vegetation with deep root systems as these may damage the cable*".

All planting from the edges of the easement to the edges of the PAB will be replanted.

EirGrid has not confirmed known precedence for safely planting trees or shrubs over High Voltage Underground cables.

A Draft Planting Strategy is under development for restricted low shrub planting within the cable easement, including the potential use of a high performing Root Barrier Membrane.

This Draft Planting Strategy is undergoing Risk Assessment, in conjunction with a review of international best practice.

If approved, by EirGrid and ESB, the Planting Strategy would complement the commitment to Offsite Compensatory Planting for permanent hedgerow loses within the footprint of permanent surfaced areas.

The risk assessment may conclude that easement planting cannot be delivered while guaranteeing cable performance and security.

Therefore, applying a precautionary principle, in this assessment offsite compensatory planting is assumed for all permanent losses within the easement.

3.2.4.3 Specific requirements (semi-natural grasslands)

The Contractor's ECoW will develop site-specific reinstatement plans for all semi-natural habitats (including dry calcareous grassland, dry meadows and grassy verges, and reed and large sedge swamps). These plans will be provided to the Developer's Ecologist (ESB), and the Planning and Environmental Unit in EirGrid's Chief Infrastructure Office. In accordance with the All-Ireland Pollinator Plan, commercial seed mixes will not be sown with the objective of restoring biodiversity. Seeds of certain plant species, such as wildflowers and certain species included in multi-species mixtures, are not subject to the seed certification schemes as implemented by the EU Member States and OECD-designated authorities in respect of third countries (DAFM, 20218). Furthermore, even where harmful weed species are not present, seeds of non-local origin — even if the species are native — introduce new genetic strains which may displace or compromise the local, naturally-occurring flora (Dublin Naturalists Field Club, 2021).

As such, in the site-specific habitat reinstatement plans for semi-natural habitats, the Contractor's ECoW will adopt the following approach, subject to consultation with the NPWS:

16. where it is deemed appropriate to allow habitats to re-vegetate naturally (e.g. roadside verges, where similar habitat is contiguous either side of the construction area), there will be no active seeding of reinstated topsoil;

17. in all other areas, the preferred approach to reinstatement shall be use of locally collected seed from similar habitats;

18. use of commercial seed in semi-natural habitats will only be permitted where local seed is not available, or where local seed establishment has failed, AND if both:

    a. Certified native by the Department of Agriculture, Food, and the Marine; and,

    b. With the written agreement of the NPWS.

3.2.4.4 General requirements (roadside verges and agricultural areas)

Measures for use of seed in grassland reinstatement are as follows:

- commercial seed mixes can be used on road verges but not on semi-natural grassland habitats.

- all seed mixes will be certified native by the Department of Agriculture, Food, and the Marine.

- in agricultural areas, the rate of seeding, time and method of sowing, including the application of fertiliser, will be agreed with an experienced agronomist and will follow the guidance on reseeding (Teagasc, 2014).

3.2.4.5 Compensation (Unrelated to European sites)

An off-site hedgerow compensation strategy has been developed, in light of the urgent biodiversity action required at European and national level, and the hedgerow/tree policy objectives of Kildare County Council (particularly Policy Objectives BI 026, BI 027, BI 028) and Meath County Council (particularly HER POL 37, HER POL 38, HER POL 40).

The strategy will comprise off-site compensatory planting, outside the PAB, to deliver an overall net gain of habitat area. A minimum of 130% compensatory off-site planting will be delivered by the Developer (ESB), in consultation with EirGrid.

The surplus will mitigate the risk of failures and contribute to the reduction of residual effects on mature and veteran trees, which cannot be replaced. Subject to consent, the planting will commence in advance of, or in parallel with, construction works. EirGrid has identified candidate sites in Co. Meath in consultation with a charity partner, who provides compensatory planting options on third-party lands. Whether these candidate sites or other sites are used for compensatory planting, there will be no planting in semi-natural habitats of significant ecological value, which will be verified by the Developer's Ecologist.

While the strategy cannot fully mitigate the loss of mature and veteran trees, the proposed surplus of off-site compensation will reduce the significance of residual effects.

3.2.4.6 Monitoring

To ensure that the proposed mitigation measures remain effective, particularly in regard to reinstatement and compensation, the Contractor and ESB will collectively deliver a five-year monitoring landscape aftercare regime.

Sediment mats/silt traps or similar will be located immediately downstream of the works within and adjacent to the watercourses. These will be inspected daily, maintained and cleaned regularly by the independent EnCoW during the course of site works. Diversion of water to and from a temporary diversion channel will only take place during the period March to September (IFI, 2016) or as agreed with the IFI.

3.2.4.7 Reporting

All reinstated or indirectly impacted semi-natural vegetation will be inspected at the completion of construction, at which time the Contractor's ECoW will provide written reports on habitat condition to the Developer's Ecologist (ESB), and EirGrid Planning and Environmental Unit. At that time, the Developer's Ecologist (ESB) will determine what additional steps are required. Additional steps could include replacement tree planting, additional hedge mulch or protection from browsing animals, or sowing of locally harvested seed (using a green hay approach) for semi-natural grasslands).

3.3 Landscape and Visual

The primary 'mitigation measure' employed in respect of landscape and visual impacts for the Proposed Development was avoidance of impacts. The key mitigation relevant to landscape and visual took place as part of the route selection process and/or is embedded in the final design.

Once the construction phase is complete, the road surface / agricultural grassland will be reinstated along the underground cable route; thus, any material surface expression of the underground features will be minimal. Hedgerows removed for temporary works within the Planning Application Boundary will

be replanted with a new species-rich hedgerow which is likely to be more ecologically diverse than what was removed. The species mix of the vegetation proposed above the 5 m permanent wayleave will be in accordance with the specification detailed in Chapter 10 (Biodiversity) of this PECR . In addition, vegetation removed during the construction phase at passing bays will be reinstated along the original alignment and will also be replanted with species-rich hedgerows. It is impossible to replace mature and veteran trees removed as part of the Proposed Development on a like-for-like basis, but the replacement planting will, over time, repair and reinforce the broader landscape fabric.

Additional landscape and visual mitigation measures are not considered necessary in relation to the Proposed Development as there will be no significant effects during the operational phase. Likewise, additional specific landscape and visual mitigation measures are not considered necessary during the construction phase as all effects will be either temporary or short-term and not considered 'significant'.

3.4 Population and Human Health

The design of the Proposed Development has evolved through comprehensive design iteration, with particular emphasis on minimising the potential for environmental impacts, where practicable.

Construction activities have the potential to create a nuisance and cause disruption. All work will be carried out in compliance with national legislation, and in accordance with best practice guidance, as detailed in the topic-specific chapters of this PECR. The assessment has been informed by the residual impacts reported in Chapter 8 *Air Quality and Climate*, Chapter 9 *Noise and Vibration*, Chapter 14 *Traffic and Transport*, and Chapter 17 *Landscape and Visual*. The reported residual impacts in these chapters take into account any topic-specific mitigation identified within the respective chapters. No further mitigation is proposed over and above that set out in individual chapters.

The appointed contractor will be required to liaise closely with local community representatives, landowners and statutory consultees throughout the construction period. This is likely to include circulating information about ongoing activities, particularly those that could cause disturbance, including due to traffic. The appointed Contractor will also implement the Traffic Management Plan, which will be finally agreed following detailed design with Kildare County Council and Meath County Council to mitigate construction traffic on the public road network. All construction activities, including construction traffic, will be managed through the site CEMP. Specific measures to mitigate effects on human health during the construction phase (i.e. noise and vibration, air quality and climate, hydrology, landscape and visual, and traffic and transport) are dealt with separately in the relevant chapters of this PECR.

Because of the potential for traffic disruption, the construction of the cable trench (Phase 2 – see Chapter 5 for further details) between Chainage 7395 and 14750 may be subject to traffic management measures which will be agreed with the owners of the Larchill Arcadian Gardens in advance of the construction phase. Phases 1 and 3 of the construction sequence are not affected by this restriction.

Because of the potential for traffic disruption, the construction of the cable trench (Phase 2 – see Chapter 5 (Project Description) for further details) between Chainage 46190 and 51450 may be subject to bespoke traffic management measures during school term times for those schools along the R448. These measures will be agreed with school management in advance of the construction phase. Phases 1 and 3 of the construction sequence are not affected by this restriction.

3.4.1 Air Quality

- Dust Emissions

The good practice dust mitigation measures to manage the generation of dust at source will be undertaken, as per the IAQM construction dust guidance (IAQM, 2016). These mitigation measures, which are based on the overall low risk for potential dust soiling, human health and ecological impacts, include the following:

- Communication:
    - Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary. This may be the environment manager/engineer or the site manager;
    - The head or regional office contact information will be displayed.
- Site management:
    - Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken;
    - Make the complaints log available to the local authority when asked;
    - Record any exceptional incidents that cause dust and/or air emissions, either on- or off-site, and the action taken to resolve the situation in the log book.
- Monitoring:
    - Carry out regular site inspections to monitor compliance with the CEMP, record inspection results, and make an inspection log available to the local authority when asked;
    - Increase the frequency of site inspections by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions. Regular site inspections to monitor compliance with the CEMP will be carried out inspection and results will be recorded.
- Preparing and maintaining the site:
    - Plan site layout so that machinery and dust causing activities are located away from receptors, as far as is possible;
    - Avoid site run-off of water or mud.
- Operating vehicles/machinery and sustainable travel:
    - Ensure all vehicles switch off engines when stationary – no idling vehicles;
    - Avoid the use of diesel or petrol powered generators and use mains electricity or battery powered equipment where practicable.
- Operations:

- Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g. suitable local exhaust ventilation systems;
- Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate;
- Use enclosed chutes and conveyors and covered skips;
- Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate. Cutting, grinding or sawing equipment will only be used where fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction.

3.4.2 Noise and Vibration

The construction works shall comply with the recommendations of BS 5228-1, and the mitigation measures that will be implemented include the following:

- Noise barriers will be installed around the HDD compounds:
  - HDD4 Ch. 22000 – Crossing of the Lyreen tributary of the River Liffey along the R407. The closest sensitive receptor is located around 18 m away. Noise barriers will be placed on the perimeter of both the launch and reception HDD compounds to screen the receptors identified in Plate 9.3;
  - HDD5 Ch. 37100 – Crossing of the River Liffey north of Sallins. The closest sensitive receptor is located around 68 m away. Noise barriers will be placed on the northern perimeter of the HDD compound on the western bank of the River Liffey to screen the receptors identified in Plate 9.4;
  - HDD6 Ch. 44600 – Crossing of the Grand Canal in Naas. The closest sensitive receptor is located around 32 m away. Noise barriers will be placed on the northern perimeter of the southern HDD compound to screen the receptors identified in Plate 9.5;
  - The noise barriers will be within the Planning Application Boundary. The exact location, height and type of noise barriers to be installed will be confirmed pre-construction;
- BS 5228-1 states that a noise barrier which blocks the line of sight between the source and the receptor would result in an approximate attenuation of 10 dB, which would reduce the effects to be not significant;
- The Contractor will be obliged to comply with Local Authority controls on noise and vibration during construction. This will include (but will not be limited to) setting limits to control noise and vibration from construction activities, implementing the necessary mitigation measures while adopting best practicable means, and carrying out any noise or vibration monitoring where significant adverse effects need to be monitored. The location of the noise barrier will be set out and agreed in advance of the works designed to keep noise levels within the limits;
- The routing, depth, locations, and drilling types of the proposed HDD works have been carefully selected to avoid effects. Structural surveys will be completed pre-construction at all structures that will be crossed or that are within 50 m of the HDD locations. These locations will be

monitored during the HDD works, and the surveys will be repeated post-construction. In the extremely unlikely event of repairs being required, these will be immediately undertaken in agreement with the structure owner;

- During the HDD works, constant monitoring by the specialist drilling team will be carried out. The volume of cuttings produced will also be monitored to ensure that no over-cutting takes place and that hole cleaning is maintained. The nature of the cuttings will also be monitored to understand the ground conditions as the drilling progresses. Technical mitigation measures will be applied to the drilling equipment to reduce any vibrational issues. The CEMP will be updated pre-construction with further information about HDD monitoring when the Contractor is appointed and will be agreed with stakeholders including the Local Authorities, TII, Waterways Ireland, and Irish Rail;

- The Contractor will develop and implement a stakeholder communications plan prior to the commencement of construction which will facilitate community engagement;

- Selection of plant and equipment, construction methods and programming. Only plant conforming with or exceeding relevant national or international standards, directives or recommendations on noise or vibration emissions would be used. Construction plant will be maintained in good condition with regards to minimising noise and vibration emission;

- Plant will be operated and maintained appropriately, with due regard for manufacturer recommendations. All vehicles, plant and equipment will be switched off when not in use;

- Careful selection of routes and programming for the transport of construction materials, spoil and personnel to reduce the risk of increased noise and vibration impacts during construction;

- Vehicle and mechanical plant/equipment used for the works will be fitted with effective exhaust silencers, to be maintained in good working order and operated in a way that minimises noise emissions;

- Construction plant and activities will be positioned to minimise noise at sensitive locations;
- Equipment that breaks concrete by pulverising or similar, rather than by percussion, will be used where practicable;
- Mufflers shall be used on pneumatic tools;

- Works will be programmed to minimise the need for working outside normal working hours;

- Unnecessary revving of engines will be avoided and equipment will be switched off when not required;

- Plant and vehicles will be started-up sequentially rather than all together;

- Drop height of materials will be minimised;

- Rubber linings will be used in, for example, chutes and dumpers to reduce impact noise;

- Any plant, such as generators, which are required to operate before 07:00 or after 19:00 will be surrounded by an acoustic enclosure or portable screen;
- Low vibratory or non-vibratory plant will be used when working close to a vibration sensitive receptor; and

- Vibratory equipment will be started up and turned off as far away from sensitive receptors as is possible.

3.5 Traffic and Transport

The appointed contractor will agree temporary traffic measures, and will then adopt and monitor an appropriate way of working, in consultation with Kildare and Meath County Councils, TII and/or their agents, and An Garda Síochána as appropriate. Construction traffic will travel on predefined routes to and from the relevant sites to reduce the effects on local traffic.

The TMP will document measures to help efficiently transport components and materials to site, while reducing congestion and disruption which might impact negatively on local communities or general traffic and, in particular, emergency services.

Signed diversion routes, outlined in this chapter but with final agreement with the Roads Authorities, will be provided to mitigate journey disruption, and to minimise potential driver delay. Where practically achievable, diversion routes will not apply outside of the worksite hours of operation.

During the construction phase, signage will be installed to warn road and recreational route users to the presence of the works access and the associated likely presence of large or slow-moving construction traffic.

To minimise inconvenience to the local community in terms of obstructive parking, adequate car parking for permanent site personnel, visitors and deliveries will be provided within the site compounds. Car parking will not be permitted on any public road network adjacent to the site, to maintain sight lines and minimise the potential for obstruction and delay for other road users.

Furthermore, only vehicles needed for construction will be permitted to attend cable route worksites. Car sharing will be promoted to construction personnel by the contractor during the induction process.

The appointed contractor will nominate a person to be responsible for the coordination of all elements of traffic and transport during the construction process (liaison officer). This person will liaise with the local community, and be a direct point of contact within the contractor organisation for the community to contact for information or to discuss the traffic management.

Transportation, including deliveries to and from the construction areas, will be via the existing public road network. Given the nature of the cable route's construction, there will be multiple worksites along the route throughout the construction programme. The proposed programme of worksite locations will be confirmed by the appointed contractor as an integral part of their adopted TMP. All construction vehicle drivers will be instructed to access their destination worksite via an approved route.

3.6 Material Assets

3.6.1 Major Infrastructure and Utilities

The Proposed Development has been designed to minimise the impact on major infrastructure. This includes the avoidance of interactions with major utility infrastructure as far as possible. Where there are interfaces with existing utility infrastructure, protection in place or diversion as necessary is proposed to prevent long-term interruption to the provision of the affected services.

All reasonable measures will be taken to avoid unplanned disruptions to any services during the construction phase. Prior to excavation works being commenced, localised confirmatory surveys will be undertaken by the Appointed Contractor to verify the results of pre-construction assessments undertaken. Where works are required in and around known utility infrastructure, precautions will be

implemented by the Appointed Contractor to protect the infrastructure from damage, in accordance with the best practice methodologies and the requirements of the utility companies, where practicable.

Where diversions, or modifications, are required to utility infrastructure, service interruptions and disturbance to the surrounding residential, commercial and/or community property may be unavoidable. Where this is the case, it will be planned in advance by the Appointed Contractor. Prior notification of disruptions will be given to all impacted properties. This will include information on when disruptions are scheduled to occur and the duration of the disruption. Any required works will be carefully planned by the appointed contractor to ensure that the duration of interruptions is minimised as far as possible. Consultation with relevant neighbouring parties will be undertaken prior to any proposed disruptions.

3.6.2 Land and Property

Much of the mitigation against the impacts on land and property have been embedded within the design, by selecting a route which follows public roads for the most part, minimising the requirement for additional lands to be affected. Where private lands will be directly affected, either temporarily during construction or permanently, this will be managed by ESB and their contractor and supported by EirGrid's Agricultural Liaison Officers.

Where there are potential access issues as a result of the Proposed Development, access arrangements to individual properties will be agreed with the affected property holders in advance to minimise the impact. Access arrangements in general along affected roadways and footpaths will be managed in accordance with applicable traffic management plans.

Along the Sallins Bypass, early notification and signage to show diversions will be used by the Contractor. Local cycling/walking groups and community groups (as well as Cycling Ireland and Kildare County Council) will be directly contacted by the Contractor to inform them of the timing, extent, and duration of any closures and what signed diversion routes will be available. As far as possible the works along the Sallins Bypass will be phased so that the entire length of the cycleway and footpath will not be closed at any one time. The use of the Sallins Link Road at the roundabout on the Sallins Bypass will allow a shorter diversion.

During the construction works at the bus stop located on the R403 in Firmount West (approximate chainage 33000), a new temporary bus stop will be provided. Consultations with Kildare County Council, and Bus Éireann, will be undertaken prior to construction to ensure no disruption to bus services.

Impacts to the garden of a residential property on the R125 at approximate chainage 11200 will be mitigated by the use of screens during construction to allow the owner to use their garden. The affected area will be reinstated to its original condition post-construction. The owner will be consulted on the species for planting. Selected tree species will need to be agreed with ESB to ensure no impacts to the cable (See Chapter 17 Landscape for further details). At the detailed design stage the cable route will be re-examined to determine if the garden can be fully avoided.

Impacts to the "New Residential" area under the Kilcock Local Area Plan 2015-2021 (approximate chainage 16250) have been largely mitigated through routing. However, further consultation with the developer and Kildare County Council will be undertaken in so far as possible, to ensure there is no disruption during construction.

Similarly, impacts to the Naas Sports Centre the adjacent car park or recreational facilities (skatepark and playground) have been largely mitigated through routing. Further mitigation will be provided through consultation, early notification of proposed works, and ensuring safe access to the facilities at all times. Daily cleaning of road surfaces in this area and good site management, will ensure that the

construction activities do not cause unclean or muddy conditions. The affected areas will be reinstated to their current condition post-construction.

Access to properties which are not being directly impacted by land take will be maintained.

3.6.3 Waste Management

A Construction Resource Waste Management Plan (CRWMP –) is included for the Proposed Development. The appointed contractor will be responsible for reviewing and updating the CRWMP prior to commencement of construction and in periodically reviewing and updating as necessary throughout the Construction Phase.

All operations will be managed and programmed in such a manner as to prevent / minimise waste production. All waste material will be managed in accordance with the Waste Hierarchy, with an emphasis on reuse, recycling and recovery of material over disposal where feasible.

In order to minimise the creation of waste, opportunities for reuse of excavated material within the Proposed Development (e.g. as fill or in landscaping) will be sought. Where there is no reuse potential within the Proposed Development of such material, either due to the material being unsuitable or due to the quantity being in excess of requirements, the potential for reuse as a by-product in accordance with Article 27 will be investigated by the appointed contractor. Where this option is technically / economically feasible, the appointed contractor will be responsible for the EPA Article 27 notification and the associated requirements. Any material which is to be managed as a by-product will be appropriately stored on site and will be kept separate from any waste storage to avoid cross contamination.

Where waste is created it shall be managed on site in accordance with good practice and applicable waste legislation as follows:

- Waste excavated material will be appropriately stockpiled;
- Waste will be segregated at source to prevent cross contamination;
- Any hazardous wastes will be stored in segregated waste containers which are appropriately labelled;
- All waste will be collected by a suitable contractor in possession of a valid and appropriate Waste Collection Permit, and will only be transported to suitably licensed or permitted waste facilities;
- Regular site cleaning will be done in order to minimise the potential for litter in the surrounding area; and
- Waste records will be maintained throughout the Construction Phase of the Proposed Development.

The CRWMP will be available for inspection at all reasonable times by the Local Authority. All waste generated will be managed in accordance with the relevant provisions of the Waste Management Act 1996 and associated amendments and regulations, particularly with regard to the use of appropriately permitted waste contractors and destinations for waste materials.

3.7 Soils, Geology and Hydrogeology

For hydrogeology there is the potential for some temporary and long term localised significant impacts. The following mitigation measures will be implemented prior to the commencement and throughout the duration of the works to limit these impacts:

- Protection of private water supplies:
    - The potential presence of private water supply abstractions will be confirmed through pre-construction surveys. Source and supply assets will be monitored if unforeseen private abstractions are present near the Proposed Development.
    - Replacement water supplies will be provided if necessary.
- Protection of potential GWDTE sites:
    - o While impacts on groundwater levels and flows are predicted to be generally small, in order to prevent potential impacts to GWDTE the potential GWDTE sites identified will be monitored by the ECoW during construction. The ECoW will be on site for any works deemed sensitive, i.e. within or near protected European sites or watercourses linked to such sites. There is the possibility of groundwater ingress from excavations at potential GWDTEs, and where deeper excavations are proposed (HDD sites and any stream crossings deeper than 1.7m). In this case, the Contractor will remove water to facilitate suitable working conditions. The Contractor will overpump intercepted water and treat it via a filter bag (or similar) before discharging it within a suitable vegetated area locally to infiltrate to ground and recharge groundwater.
- Groundwater monitoring:
    - Groundwater conditions will be monitored during construction where deeper excavations are proposed (HDD sites and any stream crossings deeper than 1.7 m) in order to confirm no significant impacts to the groundwater regime at critical points along the cable route.

3.8 Water

3.8.1 Construction Phase

3.8.1.1 General

The following mitigation measures will be implemented prior to commencement and throughout the duration of the proposed works:

- Implementation of the CEMP (Appendix 5.4 of this PECR) and the Construction Resource Waste Management Plan (Appendix 5.5) which sets out measures to control and manage activities at the surface to prevent issues such as accidental spillage;
- A full-time on-site Environmental Clerk of Works (EnCoW) will be appointed prior to commencement of works;

- Works will be carried out in accordance with the guidelines set out by Inland Fisheries Ireland in Guidelines on Protecting Fisheries During Construction Works in and Adjacent to Waters (Inland Fisheries Ireland, 2016);

- The Inland Fisheries Ireland Biosecurity Protocol for Field Survey Works will be complied with;

- Works method statements will be agreed with Inland Fisheries Ireland for all watercourse crossings. The works method statement will include details on silt fencing, pH monitoring requirements for in-stream concrete pouring works, and handheld turbidity monitoring for in-stream and HDD works; and

- An adverse weather stop work plan will be developed to ensure that activities with the potential to cause pollution are stopped under certain weather conditions. Certain activities (such as open cut trenching, HDD works) will not be carried out during extreme rainfall or high flow events. Met Eireann (Red, Amber, Yellow) warnings and flood warnings will be monitored daily by the EnCoW.

3.8.1.2 Surface Water Quality Protection Measures

The following surface water quality mitigation measures will be implemented prior to commencement and throughout the duration of the works:

- Activities will be planned in advance and machinery will be managed to ensure that the number of trips is limited to the minimum required at each location. This is because the more times a piece of ground is tracked, the more likely it is that vegetative cover will be removed and ruts will be created that will act as miniature rivers where dirty water will flow;

- Tracking beside streams and tracks will be avoided to avoid damage to the bankside;

- Geotextile or timber matting will be used on soft ground, and in all protected areas;

- A buffer zone of 20 m will be maintained between storage/working areas and sensitive watercourses, such as the River Liffey, taking account of the minimum working area required to facilitate the works;

- Oil or fuel stored in or adjacent to the construction site will be kept in a bunded area (providing 110% capacity of the largest storage unit), 100 m from any watercourse which appears on a 6" OS map of the site. Vehicle maintenance will not occur within 100 m of any watercourse and all machinery will be in good working order, free from any leakage of fuel, oil or hydraulic fluid;

- Reinstatement method statements will be subject to approval by the EnCoW;

- Concrete will be brought to site by covered truck. Wet concrete operations adjacent to watercourses will be minimised, with a minimum separation distance of 10 m. Where unavoidable, these operations will be carried out under supervision of the EnCoW and with suitable mitigation measures in place, such as controlling the leakage of any cement;

- The Contractor will ensure that all concrete truck rinsings/cleaning is undertaken within construction compounds and at least 10 m away from watercourses;

- In order to reduce the risk of contamination arising as a result of spills or leakages, measures including, but not limited to, the following will be employed:

    - All collected waste will be managed in accordance with the Waste Management Act 1996, and associated Regulations;

  - Fuels, chemicals, liquid and solid waste will be stored on impermeable surfaces;
  - Refuelling of plant, equipment and vehicles will be carried out on impermeable surfaces;
  - All tanks and drums will be bunded; and
  - Spill kits will be provided at all compound locations and carried by all crews during underground cable installation works.

- Silt fences (to Hy-Tex Premium specification or similar) and silt traps will be installed prior to commencement of works and will be inspected daily so that they can be adjusted as necessary. The EnCoW will consider the locations for these measures based on the potential for sediment-laden run-off to reach a receiving watercourse.
- Site restoration post works will be carried out, in agreement with Inland Fisheries Ireland. These works may include riverbank stabilisation, gravel replacements, etc. In all cases, the site will be restored post-installation;
- The Emergency Incident Response Plan and environmental control and mitigation measures described in the CEMP will be agreed prior to construction with Inland Fisheries Ireland; and
- Water pumped from dry works areas and any dewatering will be treated using settlement tanks to remove sediment prior to discharge onto grass and allowed to filter back to the watercourse.

3.8.1.3 Silt Control Measures

The following silt control mitigation measures will be implemented prior to commencement and throughout the duration of the works:

- Silt control measures will be used to control silt generated from activities on site and prevent it gaining access to surface drainage which could convey silt to larger streams and watercourses;
- Silt control measures will include silt traps which can be located in small drains where flow is small and silt fences where run-off from large areas needs to be controlled;
- Silt fences will be installed in the working areas and not at the watercourse;
- Access routes will be delineated such that an appropriate set back distance from watercourses is maintained. Where works are to be undertaken adjacent to watercourses the setback distance will be delineated by the EnCoW on site;
- Where distances between the works and watercourse allow, a minimum setback distance of 20 m from the watercourse will be maintained; and
- Where the site is constrained, the best available set back distance will be employed taking account of the minimum working area required to facilitate the works.

Silt Fences

- Silt fences will be installed downslope of the area where silt is being generated on disturbed ground;
- To be effective, the silt fence will contain the area where silt is generated and will terminate on high ground (i.e. an elevated area not in the watercourse);

- Silt fences will be constructed using a permeable filter fabric (e.g. Hy Tex Terrastop Premium silt fence or similar) and not a mesh;
- The base of the silt fence will be bedded at least 15–30 cm into the ground at 2 m intervals. The manufacturer's installation instructions should be consulted prior to installation to ensure the silt fence is appropriately installed to avoid a reduction on performance efficacy,
- Once installed the silt fence will be inspected regularly by the EnCoW, daily during the proposed works, weekly on completion of the works for at least one month, but particularly after heavy rains;
- The integrity of the silt fencing will be checked daily by the EnCoW and after poor weather conditions (rain or wind) and any failures rectified immediately;
- Two lines of silt curtain/fence will be installed, where considered necessary, by the EnCoW;
- Any build-up of sediment along the fence boundary will be removed daily;
- Silt fences will be maintained until vegetation on the disturbed ground has re-established;
- The silt fencing will be left in place until the works are completed (which includes removal of any temporary ground treatment);
- Silt fences will not be removed during heavy rainfall;
- The silt fence will not be pulled from the ground but cutaway at ground level and posts removed; and
- A record of when it was installed, inspected and removed will be maintained by the EnCoW.

Silt Traps

The purpose of the trap is to reduce the level of solids in the slowly flowing water. The silt trap works by allowing a build-up of water behind it, slowing flow and allowing solids to settle out. The following requirements will apply:

- Silt traps will only be placed in drains downstream of working areas where the volume of water flow is expected to be low;
- Silt traps will be made of Terram or similar material, not mesh;
- The trap will be staked into the banks of the drain/watercourse such that no water can flow around the sides;
- The material will be bedded into the drain bed/watercourse to prevent water flowing beneath it;
- The height of the trap will be lower than the bank heights. The upper edge will be fixed to a timber cross piece. This will allow water to overtop the silt trap and not burst through or around it;
- Inspections will be carried out daily during the proposed works, weekly on completion of the works for at least one month, and after heavy rains, and monthly thereafter until bare areas have developed new growth;

- Any build-up of solids will be carefully removed without removing any vegetation growing on the bottom;
- The silt trap will not be pulled from the ground but cutaway at ground level and posts removed; and
- A record of when it was installed, inspected and removed will be maintained by the EnCoW.

3.8.2 Construction Compounds/Laydown areas

All temporary construction compounds will be secured with hoarding/fencing around the compound perimeters as appropriate. Where temporary construction areas are required and existing hardstanding is not available, engineering stone fill will be laid and compacted and maintained as required for the duration of the works. Once the works are completed, the engineered stone fill will be removed, and the land will be reinstated to its original condition or for specific locations with biodiversity value in line with reinstatement measures outlined in Chapter 10: Biodiversity of this PECR.

Temporary facilities will be provided at the construction compounds including construction phase car parking and welfare facilities and temporary material storage areas as necessary.

Any discharges from temporary welfare facilities will be connected to a sealed holding tank to be emptied and disposed of off-site by a licensed contractor to an approved licensed facility.

Storage of fuel and refuelling will be undertaken within bunded hardstanding areas. Water will be brought to site via tankers as required.

3.8.3 Service Diversions/Interactions

All reasonable measures will be taken to avoid unplanned disruptions to any services during the proposed works. This will include thorough investigations to identify and reconfirm the location of all utility infrastructure within the works areas and implementing procedures to be agreed with utility providers when undertaking works around known infrastructure services.

Service disruptions impacting the surrounding residential, social and commercial properties will be kept to a minimum, only occurring where unavoidable. Prior notification of disruptions will be given to all impacted properties. This will include information on when disruptions are scheduled to occur and the duration of the disruption. Relevant neighbouring parties will be consulted prior to any proposed disruptions.

3.8.4 Open Trench Water Crossings

As with all construction works proposed, no works on watercourses will be allowed to commence until the relevant Risk Assessment Method Statements (RAMS) and pertinent Health and Safety documents are received from the specialist Contractor and are reviewed and agreed by the Client's representative. These Contractor documents will include method statements, open trenching risk assessments and environmental management plans specific to the area where the trenching is to take place. These plans will be submitted by the Contractor to the Employer's Representative on site for review and comment prior to commencing open trench operations. All documentation relating to the proposed works will also be provided to Inland Fisheries Ireland for approval.

All open trench watercourse crossings in salmonid watercourses will take place during the May to September period in order to avoid the period of salmon and trout spawning.

The ground preparation works (such as soil stripping, hardstand formation) adjacent to the watercourse crossing will be carried out in the same manner as that for other works activities. All clean coarse surface material (gravel, cobbles and boulders) on the riverbed or stream will be removed to a depth of 20cm. A thinner layer will be removed if deeper material is mainly clay or sand. These excavated materials will be set back from the watercourse and placed on a geotextile base for use in the reinstatement process following the cable installation.

Where damming and pumping methods are to be used for open trenching, sandbags will be used with an impermeable barrier. Should sites be flumed, the diameter chosen for the flume pipe will accommodate flows at the time with spare capacity to cover that predicted over the period that the works would be expected to last. A clay material will be used around the flume pipe to create a seal.

Material excavated from the trench (and an upstream pump sump if required) will be placed on terram on level ground as far back from the watercourse edge as is practicable and surrounded on its downslope side by a silt fence to prevent material re-entering the watercourse. This material, if deemed suitable, can be used to partially backfill the trench. However, a significant amount will be in excess and will be removed from site under licence. Dewatering of the excavation will be treated on site using settlement tanks before the settled water is returned to the watercourse. A second tank in series with the first will be used if the first isn't sufficient to remove enough solids. Pumped over water will be directed to a splash plate to prevent erosion of the riverbed at the downstream side.

The surface coarse substrate which was set aside will be used to reinstate the stream bed after the ducts have been installed and the flume pipe has been removed as well as all the damming materials. All surfaces will be reinstated to the satisfaction of the landowner and re-seeded to assist soil stabilisation. A silt fence will be placed along the riverbank where the works were undertaken in order to prevent solids washed off the works area during heavy rainfall from entering the stream while the surface adequately re-vegetates. This measure will be particularly important at sites which slope to the edge of the watercourse.

Site restoration works will be carried out following completion of any water crossings, in agreement with Inland Fisheries Ireland. These works may include riverbank stabilisation, gravel replacements, etc. In all cases, the site will be restored post-installation. Significant adverse effects in terms of water depth, velocities and sediment erosion/deposition are therefore not anticipated.

3.8.5 HDD Water Crossings

As with all construction works proposed, no drilling works will be allowed to commence until the relevant RAMS and pertinent Health and Safety documents are received from the specialist Contractor and are reviewed and agreed by the Client's representative. These Contractor documents will include method statements, drilling risk assessments and environmental management plans specific to the area where the drilling is to take place. These plans will be submitted by the Contractor to the Employer's Representative on site for review and comment prior to commencing drilling operations.

The specialist drilling team will constantly monitor fluid volume pressure, pH, weight and viscosity during the proposed works. The volume of cuttings produced will also be monitored to ensure that no over cutting takes place and that hole cleaning is maintained. The mud returns will be pumped to the circulation system trailer by a bunded centrifugal pump. The nature of the cuttings will also be monitored to understand the ground conditions as the drilling progresses.

After the initial pilot hole is completed, it will be reused in a number of passes to reach the required bore size to enable the duct lining to be pulled. To ensure that the prevailing geological conditions have suitable cohesion that can maintain the bore during the drilling and reaming process, the specialist drilling team will pay close attention to modelled drag forces during pullback and constantly monitor

load stress to ensure that modelled tensile stress, collapse pressures, hoop stress and buckling stress are not exceeded. In addition to the above measures, the rate of drilling progress will be monitored to help identify any voids or changes in strata.

In addition, the Contractor will monitor river/stream flows upstream and downstream of any HDD watercourse crossings. The flow monitoring will be undertaken on a daily basis for five working days prior to the HDD, during the HDD and for five working days following completion of the HDD. If a measurable increase in losses from the watercourse to ground is observed in the reach where the HDD took place, bed lining will be undertaken if required by Inland Fisheries Ireland.

3.8.6 Operational Phase

There are no recommended mitigation and monitoring measures during operation of the Proposed Development to reduce the potential impact with respect to hydrology.

3.8.7 Monitoring

The appointed Contractor will ensure that all personnel and visitors to site are encouraged to report visual indications of changes in water quality in any watercourses on site. Ongoing monitoring will be carried out throughout the construction phase of the Proposed Development to ensure that the mitigation measures deployed remain effective,

The Contractor will undertake regular visual inspection of the watercourses on site. The monitoring records will include the following minimum information:

- Antecedent and current weather conditions;
- Current construction activities near and in particular up-stream or up-gradient of the observation point;
- Visual assessment of water colour, turbidity and flow rate;
- Details on any communication, corrective action and/or mitigation undertaken as a result of water quality issues observed.

Certain construction activities (including HDD, open trench crossings, or wet concrete near watercourses) will require constant supervision by the EnCoW. Visual monitoring supported by turbidity monitoring of receiving waters will be conducted by the Contractor's EnCoW for the duration of works.

3.9 Agriculture

3.9.1 Construction Phase Mitigation

The following mitigation measures will be implemented to address the impacts on agriculture (including equine):

- The appointed contractor will maintain close liaison with local community representatives and landowners to provide them with adequate progress information and advance notice of works. This will facilitate planning the maintenance of access to land to match the needs of the landowner. Scheduling of works will have to be agreed with each landowner to facilitate the operation of the farm and minimise disturbance. Where it is necessary to move livestock along public roads or across the working area this will be facilitated by the appointed contractor;

- Landowners with lands adjoining sites where rock breaking takes place will be notified in advance of these activities;

- Traffic management plans will ensure that farmers and agri-business have adequate access to farmyards and land so that the transport of farm inputs and produce is not significantly affected;

- Mitigation measures for the control of dust as set out in Chapter 8 (Air Quality) will be implemented by the appointed contractor;

- Mitigation measures for the control and monitoring of water quality and as set out in Chapter 12 (Hydrology) will be implemented by the appointed contractor;

- Mitigation measures for the control and monitoring of noise and vibration as set out in Chapter 9 (Noise and Vibration) will be implemented by the appointed contractor;

- The appointed contractor will comply with any regulations pertaining to the control of farm diseases as specified by Department of Agriculture Food and the Marine and will employ reasonable and best practice precautions against spreading any such farm disease. ESB and/or its appointed contractor will also take due notice and consideration of reasonable concerns expressed by landowners or occupiers prior to entry; and

- The appointed contractor will adhere to mitigation specified in this PECR and the Construction Environmental Management Plan (Appendix 5.4) in relation to issues such as; avoidance of staying livestock, maintenance of adequate pre-entry records, facilitating the provision of timber from the working area to landowners, provision of fit for purpose temporary fencing for the reasonable needs of landowners and the reinstatement of boundaries, farm roads or pathways, field drainage systems (if affected) and field surfaces (topsoil).

3.9.2 Operational Phase Mitigation

- The drainage reinstatement shall not impede the drainage of surrounding agricultural lands and where land drains have been intersected or blocked during construction these will be re connected or diverted to a suitable outflow;

- The loss of agricultural land due to the construction of the Proposed Development would be a permanent loss which cannot be mitigated except through compensation. Restriction of Common Agricultural Policy (CAP) payments, farmyard building, commercial forestry and commercial tree planting will be addressed by compensation where applicable; and

- Routine maintenance and inspection of cable infrastructure will be notified in advance to minimises disturbance to livestock and farm enterprises.

4. Environmental Incident Response Plan

The Environmental Incident Response Plan (EIRP) will be prepared to ensure that in the unlikely event of an incident, response efforts are prompt, efficient, and suitable for the particular circumstances. The EIRP details the procedures to be undertaken. This plan will be further developed by the appointed Contractor, in line with the mitigation measures detailed in the PECR and NIS for the proposed development, to describe the procedures, lines of authority and processes that will be followed to ensure that all incident response efforts are prompt, efficient and appropriate to the particular incident.

4.1 Plan Objectives

The objectives of this EIRP are to:

- Ensure the health and safety of all workers on site and visitors along the Proposed Development;
- To minimise environmental effects;
- Minimise any impacts on properties, services etc.; and
- Establish procedures that could enable personnel to respond to incidents with an integrated multi-departmental effort and in a manner that minimises the possibility of loss and reduces the potential for affecting health, property and the environment.

4.2 Relevant guidelines

This EIRP will be prepared with regard to the following guidance documents, where relevant:

- Control of Water Pollution from Linear Construction Projects. Technical Guidance (C648) (CIRIA 2006a);
- Control of Water Pollution from Linear Construction Projects. Site Guide (C649) (CIRIA 2006b); and
- Control of Water Pollution from Construction Sites. Guidance for Consultants and Contractors (C532) (CIRIA 2001);
- A Framework for Emergency Management (Department of Housing, Local Government and Heritage 2021);
- Kildare Major Emergency Plan (KCC 2010); and
- Meath Major Emergency Plan (MCC 2020).

4.3 Implementation of the Plan

The EIRP will be reviewed and updated regularly so that it continues to apply to construction activities and is amended when applicable regulations are revised or when amendments are required by a regulatory authority. It will identify the risks associated with health and safety and the environment and will evolve throughout the project lifecycle, with inputs from the Contractor/PSCS and sub-Contractors. It will be the responsibility of the EnCoW or equivalent as stipulated by the Appointed Contractor to maintain and change the EIRP as required. The EIRP may also require amendments from the various stakeholders or suppliers as the Proposed Development progresses.

The mitigation measures specified in the PECR and NIS will minimise / avoid the potential for environmental pollution. However, procedures must be in place in the unlikely event of an incident. The appointed Contractor shall provide a full list, including the exact locations, of all pollution control plant and equipment. All such plant and equipment shall be maintained in place and in working order for the duration of the works.

As part of the Proposed Development and management of the EIRP, the appointed Contractor will:

- Assess the pollution risks and develop emergency and spill response procedures for specific construction activities;
- Obtain details of key people that may need to be contacted for help in the event of an incident;
- Conduct a risk assessment for each activity and all possible emergency scenarios, including but not limited to:
    - Injury or health emergency to site staff or members of the public; bridge strikes, fire, criminal damage, fuel spills, earthworks incidents, siltation incident and other water pollution events, HDD incidents, utility strikes and traffic collision and incidents.
- Identify emergency access routes along the Proposed Development;
- Identify emergency response equipment and resources that will be needed in the event of an environmental emergency, such as spill kits, containment kits and pumps, and identify their locations at regular intervals for ease of access;
- Develop an Emergency Response Team that includes designated individuals (including the EnCoW) who will be responsible for coordinating and implementing the Plan. This team should be trained in emergency response procedures and familiar with the specific environmental risks and hazards associated with the construction project;
- Establish communication protocols with local authorities and emergency services, including phone numbers and contact details for the responsible parties;
- Conduct drills and exercises to test the effectiveness of the Plan and ensure that all team members are familiar with their roles and responsibilities;
- Train personnel to follow procedures and use equipment correctly;
- Take action following an incident to ensure it does not occur again; and
- Review and update the Plan regularly to ensure it remains relevant and effective.

4.4 Environmental Emergency Response Procedures

The following are the procedures for the Environmental Emergency Response Plan. The actual response will be tailored to the nature and scale of the incident: Professional judgment will be applied to ensure the response is appropriate without undermining anyone's safety or protection of the environment, and property.

- Notification and Communication: In the event of an environmental emergency, the first priority is to notify the appropriate authorities and emergency services. The contact numbers should be

readily available and will be displayed at prominent and suitable locations at construction sites during the proposed works. Additional, all numbers will be preprogramed into site members mobile phones so that they can be easily contacted. Table 4.1 provides an example of the relevant Emergency Contact, this will be further developed to include contact details for key personnel with environmental responsibilities, as detailed in Chapter 1 of this CEMP.

- Evacuate all personnel from the immediate area of the incident to a safe location;
- If possible, contain the spill or release using appropriate equipment such as spill kits or containment booms;
- Notify the designated Emergency Response Team members and ensure they have access to the necessary resources and equipment to respond to the emergency;
- Implement emergency response measures, as outlined in the Plan, to mitigate the environmental impact of the incident; and
- Cooperate fully with the relevant authorities and emergency services to ensure a coordinated and effective response.
- All works in the vicinity of the incident must be ceased until such a time as the Site Manager notifies personnel that it is safe to proceed with the works. The Contractor's EnCoW will be responsible for formulating any corrective actions that are required (e.g. repairs silt fencing in the event of damage from extreme weather) in consultation with the Contractor and relevant stakeholders.
- Conduct an assessment of the environmental impact of the incident, including any damage to the surrounding area or waterways.
- Where appropriate, monitor air, soil and water quality to ensure that the environment is returning to normal levels.
- Report the findings of the assessment to the relevant authorities, including details of any remedial action taken to mitigate the environmental impact of the incident.

Table 4.1 : Emergency Contacts

Point of Contact	Telephone Number
Emergency Services (fire, police, ambulance)	999/112
Local Authority	*<Relevant point of contact within Meath and Kildare County Council will be confirmed pre-construction>*
Lead member of the Emergency Response Team (likely Project Supervisor)	*<Relevant details will be confirmed pre-construction>*
Senior Project Manager	*<Relevant details will be confirmed pre-construction>*
Project Supervisor	*<Relevant details will be confirmed pre-construction>*
Safety, Health, Environment, Security and Quality (SHESQ) Manager	*<Relevant details will be confirmed pre-construction>*
Environmental Clerk of Works	*<Relevant details will be confirmed pre-construction>*
ESB (Client)	*<Relevant details will be confirmed pre-construction>*
Irish Rail Emergency	018555454
ESB Emergency Services	1850372999
Waterways Ireland Emergency	*<Relevant details will be confirmed pre-construction>*
Uisce Eireann Emergency	1800278278
Bórd Gais Emergency	1850205050
TII – Motorway Control Centre	0818715100
Health and Safety Authority	1890289389
Inland Fisheries Ireland (IFI)	1890347424
Project Supervisor Construction Stage (PSCS): TBC	*<Relevant details will be confirmed pre-construction>*
Project Supervisor Design Process Lead (PSDP): TBC	*<Relevant details will be confirmed pre-construction>*
Environmental Protection Agency	1890 33 55 99 / 053 9160600

For each incident, the following information will be communicated to the relevant authorities:

- The nature and location of the emergency;
- The time and date;
- Nature of the incident and source-pathway and receptor;
- The estimated size and severity of the incident;
- The type of hazardous materials or substances involved, if applicable; and
- The number of individuals involved or affected by the incident, if applicable.
- Remediation measures undertaken;

- Name of the personnel who reported the incident; and
- Any other relevant details.

The Site Manager will keep a log of all environmental incidents on file and these will be made available to the Local Authority, the independent EnCoW within the Employer's Representative Team and other agencies, as required, such as the Inland Fisheries Ireland or the Environmental Protection Agency.

The communication chain shown in Plate 4.1 will be followed in the event of an emergency.

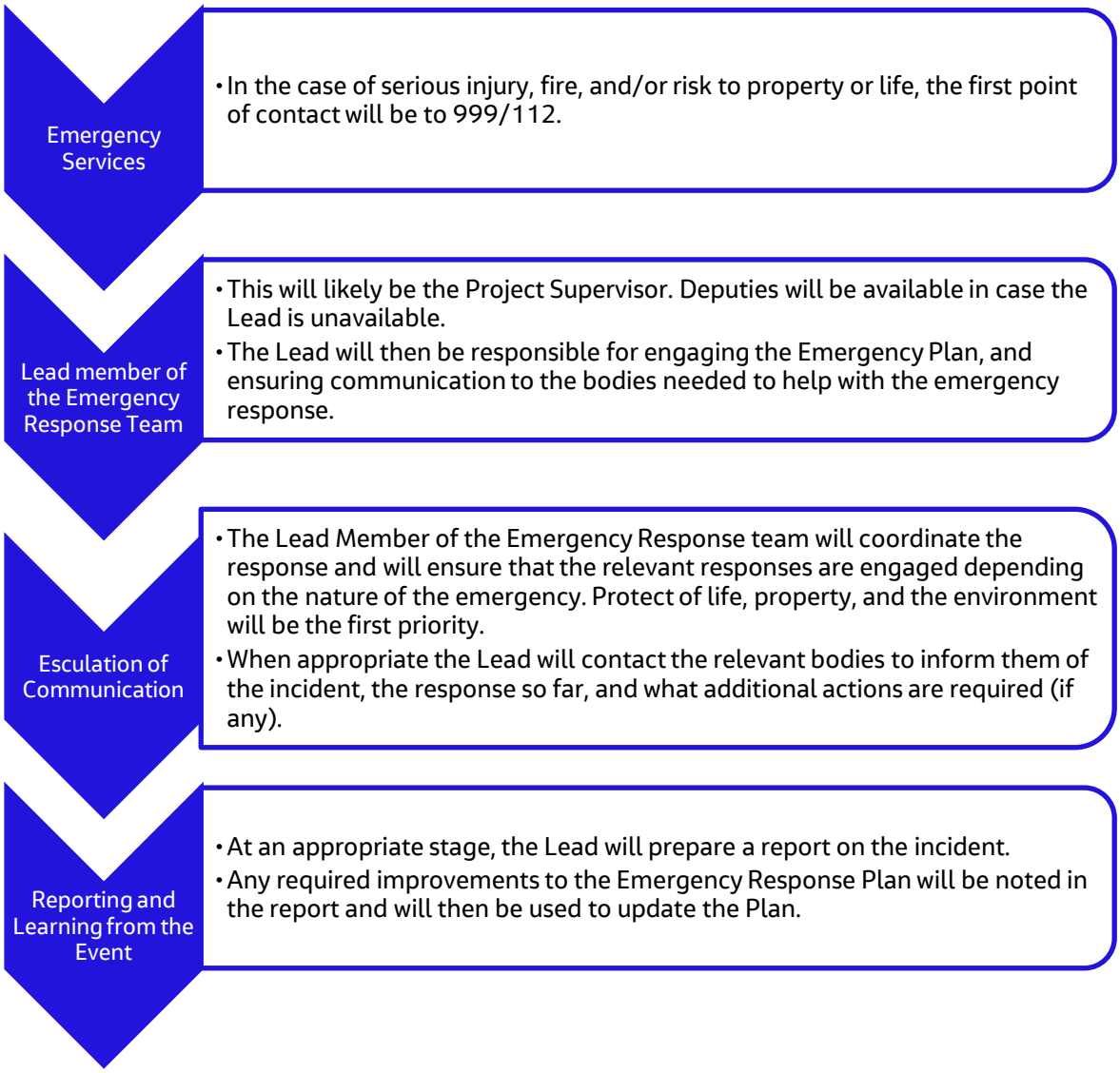

Plate 4.1: Emergency Communication Chain

5. Compliance and Review of the CEMP

Compliance and review are crucial components of the CEMP. The purpose of compliance and review is to ensure that the plan is being followed and that any necessary adjustments are made to mitigate any potential environmental impacts. To achieve compliance and review, the CEMP has the following steps that will be implemented in full:

- Environmental Induction and Awareness Training: All site personnel will receive environmental induction and awareness training in conjunction with site safety training.
- Monitoring: Regular monitoring of the construction site and surrounding areas is essential to identify any potential environmental impacts. This will include monitoring air quality, water quality, noise levels, etc. in-line with the mitigation measures set out in the PECR;
- Reporting: All environmental incidents or near misses should be reported as soon as possible to the relevant authorities and stakeholders. This will allow for prompt action to be taken to mitigate any potential impacts;
- Review: The CEMP will be reviewed regularly to ensure that it is up to date and that any new environmental risks are identified and addressed. The review will take into account any feedback from stakeholders, monitoring data, and any changes to relevant legislation or regulations;
- Auditing: An independent audit of the construction site and the CEMP can provide valuable insights into its effectiveness. Auditing will be conducted by a qualified environmental consultant, and the findings should be used to improve the CEMP; and
- Environmental Complaints – any feedback from the public or stakeholders will be logged and addressed.

5.1 Environmental Induction and Awareness Training

The environmental induction and awareness training will ensure that staff are familiar with the principles of the CEMP, the environmental aspects and potential impacts associated with their activities, the controls in place to mitigate said impacts. Prior to working in areas of particular sensitivity, the Contractor's EnCoW will give a toolbox talk to site personnel. All site personnel will be trained in relation to incident response procedures and drills will be undertaken to ensure timely and effective responses to incidences.

All signed training records will be held on site for future inspection.

5.2 Monitoring

The Contractor will undertake regular inspections, which will include monitoring conformance with the CEMP. The EnCoW will be responsible for carrying out regular monitoring of the Contractor CEMP and will report monitoring findings in writing to ESB and EirGrid on a regular basis (at least weekly, but immediately in the case of incidents or accidents). Assessment forms will be completed during the daily checks. Checks on equipment will be undertaken to reduce the risk of incidents occurring. As a minimum the following equipment will be inspected:

- Fencing;

- Waste storage facilities;
- Chemical storage facilities;
- Bund integrity;
- Foul water storage facilities;
- Storage vessels (including pumps, gauges, pipework and hoses);
- Secondary containment;
- Spill response materials; and
- Equipment with potential to leak oils and other liquids.

Regular inspections will be undertaken to ensure the daily checks are being undertaken correctly.

The inspections will also include:

- Reviewing the daily risk assessment forms;
- Ensuring that faults and defects are identified and rectified; and
- Providing data for performance monitoring.

Immediate action including, if necessary 'stopping a job', will be taken should any incidents or non-conformance with the CEMP be found during inspection.

5.3 Reporting

Reporting provides a means to track progress towards achieving environmental objectives and targets and identify areas where improvements can be made. The reporting will follow the monitoring process described above and reports will be prepared on a monthly basis; where improvements are considered required; or after an incident on site.

Reports set out the objectives of the CEMP and how they are being met. They will also include information on the Proposed Development's environmental performance, including any environmental incidents or non-compliance issues, progress towards achieving objectives and targets, and any corrective actions taken. It will also include information on waste management and recycling efforts, energy and water usage, and any training provided to workers.

5.4 Review

Following the completion of the CEMP report, the Senior Project Manager, Project Supervisor, Safety, Health, Environment, Security and Quality (SHESQ) Manager, EnCoW, Waste Manager, and other members of the Emergency Response Team will meet to discuss and agree any actions required. Any actions will be updated in the CEMP as appropriate and communicated to site members and other stakeholders as needed.

5.5 Auditing

Environmental audit reports will be carried out during the construction phase of the Proposed Development. Audits are additional activities to monitoring and inspections, as audits will be undertaken by a person separate to the day-to-day operation of the project and are to assess regular activities to determine if there are reasons for noncompliance. Audits will also identify opportunities for improving the systems that are in place. Environmental audits will be carried out by a suitably qualified and experienced person that is not involved to the day-to-day operation of the project. Environmental audits will be conducted at planned intervals to determine whether the CEMP is being properly implemented and maintained. Audit reports will be produced identifying examples of good practice, opportunities for improvement, non-conformances, and corrective actions taken, as appropriate. Recommendations for follow-up audits will also be provided and implemented. The findings of the audits will be reported to the Site Manager, the Contractor and the independent EnCoW within the Employer's Representative Team and further relevant project management personnel.

5.6 Environmental Complaints

A formal complaints procedure will be developed and implemented by the Contractor. Signage will be provided at site entrances or on perimeter hoarding locations showing appropriate site contact details. The Contractor will:

- Assess what corrective and preventive action is required;
- Carry out further investigation if necessary;
- Provide a response within a reasonable timescale;
- Notify the relevant stakeholder of the proposed corrective and preventive actions to be adopted; and
- On completion of the corrective action and following agreement that the complaint has been adequately addressed; the Site Manager will close the case and record the date of closure. The complaints register will include details of the preventative measures undertaken to avoid a reoccurrence and will be agreed with the Contractor's EnCoW.

The Contractor will additionally communicate the specifics of any environmental complaint to ESB.

6. References

Directive 2011/92/EU of the European Parliament and of the Council of 13 December 2011 on the assessment of the effects of certain public and private projects on the environment

Directive 2014/52/EU of the European Parliament and of the Council of 16 April 2014 amending Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment

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Transport Infrastructure Ireland (TII). (2020a). The Management of Invasive Alien Plant Species on National Roads – Standard.

Transport Infrastructure Ireland (TII). (2020b). The Management of Invasive Alien Plant Species on National Roads – Technical Guidance.

UK Environment Agency. (2021). Guidance Land Contamination Risk Management (LCRM).

Appendix 5.5 Construction Resource Waste Management Plan

Kildare Meath Grid Upgrade

Construction Resource Waste Management Plan

| 0

April2023

EirGrid

Kildare - Meath Grid Upgrade

Project No: 321084AH
Document Title: Construction Resource Waste Management Plan
Document No.: 0111
Revision: Final
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Date: April 2023
Client Name: EirGrid
Client No: CP966
Project Manager: Andrew Power
Author: Hannah Cullen
File Name:

Jacobs Engineering Ireland Limited

Merrion House
Merrion Road
Dublin 4, D04 R2C5
Ireland
T +353 1 269 5666
F +353 1 269 5497
www.jacobs.com

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Revision	Date	Description	Author	Checked	Reviewed	Approved
		Final	HC	LMcC	FL	FL

1. Introduction

CP966 Kildare Meath Grid Upgrade project (hereafter referred to as the 'Proposed Development') will help transfer electricity to the east of the country and distribute it within the network in Meath, Kildare and Dublin.

A significant number of Ireland's electricity generators are in the south and southwest, where many wind farms and some modern electricity generators are located. The power they generate needs to be transported to where it is needed. The power is mainly transported cross-country on the two existing 400 kV lines from the Moneypoint station in Clare to the Dunstown substation in Kildare and Woodland substation in Meath. The Proposed Development involves improvements to the transfer of electricity from where it is generated in the south and southwest to the east of Ireland and the subsequent distribution within the network of Meath, Kildare and Dublin.

The project will add or upgrade a high-capacity electricity connection between Dunstown substation in Kildare and Woodland substation in Meath. The project is essential to meet the Government of Ireland's Climate Action Plan target of up to 80% renewable energy generation by 2030, which includes transporting electricity from offshore renewable sources. It will also help meet the growing demand for electricity in the East. This growth is due mainly to increased population and economic activity in the region.

To expand on the above requirements, the need is based on two drivers, namely integration of generation (including offshore renewables) and increase in demand. These generation and demand trends will require additional substation feeder and transformer bays for customer connections and to accommodate the associated network expansion.

1.1 The Purpose of the Construction Resource Waste Management Plan

This Construction Resource Waste Management Plan (CRWMP) has been prepared to present the approach and application of waste management and mitigation measures for the construction of the Proposed Development. It aims to ensure that adverse effects from the management of waste during the construction phase of the Proposed Development, on the environment and the local communities, are avoided or minimised. This document forms part of the overarching Construction and Environmental Management Plan (CEMP) for the project and should be read in conjunction with that document.

This CRWMP has been prepared in accordance with the Environmental Protection Agency's (EPA) Best Practice Guidelines for the Preparation of Resource & Waste Management Plans for Construction & Demolition Projects (EPA 2021) (hereafter referred to as the EPA WMP Guidance).

This CRWMP is based on the estimated quantities of waste generation and the proposed management measures at the planning stage. It will be used by the construction contractors as a guidance document for the construction phase of the Proposed Development. They will be required to review and update this CRWMP to ensure that any relevant planning conditions are captured and to ensure that it captures any changes as part of detailed design. The project life cycle of the Plan is illustrated in the EPA WMP Guidance as shown in Image 1.1.

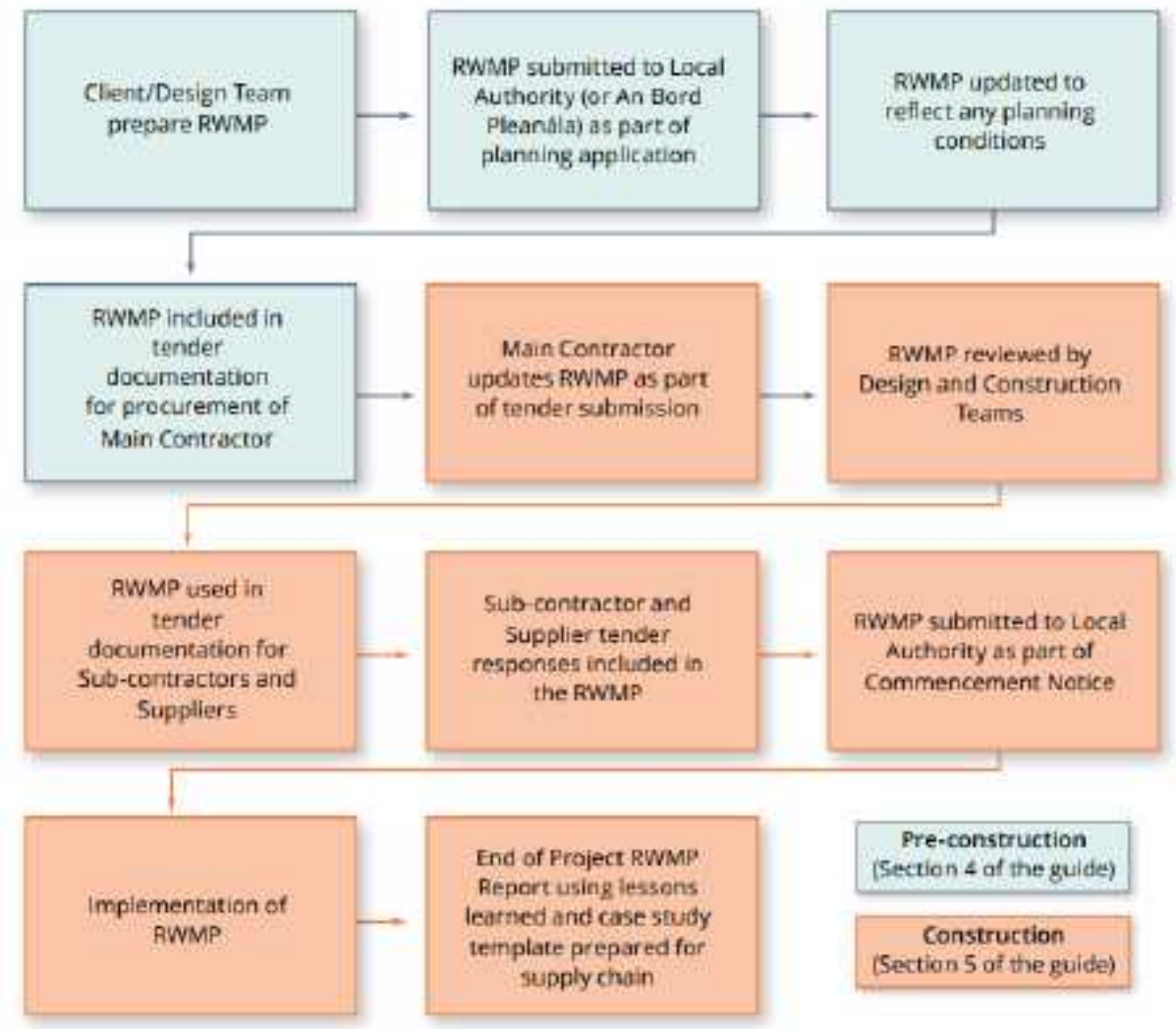


Image 1.1: Project Life Cycle of the Plan (taken from the EPA WMP Guidance Figure 3-1)

The appointed contractors will be required to review the document regularly throughout the construction phase to ensure that it remains relevant to the Proposed Development and its requirements. Reviewing the control measures outlined in the CRWMP throughout the construction phase of the Proposed Development will allow for opportunities for additional efficiencies or waste reduction are exploited as soon as possible and will ensure that data is collected on an ongoing basis to provide increased accuracy.

In accordance with the EPA WMP Guidance, the Proposed Development would fall within the Tier 2 project threshold ('*larger scale projects, including Strategic Infrastructure Developments, Strategic Housing Developments, infrastructure projects (road, rail, gas, energy)*'), which requires a bespoke CRWMP. In alignment with Appendix C of the EPA WMP Guidance, this CRWMP has the following structure:

- Introduction;
- Project Description;
- Roles and Responsibilities;

- Design Approach;
- Key Materials, Quantities and Costs;
- Site Management; and
- Site Infrastructure.

1.2 Relevant Waste Policy and Legislation

Applicable legislation, policy and best practice guidance was reviewed as part of the preparation of this CRWMP. The following directives and legislation are the central driver of waste policy in Ireland:

- Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain directives (Waste Framework Directive);
- European Union (Waste Directive) Regulations 2020 (S.I. No. 323/2020);
- Waste Management Act 1996 (Number 10 of 1996);
- Council Directive 1999/31/EC of 26 April 1999 on the landfill of waste (Landfill Directive);
- Waste Management (Facility Permit and Registration) Regulations 2007 (S.I. No. 86/2008);
- Waste Management (Collection Permit) Regulations 2007 (S.I. No. 820/2007);
- Waste Management (Shipments of Waste) Regulations 2007 (S.I. No. 419/2007); and
- Waste Management (Hazardous Waste) Regulations 1998 (S.I. No. 163/1998).

The following guideline and policy documents have been referenced in preparation of this CRWMP:

- Best Practice Guidelines on the Preparation of Waste Management Plans for Construction and Demolition Projects (EPA 2021);
- Construction & Demolition Waste, Soil and Stone Recovery / Disposal Capacity – Updated report 2020 (Regional Waste Management Offices 2020);
- A new Circular Economy Action Plan for a Cleaner and More Competitive Europe (European Commission 2020);
- Circular Economy Programme 2021-2027 (EPA 2021);
- A Waste Action Plan for a Circular Economy – Ireland's National Waste Policy 2020-2025 (Government of Ireland 2020);
- Whole of Government Circular Economy Strategy 2022 – 2023: Living more, Using Less (Government of Ireland 2021);
- Environmental Protection Agency (EPA) Waste Statistics for Ireland (EPA 2022);
- National Waste Action Plan (Government of Ireland 2021);
- EU Construction and Demolition Waste Protocol and Guidelines (European Commission 2018);

- Transport Infrastructure Ireland (TII) The Management of Waste from National Road Construction Projects. Standard GE-ENV-01101 (TII 2017);
- Waste Management Plan for the Eastern-Midlands Region 2015 – 2021 (EMWR 2015);
- Circular Economy Action Plan (European Commission 2015); and
- Waste Classification – List of Waste and Determining if Waste is Hazardous or non-Hazardous EPA (2015).

This aspect of the CRWMP will be kept under review and updated as required as a result of new or amended legislation, standards and guidance.

1.2.1 Irish Waste Management Targets

Under the Waste Framework Directive and other related EU Directives, there are a number of waste targets established for EU Member States. These targets cover household recycling, C&D waste, packaging waste, end-of-life vehicles, batteries, WEEE and landfilling. The EPA tracks and reports Ireland's progress against the targets set out at EU level.

With respect to the Proposed Development the most applicable target is laid out in Article 11(2)b of the Waste Framework Directive regarding construction and demolition (C&D) waste:

'*By 2020, the preparing for re-use, recycling and other material recovery, including backfilling operations using waste to substitute other materials, of non-hazardous construction and demolition waste excluding naturally occurring material defined in category 17 05 04 in the list of waste shall be increased to a minimum of 70 % by weight*'.

According to the most recent EPA update from October 2022, Ireland had met this target with 78% achieved in 2020.

1.3 Objectives of the CRWMP

The overall objective of the CRWMP is to minimise the quantity of waste material generated and disposed of as a result of the construction phase of the Proposed Development. The key principles which drive this objective are the Circular Economy model and the Waste Hierarchy. These are explained further in the following sections.

1.3.1 Circular Economy

The principal objective of sustainable resource and waste management is improving the efficiency of resource use, i.e. maintaining the value of materials and resources within the economy for as long as possible, minimising the generation of waste. This model is referred to as the Circular Economy model, where materials or resources are continually reused within the economy, through straight reuse, repair, redistribution, refurbishment or remanufacture. This differs from the traditional linear model of produce, consume, and discard. The circular economy is illustrated in Image 1.2.

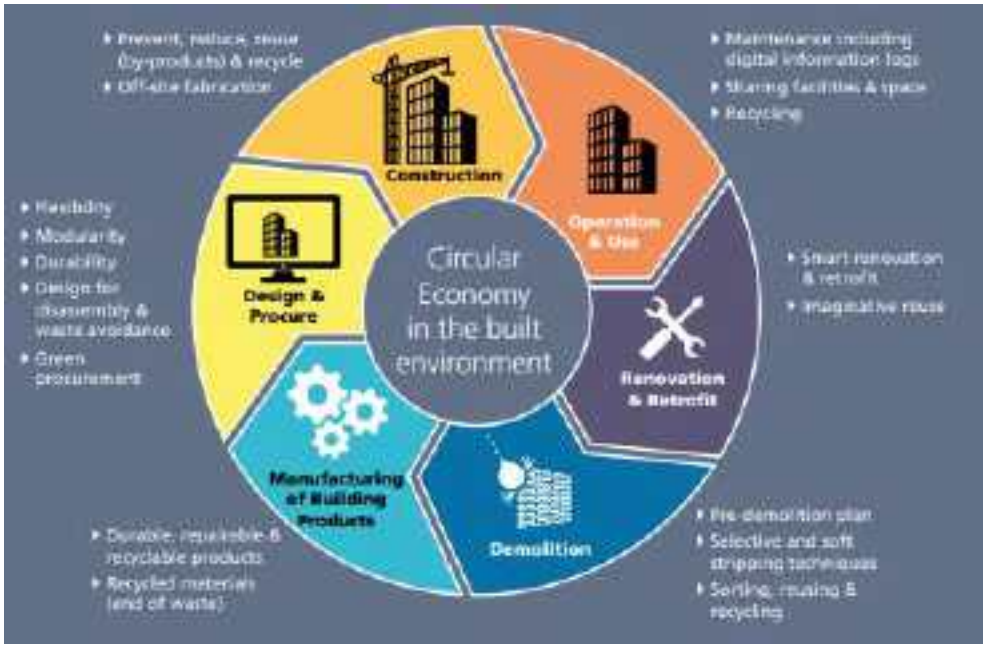


Image 1.2: Circular Economy Model (taken from the EPA WMP Guidance Figure 2-1)

1.3.2 Waste Hierarchy

Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain Directives (referred to as the Waste Framework Directive) defines waste as '*any substance or object that the holder discards or intends to or is required to discard*'.

The Waste Hierarchy as shown in Image 1.3, prioritises prevention over re-use, recycling, recovery, and disposal. It establishes the order of preference for the management of waste, with the most preferential management method be to prevent the creation of waste in the first place. The ultimate goal is to reduce, as far as is possible, the quantity of waste disposed of to a landfill, thus increasingly treating waste as a resource.

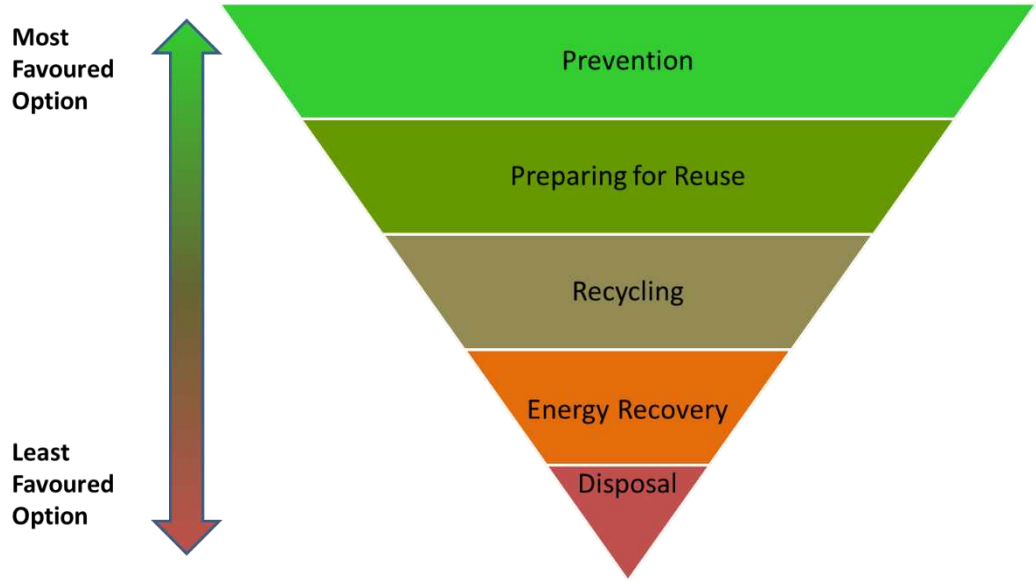


Image 1.3: Waste Hierarchy (as per Waste Framework Directive)

2. Project Description

The Proposed Development is a 52.9 km underground cable between Woodland 400 kV substation in Meath to the Dunstown 400 kV substation in Kildare to the south. The 400 kV underground cable will be sited along existing roads and will be in a trench generally 1.3-1.7 m deep, 1.5 m wide and will run the full length of the scheme. There are locations where these dimensions will vary such as watercourse crossing and where existing utilities need to be crossed.

The cable will be delivered to the construction site in lengths and will be joined together by joint bays (precast concrete structures), on average every 745 m. Passing bays will be located at 33 no. of the joint bays. Passing bays are temporary mitigation measures during construction that will allow traffic to flow around the construction area. The passing bays will be 5.5 m wide and approximately 100 m in length allowing traffic to flow in one direction at a time and are expected to be controlled by temporary traffic lights. Additional land take of up to 10 m is required for the storage of excavated material adjacent to a passing bay, making the combined land take required at these locations 15.5 m wide. Additional permanent land take will also be required at the location of joint bays where the trench will be widened to facilitate their construction.

The Proposed Development comprises:

- Approximately 52.9 km of new 400 kV Underground Cable (UGC) including communication links and fibre optic cables, between the existing Woodland 400 kV substation in County Meath, and the existing Dunstown 400 kV substation, County Kildare;
- Associated extensions to the existing Woodland 400 kV and Dunstown 400 kV Substations to accommodate the proposed UGC; and
- All associated and ancillary development, including temporary construction compounds and laydown areas, tracks, site development, landscaping works, fencing and vegetation removal.

The majority of the underground cable will be installed in the public road network. Approximately 43.3 km will be in-road and 9.5 km will be in off-road sections.

Further detail of the Proposed Development is provided in Chapter 5 of the Planning and Environmental Considerations Report and in the CEMP.

3. Roles and Responsibilities

ESB will be responsible for the appointment of the Contractor. The CEMP lists specific roles and their responsibilities with respect to the management of the CEMP, including a "Waste Manager". Please refer to the overarching CEMP for further detail on the other Environmental Project Construction Team roles

The appointed contractor will appoint a suitably qualified person as Waste/Resource Manager to implement and maintain the CRWMP. That person will be responsible for the following:

- Implementing the CRWMP throughout the Construction Phase of the Proposed Development;
- Detailing and maintaining the CRWMP, and updating it as appropriate;
- Following each update or revision of the CRWMP, providing the CRWMP to the Client, appointed contractor and all relevant personnel;
- Ensuring that all personnel are instructed about the objectives of the CRWMP and informed of the responsibilities which fall upon them as a consequence of its provision. This will be carried out during the induction process for new personnel;
- Communicating the requirements of the CRWMP using for example, toolbox talks, prominently displayed notices and audits as relevant;
- Maintaining accurate records of waste / surplus materials generated and the costs associated with waste generation and management; and
- Ensuring, where training is required regarding the handling and management of wastes on-site, that this is provided, where required.

The appointed contractor and all personnel handling wastes must be in a position to:

- Distinguish reusable materials from material suitable for recycling;
- Ensure maximum segregation of waste and recyclables at source;
- Co-operate with the appointed contractor on best locations for stockpiling reusable material;
- Separate material for recovery; and
- Identify and liaise with operators of recovery outlets as appropriate.

Copies of the CRWMP will be made available to all relevant personnel.

On appointment, the contractor should review this section of the CRWMP, add in the details of the personnel and outline their specific responsibilities. The hierarchy of all personnel designated with responsibilities under this CRWMP should be included to make clear the reporting chain.

4. Design Approach

The Proposed Development, as with any such infrastructure project, will result in the generation of surplus materials and waste. This material will need to be handled in a manner which is in compliance with all applicable legislation as well as all Client, local and national policy.

At a minimum the appointed contractor will manage surplus material in accordance with the Waste Hierarchy (refer to Section 1.3.2). This states that prevention of waste should be the first priority in designing and managing the Proposed Development, with disposal being the least preferred option.

4.1 Waste Reduction / Prevention

Where practicable, and throughout all stages of design development and construction, opportunities to minimise or prevent waste generation will be sought. Measures such as design optimisation, careful planning of material use and storage, good practice with respect to the handling of materials, and the reuse of material on site will be prioritised.

The following measures will be implemented at a minimum to reduce and/or prevent the generation of excess surplus materials and waste throughout the construction phase of the Proposed Development:

- Materials required for the construction of the Proposed Development will typically be ordered and managed on a "Just-In-Time" basis in so far as is reasonably practicable. This will reduce the potential for over-ordering, and will reduce the potential for materials to be damaged or spoiled due to prolonged storage times;

- Where materials are required to be stored, they will be stored in a suitable manner in an appropriate storage area or receptacle. This will reduce the potential for losses or spills, and reduce the potential for damage due to incorrect storage measures;

- Waste storage areas will be clearly defined and separated from material storage areas to prevent potential contamination of materials, making them unsuitable for their intended use.

Clean excavated material should be reused within the Proposed Development as fill or for landscaping where reasonably practicable to avoid the material needing to be removed for management elsewhere. Where reuse within the Proposed Development is not feasible, either due to the material being inappropriate for such reuses or being in excess of what is required, alternative solutions will be explored to prevent the material becoming a waste. The option to manage any surplus clean soil and stone material as a by-product in accordance with Article 27 of the European Communities (Waste Directive) Regulations 2011 will be investigated. Where this is deemed to be an appropriate option, the appointed contractor will be responsible for:

- Storage of any Article 27 material in such a manner that does not compromise its suitability for further use under Article 27 (i.e. stored separately to any waste materials, stored away from any potential sources of contamination, etc.);

- Identifying appropriate and compliant locations for the reuse of such material; and

- Submitting the required EPA notification (including completing all assessments and documentation required in order to make that notification).

4.2 Waste Reuse / Recycling

Where waste is generated / cannot be completely prevented, the preferred option for management of the waste will be reuse or recycling.

The appointed contractor will be responsible for maximising reuse and recycling of waste materials arising from the construction of the Proposed Development, and for achieving the waste management targets set by the Client. Disposal will only be considered as a last resort where there are no viable options for reuse or recycling available. The following potential waste streams will likely be reusable / recyclable:

- Clean soil and stone;
- Concrete;
- Metals;
- Packaging (plastics, cardboard, paper, wood pallets);
- Material containers (i.e. spent containers not containing hazardous substances or which have been adequately cleaned to not be hazardous (if possible and applicable)); and
- Green / food waste (i.e. from vegetation clearing and from canteens / breakrooms).

In order to maximise the potential for reuse or recycling of any waste generated by the Proposed Development, the following measures will be implemented by the appointed contractor:

- Clean excavated soil and stone, which is not suitable for reuse within the Proposed Development or elsewhere as a by-product in accordance with Article 27, will be managed as a waste:
    - Waste soil and stone will be stockpiled on site in advance of removal by a contractor in possession of an appropriate Waste Collection Permit. Waste will be collected in a timely manner and will not be stored for longer than six months. Where there is a requirement for storage in excess of six months, the appointed contractor will be responsible for attaining the applicable waste facility consent (Certificate or Registration or Waste Facility Permit from the local authority, or waste licence from the EPA);
    - Stockpile sizes and forms will be appropriate to the nature of material being stockpiled. Different material types should not be mixed in stockpiles;
    - Where materials have different end uses (i.e. reuse on site, reuse as a by-product, or being treated as a waste) they must be stockpiled separately to prevent contamination;
    - Any waste soil and stone generated will be taken to a suitably licensed or permitted waste facility.
- Suitable waste storage receptacles will be made available for all recyclable waste types (e.g. skips or collection areas will be enclosed where required to prevent damage from the weather);
- Waste will be segregated at source to improve the level of reuse and recycling, with labelling / signage used to denote where each waste stream is to be stored; and

- Waste which is unsuitable for reuse / recycling will be stored separately to recyclables in order to prevent contamination.

4.3 Other Waste

Where all viable options for reuse / recycling have been exhausted, only then will waste be disposed of. This type of waste will likely be composed of predominantly mixed municipal wastes and hazardous waste. Where cross contamination of other waste streams occurs, this can also render a reusable or recyclable waste unsuitable for reuse / recycling, resulting in a requirement for disposal.

Typical types of hazardous waste on construction projects generally consist of:

- Batteries;
- Oil-contaminated items (e.g. oily rags, filters);
- Fluorescent lightbulbs (where used in temporary site offices and welfare facilities);
- Packaging for hazardous material (e.g. pain cans, fuel / oil drums);
- Contaminated spill clean-up materials (e.g. absorbents, cloths); and
- Contaminated soils (if encountered during excavation).

Hazardous waste generated on site will be managed by the appointed contractor in accordance with applicable legislation and national policy as follows:

- Appropriate, segregated waste receptacles will be provided for the storage of the different hazardous waste streams, with each hazardous waste type to be stored separate from other hazardous waste types;
- Hazardous waste storage will be on hardstanding or bunded to avoid leaking of contaminated material into the underlying soil;
- Appropriate signage will be used to denote the disposal areas for hazardous waste;
- Hazardous waste will only be collected by contractors in possession of a suitable Waste Collection Permit and will be disposed of to a suitably licensed hazardous waste facility; and
- Records of hazardous waste will be kept and retained for a minimum of three years in accordance with the requirements of the Waste Management (Hazardous Waste) Regulations 1998 (S.I. No. 163 of 1998).

5. Key Materials, Quantities and Costs

5.1 Key Materials / Waste

The main waste streams which are likely to arise during the construction phase of this Proposed Development are listed in Table 5.1. The List of Waste (LoW) Code is provided for each waste type, with an asterisk (*) denoting any waste types which are hazardous

Table 5.1: Main Waste Types Likely to be Generated during Construction

Waste Type	LoW Code
Concrete	17 01 01
Wood, glass and plastic	17 02 01 – 17 02 04*
Bituminous mixtures	17 03 01* & 17 03 02
Metals	17 04 01 – 17 04 11
Soil and Stones	17 05 04
Wastes of liquid fuels	13 07 01* – 13 07 03*
Absorbents, filter materials, wiping cloths and protective clothing	15 02 02* – 15 02 03
Batteries and accumulators	16 06 01* – 16 06 06*
Waste packaging	15 01 01 – 15 01 11*
Packaging containing residues of or contaminated by hazardous substances	15 01 10*
Mixed C&D waste	17 09 04
Waste Electrical and Electronic Equipment (WEEE)	20 01 35* & 20 01 36
Biodegradable wastes (e.g. food, vegetation)	20 01 08 & 20 02 01

5.2 Estimated Material / Waste Quantities

Table 5.2 provides an estimate of the quantities of material and waste arising during the construction phase. These quantities are indicative only, based on the outline design for the planning application, and are for the main waste streams anticipated. The below will be reviewed and updated by the appointed contractor once the detailed design has been completed.

Table 5.2: Material Quantity Estimate

			Import (m^3)	Export (m^3)		Transported Material Compacted (m^3)	Transported Material (t)
By Location	**Cable Route**						
	In-road	Asphalt	6545	6545		13089	30105
		Engineered Fill	*	-		52356	115183
		Subsoil	-	52356		52356	78534
		Concrete	37905	-		37905	-
	Off-road	Topsoil	-	-		-	-
		Subsoil	-	8691		8691	13036
		Concrete	8054	-		8054	-
	Permanent Access Tracks	Top Soil	-	4803		4803	6724
		Engineered Fill	7205	-		7205	15851
	Enabling Works						
	Passing Bays	Topsoil	-	-		-	-
		Asphalt	1421	1421		2843	6538
		Engineered Fill	5685	5685		11370	25014
		Subsoil	-	-		-	-
	Construction Platforms	Topsoil	-	-		-	-
		Engineered Fill	3314	3314		6629	14583
		Subsoil	-	-		-	-
	Compounds	Top Soil	-	-		-	-
		Engineered Fill	37540	37540		75080	165176
By material		Asphalt	7966	7966		15932	36642
		Top Soil	-	4803		4803	6724
		Subsoil	-	61047		61047	91570
		Engineered Fill	53744	46539		152639	335807
		Concrete	45958	-		45958	-
		Total	**108000**	**121000**		**281000**	**471000**

*All engineered road fill will be reused but will require movement around the project due to construction space constraints.

5.3 Route Options for Resource / Waste Management

Where surplus material and waste are generated that are unsuitable for reuse within the Proposed Development they will need to be managed in accordance with all applicable legislation.

5.3.1 Article 27

Where there is surplus clean soil and stone generated by the Proposed Development, there is the option to manage it as a by-product as defined in Article 27 of the European Communities (Waste Directive) Regulations 2011 (S.I. No. 126 of 2011). Surplus soil and stone which has been excavated as part of construction, and which cannot be reused within the project (e.g. as fill or for landscaping) may be managed as a by-product under Article 27 if it satisfies the following requirements:

> *'(a) further use of the substance or object is certain;*
>
> *(b) the substance or object can be used directly without further processing other than normal industrial practice;*
>
> *(c) the substance or object is produced as an integral part of a production process; and*
>
> *(d) further use is lawful in that the substance or object fulfils all relevant product, environmental and health protection requirements for the specific use and will not lead to overall adverse environmental or human health impacts.'*

If it is proposed to manage any material arising from the construction as a by-product instead of a waste, an Article 27 Notification will be made by the appointed contractor to the EPA. As part of this process the appointed contractor must be able to demonstrate that the above requirements are satisfied.

This section of the CRWMP should be updated by the appointed contractor with the specific details if/when a by-product end user has been identified and the By-Product Notification has been made to the EPA.

5.3.2 Waste Management

There are a number of waste management facilities within counties Kildare and Meath and within the wider Eastern and Midlands Region which accept C&D waste. The most prominent C&D waste type likely to be generated by the construction of the Proposed Development will be uncontaminated soil and stone (List of Waste (LoW) Code 17 05 04). The potential waste management facilities available within Meath and Kildare which accept such C&D waste are summarized in Table 5.3.

Table 5.3: Summary of Waste Management Facilities within Meath and Kildare Which Accept C&D Soil & Stone Waste (February 2023 - Source: National Waste Collection Permit Office (NWCPO) website, EPA website)

Facility Type	Number of Facilities
County Meath	
EPA Licensed	10
Waste Facility Permit	21
Certificate of Registration	6
County Kildare	
EPA Licensed	5
Waste Facility Permit	15
Certificate of Registration	8

Table 5.3 provides an overview of the numbers of facilities operating at the time of compiling this CRWMP (February 2023), however new facilities may come on stream or existing facilities may cease operations in the meantime. The list of waste management facilities will need to be reviewed and updated by the appointed contractor in advance of commencement of construction. Where practicable, waste facilities near to the Proposed Development will be used in order to reduce the impacts associated with transportation of the waste.

Suitable waste facilities will be identified for each waste stream. The appointed contractor will keep records of Waste Licences, Waste Facility Permits, or Certificates of Registration for any facilities being used by the Proposed Development. Waste will only be transported from site by vehicles in possession of an appropriate Waste Collection Permit for the type of waste being transported and the area in which it is being transported. The appointed contractor will retain records of the wastes transported from the site and the Waste Collection Permits of the transporters.

5.4 Cost of Resource Management

The total cost associated with the management of surplus materials and waste from the Proposed Development will be calculated. At this preliminary stage in the Proposed Development, the costs of materials and waste disposal are unknown. Once exact quantities of materials and wastes are known, the full costs can be calculated by the appointed contractor. Such calculations should be reviewed and amended as needed throughout the construction phase.

The costs of waste management will depend on the waste management routes selected and waste management contractors used. The Landfill Levy as per the Waste Management (Landfill Levy) Regulations 2015 is currently €75 per tonne of waste being disposed of to landfill. It will therefore be economically advantageous to divert as much material as possible away from the disposal route. This will be weighed up by the appointed contractor in advance of, and during, the construction phase of the Proposed Development to find the best solutions.

6. Site Management

6.1 Waste / Resource Manager

As outlined in Section 3, the construction contractor will appoint a Waste / Resource Manager with the responsibility to manage materials and waste in accordance with the requirements laid out in this CRWMP and any other requirements or policies from the Planning Authority and Client. They will be responsible for the day-to-day management of waste and resources and for updating and amending this CRWMP as needed.

6.2 Training

All site personnel will be made aware of their responsibilities with respect to the implementation of this CRWMP. This should be covered through training, including:

- Site induction training for new site operatives; and
- Periodic toolbox talks to refresh operatives on their requirements, particularly after updates to the CRWMP or following any incidents or issues arising from improper waste management practices.

The topics to be covered in training should include:

- The site-specific waste management procedures and role of all site operatives in implementing these procedures;
- The key personnel responsible for waste and resource management;
- Commitments and targets for waste and materials management;
- Information on the waste storage areas, including any specific storage requirements for specific materials;
- Detail how waste and materials will be segregated and the importance of adhering to the required source segregation policies;
- Details on response to incidents such as spills;
- Information on the handling of any hazardous wastes; and
- Document control requirements.

6.3 Sourcing and Management of Materials and Waste Services

The appointed contractor will be responsible for the sourcing of materials and the appointment of suitable waste contractors. Considerations when identifying these will include transportation requirements for imported materials and exporting of waste, material sources, sustainability within supply chains, availability of materials, costs of material supply and waste management, and opportunities for waste minimisation through agreements to return unused surplus materials. All of these considerations should be weighed when procuring suppliers or waste contractors to ensure the most efficient and sustainable resource and waste management.

6.4 Record Keeping

A key aspect of waste management legislation is the concept that a waste producer is responsible for their waste "from cradle to grave", i.e. the producer is responsible for the compliant management of any waste they create until it reaches its final disposal destination or has been treated to the extent that it is no longer considered a waste. To this end, record keeping is very important. Records of all waste and materials will be kept by the appointed contractor. These records will include, but not be limited to:

- Records of updates to the CRWMP;
- Minutes of meetings with respect to materials and waste management;
- Records of deliveries of materials on site;
- Records of waste quantities collected from site;
- A copy of Waste Licences / Waste Facility Permits / Certificates of Registration for any waste facilities to which waste from the site is transported;
- A copy of Waste Collection Permits for any waste collection vehicles being used to transport the waste to the waste facilities;
- Copies of any Waste Transfer Forms from the transfer of hazardous waste;
- Copies of any Transfrontier Shipment paper work where any waste from the site is to be shipped outside of Ireland for treatment / disposal (if applicable);
- Training records;
- Records of any site inspections and audit findings and any remedial actions undertaken as a result; and
- Records of any environmental incidents.

6.5 Communications

The requirements and contents of the CRWMP will be communicated to site operatives through site induction training and toolbox talks as outlined in Section 6.2.

The Waste / Resource Manager will be the designated contact person for any communications associated with waste and resource management during the construction phase. They will be responsible for any communications with the Local Authorities, Client, local community or any other interested parties. This may include:

- Regular updates (as required) to the Client on resource and waste targets, procedures or issues;
- Providing the CRWMP to the Local Authority if requested;
- Management of any resource or waste-related complaints received by the appointed contractor;
- Engagement with the Client, Local Authorities or EPA with respect to any site inspections / audits, including being available to the inspector / auditor during any site visits, providing any

requested records, and liaising with respect to close out of any corrective or follow-up actions required; and

- Preparation of a final report on resource and waste management on completion of the Proposed Development.

6.6 Audits / Inspections

Audits / inspections are an important aspect of environmental management of the construction phase of the Proposed Development. These shall be carried out by the Waste / Resource Manager on a regular basis to ensure that the CRWMP is effective and fit for purpose. Audits / inspections may also be carried out by the Client (or someone acting on their behalf), by the Local Authorities or by the EPA.

Regular audits / inspections by the Waste / Resource Manager will aid in the identification of potential issues or areas for improvement and will aid in the regular review and update of the CRWMP. These inspections / audits will range from regular checks of the materials and waste storage areas to ensure they are kept tidy and being utilised correctly, to larger audits of the project's performance against the targets / KPIs set at the start of the construction phase. Where issues are identified they should be remedied as quickly as possible.

Where audits / inspections are undertaken by the Client, the Local Authorities or the EPA, the Resource / Waste Manager will be responsible for accommodating this, including meeting with the auditor(s) / inspector(s), escorting them to any places they wish to see on site, and providing them with any information or records they wish to examine. Where non-compliances or areas for improvement are identified by the auditor(s) / inspector(s), the Resource / Waste Manager will be responsible for actioning these and reporting on progress towards close-out to the auditor(s) / inspector(s).

Remedial actions shall always be taken as quickly as possible. Where actions can be taken immediately (i.e. housekeeping issues, signage issues, etc.) these should be closed out as soon as practicable. For actions required in relation to policies or procedures, these should be actioned as soon as reasonably practicable and by an agreed close-out date.

7. Site Infrastructure

For the construction phase of the Proposed Development, a number of site compounds have been proposed at various locations along the approximately 53km route. For further detail on the construction compounds refer to the CEMP.

With respect to resource and waste management on site, the appointed contractor shall, at a minimum:

- Set up designated storage locations for materials and waste, including areas for stockpiling;
- Put up signage to indicate what materials or waste should be stored, and the specific storage locations;
- Provide appropriate storage receptacles for each material, i.e. bunded storage cabinets, drip trays, bins, skips, secure containers for hazardous waste, etc.;
- Ensure any storage areas will be suitably contained or bunded as required;
- Ensure storage areas are large enough and are safely accessible for any personnel or vehicles which need to access them;
- Situate storage areas away from areas which pose a high risk to human or natural environments, and they will be set up in accordance with any mitigation measures or planning conditions as applicable (e.g. suitable buffer zones, maximum heights, suitable bunding, etc.); and
- Ensure storage areas are kept tidy, and that materials are not stored longer than required.

The storage areas will be set up in a location and configuration which provide adequate space for deliveries or collections to take place.

Appendix 7.1 Known Community and Commercial Properties within 300m of the Proposed Development

Table 7A Known Community and Commercial Properties within 300m of the Proposed Development

Community	Address / Location		Commercial	Address / Location
Larchill Arcadian Gardens	Kilcock, Co. Kildare. W23 Y44P		Barstown Commercial Park	Barstown, Dunboyne, Co. Meath. A86 T289
Forest School Ireland	Phepotstown, Rathganley, Co. Meath		Applegreen Service Station	Barstown, Dunboyne, Co. Meath. A86 VF80
Medilase Laser Clinic / Kilcock Physiotherapy Clinic	Ryebridge Avenue, Commons East, Kilcock, Co. Kildare. W23 A5X9		Hatchet Inn Pub	Barstown, Dunboyne, Co. Meath. A86 NY13
Tigers Childcare Ryebridge	Ryebridge Avenue, Commons East, Kilcock, Co. Kildare. W23 XK51		Jensal Wholesale Pub	Mullagh, Kilcock, Co.Meath. W23 WT7W
St. Joseph's Cemetery Kilcock	R148, Kilcock, Co. Kildare.		Fordes Superstore	Mullagh, Kilcock, Co. Meath. W23 WDX8
Tír na nóg Montessori Preschool	Boycetown, Kilcock, Co Kildare.		Kilcock Autos	Kemmins Mill, Kilcock, Co. Meath. W23 P58C
Kilcock Celtic Football Club	Bawnogues, Kilcock, Co.Kildare		Maxxfit Ireland	Ryebridge Avenue, Commons East, Kilcock, Co. Kildare. W23 A5X9
First Care Nursing Home - Mountpleasant Lodge	Clane Road, Portgloriam, Kilcock, Co. Kildare. W23 XT7W		Mulligan's Sawmills	Boycetown, Kilcock, Co Kildare. W23 X4XC
Rathcoffey GAA Club	Moortown, Rathcoffey, Co. Kildare W91 W292		Musgrave Retail Partners Ireland	Boycetown, Kilcock, Co.Kildare. W23 E2HY
Premier Physical Therapy	The Cott, Co. Kildare		Hot Wheels Auto/Kilcock Tyre Centre	Commons South, Kilcock, Co. Kildare. W23 HD1H
Focolare Centre	Curryhills House, Curryhills, Prosperous, Co. Kildare. W91 XR23		DKM Motors / Lyons & Burton Ltd.	Clane Road, Kilcock, Co. Kildare. W23 P580

Community	Address / Location		Commercial	Address / Location
Hewetson National School	Millicient North, Clane		Westside Auto Care & Windscreen Centre	Clane Road, Kilcock, Co. Kildare. W23 X8H4
St Michael and All Angels Church	Milicent North, Co. Kildare		Portgloriam Business Campus	Portigloriam, Kilcock, Co. Kildare W23 XH0A
St Kildare Clane Scout Group	Parish Hall, Millicent South, Sallins, Co. Kildare W91 P6P4		Inver Service Station	Donadea, Painstown, Co. Kildare W91 X97V
Sallins Scout Den	Oldbridge Park, Monread North, Sallins, Co.Kildare.		Painstown Precast Concrete	Painstown, Donadea, Naas, Co. Kildare W91 DX57
Acorn Montessori & Creche	Osberstown Road, Naas, Co.Kildare.		Glenora Nursery – Wholesale Plant Nursery	Betaghstown, Clane, Co. Kildare W91 FX31
Cocoon Childcare Naas	The Millenium Business Park, Monread South, Naas, Co. Kildare		APS Autogates	Ballynagappagh, Clane, Co. Kildare W91 D966
Naas Community College	Millennium Park, Osberstown, Naas, Co. Kildare. W91 P93F		Car – Tork Garage	Firmount West, Clane, Co. Kildare
Tender Years (Childcare Agency)	Jigginstwon Lodge, Carragh Road, Naas West, Naas, Co. Kildare W91 NX77		Clement & Grace Hat Shop	Longtown North, Prosperous, Co.Kildare. W91 FX4N
Naas Athletics Club	Carragh Road, Ploopuck, Naas, Co. Kildare		Firmount Demense Events Venue	Firmount Demense, Co.Kildare
K Leisure Naas / Naas Sports Centre Complex	New Caragh Court, Naas, Co. Kildare. W91 VP27		Boran Packaging Limited	Millennium Park, Monread South, Naas, Co. Kildare. W91 PY99
Barneys Playschool	Jigginstown Park, Naas West, Co. Kildare W91 N720		Leinster Mills Café	Leinster Mills, Osberstown, Naas, Co. Kildare. W91 X264
Naas Further Education and Training Centre	Jigginstown, Naas, Co. Kildare. W91 FT54		Kennedy Security & Consultancy Ltd.	Elm House, Millenium Park, Naas, Co. Kildare
Enable Ireland Kildare Children's Services	Jigginstown Lodge, Jigginstown, Naas, Co. Kildare.		International Fund Services (Ireland) Ltd	Chestnut House, Milliennium Park, Naas, Co. Kildare.

Community	Address / Location		Commercial	Address / Location
Gaelscoil Nas Na Roigh	Piper's Hill Educational Campus, Naas, Co. Kildare		Kerry Global Centre	Millennium Park, Naas, Co. Kildare. W91 W923
Piper's Hill Montessori School	Piper's Hill Educational Campus, Naas, Co. Kildare		Irish Commercials Volvo Truck and Bus	Millennium Park, Naas, Co. Kildare.
Piper's Hill College	Piper's Hill Educational Campus, Naas, Co. Kildare		Applegreen Milennium Park	Millennium Park, Osberstown, Naas, Co. Kildare.W91 K19X
St Davids National School	Piper's Hill Educational Campus, Naas, Co. Kildare. W91 AE26		Aldi Jigginstown	Newbridge Road, Jigginstown Park, Naas West, Co. Kildare
Killashee Multi-Denominational National School	Kilcullen Road, Naas, Co. Kildare. W91 YV60		Chadwicks Building Providers	Newbridge Road, Naas, Co. Kildare. W91 XN7T
Killashee Leisure Centre	Kilcullen Road, Killashee Naas, Co. Kildare		Esmondale B&B	Broadfield, Naas, Co. Kildare, W91 YYT7
Two Mile House GAA	Harristown Common, Naas, Co.Kildare		Dynasty Kitchen Take away	Esmondale, Craddockstown North, Naas. Co. Kildare.
Soul Pilates	Killashee Leisure Centre, Killashee Hotel, Naas Co. Kildare W91 DC98		The Bower B&B	Killashee, Naas, Co Kildare. Ireland
Killossy House	Oldtown Lodge, Mullacash North, Naas, Co. Kildare W91 K02D		Killashee Hotel	Kilcullen Road, Killashee, Naas, Co. Kildare. W91 DC98
M&D Naas Motors	Mullacash, Middle, Two Mile House, Co. Kildare		TMH Tyres	Mylerstown, Two Mile House, Co. Kildare. W91 FK02
Primal Performance Fitness	Mullacash, Middle, Two Mile House, Co. Kildare		Soul Shot Coffee	Mylerstown, Two Mile House, Co. Kildare.
			Oak and Anvil Restaurant	Kilcullen Road, Killashee, Naas Co. Kildare

Appendix 8.1 IAQM Construction Dust Methodology

The methodology for the assessment of the construction impacts is based on a five-step approach as set out below.

Step 1 – Identify the need for a detailed assessment

An assessment would normally be required for a detailed assessment

a human receptor within 350 m of the Proposed Development site boundary and/or within 50 m of the access route(s) used by construction vehicles on the public highway, up to 50 m from the Proposed Development site exit(s) for small sites, up to 200 m from the Proposed Development site exit(s) for medium sites and up to 500 m from the Proposed Development site exit(s) for large sites; and/or

an ecological receptor within 50 m of the Proposed Development site boundary and/or within 50 m of the access route(s) used by construction vehicles on the public highway, up to 50 m from the Proposed Development site exit(s) for small sites, up to 200 m from the Proposed Development site exit (s) for medium sites and up to 500 m from the Proposed Development site exit(s) for large sites.

The requirement for a dust risk assessment can be screened out where the above criteria are not met, therefore it can be concluded that the level of risk is negligible and any impacts would be 'not significant'. If there are human or ecological receptors within the distance criteria set out in Step 1, then Steps 2 to 4 should be undertaken, as shown in Figure 2.

Step 2 - Assess the risk of dust impacts

A site is allocated to a risk category on the basis of the scale and nature of the works (Step 2A – Define potential dust emission magnitude) and the sensitivity of the area to dust impacts (Step 2B – Define sensitivity of the area). These two factors are combined (Step 2C - Define the risk of dust impacts) to determine the risk of dust impacts before the implementation of mitigation measures. Risks are described in terms of there being a low, medium or high risk of dust impacts for each of four separate potentially dust emitting activities (i.e. demolition, construction, earthworks and trackout). Site-specific mitigation would be required, proportionate to the level of risk identified.

Step 2A - Define the potential dust emission magnitude

The potential dust emission magnitude is based on the scale of the anticipated works and is classified as small, medium or large. Table A81-1 presents the dust emission criteria outlined for each construction activity.

Table A8-1. Potential dust emission magnitude

Construction activity	Large	Medium	Small
Demolition	Total building volume >50,000 m^3, potentially dusty construction material (e.g. concrete), on-site crushing and screening, demolition activities >20 m above ground level.	Total building volume 20,000 m^3 – 50,000 m^3, potentially dusty construction material, demolition activities 10 - 20 m above ground level.	Total building volume <20,000 m^3, construction material with low potential for dust release (e.g. metal cladding or timber), demolition activities <10 m above ground, demolition during wetter months.
Earthworks	Total site area >10,000 m^2, potentially dusty soil type (e.g. clay, which will be prone to suspension when dry due to small particle size), >10 heavy earth moving vehicles active at any one time, formation of bunds >8 m in height, total material moved >100,000 tonnes.	Total site area 2,500 m^2 – 10,000 m^2, moderately dusty soil type (e.g. silt), 5-10 heavy earth moving vehicles active at any one time, formation of bunds 4 m – 8 m in height, total material moved 20,000 tonnes – 100,000 tonnes.	Total site area <2,500 m^2, soil type with large grain size (e.g. sand), <5 heavy earth moving vehicles active at any one time, formation of bunds <4 m in height, total material moved <20,000 tonnes, earthworks during wetter month.
Construction	Total building volume >100,000 m^3, on site concrete batching, sandblasting.	Total building volume 25,000 m^3 – 100,000 m^3, potentially dusty construction material (e.g. concrete), on site concrete batching.	Total building volume <25,000 m^3, construction material with low potential for dust release (e.g. metal cladding or timber).
Trackout	>50 Heavy Duty Vehicles (HDV) (>3.5 t) outward movements[1] in any one day[2], potentially dusty surface material (e.g. high clay content), unpaved road length >100 m.	10-50 HDV (>3.5 t) outward movements[1] in any one day[2], moderately dusty surface material (e.g. high clay content), unpaved road length 50 m – 100 m.	<10 HDV (3.5 t) outward movements[1] in any one day[2], surface material with low potential for dust release, unpaved road length <50 m.

Note 1: A vehicle movement is a one-way journey. i.e. from A to B and excludes the return journey.

Note 2: HDV movements during a construction project vary over its lifetime, and the number of movements is the maximum not the average.

Step 2B – Define the sensitivity of the area

The sensitivity of the area is described as low, medium or high and takes a number of factors into account:

the specific sensitivities of receptors in the area;
the proximity and number of those receptors;
the local background PM_{10} concentrations; and
site-specific factors, such as whether there are natural shelters, such as trees, to reduce the risk of wind-blown dust.

Table A8-2 presents indicative examples of classification groups for the varying sensitivities of people to dust soiling impacts, to the health impacts of PM_{10} and the sensitivities of receptors to ecological impacts. A judgement is made at the site-specific level where sensitivities may be higher or lower, for example a soft fruit business may be more sensitive to soiling than an alternative industry, such as coal mining, in the same location. Section 7.3 within the IAQM guidance (IAQM, 2016) outlines more detailed parameters for defining sensitivity.

Table A8-**2. Indicative examples of the sensitivity of different types of receptors**

	Dust soiling activities impacts	Heath impacts of PM_{10}	Ecological impacts
High	Dwellings, museums and other culturally important collections, medium and long-term car parks and car showrooms.	Residential properties, hospitals, schools and residential care homes.	Locations with an international or national designation and the designated features may be affected by dust soiling (e.g. Special Area of Conservation (SAC)/Special Protection Area (SPA)/Ramsar site).
Medium	Parks, places of work.	Office and shop workers not occupationally exposed to PM_{10}.	Locations where there is a particularly important plant species, where dust sensitivity is uncertain or unknown. Locations with a national designation where the features may be affected by dust deposition (e.g. Areas of Special Scientific Interest (ASSIs)
Low	Playing fields, farmland, footpaths, short-term car parks and roads.	Public footpaths, playing fields, parks and shopping streets.	Locations with a local designation where the features may be affected by dust deposition (e.g. Local Nature Reserve (LNR).

Note 1: People's expectations would vary depending on the existing dust deposition in the area.

Note 2: This follows the Department for Environment, Food and Rural Affairs (Defra, 2016) guidance as set out in Local Air Quality Management Technical Guidance (LAQM.TG (16)).

Note 3: A Habitat Regulation Assessment of the site may be required as part of the planning process if the site lies close to an internationally designated site (i.e. SACs/SPAs) designated under the Habitats Directive (92/43/EEC) and Ramsar sites.

The IAQM guidance (IAQM, 2016) advises consideration of the risk associated with the nearest receptors to each phase of work. Where there are multiple receptors in a single location, a worst-case representative receptor location is considered and the highest risk applicable is allocated.

The receptor sensitivity and distance are then used to determine the potential dust risk for each dust effect for each construction activity as shown in **Table** A8-**3**, **Table** A8-**4** and **Table** A8-**5**. It is noted that distances are between the dust source to the nearest receptor so a different area may be affected by trackout than by on-site works.

For trackout, the distances should be measured from the side of the roads used by construction traffic. Without site specific mitigation, trackout may occur from roads up to 500 m from large sites, 200 m from medium sized sites and 50 m from small sites, as measured from the site exit. The impact declines with distance from the site, and it is only necessary to consider trackout impacts up to 50 m from the edge of the road.

Based on the likely scale of HDV activities anticipated the Proposed Development is considered a medium site for trackout activities. This means an assessment would be required where there is a human receptor within 50 m of the route used by construction vehicles up to 200 m from the site exit(s) (as per the IAQM guidance (IAQM, 2016)).

Table A8-**3. Criteria for the sensitivity of the area to dust soiling effects on people and property**

	Number of receptors	Distance from the source (m)			
		<20	<50	<100	<350
High	>100	High	High	Medium	Low
	10-100	High	Medium	Low	Low
	1-10	Medium	Low	Low	Low
Medium	>1	Medium	Low	Low	Low
Low	>1	Low	Low	Low	Low

Table A8-4. Criteria for the sensitivity of the area to human health

Receptor sensitivity	Annual mean PM_{10} concentrations	Number of receptors	Distance from the source (m)			
			<20	<50	<100	<350
High	>32 µg/m^3	>100	High	High	High	Medium
		10-100	High	High	Medium	Low
		1-10	High	Medium	Low	Low
	28 – 32 µg/m^3	>100	High	High	Medium	Low
		10-100	High	Medium	Low	Low
		1-10	High	Medium	Low	Low
	24 – 28 µg/m^3	>100	High	Medium	Low	Low
		10-100	High	Medium	Low	Low
		1-10	Medium	Low	Low	Low
	<24 µg/m^3	>100	Medium	Low	Low	Low
		10-100	Low	Low	Low	Low
		1-10	Low	Low	Low	Low
Medium	>32 µg/m^3	>10	High	Medium	Low	Low
		1-10	Medium	Low	Low	Low
	28 – 32 µg/m^3	>10	Medium	Low	Low	Low
		1-10	Low	Low	Low	Low
	24 – 28 µg/m^3	>10	Low	Low	Low	Low
		1-10	Low	Low	Low	Low
	<24 µg/m^3	>10	Low	Low	Low	Low
		1-10	Low	Low	Low	Low
Low	-	>1	Low	Low	Low	Low

Table A8.-5. Criteria for the sensitivity of the area to ecological impact

Receptor sensitivity	Distance from the source (m)	
	<20	<50
High	High	Medium
Medium	Medium	Low
Low	Low	Low

Step 2C – Define the risk of impacts

The dust emission magnitude is then combined with the sensitivity of the area to determine the overall risk of impacts with no mitigation measures applied. The matrices in Table 6 provide a method of assigning the level of risk for each activity. These can then be used to determine the level of mitigation that is required.

Table A8-6. Determination of risk of dust impacts

Sensitivity of the area	Dust emission magnitude		
	Large	Medium	Small
Demolition			
High	High risk	Medium risk	Medium risk
Medium	High risk	Medium risk	Low risk
Low	Medium risk	Low risk	Negligible risk
Earthworks			
High	High risk	Medium risk	Low risk
Medium	Medium risk	Medium risk	Low risk
Low	Low risk	Low risk	Negligible risk
Construction			
High	High risk	Medium risk	Low risk
Medium	Medium risk	Medium risk	Low risk
Low	Low risk	Low risk	Negligible risk
Trackout			
High	High risk	Medium risk	Low risk
Medium	Medium risk	Low risk	Negligible risk
Low	Low risk	Low risk	Negligible risk

Step 3 – Site specific mitigation

During the construction phase, it would be important to control dust levels for high, medium and low risk construction activities. In order to avoid significant impacts from dust during the construction phase, suitable mitigation measures should be adopted. Following the identification of the overall risk category for the demolition, earthworks, construction and trackout activities based on Table 6, appropriate mitigation measures can be identified for the Proposed Development. Activities identified as a high risk would require a greater level of mitigation than those identified as low risk.

A selection of these measures has been specified for low risk to high risk sites in IAQM guidance (IAQM, 2016) as measures suitable to mitigate dust emissions from activities such as those which would be undertaken during the construction of the Proposed Development.

Step 4 - Determine significant impacts

Following Step 2 (determining the risk of dust impacts for each activity) and Step 3 (identification of appropriate site-specific mitigation), the significance of the potential dust impacts can be determined. The recommended mitigation

measures are considered to be sufficient to reduce emissions of dust based on the successful application of these measures at other large construction sites, such that a significant impact would not occur at off-site receptors.

The approach in Step 4 of IAQM guidance (IAQM, 2016) (Determine significant impacts) has been adopted to determine the significance of impacts with regard to dust emissions. The guidance states the following:

'For almost all construction activity, the aim should be to prevent significant impacts on receptors through the use of effective mitigation. Experience shows that this is normally possible. Hence the residual effect will normally be 'not significant'.

IAQM guidance (IAQM, 2016) also states that:

'Even with a rigorous DMP [Dust Management Plan] in place, it is not possible to guarantee that the dust mitigation measures will be effective all the time, and if, for example, dust emissions occur under adverse weather conditions, or there is an interruption to the water supply used for dust suppression, the local community may experience occasional, short-term dust annoyance. The likely scale of this would not normally be considered sufficient to change the conclusion that, with mitigation, the impacts will be 'not significant'.

Step 4 of IAQM guidance (IAQM, 2016) recognises that the key to the above approach is that it assumes that the regulators ensure that the proposed mitigation measures are implemented. The management plan would include the necessary systems and procedures to enable on-going checking by the regulators to ensure that mitigation is being delivered, and that it is effective in reducing any residual effect to 'not significant' in line with the guidance.

Appendix 10.1 Desk study and field data collection methodologies

Baseline data collection involved two components, desk study and field survey, using the methodologies below.

Desk Study

A desktop study was carried out to inform the scope of the field surveys for the baseline. The desktop study involved collection and review of relevant published and unpublished sources of data, collation of existing ecological information and consultation with relevant statutory bodies.

The following sources were consulted during the desk study to inform the scope of the ecological surveys:

- Online data available on European sites[1] and nationally designated sites[2] as held by the National Parks and the National Parks and Wildlife Service (NPWS, 2019);
- Online data records available on National Biodiversity Data Centre Database (NBDC, 2022);
- Ordnance Survey Ireland mapping and aerial photography[3] – utilised for desk review of potential habitats within the subject lands and their surroundings;
- Irish Wetland Bird Survey (I-WeBS) data available on Birdwatch Ireland I-WeBS section[4] (Birdwatch Ireland, 2019)
- Records of rare and protected species for the 10km grid squares (N84, N94, N83, N93, N82, N92, N81 and N91) held by the NPWS;
- Habitat and species GIS datasets provided by the NPWS;
- Bat records from Bat Conservation Ireland's (BCI) database;
- Records from the Botanical Society of Britain & Ireland (BSBI);
- Information on Lowland Hay Meadows from BSBI Ireland Annex I Grassland Resources[5] (BSBI, 2020);
- Environmental information/data for the area available from the Environmental Protection Agency website (EPA, 2019); and
- Article 17 reports containing information on the status of EU protected habitats and species in Ireland (NPWS 2019a, 2019b and 2019c);

Field Survey Methods

Habitat Survey

Habitat surveys were undertaken between June 2022 and October 2022. All habitats were mapped and classified using A Guide to Habitats in Ireland (Fossitt, 2000). This classification is used to rapidly record habitats and the main species present. Plant species that were either representative of a habitat or considered to be of conservation interest were recorded, along with their relative abundances using the 'DAFOR' scale (i.e. dominant/abundant/frequent/occasional rare), although note this scale has no agreed quantitative meaning (Rodwell, 2006). The extent of habitat was mapped onto a tablet with GPS and aerial imagery. Target notes are included in the habitat map to indicate any points of interest within the study area (e.g. describing a habitat in more detail, information on conservation interests or information on land use practices etc.). Vascular plant nomenclature follows that of the New Flora of the British Isles 3rd Edition (Stace, 2010).

[1] European site" replaced the term "Natura 2000 site" under the EU (Environmental Impact Assessment and Habitats) Regulations 2011 S.I. No. 473 of 2011. European site refers to Special Areas of Conservation (SACs) or Special Protection Areas (SPAs) which have been designated by legislation implementing the Birds and Habitat Directives.

[2] Nationally designated sites are Natural Heritage Areas (NHAs) or proposed Natural Heritage Areas (pNHAs)

[3] Ordnance Survey Ireland mapping and aerial photography: www.osi.ie

[4] Birdwatch Ireland (2019): https://birdwatchireland.ie/our-work/surveys-research/research-surveys/irish-wetland-bird-survey/.

[5] BSBI (2020):https://bsbi.org/wp-content/uploads/dlm_uploads/Lowland_Hay_Meadows_6510-1.pdf

Where notable habitats were identified (e.g. affinities with Annex I habitat) a detailed species list representative of the habitat was taken to help in the determination as to whether or not the habitat conformed to the Annex I habitat. Where required this data was also used to assign a vegetation community to the habitat type using the Irish Vegetation Classification (Perrin *et al.,* 2018).

Aquatic habitats

Aquatic habitats such as drainage ditches and waterbody crossing points and a minimum distance along waterbodies of 100m to either side of crossing points were visually assessed for their suitability to support aquatic flora and fauna species. Condition of aquatic habitats including substrate make-up, flow rates and notable species were recorded. These surveys were carried out between October 2021 and September 2022.

Invasive plants

The presence of invasive plant species was recorded during initial ecological walkover surveys and during subsequent habitat surveys. Particular focus was placed on the species listed on the Third Schedule of the EC Birds and Natural Habitats Regulations, 2011 (e.g., Japanese knotweed, Himalayan balsam) with further non-native plant species not included on the Third Schedule recorded in line with Irish Water, National Roads Authority and Transport Infrastructure Ireland guidelines (e.g., *Buddleja davidii* and winter heliotrope*)*. Presence of invasive plant species was recorded between October 2021 and September 2022.

Habitat Suitability: Amphibians

Habitats and water features (watercourses and drainage ditches) within c.100m of the Proposed Development were assessed for their suitability to support protected amphibians. This was carried out during the multi-disciplinary walkover undertaken between December 2021 – June April 2022. Incidental sightings of these species were recorded. A nocturnal newt survey was undertaken of two waterbodies within the survey area the Baltracey , a tributary of the River Lyreen (WB19) and the pond at WB05.

Habitat Suitability: Reptiles

Habitats within c.100m of the Proposed Development were assessed for their potential to support common lizard (*Lacerta vivipara*). This was carried as part of the multi-disciplinary walkover undertaken in December 2021 and June 2022. Incidental sightings of these species where present were recorded.

Habitat Suitability: Marsh fritillary butterfly

Habitats within c.100m of the Proposed Development were assessed for their potential to support marsh fritillary butterfly. This was carried as part of the multi-disciplinary walkover survey undertaken in December 2021 and June 2022. Incidental sightings of marsh fritillary and other terrestrial invertebrates of conservation interest were recorded where present.

Habitat Suitability: Fish and white-clawed crayfish

Waterbody crossing points and a minimum of distance along waterbodies of 100m to either side of crossing points were visually assessed for their potential to support fish of conservation interest and white-clawed crayfish. Assessments identified sites that had appropriate fish spawning habitat and juvenile nursery areas including instream features such as substrates and flows as detailed Hendry and Cragg-Hine, (2003), and Maitland, (2003). White clawed crayfish habitat was assessed for features that provide suitable refuge such as substrates large enough to provide cover and not armoured. Other features favourable for white clawed crayfish included tree roots, woody debris and suitable flows as outlined in Holdich, (2003). Sites identified as having appropriate habitat were selected for eDNA surveys to determine their presence or likely absence within each watercourse. The presence of macrophytes were also noted where present. This was carried out during the multi-disciplinary walkover undertaken between June 2022 and October 2022.

Amphibian- Smooth newt eDNA

Two Waterbodies within the study area, WB19 and west of WB05 were assessed for the presence/likely absence of smooth newt using the standard eDNA methodology. This includes collecting twenty water samples from around the perimeter of the watercourse using a 40 ml ladle, focusing on areas most likely to be used by smooth newt. The water samples were then transferred into a whirl Pak bag. Before each sample was taken, the water was gently stirred using the ladle. This is because eDNA will often be present in larger quantities at the bottom of the watercourse as it tends to sink in water.

The whirl Pak bag was then gently shaken to mix eDNA across the whole water sample. A pipette was then used to transfer 15 ml of water from the whirl Pak bag into each of the six conical tubes containing a preserving fluid. Each conical tube was then vigorously shaken for ten seconds to mix the water sample and the preservative. The six conical tubes were then labelled and sent to the Sure Screen Scientifics lab for analysis.

Mammal Survey (other than bats)

Surveys for large mammals (e.g. badger *Meles meles* and otter *Lutra lutra*) were carried out as part of the multi-disciplinary walkover survey undertaken between October 2021 – April 2022. Otter and badger were surveyed through the detection of field signs including resting sites (holts and setts) as well as mammal tracks, markings, feeding signs, and droppings.

Species-specific surveys were not undertaken for other protected mammal species which are harder to detect through field signs such as red squirrel (*Sciurus vulgaris*), hedgehog (*Erinaceus europaeus)*, Irish stoat (*Mustela erminea hibernica)* or pine marten (*Martes martes)*. Nevertheless, during all surveys, searches for any signs of these species such as footprints in soft muds and or droppings was carried out. Potential presence of these species within the study area was noted based on the species distribution and habitat preferences (Marnell *et al*., 2009).

Bats

All trees with potential roost features within the study area were visually assessed. Structures / trees not directly impacted were not subjected to survey. Only structures / trees to be directly impacted were subject to survey. A daytime ground assessment of trees determined their bat roost potential, and those with low, medium, or high potential were subject to emergence/return surveys. Where possible individual trees as well as tree lines were subject to dawn and dusk surveys. Additionally, static detectors were deployed along these tree lines. Further details are provided below. All bat surveys were designed taking into consideration the guidance set out in Collins, 2016, which is summarised below.

Bats: Assessment of Potential Roost Features (Initial Daytime Assessment)

Preliminary roost assessment surveys for trees and buildings within the study area were undertaken between February and August 2022 to identify their potential to support roosting bats. This daytime assessment comprised a ground level, external inspection of trees and buildings to identify potential roost features (PRFs) or signs of bat presence (bat droppings, insect remains etc.) using a pair of binoculars and a one million candle power torch. Each tree or building was assigned a roosting potential (high/moderate/low/negligible) according to good practice guidance, as described below (Collins, 2016). Where possible, individual trees as well as tree lines were subject to dawn and dusk surveys at the survey effort recommended by good practice guidelines.

PRFs of note included:

- knot holes (cavities with a collar resulting from natural branch loss and fungal infection);
- hazard beams (split spanning the limb/stem completely forming an elongated crevice that narrows at both ends);
- thick ivy *Hedera helix* cover potentially obscuring PRFs beneath;
- lifting bark (substantial areas of lifted bark typically resulting from fungal infection); and
- tear outs (cavities within an inverted tear shape wound created when a limb was torn from the main stem or other limb).

Table 1 Assessing the Value of Trees and Buildings to Roosting Bats (Collins, 2016).

Category	Description	Recommended No. of Survey Visits*	Recommended Survey Timings**
High **Trees / buildings that are suitable for use by large numbers of bats on a regular basis.**	PRFs in trees include but are not limited to knotholes, wounds, frost cracks or split limbs[6] that provide voids and/or crevices suitable for bats. In buildings, examples include eaves, barge boards, gable ends and corners of adjoining beams, ridge and hanging tiles, behind roofing felt or within cavity walls. **Further survey is required to determine whether or not bats are present and if so, the bat species present. Appropriate mitigation and potentially licensing requirements may then be determined. Seasonal constraints may apply.**	**Buildings / trees –** Three separate visits. One dusk emergence and a separate dawn re-entry survey. The third survey visit can be dusk or a dawn survey. NB. Multiple survey visits will be spread out as much as possible, with surveys at least two weeks apart, preferably more.	**Buildings / trees –** May to September (with at least two of the surveys between May and August).
Moderate **Moderate potential is assigned to trees / structures with potential to support bat roosts but supports fewer features than a high potential building / tree and is unlikely to support a roost of high conservation value.**	From the ground, building / tree appears to have features that may provide suitable roosting opportunity for bats. However, owing to the characteristics of the feature, they are deemed to be sub-optimal for large numbers of roosting bats. **Further survey is required to determine whether or not bats are present and if so, the bat species present. Appropriate mitigation and potentially licensing requirements may then be determined. Seasonal constraints may apply.**	**Buildings / trees –** Two separate visits. One dusk emergence and a separate dawn re-entry survey. NB. Multiple survey visits will be spread out as much as possible, with surveys at least two weeks apart, preferably more.	**Buildings / trees –** May to September (with at least two of the surveys between May and August).
Low **Low potential is assigned to structures and trees with features that could support individual bats opportunistically.**	If no features are visible but owing to the size and age and structure, hidden features, sub-optimal for roosting bats may occur that only and elevated inspection may reveal. In respect of ivy cover this could be hiding a PRF. **Further survey may be required for buildings only or works may proceed using reasonable precautions (e.g. controlled working methods, under licence**	**Buildings–** One survey visit. One dusk emergence or dawn re-entry survey. **Trees –** No further surveys required.	**Buildings / trees –** May to September (with at least two of the surveys between May and August).

[6] Further detailed information on the type of PRFs found in trees is detailed in Andrews (2018).

Category	Description	Recommended No. of Survey Visits*	Recommended Survey Timings**
	or supervision of a bat worker. Seasonal constraints may apply.		
Negligible	Negligible habitat features on site likely to be used by roosting bats.	No further surveys required.	

Bats: Transect Surveys

Transect surveys were not considered appropriate for the Proposed Development and no bat transects were done since primarily linear features that will be impacted along existing roads (i.e. tree lines/hedgerows). At off-road locations the cable will punch through existing tree lines. It is assumed that these features will be used by foraging and commuting bats. Static detector data was collected at 12 sites consisting of suitable habitat spread along the Proposed Development to provide a sufficient species assemblage for the area. As such, transect surveys were not considered appropriate.

Bats: Static detector surveys

Twelve static monitoring locations were selected along the Proposed Development aiming to provide a representative species assemblage for the area. Locations were chosen using the results from the ground-based habitat assessments to determine areas with the most suitable habitat and roosting opportunities for bats. Anabat Express and Song Meter 4 Bat (SM4) detectors were positioned in the predetermined locations along the Proposed Development. They were set to record from half an hour before sunset until half an hour after sunrise for a minimum of five consecutive nights, with two deployments between May and August to capture seasonal changes in behaviour and habitat use along the route. The Anabat Express was set to record in zero-crossing (a measurement of an incoming audio signal's most prominent frequency at any point in time rather than the full audio recording) and the SM4s set to record in full spectrum (an audio recording that includes time, frequency and amplitude).

The dates that the static detectors were active at each monitoring location are provided in Table2 below and locations of the detectors and results of the surveys are shown on in Figure 10.5 Volume 4.

Note that the static detectors were not deployed along the entire Proposed Development route on the same dates. Therefore, results between locations could not be compared directly.

Table 2 Static survey dates

Bat survey location	Detector	Survey 1 - Dates active	Survey 2 - Dates active
Location 1	Express	27.06.2022 - 05.07.2022	18.07.2022 - 22.07.2022
Location 2a	Express / SM4	24.05.2022 – 31.05.2022	02.08.2022 - 03.08.2022
Location 2b	Express / SM4	28.06.2022 - 05.07.2022	06.07.2022 - 26.07.2022
Location 3	SM4	10.05.2022 – 17.05.2022	19.07.2022 - 26.07.2022
Location 4	SM4 2 / Express	10.05.2022 – 11.05.2022	02.08.2022 - 09.08.2022
Location 5	Express	01.06.2022 – 08.06.2022	02.08.2022 - 09.08.2022
Location 6	Express / SM4	02.06.2022 – 08.06.2022	02.08.2022 - 09.08.2022
Location 7	SM4 / Express	18.05.2022 – 20.05.2022	25.07.2022 - 02.08.2022
Location 8	SM4	18.05.2022 – 19.05.2022	26.07.2022 - 28.07.2022
Location 9	Express 1 / SM4	16.05.2022 – 23.05.2022	27.07.2022 - 02.08.2022
Location 10	SM4 / Express	29.06.2022 - 11.07.2022	09.08.2022 - 16.08.2022

Location 11	SM4 / Express	30.06.2022 - 04.07.2022	09.08.2022 - 16.08.2022

Bats: Dusk Emergence and Dawn Re-entry Surveys

Dusk emergence and dawn re-entry surveys were undertaken using handheld bat detectors on a selection of the trees that were identified as having potential to support roosting bats. The aim of these surveys was to confirm the presence or likely absence of roosting bats. Surveys were completed at 11 locations, location one being the furthest south, location ten being the furthest north and location 11 approximately in the middle. The survey locations are shown on Figure 5, Appendix 15.6.

Trees were surveyed by experienced ecologists in teams of two or four surveyors depending on the number of trees to be surveyed. At least two surveyors were present at each location with 4 surveyors being at one location where there was a very long linear feature. Surveyors were positioned at potential roost access / egress point to identify any bats emerging from or returning to roost. Surveyors recorded bat activity using full spectrum SM4 bat detectors and made notes on bat activity including time of observation, bat behaviours and species recorded. Dusk emergence surveys commenced approximately 15 minutes before sunset and continued for approximately one and a half hours after sunset. Dawn re-entry surveys commenced 1.5 hours before sunrise and finished at 15 minutes after sunrise. Details of the dates, times and weather conditions for each survey are provided in Table 3.

Table 3: Details of emergence / re-entry surveys

Bat survey location	Date	Survey type	Weather	Sunset / Sunrise time	Survey times
Location 1	25.05.2022	Dawn	11°C, light rain, light breeze, >50% cloud cover.	5:15	03:45 – 5:30
	27.06.2022	Dusk	13°C, no rain, strong breeze, >50% cloud cover.	21:56	21:35 – 23:56
	18.07.2022	Dusk	26°C, no rain, light breeze, >50% cloud cover.	21:34	21:33 – 23:30
Location 2a	18.05.2022	Dawn	10°C, no rain, light breeze, <50% cloud cover.	5:15	03:50 – 05:45
	28.06.2022	Dusk	14°C, no rain, light breeze, <50% cloud cover.	21:57	21:40 – 23:40
Location 2b	18.07.2022	Dusk	27°C, no rain, no wind, >25% cloud cover.	21:43	21:28 – 23:13
	20.07.2022	Dawn	15°C, no rain, light breeze, 100% cloud cover.	05:25	03:50 – 05:55
	21.07.2022	Dusk	17°C, no rain, no wind, >50% cloud cover.	21:39	21:24 – 23:10
Location 3	24.05.2022	Dawn		05:32	03:43 – 05:45
	19.07.2022	Dusk	19°C, no rain, light breeze, 75% cloud cover.	21:42	21:27 – 23:12

Bat survey location	Date	Survey type	Weather	Sunset / Sunrise time	Survey times
Location 4	26.05.2022	Dawn		05:30	03:49 – 05:45
	20.07.2022	Dusk	16°C, no rain, light breeze, 100% cloud cover.	21:40	21:25 – 23:10
Location 5	19.07.2022	Dusk	11°C, no rain, strong breeze, 75% cloud cover.	21:25	21:50 – 23:20
Location 6	29.06.2022	Dawn	12°C, no rain, no wind, 0% cloud cover.	05:04	03:30 – 05:45
	21.07.2022	Dawn	14°C	05:43	03:55 – 05:40
Location 7	18.05.2022	Dusk	11°C, no rain, strong breeze, 50% cloud cover.	21:25	21:27 – 23:00
	24.05.2022	Dawn	7°C, no rain, light breeze, 75% cloud cover.	05:14	03:45 – 05:30
	25.07.2022	Dusk	16°C, light rain, moderate breeze, 100% cloud cover.	21:32	21:20 – 23:25
Location 8	23.05.2022	Dusk	11°C, no rain, no wind, 25% cloud cover.	21:32	21:15 – 23:00
	26.05.2022	Dawn	12°C, light drizzle, light breeze, 75% cloud cover.	05:14	03:45 – 05:30
	26.07.2022	Dusk	16°C, no rain, light breeze, 0% cloud cover.	21:33	21:15 – 23:19
Location 9	24.05.2022	Dusk	11°C, no rain, no wind, 50% cloud cover.	21:33	21:15 – 23:05
	27.07.2022	Dusk	14°C, no rain, light breeze, 100% cloud cover.	21:32	21:15 – 23:20
Location 10	29.06.2022	Dusk	14°C, no rain, no wind, 25% cloud cover.	21:58	21:30 – 23:30
Location 11	30.06.2022	Dusk	15°C, no rain, no wind, 25% cloud cover.	21:57	21:30 – 23:30
	20.07.2022	Dusk	15°C, no rain, light breeze, 100% cloud cover.	21:42	21:25 – 23:10
	21.07.2022	Dusk	17°C, no rain, moderate breeze, 100% cloud cover.	21:41	21:55 – 23:15
	22.07.2022	Dawn	13°C, no rain, no wind, 75% cloud	05:27	03:57 – 05:42

Bat survey location	Date	Survey type	Weather	Sunset / Sunrise time	Survey times
			cover.		

Bats: Call Analysis

Bat call analysis was undertaken using Analook W and Kaleidoscope software. Bat species identification was interpreted using known bat call parameters (Russ, 2012) and existing literature on the ecology of Irish and UK bat species, including distribution, range, habitat associations and behavioural characteristics, in addition to professional judgement. Every attempt was made to identify bats to species level. However, bats in the genus *Myotis* have calls with peak frequencies which can overlap. Their calls cannot reliably be distinguished from each other without reference to specialist technology and expertise which was not readily available or deemed necessary for a robust assessment. Therefore *Myotis* calls were not identified to species level and have been labelled Myotis *sp*. This limitation will not affect the assessment within this report as impacts on all *Myotis* species are mitigated in the same way.

Bats: Static Detector Analysis

The data recorded on the static detectors was standardised as the average number of bat passes per night for each static deployment as an index of activity.

Fish and White-clawed Crayfish: eDNA Sampling

Non-invasive environmental DNA (eDNA) surveys were used to detect the presence/probable absence of Atlantic salmon (*Salmo salar*), European Eel (*Anguila anguila*) and Whiteclawed crayfish (*Austropotamobius pallipes*) from eleven watercourses within the study area as follows (Figure 8, Appendix 15.9).

- Pond WB05
- Jenkinstown stream (WB08);
- Rye Water_020 (Padinstown) (WB12)
- Baltracey, tributary of the River Lyreen (WB19);
- Clonshanbo segment 09_1129 (WB22);
- Clonshanbo (WB24);
- Kilmurry (WB25)
- Tributary of the River Kilmurry (WB26)
- Longton_Demesne, Trib of River Liffey (WB32)
- Dunstown (WB45);
- Tributary of the River Liffey (WB46);

eDNA sampling provides a tool for surveying aquatic communities without the need to catch the animals themselves. It has been shown to be effective in a wide variety of aquatic ecosystems (ponds, lakes, streams, rivers, estuaries and oceans) and can be used either to detect the presence of particular species, or to survey whole communities of organisms. Samples were collected on 10 August 2022 and 21 September 2022 and sent to SureScreen Scientifics for subsequent analysis. This sampling was undertaken inside the optimal survey period for these species which is taken to be April to October inclusive.

Birds

Wintering birds

Wintering bird surveys were undertaken over two- three consecutive days each month during October, November and December 2021 and January, February, March and April 2022. The survey area ('buffer') extended to 800m either side of the red line boundary. This survey buffer ensured that the disturbance distances of the wariest bird species likely to be encountered in the area was sufficiently covered. Note that the winter bird surveys were carried out when all four the cable route options were under consideration, so included the 800m buffer area of all those routes., Therefore some of the bird data is over 9km from the cable route. All this bird data is included, as it gives further indication of the birds present in the area, as well as the survey effort.

In general, the approach was a "look-see" methodology as per the Wetland Bird Survey (WeBS) core count methodology (Gilbert et al. 1998; Bibby et al., 2000). All birds present within the study area were identified with reference to Collins Bird Guide (Svensson, 2009) to confirm identification (where necessary) and species were recorded using the BTO species codes. The total flock size of birds present, their general location within the site and any activity exhibited were also recorded. Surveys involved non-intrusive, visual recordings of wintering birds

with the aid of binoculars and a spotting telescope and recorded and mapped using a digital tablet. Surveys were undertaken during daylight hours and in weather conditions that were mostly favourable with good visibility. Following a comprehensive desk study and the initial site visit, a list of "Target species" likely to occur at the site was compiled. The survey work carried out on the site was specifically designed to survey for these identified target species. The target species list was drawn from:

- Annex I of the Birds Directive,
- Special Conservation Interests (SCI) of Special Protection Areas (SPA) within the zone of likely significant effects,
- Red listed birds of Conservation Concern in Ireland,
- Species with the potential to be impacted by this type of development.

All species within these categories were considered as target species for the purpose of these surveys.

Within the 800m buffer from the Proposed Development all wetland and waterbodies were noted and assessed for their suitability to supporting wintering birds. Where the sites were deemed as suitable they were visited each month during the surveys.

In addition, the area between the southern extent of the Proposed Development and the western section of Poulaphouca reservoir was surveyed for the presence of greylag geese which are a qualifying interest species of Poulaphouca reservoir SPA. This area lies within the potential 15-20km core foraging range of the Poulaphouca reservoir wintering population (Scottish Natural Heritage, 2016).

Following the initial scoping survey, unsuitable habitat (woodland, dense vegetation, steep fields etc.) and urban areas were assessed and discounted where necessary to allow a focus to be placed on suitable habitats for Target Species birds including agricultural grassland fields, arable fields, flooded land and wetlands. In addition, several wetland/waterbodies outside of the survey area were surveyed to check for the presence of Target Species potentially within commuting distance of the survey area. Monthly visits were timed to be at least three weeks apart. Surveys consisted of drive-overs with short stops at suitable vantage points. Surveys remained flexible allowing surveyors to react to conditions within the survey area, including notable observations of bird behaviour. Where vantage points were used, they were selected to provide the least obstructed view of the entire survey area. Two surveyors (one driving and one experienced ornithologist) drove along the available roads within the survey area while scanning for flocks of foraging waders and wildfowl. Upon observing waders and/or wildfowl, surveyors stopped in a safe location to record and map flock sizes and behaviour. Surveyors also stopped at locations that provided good views over wide areas of suitable habitat to observe for any birds which were not observed during the drive-by survey. Meteorological data was also recorded on each day of survey.
Bird data parameters recorded during surveys included the following:

- Surveyor
- Date
- Time
- BTO code of recorded species
- Common name of species
- Number of individual recorded
- Behaviour
- Weather
- Habitat
- Other notes

Winter bird data survey results were captured and digitised onto a digital tablet using point, polyline and polygon shapefiles. Survey dates are provided in Table 4 and wintering bird survey results are presented in Appendix 15.4. Due to technical difficulties information for survey number seven is not available and therefore has not been included in the results table.

Table 4 Wintering bird survey dates and surveyors

Survey Number	Survey Dates	Surveyors
1	14th, 15th and 18th October 2021	AR/SS/LON
2	1st – 3rd November 2021	AR/SS
3	6th, 9th and 10th December 2021	SS/LON
4	10th -12th January 2022	SS/MH
5	8th – 9th February 2022	AR/LON
6	7th – 8th March 2022	AR/HJ
7	13th – 14th April	LON/MH

Hen-harrier winter roost survey

During the initial options appraisal for the Proposed Development there were four route options proposed across various areas of counties Meath and Kildare. Several records existed of hen-harrier sightings within a 10km radius of the Proposed Development therefore a desktop study was undertaken to assess the potential for hen-harrier surveys within or in close proximity to the Proposed Development. Following a desk based review the potential for breeding hen-harrier was ruled out within or near the survey area. However, there were two areas deemed suitable to support winter roosting hen-harrier namely Ballynafagh Bog SAC and Prosperous Bog. Prosperous Bog has no designation (see paragraph below). Two vantage points were undertaken at each of these sites.

Vantage Point 1 (VP1) was located at Ballynafagh Bog Special Area of Conservation (SAC) (000391) is a site designated for its bog and peat habitats (NPWS, 2015). The site is located c1.6km from the Proposed Development at its nearest location. There are mosaics of active raised bogs, rhynchosporion vegetation, degraded bog dominated by heath communities and cut-away bog colonised by rushes.

Vantage Point 2 (VP2) was Prosperous Bog which is located 600m west from the Proposed Development at its closest location, west of chainage 30250. In the 1980s, Prosperous Bog was drained and developed for industrial peat production for the horticultural market. Peat production ceased in 2020 and is the site now part of the proposed Peatlands Enhanced Decommissioning, Rehabilitation and Restoration Scheme (Bord na Móna, 2021). The area presently comprised bare peat with marginal habitats along the boundary and retains residual deep peat.

Winter bird roost surveys were carried out during the non-breeding seasons, once a month between October 2021 and March 2022. Surveys were undertaken following methods described by Hardey et al. (2013). Roost watches were undertaken from vantage points overlooking potentially suitable roosting habitat within the study area from late afternoon (1.5hrs before sunset) until dusk (0.5hrs after sunset). All incidental bird species were noted during the bird survey. Survey dates are provided below in Table 5.

Table 5 Hen harrier winter roost survey dates and surveyors

Survey Number	Survey Dates	Site	Surveyors
1	14th October 2021	Ballynafagh Bog	AR/SS
1	18th October 2021	Prosperous Bog	AR/LON
2	1st November 2021	Ballynafagh Bog	AR/SS
2	3rd November 2021	Prosperous Bog	AR/SS

3	6thDecember 2021	Ballynafagh Bog	SS/LON
3	9th December 2021	Prosperous Bog	SS/LON
4	10th January 2022	Ballynafagh Bog	SS/MH
4	11th January 2022	Prosperous Bog	SS/MH
5	8th February 2022	Prosperous Bog	AR/LON
5	9th February 2022	Ballynafagh Bog	AR/LON
6	7th March 2022	Ballynafagh Bog	AR/HJ
6	8th March 2022	Prosperous Bog	AR/HJ

Breeding birds

Breeding bird surveys were conducted over three visits between March and June 2022 using a methodology adapted from the Breeding Bird Survey (Gilbert *et al.*, 1998) combined with the Common Bird Census (CBS) survey methodology. These survey methods target potential breeding territories of raptors, waterbirds and passerines of conservation concern (e.g. waders and red/amber-listed species). Other species of note were also recorded to assess the importance of the study area for breeding bird species. Seventeen transects routes were carried out on each visit. Transect routes were chosen to sample suitable breeding bird habitat representative of the habitat types present along and adjacent to the entire footprint of the Proposed Development and in surrounding areas predominantly within 250m of it. Transect routes occasionally went beyond 250m to include suitable habitats of interest or because transects along the Proposed Development were unsafe. Transects were distributed along the length of the Proposed Development and covered a total distance of 12.6km. Transects were walked slowly in a manner allowing the surveyor to come within 50m of all habitat features. Bird species were identified by sight and sound, and general location and activity were recorded using the British Trust for Ornithology (BTO) species and activity codes.

During the breeding bird surveys all watercourses crossed were assessed for their suitability to support nesting kingfisher. Where possible watercourses were walked for approximately 500m either side of river crossing or alternatively viewed for a short period from a pre-selected vantage point and signs of kingfisher/riparian bird species including burrow entrances were searched for.

Meteorological data was also recorded on each day of survey. The conservation status of the bird species was recorded as per:

- Birds of Conservation Concern in Ireland (BoCCI): Red List contains birds of high conservation concern; Amber List contains birds of medium conservation concern;
- Bird species listed on Annex I of the EU Birds Directive (2009/147/EC); and
- Special Conservation Interest (SCI) species of Special Protection Areas (SPAs) within the ZoI of the Proposed Scheme.

Bird data parameters recorded during surveys included the following:

- Surveyor
- Date
- Time
- Transect no.
- Map no.
- BTO code of recorded species
- Common name of species
- Number of individual recorded
- Gender
- Behaviour/breeding evidence
- Weather

- Habitat
- Other notes

Breeding bird data survey results were captured and recorded on sperate field maps and recording forms. Survey dates are provided below in Table 6.

Table 6 Breeding bird survey dates and surveyors

Survey Number	Survey Dates	Surveyors	Transect no.	Survey time
1	11th May 2021	AR/IC	11	05:30 – 11:15
1	11th May 2021	AR/IC	10.3	05:30 – 11:15
1	11th May 2021	AR/IC	10.2	05:30 – 11:15
1	11th May 2021	AR/IC	10.1	05:30 – 11:15
1	12th May 2021	AR/IC	9	05:30 – 10:55
1	12th May 2021	AR/IC	8	05:30 – 10:55
1	12th May 2021	AR/IC	7	05:30 – 10:55
1	12th May 2021	AR/IC	6.2	05:30 – 10:55
1	13th May 2021	AR/IC	6.1	05:15 – 10:50
1	13th May 2021	AR/IC	5	05:15 – 10:50
1	13th May 2021	AR/IC	4	05:15 – 10:50
1	13th May 2021	AR/IC	3	05:15 – 10:50
1	14th May 2021	AR/IC	1	05:30 – 10:30
1	14th May 2021	AR/IC	1.1	05:30 – 10:30
-	28th May 2021	AR/IC	Incidental	-
2	22nd June 2021	AR/IC	11	05:30 – 10:30
2	22nd June 2021	AR/IC	10.3	05:30 – 10:30
2	22nd June 2021	AR/IC	10.2	05:30 – 10:30
2	22nd June 2021	AR/IC	10.1	05:30 – 10:30
2	23rd June 2021	AR/IC	9	05:45 – 11:00
2	23rd June 2021	AR/IC	5	05:45 – 11:00
2	23rd June 2021	AR/IC	8	05:45 – 11:00
2	23rd June 2021	AR/IC	7	05:45 – 11:00
2	23rd June 2021	AR/IC	6.2	05:45 – 11:00
2	24th June 2021	AR/IC	6.1	05:45 – 10:30
2	24th June 2021	AR/IC	1	05:45 – 10:30
2	24th June 2021	AR/IC	1.1	05:45 – 10:30
2	25th June 2021	AR/IC	4	06:15 – 08:00
2	25th June 2021	AR/IC	3	06:15 – 08:00

Appendix 10.2 Wintering Birds Data

British Trust for Ornithology bird species codes

BTO Code	Bird	Breeding bird survey	Wintering bird survey
BH	Black-headed gull	X	ü
BZ	Buzzard	X	ü
	Coot	X	ü
CA	Cormorant	ü	ü
E.	Eider	X	ü
FF	Fieldfare	X	ü
GC	Goldcrest	ü	X
GP	Golden plover	X	ü
GB	Great black backed gull	X	ü
GR	Greenfinch	ü	X
H.	Grey heron	X	ü
GL	Grey wagtail	ü	X
HG	Herring gull	ü	ü
HM	House martin	ü	X
HS	House sparrow	ü	X
K.	Kestrel	X	ü
L.	Lapwing	ü	ü
LB	Lesser black backed gull	X	ü
LI	Linnet	ü	ü
ET	Little egret	ü	ü
LG	Little grebe	X	ü
MA	Mallard	ü	ü
MP	Meadow pipit	ü	X
ML	Merlin	X	ü
MH	Moorhen	X	ü
MS	Mute swan	ü	ü
PE	Peregrine	X	ü
PH	Pheasant	ü	X
RE	Redwing	X	ü
S.	Skylark	ü	X
SN	Snipe	X	ü
SG	Starling	ü	X
SL	Swallow	ü	X
SI	Swift	ü	X
T.	Teal	X	ü
WS	Whooper swan	X	ü
WW	Willow warbler	ü	X
WK	Woodcock	ü	X
Y.	Yellowhammer	ü	X

Wintering bird survey tabulated results

Survey	1	2	3	4	5	6	Total
Common name/Latin Name							
Black headed gull (Larus ridibundus)	14	11	83	55	53	43	259
Cormorant (Phalacrocorax carbo)						1	1
Great black backed gull (Larus marinus)		7					7
Lesser black backed gull (Larus fuscus)	42	8			1		51
Coot (Fulica atra)	10	7	5	5	8	6	41
Grey heron (Ardea cinerea)	3	1	1	4			9
Snipe (Gallinago gallinago)	3	6	1		3		13
Redwing (Turdus iliacus)			59	185			244
Fieldfare (Turdus pilaris)				110			110
Buzzard (Buteo buteo)	1	2			3	1	7
Lapwing (Vanellus vanellus)		1	2				3
Kingfisher (Alcedo atthis)	1	1					2
Golden plover (Pluvialis apricaria)		7	200	394	127	254	982
Merlin (Falco columbarius)	1						1
Kestrel (Falco tinnunculus)		2					2
Linnet (Carduelis cannabina)	150						150
Peregrine (Falco peregrinus)	1						1
Herring gull (Larus argentatus)		4	17	34	2	2	59

Little egret (Egretta garzetta)				1			1
Little grebe (Tachybaptus ruficollis)	12	12	7	11	8	6	56
Eider (Somateria mollissima)				1			1
Mallard (Anas platyrhynchos)	54	48	74	83	55	63	377
Moorhen (Gallinula chloropus)	11	12	13	28	9	7	80
Whooper swan (Cygnus cygnus)		5					5
Mute swan (Cygnus olor)	10	21	14	16	11	6	78
Teal (Anas crecca)				12		6	18

Appendix 10.3 Locations of plots and analysis of data of a potential Annex 1 lowland hay meadow using ERICA software

Plot locations (Plot 1, Plot 2 and Plot 3).

Date of survey 5 July 2022

Plot 1 (FAILS lowland meadow ERICA test)		
Common name	**Latin name**	**% converted**
Creeping bent	*Agrostis_stolonifera*	18
Meadow foxtail	*Alopecurus_pratensis*	63
Sweet vernal	*Anthoxanthum_odoratum*	42
Common mouse-ear chickweed	*Cerastium_fontanum*	42
Yorkshire fog (10%)	*Holcus_lanatus*	42
Perennial ryegrass	*Lolium_perenne*	42
Ribwort plantain (0)	*Plantago_lanceolata*	30
Creeping buttercup	*Ranunculus_repens*	96
Common sorrel	*Rumex_acetosa*	42
Physiognomy		
Bareground	0	
Sward height	25cm	

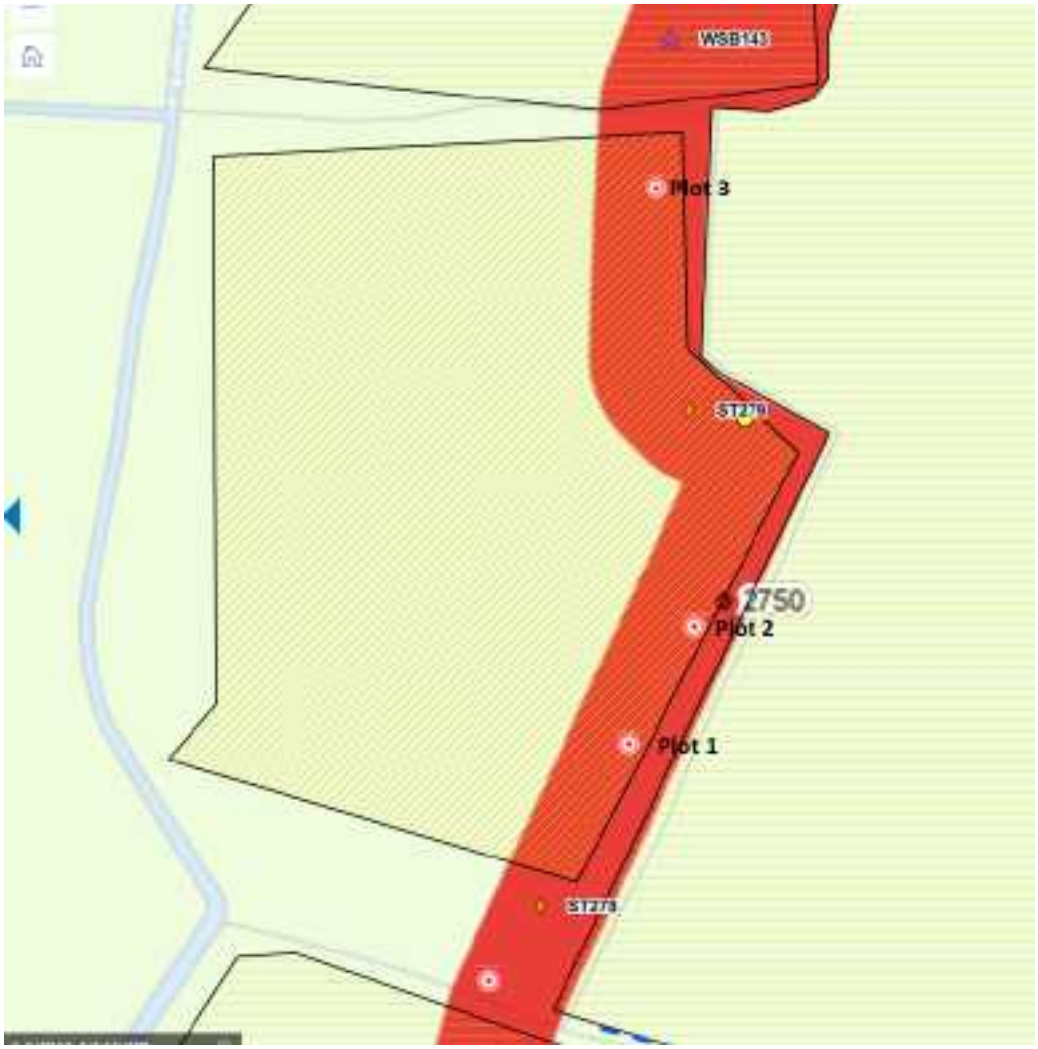
Plot 2 (FAILS lowland meadow ERICA test)		
Common name	**Latin name**	**% converted**
Creeping bent	*Agrostis_stolonifera*	8
Meadow foxtail	*Alopecurus_pratensis*	18
Sweet vernal	*Anthoxanthum_odoratum*	18
Common mouse-ear chickweed	*Cerastium_fontanum*	42
Yorkshire fog	*Holcus_lanatus*	63
Perennial ryegrass	*Lolium_perenne*	42
Forget-me-not	*Myosotis_discolor*	30
Ribwort plantain	*Plantago_lanceolata*	8
Creeping buttercup	*Ranunculus_repens*	96
Yellow rattle	*Rhinanthus_minor*	42
Common sorrel	*Rumex_acetosa*	18
White clover	*Trifolium_repens*	8
Physiognomy		
Bareground	0	
Sward height	25cm	

Plot 3 (FAILS lowland meadow ERICA test)		
Common name	**Latin name**	**% converted**
Creeping bent	*Agrostis_stolonifera*	18
Meadow foxtail	*Alopecurus_pratensis*	8
Sweet vernal	*Anthoxanthum_odoratum*	42
Common mouse-ear chickweed	*Cerastium_fontanum*	8
Crested dogs tail	*Cynosurus_cristatus*	3
Yorkshire fog	*Holcus_lanatus*	63
Perennial ryegrass	*Lolium_perenne*	18
Forget-me-not	*Myosotis_discolor/arvensis*	18
Creeping buttercup	*Ranunculus_repens*	83
Yellow rattle	*Rhinanthus_minor*	15
Common sorrel	*Rumex_acetosa*	18
Lesser Stitchwort	*Stellaria_graminea*	8
Red clover	*Trifolium_pratense*	18
Physiognomy		
Bareground	0	
Sward height	25cm	

Key

Indicator species for lowland hay meadows (NPWS, 2018)			
Plot 2		positive indicator species	2
FAIL		high quality indicators	1
		negative indicators	2
			<7 indicator species

Plot locations



Lowland hay meadows (*Alopecurus pratensis, Sanguisorba officinalis*) (6510)

a) **Positive species data**

The presence/absence of the High quality and Positive indicator species within each 2 m x 2 m monitoring p should be recorded.

High Quality Positive Indicator Species	Positive Indicator Species
Bromus racemosus	*Alopecurus pratensis*
Hordeum secalinum	*Centaurea nigra*
Knautia arvensis	*Crepis capillaris*
Leucanthemum vulgare	*Daucus carota*
Lotus corniculatus	*Filipendula ulmaria*
Pimpinella major	*Heracleum sphondylium*
Rhinanthus minor	*Hypochaeris radicata*
Sanguisorba officinalis	*Lathyrus pratensis*
Tragopogon pratensis	*Leontodon autumnalis*
Orchid species (record individual orchid species separately)	*Leontodon hispidus*
	Plantago lanceolata
	Prunella vulgaris
	Ranunculus acris
	Trifolium pratense
	Trisetum flavescens

	Vicia cracca

b) **High quality and Positive species criteria to assess in the field.** Only search the surrounding 20 m area if indicator species are failing by 1-2 species.

Criteria	Scale of assessment
High quality and Positive indicator species	
Number of high quality species present ≥ 1	**Plot + include 20 m surrounding area**
Total number of positive indicator and high quality species present ≥ 7	**Plot + include 20 m surrounding area**
IF positive indicator species are failing consider recording presence/absence of additional positive indicator species. For example, *Juncus acutiflorus* can be included as a +ve indicator species for wetter 6510 communities.	

Appendix 10.4 Watercourses

PECR Naming Convention	Waterbody Name	Step 5 SB Design Oct 2022 Chainage	Location NGR	WFD Status	Assessment	eDNA survey notes	Survey	eDNA results	Proposed Crossing	Photographs
WB01	Trib of Tolka_020	800	N 95028 46797	Poor	Potential for eel. Trout (sub-optimal), brook lamprey (possible) and WCC. No spawning gravels. Associated ditch crosses road. D/S section ditch runs to the left of the road. Overdeep, approx. 30cm wide and 5cm deep. Likely ephemeral. No outfall seen. No fish (salmon, trout) unlikely. No WWC likely. U/S section more ditch line than D/S and less likely to host fish. Survey was carried out downstream of actual crossing location due to design changes.	N/A	No eDNA	N/A	Instream trenching	
WB02	Dunboyne stream_010	1900	N 94770 46271	Poor	Watercourse width about 1.5m overall with mixed flows and substrates and depths. Highly polluted. Mostly shaded over length and no macrophytes seen. Potential for invertebrates and WCC. Otter possible but unlikely due to pollution. Culvert/bridge apron unpassable for all fish. Trenched.	N/A	No eDNA	N/A	Instream trenching	
WB03	Rye Water_030	3615	N 93930 45180	Poor	Large section of the watercourse is culverted under an industrial estate. Water flow from north of road into/under the estate. At road U/S is about 50m wide with 100% shading. Earth banks and base. Very low potential for aquatics. No fish, plants. On low water (08.06.22) confirmed as not suitable for any fish/WCC to be present. No further surveys needed	N/A	No eDNA	N/A	Diversion from in-road to off-road, by instream trench.	

WB04	Jenkinstown stream_010	6000	N 91730 45313	Moderate	Watercourse width about 1.5m overall with mixed flows and substrates and depths. Highly polluted. Mostly shaded over length and no macrophytes seen. Potential for invertebrates and WCC. Otter possible but unlikely due to pollution. Culvert/bridge apron unpassable for all fish.	N/A	No eDNA	N/A	Diversion from in-road to off-road, by instream trench.	
WB05	Pond	7385	N 90677 45988	N/A	Pond on the side of the road	DRY AT TIME OF SURVEY 10.08.22 Still dry on survey 21.09.22 eDNA sample taken on the 12.10.22 Ephemeral pond Feb/March wet, completely dry in July. Likely to be dry approx.. month at least. 10.08.22. Still suitable for amphibian breeding in April etc.	Yes eDNA for Smooth newt	Smooth Newt - negative	Instream trenching	 
WB06	Jenkinstown stream Stream (supplemented by ditches)	8080	N 90246 45483	Not mapped on EPA	Flowing N to S. On north side of road: 1m wide, 15cm deep, 85% cobbles, 15% silt/detritus, riparian vegetation, male fern hearts tongue fern, bramble, ivy On south side of road: 2m wide, 20cm deep, 65% pebble, 35% silt, moderate flow Drainage ditch flowing into river on N side of road: flowing W to E. 60cm wide, overgrown 85% cobbles, 15%silt, 10cm deep, moderate flow Drainage ditch flowing into river on S side of road: flowing E to W. 1.5m wide, little to no flow, 10cm deep, 100% detritus, dense aquatic vegetation, watercress, rose bay willow herb	N/A	No eDNA	N/A	Diversion from in-road to off-road, by instream trench.	  

WB07	Jenkinstown stream_010	10700	N 89775 43468	Moderate	Difficult to see watercourse. Run flows but substrates not seen. Polluted. 100% shaded with earth banks and scrub. About 1.5m wide and about 40cm deep. High flows and turbid. Low likelihood of fish of conservation interest being present but eel possible. D/S of bridge right bank and left bank field drains at bridge present. Fish can pass under bridge if present. Otter possible and also WCC.	N/A	No eDNA	N/A	Diversion from in-road to off-road, by instream trench.	
WB08	Jenkinstown	11180	N/A	Unassigned	Overdeep and straightened ditch about 1.5m high bank with run flows. S/S and D/S of bridge very different in character. U/S trees with high otter potential for holting. D/S no cover from vegetation and straight/overdeep. Macrophytes possible but potential for fish low with exception of eel/trout.	SAMPLE TAKEN 10.08.22 Client ID: K2MWC22 Lab sample: FK705	Yes eDNA One eDNA sample to characterise all three Jenkinstown watercourses e.g. 22, 23 and 24. WCC Eel Salmon	Atlantic salmon – positive European eel – positive WWC- Negative	Diversion from in-road to off-road, by instream trench.	
WB09	N/A	11400	N/A	Unassigned	Flows into NEWTOWNMOYAGHY STREAM (as do Sites 23 and 24). Very small watercourse about 1m wide. Culverted D/S of bridge. No fish potential and no macophytes seen. Very overgrown U/S such that watercourse can't be seen. Culverted about 30m under field on D/S section. Trenched.	N/A	No eDNA	N/A	Diversion from in-road to off-road, by instream trench.	

WB10	Rye Water_020 (Brides Stream)	12370	N 89243 42178	Good	Culverted under road. Macrophytes present and three-spined sticklebacks seen. Overdeep watercourse about 20cm deep with riffle/run flows. Left bank U/S artificial and right bank hedgerow. D/S left bank is grassy as is the right bank. No shading of watercourse which is straightened along house boundary U/S and culverted under road. No otter or fish potential but some macrophytes present (likely due to run-off). D/S earth bank and overgrown ditch with no potential for species of conservation interest.	N/A	No eDNA	N/A	Diversion from in-road to off-road, by instream trench.	
WB11	Newtownmoy Aghy Stream Trib of RYE WATER_020	13650	N 89076 40939	Not mapped on EPA	Flowing S and then E. 1m wide, 5cm deep, 80% fine gravel, 5%silt, 5% large cobble, 10% pebble, moderate flow south and then east, riparian vegetation, hearts tongue fern, herb Robert, ivy, elder	N/A	No eDNA	N/A	Not crossed by cable	
WB12	Rye Water_020 (Padistown)	14400	N 88410 40767	Good	Approx. 150m U/S of road river width about 3m and 1.5-2m over deep. Around 1m riparian vegetation duffer fenced off. Flow type run/glide and narrowing in places evident. Emergent vegetation. Right bank grassy. Left bank scrub and rank grass. Low otter holting potential. Water depth 60-80cm with organic and cobble substrate. Most substrate not seen due to emergent vegetation which had fallen over. Substantial stands of macrophytes/ buttercups about 30m U/S of bridge. Three arched bridge with middle only conveying water. Ditch on left bank running along road about 40cm wide. High potential of fish. Directly D/S of bridge mixed substates of boulder to sand. Riffle/glude and run flows. Width about 2m with scrub on both sides. Good for fish (trout, stickleback, minnow and eel). Dipper nest under middle arch of bridge. About 50cm D/S organic substrate with mainly glide flows and slower. Due to disturbance from housing estate otter potential lower but high potential for fish and potentially WCC.	N/A	No eDNA	N/A	HDD	
WB13	Rye Water_010	15050	N 88065 40613	Moderate	Approx. 150m U/S of road river width about 3m and 1.5-2m over deep. Around 1m riparian vegetation duffer fenced off. Flow type run/glide and narrowing in places evident. Emergent vegetation. Right bank grassy. Left bank scrub and rank grass. Low otter holting potential. Water depth 60-80cm with organic and cobble substrate. Most substrate not seen due to emergent vegetation which had fallen over. Substantial stands of macrophytes/ buttercups about 30m U/S of bridge. Three arched bridge with middle only conveying water. Ditch on left bank running along road about 40cm wide. High potential of fish. Directly D/S of bridge mixed substates of boulder to sand. Riffle/glude and run flows. Width about 2m with scrub on both sides. Good for fish (trout, stickleback, minnow and eel). Dipper nest under middle arch of bridge. About 50cm D/S organic substrate with mainly glide flows and slower. Due to disturbance from housing estate otter potential lower but high potential for fish and potentially WCC. Off-road, HDD?	N/A	No eDNA	N/A	HDD	  Aerial photograph used.

WB14	Royal Canal	15400	N 87874 40210	N/A	Organic/clay substrate. About 1.5m deep in the deepest point in the middle. Vegetation mostly along west bank and emergent macrophytes mostly. Some submerged buttercup and water lilly on east (tow-path) side. Approx. 8m side with scrub/trees on west side. Coots/moorhen present.	N/A	No eDNA	N/A	HDD	 
WB15	Lyreen_010	19920	N 86262 37369	Poor	Watercourse running along road mostly filled in. Wet/ponded area at culvert but terrestrial grasses present at north end. Perpendicular to road a ditch flows under the road via an old culvert. No sign of otter. South end checked ditch. Overall although wet in places no ecological potential.	N/A	No eDNA	N/A	Not crossed by cable	 
WB16	Drainage ditches	20870	N 86442 36490	Not mapped on EPA	Mostly dry ditch with occasional stagnant pools present, 50cm wide, ivy growing along it, clay/silt base	N/A	No eDNA	N/A	Not crossed by cable	 

WB17	Drainage ditches	21250	N 86592 36149	Not mapped on EPA	1m wide drainage ditch. Pipe feeding into drainage ditch, otherwise no flow, heavily vegetated, water cress present	N/A	No eDNA	N/A	Diversion from in-road to off-road, by instream trench.	 
WB18	Drainage ditch	21500	N 86589 36154	Not mapped on EPA	1m wide drainage ditch, Pipe feeding into drainage ditch, otherwise no flow, heavily vegetated, water cress present. Species of conservation interest unlikely.	N/A	No eDNA	N/A	Diversion from in-road to off-road, by instream trench.	 
WB19	Lyreen_010 (Baltracey Trib Lyreen)	21650	N 86673 35787	Poor	Culverted under field with ditches on either side of the road and feeding into a pipe under a field to east of road. Although strong flows actual alignment of watercourse is not clear. Ditch on U/S side about 1m wide with earth banks. Left bank grassy field and right bank hedged. Approx. 1.2m overdeep ditch. No fish, macrophytes, WCC. Potential for amphibians and newts (possibly). Dry at time of survey	DRY AT TIME OF SURVEY 10.08.22 River and ditches dry. Sample taken 21.09.22	Yes eDNA Smooth newt	Smooth Newt - negative	Diversion from in-road to off-road, by instream trench.	

WB20	Trib of Liffey_010	22000	N/A	Unassigned	New building in field to east of road. Ditch flowing along houses. Overdeep and likely been dredged. Very deep water >60cm. Likely no spawning gravels. Eels possible but no lamprey. No macrophytes seen. Potential for WCC.	N/A	No eDNA	N/A	HDD	
WB21	Drainage ditches	22300	N 86823 35188	Not mapped on EPA	20cm depth, 100% slack. East of road grassy bank northside, south side hedge. West side scrub on both sides. 1m bank height, has roots and overhanging vegetation. 100% overlying silt, 1m channel width, 1m wet width, heavily shaded, overdeepened. Low to no ecological importance for fish or WCC.	N/A	No eDNA	N/A	Diversion from onroad to off road trench.	 
WB22	Clonshanbo_010	23620	N 87176 33938	Poor	Approx 2m wide watercourse. Run and glide flows but substrate not seen. Water depth of >30cm. Overdeep with right bank grassy and no shading. Left bank cover from scrub. Potential for trout and eel. No macrophytes seen. Potential for WWC but not amphibians. Potential for otter.	SAMPLE TAKEN 10.08.22 Client ID: K2MWC15 Lab sample: FK707	Yes eDNA WCC Eel Salmon	Atlantic salmon – negative European eel – negative WWC – negative	Diversion from in-road to off-road, by instream trench.	 
WB23	Drainage ditches	24150	N 87298 33417	Not mapped on EPA	Stagnant drainage ditch, visibility poor assessed through hedgerows, no photos, 30cm wide	N/A	No eDNA	N/A	Not crossed by cable	NO PHOTOS OF THIS DITCH DUE TO POOR VISIBILITY
WB24	Painestown 09	25800	N/A	Poor	Normal flows and water depth of around 20cm. Turbid. Run and riffle with some slack. 2m high earth banks on both sides. >75% shading. 10% bolder, 30% cobble, 30% gravel, 30% sand. Width of 1.5m wet and bank. Over deep. Little ecology value. No otter, fish, inverts, macrophytes. Possible for WCC.	DRY AT TIME OF SURVEY 10.08.22 Sample Taken 21.09.22	Yes eDNA WCC	WCC - negative	Diversion from in-road to off-road, by instream trench.	

WB25	Kilmurry_010	27300	N/A	Poor	Rapid assessment only due to safety issues. Culverted under road. Small ditch. Potential for eel and WCC.	Better sample location see photo/google map point. SAMPLE TAKEN 10.08.22 at u/s location- check EPA map to see if u/s or d/s. Sticklebacks present. Client ID: K2MWC13. Lab sample: FK704	Yes eDNA WCC Eel	European eel – negative WCC – negative	Diversion from in-road to off-road, by instream trench.	
WB26	Trib of Kilmurry_010	27600	N/A	Unassigned	Not on map. Small flowing ditch about 30cm wide and 20cm deep with sand/grave/organic matter substrates. Mainly run flows with 75% shading. Water starwort and other macrophytes present. No fish potential or otter. Little ecological values and culverted under road.	DAMP, better sample location see photo/google map point. SAMPLE TAKEN 10.08.22 at u/s location- check EPA map to see if u/s or d/s. Sticklebacks present. Client ID: K2MWC13. Lab sample: FK704	Yes eDNA WCC Eel	European eel – negative WCC – negative	Diversion from in-road to off-road, by instream trench.	
WB27	Liffey_130	30000	N 84449 28586	Good	40cm wide ditch with sand/gravel substrate. Runs along road and culverted under road. Run flows. Water depth 5cm and vegetated on both sides. No ecological potential.	N/A	No eDNA	N/A	Crossed inroad	

WB28	Trib of Liffey_130	30250	N 84283 28429	Unassigned	Overgrown ditch, 1m wide, 1m deep, wet, lined by bramble, common reed, bull rush, hemp agrimony, alder tree, nettle.	N/A	No eDNA	N/A	Diversion from in-road to off-road, by instream trench.	 
WB29	Liffey_130	30400	N 84425 28283	Good	1m wide field drain with 100% shading. 60% pebble, 10% gravel and 5% sand. 25% silt. 15cm water depth. Run/riffle flows with earth banks overgrown with scrub. 1m high banks. No ecological potential.	N/A	No eDNA	N/A	Crossed inroad	
WB30	Trib of SLATE_010	31360	N 84237 27559	Poor	NB this may replace WB31 below. Not surveyed at new crossing point.	N/A	N/A	N/A	Not crossed by cable	  

WB31	Liffey_130	NB this may be replaced by WB30 above	N 84807 27542	Good	No access. Ditch for amphibians may be impacted. If alternative route avoids this watercourse not survey needed.	N/A	Out - No eDNA	N/A	Instream trenching	 
WB32	Longton_Demesne_Trib of Liffey_120	36150	N 87519 25081	Good	Trib of Liffey crossed by scheme. 100m D/S of survey point. 1 outfall on left bank at road and U/S two outfalls at bridge. 2-3m wide. Smaller substrates mostly sand to pebble with some boulder/cobble. Very good for trout, eel, lamprey. Otter and WCC. No macrophytes. Pers Comm with home-owner of Blundell House-mink, otter, sticklebacks, frog and birds present.	SAMPLE TAKEN 10.08.22 Client ID: K2MWC09 Lab sample: FK706	Yes eDNA WCC Eel Salmon	Atlantic salmon – negative European eel – positive WWC – positive	Instream trenching	 
WB33	Drainage ditches	36650	N 87844 24820	Not mapped on EPA	Ref screen grab 1: Drainage ditches perpendicular to road: S of road: Two drainage ditches parallel, 50cm wide each, stagnant, pools but mostly just damp detritus and mud N of road: could not see due to hedgerow and fencing. Drainage ditches in screenshot which run parallel to the road do not exist.	N/A	No eDNA	N/A	Crossed inroad	 

WB34	Drainage ditches	36900	N 87950 24710	Not mapped on EPA	Drainage ditches perpendicular to road: S of road: 1-2m wide, stagnant, 10cm deep, grass encroaching on both sides, detritus substrate N of road: 1m wide, Stagnant drainage ditch 100% filled with detritus, 2cm deep. Flows north into stream in heavy rain according to owners. Culvert under road blocked by rocks.	N/A	No eDNA	N/A	Instream trenching	
WB35	Liffey_120	37200	N 88001 24231	Good	No access but have been here previously. Braded part of Liffey near to route. High potential for lamprey due to silt beds visible. High potential for other fish and otter.	N/A	No eDNA	N/A	HDD	
WB36	Liffey_120	37900	N 88281 24006	Good	Lamprey and otter potential, WCC, eDNA site Watercourse veers left at this point to join Liffey not correct as shown on epa mapping Silty organic bottom, 30cm deep 2m wide. Trib of the Liffey, signs recently dredged. Normal flows, no turbidity, 40% run, 40% riffle, 10% glide, 10% slack, vegetated, riparian vegetation, bank height 1.5m, undercutting, roots, overhanging vegetation. 20% silt, 10% sand, 20% gravel, 45% pebble, 5% cobble, 10% overlying silt, channel width 3m, wet width 1.5m, havily shaded, overdeepened	N/A	No eDNA	N/A	Crossed by bridge	

WB37	Liffey_120	39000	N 88110 23008	Good	River Liffey. No access. No assessment carried out.	N/A	No eDNA	N/A	Crossed by bridge	 

WB38	Grand Canal	39400	N 88152 22604	N/A	Less then 8m wide, water depth 1m with muddy substrates. Emergent macrophytes	N/A	No eDNA	N/A	Crossed by bridge	
562	Liffey_110	41510	N 88249 21068	Good	Very small and culverted under toad. Highly vegetated and 100% shaded. Likely organic matter substrate. No ecological value.	N/A	No eDNA	N/A	Crossed inroad	
WB40	Liffey_110	42300	N 87711 20395	Good	Watercourse, surrounded by vegetation on one side, hedgerow on the other, mainly gravel and sand, 1m banks. Little ecological potential for fish or WCC.	N/A	No eDNA	N/A	Crossed inroad	

WB41	Liffey_110	42900	N 87394 20021	Good	1m wide ditch with flowing water. 20cm water depth with run flows and organic/soil substrates. 100% shaded. Bank height 40cm and same width. No ecological value.	N/A	No eDNA	N/A	Crossed inroad	 
WB42	Grand Canal	44600	N 88288 19245	N/A	Canal about 8m wide with emergent vegetation on either side. Tow path by housing estate disturbed for otter. Opposite of side assessment may offer less disturbed potential but houses also here. Water depth about 1m with soft mud substrates. No fish seen.	N/A	No eDNA	N/A	HDD	  
WB43	LIFFEY_100	45330	N 88310 18467	Good	Realigned watercourse D/S of road through housing estate. Good quality substrate with smaller gravels and 10cm deep. Fenced off grass area with some macrophytes. 1.5m wide. U/S width of about 50cm with bankside vegetation and more suited to otter.	N/A	No eDNA	N/A	Crossed inroad	

WB44	N/A	49000	N 88077 15749	N/A	Flowing wet ditch, 1.5m, water quality visually good, 10cm deep in sections. Overgrown in parts, surrounded by rushes and willowherb. Little to no ecological value.	N/A	No eDNA	N/A	Diversion from onroad to off road trench.	 
WB45	Dunstown	52700	N/A	N/A	Crossed by scheme D/S of crossing point from bridge. At bridge mixed substrates and flows with 100% shading. Signs of pollution. Potential for trout, eel and WCC. Otter likely. Bridge not a barrier to migration and recently repointed.	SAMPLE TAKEN 10.08.22 Client ID: K2MWCA1 Lab sample: FK708	Yes eDNA WCC (white clawed crayfish) Eel Salmon	Atlantic salmon – negative European eel – negative WCC – negative	Instream trenching	 
WB46	Trib of Liffey	37600	N 88017 24231		Silty organic bottom, 30cm deep 2m wide. Trib of the liffey, signs recently dredged. Open cut crossing if crossing required. Potential for WCC.	SAMPLE TAKEN 10.08.22 Lab sample FK09	eDNA yes for salmon, eel and WCC	Atlantic Salmon - negative, European eel - positive, WCC - positive		NO PHOTOS OF THIS DITCH DUE TO POOR VISIBILITY

Appendix 10.5 Ecological receptor valuation

Examples of Ecological Valuation
International Importance: ▪ **'European Site' including Special Area of Conservation (SAC), Site of Community Importance (SCI), Special Protection Area (SPA) or proposed Special Area of Conservation.** ▪ **Site that fulfils the criteria for designation as a 'European Site' (see Annex III of the Habitats Directive, as amended).** ▪ **Features essential to maintaining the coherence of the Natura 2000 Network[1].** ▪ **Site containing 'best examples' of the habitat types listed in Annex I of the Habitats Directive.** ▪ **Resident or regularly occurring populations (assessed to be important at the national level)[2] of the following:** **Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive; and / or International Importance:** **Species of animal and plants listed in Annex II and/or IV of the Habitats Directive.** ▪ **Ramsar Site (Convention on Wetlands of International Importance Especially Waterfowl Habitat 1971).** ▪ **World Heritage Site (Convention for the Protection of World Cultural & Natural Heritage 1972).** ▪ **Biosphere Reserve (UNESCO Man & The Biosphere Programme).** ▪ **Site hosting significant species populations under the Bonn Convention (Convention on the Conservation of Migratory Species of Wild Animals, 1979).** ▪ **Site hosting significant populations under the Berne Convention (Convention on the Conservation of European Wildlife and Natural Habitats, 1979).** ▪ **Biogenetic Reserve under the Council of Europe.** ▪ **European Diploma Site under the Council of Europe.** ▪ **Salmonid water designated pursuant to the European Communities (Quality of Salmonid Waters) Regulations, 1988, (S.I. No. 293 of 1988).[3]**
National Importance: ▪ **Site designated or proposed as a Natural Heritage Area (NHA).** ▪ **Statutory Nature Reserve.** ▪ **Refuge for Fauna and Flora protected under the Wildlife Acts.** ▪ **National Park.** ▪ **Undesignated site fulfilling the criteria for designation as a Natural Heritage Area (NHA); Statutory Nature Reserve; Refuge for Fauna and Flora protected under the Wildlife Act; and/or a National Park.** ▪ **Resident or regularly occurring populations (assessed to be important at the national level)[4] of the following:** o **Species protected under the Wildlife Acts; and/or** o **Species listed on the relevant Red Data list.** ▪ **Site containing 'viable areas'[5] of the habitat types listed in Annex I of the Habitats Directive.**
County Importance:

[1] See Articles 3 and 10 of the Habitats Directive.

[2] It is suggested that, in general, 1% of the national population of such species qualifies as an internationally important population. However, a smaller population may qualify as internationally important where the population forms a critical part of a wider population or the species is at a critical phase of its life cycle.

[3] Note that such waters are designated based on these waters' capabilities of supporting Atlantic salmon, trout, char (*Salvelinus*) and whitefish (*Coregonus*).

[4] Note that such waters are designated based on these waters' capabilities of supporting salmon, trout, char and whitefish.

[5] A 'viable area' is defined as an area of a habitat that, given the particular characteristics of that habitat, was of a sufficient size and shape, such that its integrity (in terms of species composition, and ecological processes and function) would be maintained in the face of stochastic change (for example, as a result of climatic variation).

▪ **Area of Special Amenity.**[6] ▪ **Area subject to a Tree Preservation Order.** ▪ **Area of High Amenity, or equivalent, designated under the County Development Plan.** ▪ **Resident or regularly occurring populations (assessed to be important at the County level)**[7] **of the following:** o **Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive;** o **Species of animal and plants listed in Annex II and/or IV of the Habitats Directive;** o **Species protected under the Wildlife Acts; and/or** o **Species listed on the relevant Red Data list.** ▪ **Site containing area or areas of the habitat types listed in Annex I of the Habitats Directive that do not fulfil the criteria for valuation as of International or National importance.** ▪ **County important populations of species, viable areas of semi-natural habitats or natural heritage features identified in the National or Local Biodiversity Action Plan (BAP) if this has been prepared.** ▪ **Sites containing semi-natural habitat types with high biodiversity in a county context and a high degree of naturalness, or populations of species that are uncommon within the county.** ▪ **Sites containing habitats and species that are rare or are undergoing a decline in quality or extent at a national level.**
Local Importance (Higher value): ▪ **Locally important populations of priority species or habitats or natural heritage features identified in the Local BAP, if this has been prepared.** ▪ **Resident or regularly occurring populations (assessed to be important at the Local level)**[7] **of the following:** o **Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive;** o **Species of animal and plants listed in Annex II and/or IV of the Habitats Directive;** o **Species protected under the Wildlife Acts; and/or** o **Species listed on the relevant Red Data list.** ▪ **Sites containing semi-natural habitat types with high biodiversity in a local context and a high degree of naturalness, or populations of species that are uncommon in the locality.** ▪ **Sites or features containing common or lower value habitats, including naturalised species that are nevertheless essential in maintaining links and ecological corridors between features of higher ecological value.**
Local Importance (Lower value): ▪ **Sites containing small areas of semi-natural habitat that are of some local importance for wildlife.** ▪ **Sites or features containing non-native species that are of some importance in maintaining habitat links.**

[6] It should be noted that whilst areas such as Areas of Special Amenity, areas subject to a Tree Preservation Order and Areas of High Amenity are often designated on the basis of their ecological value, they may also be designated for other reasons, such as their amenity or recreational value. Therefore, it should not be automatically assumed that such sites are of County importance from an ecological perspective.

[7] It is suggested that, in general, 1% of the County population of such species qualifies as a County important population. However, a smaller population may qualify as County importance where the population forms a critical part of a wider population or the species is at a critical phase of its life cycle.

Appendix 12.1 Flood Risk Assessment

Kildare-Meath Grid Upgrade

PECR – Flood Risk Assessment

April 2023

CP0966 Kildare Meath

Project No:	321084AH
Document Title:	Kildare – Meath Flood Risk Assessment
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Jacobs Engineering Ireland Limited

Merrion House,
Merrion Road,
D4, Dublin,
Tel: +353 1 269 5666

Document history and status

Revision	Date	Description	Author	Checked	Reviewed	Approved
Final			AK	MB	MB	FL

Contents

Abbreviations

CFRAM - Catchment Flood Risk Assessment and Management

FRM – Flood Risk Management

GSI – Groundwater Survey Ireland

HDD - Horizontal Direction Drill

HDPE - High-Density Polyethylene

HEFS - High-End Future Scenario

KCC – Kildare County Council

KCDP – Kildare County Development Plan

MCC – Meath County Council

MCDP – Meath County Development Plan

MRFS - Mid-Range Future Scenario

OPW – Office of Public Works

PFRA – Preliminary Flood Risk Assessment

SFRA - Strategic Flood Risk Assessment

1. Introduction

1.1 Project Background

The Proposed Development includes approximately 52.9 kilometres of new underground cable between the existing Woodland 400kV Converter Substation and the existing Dunstown 400/200kV Substation and extensions. Approximately 37.9 km of the proposed underground cable is located in County Kildare and approximately 15 km is located in County Meath. Woodland Substation is located near Batterstown in County Meath and Dunstown Substation is located near Two Mile House, in County Kildare. Approximately 82% of the underground cable will be located within roads while approximately 18% will be located off-road, to avoid location specific constraints.

Figure 1.1 Proposed route of the Proposed Development.

The basic elements of the construction phase are:

- **Enabling Works:** These are works that allow the construction phase to progress. It will include vegetation clearance, construction of access tracks and the temporary construction areas (e.g. compound areas and haul roads on off-road sections)

- **Phase 1: Installation of passing bay and joint bay structure:** The construction of the passing bays (where required) at the joint bay locations. On completion of the passing bays, it would be proposed that the joint bays are installed within the same period.

- **Phase 2: Excavation and installation of ducts:** A trench will be dug along the cable route, ducts installed, and the road surfacing or agricultural land will be restored. This will also include physical crossings, including motorways, rivers and railways.

- **Phase 3: Installation of cables:** The cables will be installed at joint bay locations within the ducts. The cables will then be jointed (connected) at each joint bay location to allow the installation of a continuous circuit; and

- **Substation works**: Construction works are required in the existing Woodland and Dunstown substations to connect the underground cable to the existing electrical grid.

1.2 Proposed Development

The Proposed Development consists of the following principal elements (Please see Chapter 5 of the PECR for further details):

The Proposed Development consists of the following principal elements:

A. Installation of an underground cable (UGC), approximately 53 km in length, connecting Woodland 400 kV Substation in the townland of Woodland in County Meath and Dunstown 400 kV Substation in the townland of Dunnstown in County Kildare. The development of the UGC will incorporate the following:

- Construction of a trench of approximately 1.5 m in width and approximately 1.3 m in depth both in the public road (approximately 43.5 km) and private lands (approximately 9.5 km) in which the UGC is laid;

- Construction of joint bays, each approximately 10 m in length and 2.5 m in width – with adjacent communication chambers and link boxes along the alignment of the UGC (on average every 750 m). Where the joint bays are located off-road, permanent hardstanding areas will be created approximately 3 m around the joint bays;

- The laying of communication links and fibre optic cables between both substations, running in the same trench as the UGC;

- The laying of eleven no. permanent access tracks (approximately 4 m in width, covering an area of 2.1 ha in total) over private lands to access the off-road joint bays (and adjacent communication chambers and link boxes);

- The provision of seven no. temporary construction compounds (approximately 8.5 ha total) and two no. construction laydown areas along the alignment of the cable route;

- The provision of temporary construction passing bays at 33 joint bay locations, each approximately 100m in length and 5.5 m in width;

- The laying of 11 no. temporary construction tracks (approximately 9.5 km in total length);

- All associated water, rail, road and utility crossings using either trenchless drilling (such as Horizontal Direction Drilling (HDD)) or open cut techniques; and

- All associated and ancillary above and below ground site development works, including works comprising or relating to permanent and temporary construction, roadworks, utility diversions and site and vegetation clearance.

B. Installation of additional electrical equipment and apparatus at the Woodland 400 kV Station in the townland of Woodland in County Meath. which is similar to the existing infrastructure and will be installed in a permitted substation compound extension (Meath County Council Reference: 22/1550). This will include:

- Installation of a 400 kV feeder bay and associated shunt electrical reactor (approximately 8 m in height);
- Insulators, instrument transformers, overhead conductors, disconnectors, circuit breakers, surge arrestors (approximately 12.6 m in height) in order to connect the bay to the busbar;
- All ancillary site development works including site preparation works; underground cabling and earthgrid, as required to facilitate the development.

C. Installation of additional electrical equipment and apparatus at the Dunstown 400 kV Station in the townland of Dunnstown in County Kildare which are similar to the existing infrastructure and does not require the extension of the substation compound. This will include:

- Installation of a 400 kV feeder bay and associated shunt electrical reactor (approximately 9 m in height);
- an extension to the 400 kV busbar in order to connect the 400 kV cable feeder bay to the existing 400 kV busbar
- Ten no. lightning masts (approximately 41 m high);
- Insulators, instrument transformers, current transformers, overhead conductors, disconnectors, circuit breakers, surge arrestors (approximately 12.7 m in height) in order to connect the bay to the busbar; and
- An ancillary site development works including site preparation works, laydown area; underground cabling and earthgrid, surface water drainage; lighting poles as required to facilitate the development.

1.3 Structure of this Report

Section	Overview
Chapter 1 Introduction	An outline of the report, a description of the Proposed Development; information on the approach to its development, as well as information on sustainability relevant to the Proposed Development.
Chapter 2 Planning Guidelines	Contains a list of Planning Guidelines that have been considered.
Chapter 3 Flood Risk Assessment	Sets out the Flood Risk Assessment Methodology.

Section	Overview
Chapter 4 Stage 1 Flood Risk Identification	Includes the findings of the Stage 1 Flood Risk Assessment.
Chapter 5 Stage 2 Initial Flood Risk Assessment	Presents the findings of the Stage 2 Flood Risk Assessment.
Chapter 6 Stage 2: Potential Flood Risk Impacts from Proposed Works	Details the potential flood risk implications arising from the proposed works and the proposed mitigation measures.
Chapter 7 Flood Risk Management and Evaluation	Assesses the proposed development in accordance with the Justification Test.
Chapter 8 Conclusions and Recommendations	Presents the conclusions and recommendations.

2. Planning Guidelines

Please see Chapter 6 of the PECR and the associated Planning Report for further details.

2.1 The Planning System and Flood Risk management Guidelines for Planning Authorities

The Planning System and Flood Risk Management Guidelines for Planning Authorities (OPW, November 2009) introduce comprehensive mechanisms for the incorporation of flood risk identification, assessment and management into the planning process.

The Guidelines set out the methodology to be used for the Flood Risk Assessment, which require the planning system at national, regional and local levels to:

- Avoid development in areas at risk from flooding, particularly floodplains, unless there are proven wider sustainability grounds that justify development. Where this is the case, development must be appropriate and flood risks must be effectively managed to reduce the level of risk.
- Adopt a Sequential Approach to Flood Risk Management when assessing the locations for new development based on avoidance, reduction, and mitigation of flood risk.
- Incorporate Flood Risk Assessment into planning application decisions and appeals.

2.2 The EU Floods Directive, Water Framework Directive and River Basin Management Plans

Implementation of the above guidelines will also rely on the ongoing integration with existing EU directives:

- The EU Floods Directive[1] requires Member States to undertake preliminary flood risk assessments on a national scale, to identify possible future areas of flooding. Member states are also required to prepare Flood Risk Management Plans (FRMPs) per catchment, in order to set out local flood risk management goals and measures. The OPW is responsible for undertaking this role in Ireland. Under this Directive, the EU recognizes the importance of land use management as a key tool in managing flood risk as well.

- The Water Framework Directive[2], established in 2000, introduces the concept of River Basin Management Plans (RBMPs), so that all rivers and coastal waters may achieve good ecological status by 2027. As of today, River Basin Districts have been established, and relevant management plans are available.

2.3 Greater Dublin Strategic Drainage Study (April 2005)

The Greater Dublin Strategic Drainage Study (GDSDS) was commissioned in 2001 to analyse existing foul and surface water drainage systems in the local authority areas of Dublin City, Fingal, South Dublin and Dun Laoghaire – Rathdown and the adjacent catchments in Counties Meath, Kildare and Wicklow.

[1] Directive 2007/ 60/ EC of the European Parliament and of the Council of 23 October 2007 on the assessment and management of flood risk: Official Journal L288/ 27-34.

[2] Council Directive 2000/ 60/ EC of 23 October 2000 establishing a framework for Community action in the field of water policy ("the Water Framework Directive") Official Journal L197/ 30-37.

With respect to the Proposed Scheme, the applicable objectives of the study can be summarised as follows:

- To develop an environmentally sustainable drainage strategy for the region consistent with the EU Water Framework Directive.
- To provide a consistent policy framework and standards which will apply throughout the region.
- To develop tools for the effective management of the drainage systems including Geographical Information Systems (GIS), network models and digital mapping.
- To develop the optimum drainage solution from a range of alternative scenarios having regard to the whole-life cost and environmental performance, the solution to be broken down into a set of implementation projects which can be prioritised and put in place.

2.4 Strategic Flood Risk Assessment for County Meath Development Plan 2020-2026

JBA Consulting was commissioned by Meath County Council (MCC) to provide assistance in the preparation of the Strategic Flood Risk Assessment (SFRA) to incorporate the Meath County Development Plan 2020-2026 (MCDP).

The Planning Guidelines recommend a sequential approach to spatial planning, promoting avoidance rather than justification and subsequent mitigation of risk. The implementation of the Planning Guidelines on a settlement basis is achieved through the application of the policies and objectives contained within the MCDP 2020-2026. The use and application of the policies and guidelines constitutes the formal plan for flood risk management in County Meath. This approach has been achieved in the development plan making process in the settlements contained within the plan and covered in this SFRA. The objectives contained within Chapter 6 of the MCDP 2020-2026 are as follows:

Table 2.1 Objectives and recommendations MCDP 2020-2026

SFRA Section	Objective
INF OBJ 20	To implement the Planning System and Flood Risk Management-Guidelines for Planning Authorities (DoEHLG/OPW 2009) or any updated guidelines. A site-specific Flood Risk Assessment should be submitted where appropriate.
INF OBJ 21	To restrict new development within floodplains other than development which satisfies the Justification Test, as outlined in the Planning System and Flood Risk Management Guidelines 2009 for Planning Authorities (or any updated guidelines).
INF OBJ 23	To protect and enhance the County's floodplains, wetlands and coastal areas subject to flooding as "green infrastructure" which provide space for storage and conveyance of floodwater and ensure that development does not impact on important wetland sites within river/stream catchments.
INF OBJ 24	To identify existing surface water drainage systems vulnerable to flooding and develop proposals to alleviate flooding in the areas served by these systems in conjunction with the Office of Public Works.

2.5 Strategic Flood Risk Assessment for County Kildare Development Plan 2023-2029

The Strategic Flood Risk Assessment (SFRA) provides 'an area wide assessment of all types of significant flood risk to inform strategic land use planning decisions.'

The assessment presents the key flood management policies and objectives that must be followed by all new developments. It identifies sites within flood zones A and B and covers acceptable grounds for justification tests for development plans within each site. Where the Proposed Development is within or proximate to these sites, further detail is provided within this report.

Furthermore, the Kildare Draft County Development Plan (KCDP) outlines surface water and flood risk management policies which have been strengthened and improved upon since the previous Development Plan. These have also been updated based on the information provided in the SFRA process.

The Proposed Development will need to demonstrate compliance with the overarching objectives and recommendations of the SFRA stated in Table 2.2.

Table 2.2 Objectives and recommendations of the Kildare County Council SFRA

SFRA Objective/Policy Action Code	Description
HO P30	Require that site specific flood risk assessments are carried out where required, in accordance with the requirements of The Planning System and Flood Risk Management Guidelines for Planning Authorities.
TM O5	Encourage the use of materials and engineering solutions that optimise natural surface water drainage as part of Sustainable Urban Drainage Systems (SUDS) with all new active travel, public transport, parking, road and street developments and ensure adequate replacement and additional planting of pollinator-friendly and native species.
IN O6	Require an undisturbed edge or buffer zone to be maintained, where appropriate, between new developments and riparian zones of water bodies to maintain the natural function of existing ecosystems associated with water courses and their riparian zones, and to enable sustainable public access.
IN P4	Ensure adequate surface water drainage systems are in place which meet the requirements of the EU Water Framework Directive and the River Basin Management Plan in order to promote the use of Sustainable Drainage Systems.
IN O20	Maintain, protect and enhance capacity of the existing surface water drainage systems in the county.
IN O21	Facilitate the development of nature based Sustainable Urban Drainage Systems, including the retrofitting of SuDS in established urban areas. Culverting entire drains and streams will generally be prohibited; interference with natural drainage systems is to be minimised and the Council will explore

SFRA Objective/Policy Action Code	Description
	opportunities to remove culverted drainage systems in favour of open, natural drainage systems.
IN O22	Require the implementation of Sustainable Urban Drainage Systems (SuDS) and other nature-based surface water drainage as an integral part of all new development proposals.
IN O23	Require new developments to reduce the generation of storm water runoff and ensure all storm water generated is disposed of on-site OR attenuated and treated prior to discharge to an approved water system, with consideration for the following: • The infiltration into the ground through the provision of porous pavement such as permeable paving, swales, and detention basins. • The holding of water in storage areas through the construction of green roofs, rainwater harvesting, detention basins, ponds, and wetlands. The slow-down in the movement of water.
IN O24	Only consider underground retention solutions when all other options have been exhausted. Underground tanks and storage systems will not be accepted under public open space, as part of a SuDS solution.
IN O25	Promote the use of green infrastructure (e.g., green roofs, green walls, planting, and green spaces) as natural water retention measures.
IN O26	Ensure as far as practical that the design of SuDS enhances the quality of open spaces. SuDS do not form part of the public open space provision, except where it contributes in a significant and positive way to the design and quality of open space. In instances where the Council determines that SuDS make a significant and positive contribution to open space, a maximum of 10% of open space provision shall be taken up by SuDS. The Council will consider the provision of SuDS on existing open space, where appropriate.
IN O27	Ensure that all development, including rural one-off residential developments will maintain existing surface water drainage systems, particularly at access points to the development.
IN O28	Ensure development proposals in rural areas demonstrate compliance with the following: • The ability of a site in an un-serviced area to accommodate an on-site wastewater disposal system in accordance with the County Kildare Groundwater Protection Scheme, and any other relevant documents and legislation as may be introduced during the Plan period. • The ability of a site in an un-serviced area to accommodate an appropriate on-site surface water management system in accordance

SFRA Objective/Policy Action Code	Description
	with the policies of the Greater Dublin Strategic Drainage Study (2005), in particular those of Sustainable Urban Drainage Systems (SuDS). The need to comply with the requirements of the Planning Systems and Flood Risk Management Guidelines for Planning Authorities, published by the Minister for the Environment, Heritage, and Local Government (2009).
IN P5	Ensure the continued incorporation of Flood Risk Management and National Flood Risk Policy (2018) into the spatial planning of Kildare, to meet the requirements of the EU Floods Directive and the EU Water Framework Directive and to promote a climate resilient County.
IN O29	Support and co-operate with the Office of Public Works (OPW) in delivering the Flood Relief/Alleviation schemes and measures contained in the Flood Risk Management Plans adopted by the Council in July 2018, and in other flood management works and schemes, as may arise, through the OPW Non-Coastal Minor Works Programme.
IN O30	Manage flood risk in the county in accordance with the sequential approach and requirements of the Planning System and Flood Risk Management Guidelines for Planning Authorities, DECLG and OPW (2009) and circular PL02/2014 (August 2014), when preparing plans, programmes, and assessing development proposals. To require, for lands identified in the Strategic Flood Risk Assessment, a site-specific Flood Risk Assessment to an appropriate level of detail, addressing all potential sources of flood risk, demonstrating compliance with the Guidelines or any updated version of these guidelines, paying particular attention to avoidance of known flood risk, residual flood risks and any proposed site-specific flood management measures.
IN O31	Manage flood risk in the county in accordance with the sequential approach and requirements of the Planning System and Flood Risk Management Guidelines for Planning Authorities, DECLG and OPW (2009) and circular PL02/2014 (August 2014), when preparing plans, programmes, and assessing development proposals. To require, for lands identified in the Strategic Flood Risk Assessment, a site-specific Flood Risk Assessment to an appropriate level of detail, addressing all potential sources of flood risk, demonstrating compliance with the Guidelines or any updated version of these guidelines, paying particular attention to avoidance of known flood risk, residual flood risks and any proposed site-specific flood management measures.
LR O25	Contribute towards the protection of waterbodies and watercourses, including rivers, streams, associated undeveloped riparian strips, wetlands and natural floodplains, from inappropriate development. This will include buffers free of development in riverine and wetland areas, as per chapter 12.

SFRA Objective/Policy Action Code	Description
LR O27	Ensure that the Streamside buffer zone (minimum of 10m plus) is kept free from development and existing vegetation is retained undisturbed to contribute to biodiversity and to ensure that bike paths and/or larger footpaths along rivers and streams are provided in the Middle buffer zone (15m-30m), in line with the Inland Fisheries Ireland's publication 'Planning for Watercourses in an Urban Environment – 2020 Update. Planting if required should be in keeping with the recommendations of the All-Ireland Pollinator Plan.
LR O32	Control development that will adversely affect the visual integrity of distinctive linear sections of water corridors and river valleys and open floodplains.
Chapter 12 - BI O28	Generally, prohibit infilling of land adjacent to rivers, including natural floodplains, prior to or during any development. This will only be permitted, where, in the opinion of the planning authority, there is an overriding public interest in order to provide a key public infrastructure or to provide a more coherent design approach (in line with an approved urban design strategy) but it will be subject to ensuring that adequate compensatory flood storage (if necessary) is provided elsewhere.
Chapter 12 - BI O29	Ensure the protection, improvement or restoration of riverine floodplains and to promote strategic measures to accommodate flooding at appropriate locations including nature-based solutions, in order to protect ground and surface water quality and build resilience to climate change.
Chapter 12 - BI P8	Ensure that Kildare's wetlands and watercourses are retained for their biodiversity and flood protection values and maintain good ecological status of wetlands and watercourses in support of the provisions of the Water Framework Directive and Ramsar Convention.
Chapter 12 - BI O32	Prevent infilling and drainage, where possible, of wetlands identified as part of the County Kildare Wetland Survey 2012-2014, (see Table 12.6).
Chapter 12 - BI P15	Promote and support the development of Sustainable Urban Drainage Systems (SuDS) to ensure surface water is drained in an environmentally friendly way by replicating natural systems.
Chapter 12- BI O51	Promote and support the development of Sustainable Urban Drainage Systems (SuDS) such as integrated constructed wetlands, permeable surfaces, filter strips, ponds, swales and basins at a site, district and county level and to maximise the amenity and bio-diversity value of these systems.
Chapter 12 - BI A23	Showcase good examples of Sustainable Urban Drainage Systems (SuDS) which maximise amenity and biodiversity through the use of systems such as (but not limited to) swales, rain gardens as part of local authority developments.

SFRA Objective/Policy Action Code	Description
Chapter 12 - BI P7	Protect rivers, streams and other watercourses and, wherever possible, maintain them in an open state capable of providing suitable habitats for fauna and flora while discouraging culverting or realignment.
Chapter 12 - BI O21	Ensure the protection of rivers, streams and other watercourses and, wherever possible, maintain them in an open state capable of providing suitable habitats for fauna and flora while discouraging culverting or realignment. Endeavour to re-open previously culverted streams and watercourses through any future development/redevelopment proposals.
Chapter 12 - BI O50	Require multifunctional open space provision within all new developments; this includes provision for ecology and sustainable water management.
Chapter 12 - BI O53	Actively promote and encourage nature-based approaches and green infrastructure solutions as viable mitigation and adaptation measures to surface water management.

3. Flood Risk Assessment

The document Planning System and Flood Risk Management: Guidelines for Planning Authorities published by the Office of Public Works (OPW) (referred to hereafter as the FRM Guidelines) outlines the key principles that should be used for assessing flood risk to the Proposed Development. Planning authorities (both elected members and officials) must implement these Guidelines in ensuring that, where relevant, flood risk is a key consideration in preparing development plans and local area plans and in the assessment of planning applications. These Guidelines are being issued by the Minister of the Environment, Heritage and Local Government under Section 28 of the Planning and Development Act 2000. Planning authorities and An Bord Pleanála are required to have regard to the Guidelines in carrying out their functions under the Planning Acts. These Guidelines supersede previous interim guidance on flooding in Appendix E to the Development Plan Guidelines in 2007.

The core objectives of the Guidelines are to:

- Avoid inappropriate development in areas at risk of flooding;
- Avoid new developments increasing flood risk elsewhere, including that which may arise from surface water run-off;
- Ensure effective management of residual risks for development permitted in floodplains;
- Avoid unnecessary restriction of national, regional or local economic and social growth;
- Improve the understanding of flood risk among relevant stakeholders; and
- Ensure that the requirements of EU and national law in relation to the natural environment and nature conservation are complied with at all stages of flood risk management.

The assessment of flood risk requires an understanding of where the water comes from (i.e. the source), how and where it flows (i.e. the pathways) and the people and assets affected by it (i.e. the receptors). All three elements must be examined as part of the flood risk assessment including the vulnerability and exposure of receptors to determine its potential consequences. The planning process is primarily concerned with the location of receptors, taking appropriate account of potential sources and pathways that might put those receptors at risk. The FRM Guidelines recommend that a staged approach should be adopted.

The stages of appraisal and assessment are as follows:

Stage 1: Flood risk identification – This stage identifies any issues (flooding or surface water management) related to the Proposed Development.

Stage 2: Initial flood risk assessment – This stage seeks to confirm the sources of flooding identified in Stage 1. All existing information is reviewed in detail and extent of the flood risk associated with the Proposed Development established.

Stage 3: Detailed flood risk assessment – Where required, this stage will assess flood risk issues in sufficient detail to provide a quantitative appraisal of potential flood risk to a new or existing development, of its potential impacts on flood risk elsewhere and of the effectiveness of any Proposed mitigation measures. This will typically involve use of an existing or construction of a hydraulic model across a wide enough area to appreciate the catchment wide impacts and hydrological process involved.

Owing to the nature, design and location of the Proposed Development, a Stage 3 assessment was found to be unnecessary for this development.

3.1 Flood Zones

Flood zones are geographical areas within which the likelihood of flooding is in a particular range and they are a key tool in flood risk management within the planning process as well as in flood warning and emergency planning. The FRM Guidelines define the following three flood zones:

Flood Zone A – Where the probability of flooding from rivers and the sea is highest (greater than 1% annually or 1 in 100 years for river flooding or 0.5% annually or 1 in 200 years for coastal flooding). Development in this zone should be avoided and/or only considered in exceptional circumstances, such as essential infrastructure that cannot be located elsewhere, and where the Justification Test has been applied.

Flood Zone B - 'Where the probability of flooding from rivers and the sea is moderate (between 0.1% or 1 in 1000 years and 1% annually or 1 in 100 for river flooding and between 0.1% annually or 1 in 1000 years and 0.5% annually or 1 in 200 for coastal flooding).

Flood Zone C – Where the probability of flooding from rivers and the sea is low (less than 0.1% annually or 1 in 1000 years for both river and coastal flooding (Flood Zone C covers all areas of the plan that are not in zones A or B). Development in this zone is appropriate from a flood risk perspective (subject to assessment of flood hazard from sources other than rivers and the coast) but would need to meet the normal range of other proper planning and sustainable development considerations.

These flood zones are used to assess the suitability of the location for a Proposed Development with respect to its vulnerability to flooding.

Furthermore, climate change is expected to increase flood risk. It could lead to more frequent flooding and increase the depth and extent of flooding. Due to the uncertainty surrounding the potential effects of climate change a precautionary approach is recommended:

- Recognise that significant changes in the flood extent may result from an increase in rainfall or tide events and accordingly adopt a cautious approach to zoning land in these potential transitional areas;
- Ensure that the levels of structures designed to protect against flooding, such as flood defences, land raising or raised floor levels are sufficient to cope with the effects of climate change over the lifetime of the development they are designed to protect; and
- Ensure that structures to protect against flooding and the development protected are capable of adaptation to the effects of climate change when there is more certainty about the effects and still time for such adaptation to be effective.

3.2 Vulnerability of the Proposed Development

The vulnerability of development to flooding depends on the nature of the development, its occupation and the construction methods used. The classification of different land uses and types of development as highly vulnerable, less vulnerable and water-compatible is influenced primarily by the ability to manage the safety of people in flood events and the long-term implications for recovery of the function and structure of buildings. The vulnerability of the Proposed Development is high given it will be located underground and is considered to be critical infrastructure. The Proposed Development would be more likely to be at risk of flooding during the construction phase, due to its exposure at the surface.

With reference to Section 3.1 of the Planning System and Flood Risk Management Guidelines for Planning Authorities, the Proposed Development is assessed as "essential infrastructure as electricity generating power stations and substations" and therefore, classed as a "highly vulnerable development".

The FRM Guidelines require that a Justification Test be completed for any highly vulnerable developments that are located within Flood Zone A or Flood Zone B, and this would include elements of the proposed works such as the Proposed Development. On the other hand, some parts of the proposed works, such as the proposed substation upgrades at Woodland and Dunstown could be assessed as "Minor Developments" and thus be exempt from a Justification Test, see Kildare SFRA, Section 4.2.2.

4. Stage 1 Flood Risk Identification

4.1 Historic Flood Events

The OPW National Flood Hazard Mapping website (www.floodinfo.ie) was used to any identify historical flooding in the area of the Proposed Development. Figure 4.1 below indicates a number of past and reoccurring floods in the area, at Kilcock, Belgard, Clonshanbo, Prosperous, Sallins, and Naas respectively. The available information and approximate distance from the Proposed Development for each historic flood is available in Table 4.1 below.

Table 4.1 Flood events identified on or near the Proposed Development.

Location	Type	Date	Description
Kilcock – on Proposed Development route	Fluvial-Rye River	18/08/2008	After very heavy and prolonged rainfall in August areas of Kilcock were flooded in several locations.
Belgard – approx. 1km west of route	Fluvial-Lyreen River	Recurring annually	River overflows its banks onto flood plain after heavy rain. Road is liable to flood.
Clonshanbo – approx.1.5km west of route	Fluvial-Clonshanbo River	Recurring annually	The Clonshanbo river overflows its banks after heavy rain every year. The main Clane – Kilcock road is liable to flooding and was flooded in January 2005. Road has been raised by the council.
Prosperous – approx. 600m west of route	Pluvial - Low lying lands	Recurring annually	A property is flooded after heavy rain every year
East Sallins – approx. 2km east of route	Unknown – possibly pluvial	29/11/2009	A housing estate in Monread was flooded, source is not stated. Possibly related to poor/blocked drainage systems.
Naas – Newbridge Road – approx. 1km east of route	Fluvial – Liffey River	01/04/2005	Limited capacity culvert causes occasional flooding at Hotel on the Newbridge road.

Indicatively, there is a record of a past flood occurring near Kilcock on 18/08/2008,. The linked report contains images of localised floods occurring around the River Rye, which the Proposed Development crosses. Fields around the area and part of the highway are shown partially flooded after a bout of prolonged heavy rain. A summary of the effects from reoccurring floods along the path of the Proposed Development can be found in the meeting minutes of an OPW Flood Hazard Map meeting with the local Engineer reporter for Clane.

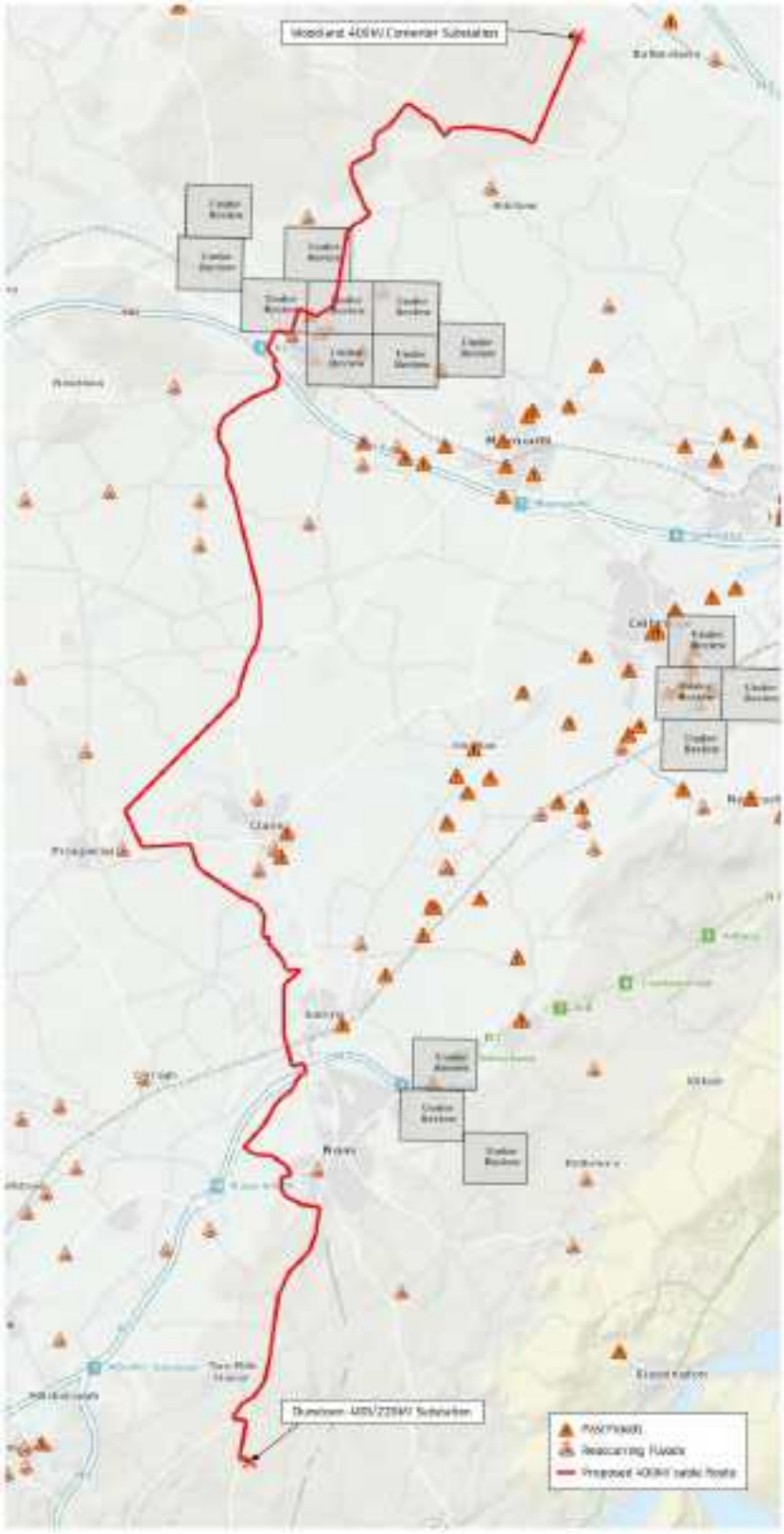


Figure 4.1 Extract of past flood events near the Proposed Development route. Source: OPW National Flood Hazard Mapping website (www.floodinfo.ie)

4.2 Nearby Watercourses and Notable Crossings

The Environmental Protection Agency maintain data of watercourses throughout Ireland. The Proposed Development crosses a number a rivers and streams along its route, a summary of those is available below, together with the proposed method of crossing.

Table 4.2. Proposed watercourse crossings along the Proposed Development.

Waterbody Label	**Waterbody Name**	**Chainage**	**Proposed Crossing**
WB01	Trib of Tolka_020	800	Instream trenching
WB02	Dunboyne stream_010	1900	Instream trenching
WB03	Rye Water_030	3615	Instream trenching
WB04	Jenkinstown stream_010	6000	Instream trenching
WB05	Pond/watercourse	7385	Instream trenching
WB06	Jenkinstown stream Stream (supplemented by ditches)	8080	Instream trenching
WB07	Jenkinstown stream_010	10700	Instream trenching
WB08	Jenkinstown	11180	Instream trenching
WB09	N/A	11400	Instream trenching
WB10	Rye Water_020 (Brides Stream)	12370	Instream trenching

WB11	Newtownmoy Aghy Stream Trib of RYE WATER_020	13650	Not crossed by cable
WB12	Rye Water_020 (Padistown)	14400	Instream trenching
WB13	Rye Water_010	15050	HDD
WB14	Royal Canal	15400	HDD
WB15	Lyreen_010	19920	Affected by passing bay
WB16	Drainage ditches	20870	Not crossed by cable
WB17	Drainage ditches	21250	Instream trenching
WB18	Drainage ditches	21300	Instream trenching
WB19	Lyreen_010 (Baltracey Trib Lyreen)	21650	Instream trenching
WB20	Trib of Liffey_010	22000	HDD
WB21	Drainage ditches	22300	Instream trenching
WB22	Clonshanbo_010	23620	Instream trenching
WB23	Drainage ditches	24150	Not crossed by cable
WB24	Clonshanbo_010	25800	Instream trenching
WB25	Kilmurry_010	27300	Instream trenching
WB26	Trib of Kilmurry_010	27600	Instream trenching
WB27	Liffey_130	30000	Crossed in-road
WB28	Trib of Liffey_130	30250	Instream trenching
WB29	Liffey_130	30400	Crossed in-road

WB30	Trib of SLATE_010	31360	Instream trenching
WB31	Liffey_130	31360	Not crossed by cable
WB32	Longton_Demesne_Trib of Liffey_120	36150	Instream trenching
WB33	Drainage ditches	36650	Crossed in-road
WB34	Drainage ditches	36900	Instream trenching
WB35	Liffey_120	37200	HDD
WB36	Liffey_120	37900	Crossed by bridge
WB37	Liffey_120	39000	Crossed by bridge
WB38	Grand Canal	39400	Crossed by bridge
WB39	Liffey_110	41510	Crossed in-road
WB40	Liffey_110	42300	Crossed in-road
WB41	Liffey_110	42900	Crossed in-road
WB42	Grand Canal	44600	HDD
WB43	LIFFEY_100	45330	Crossed in-road
WB44	Drainage ditches	49000	Instream trenching
WB45	Dunstown	52700	Instream trenching
WB46	Trib of Liffey	37600	Not crossed by cable

Of these, the most notable crossings for the Proposed Development are:

- Rye Water (WB13) – HDD;
- Royal Canal (WB14) – HDD;

- River Liffey (WB35 – HDD; WB36 – crossed in-road; WB37 – crossed in-road);
- Grand Canal (WB38 - crossed on road; WB42 HDD).

4.3 OPW PFRA and CFRAM Study Mapping

4.3.1 Fluvial & Coastal Flood Risk

Fluvial and Coastal present day flood risk in the area of the Proposed Development was assessed against the OPW Preliminary Flood Risk Assessment Study (PFRA) Eastern Catchment Flood Risk Assessment and Management (CFRAM) Study. The Eastern CFRAM Study and PFRA Flood Extent and Depth Maps for Coastal Flood Risk are available online (www.floodinfo.ie). Figures 4.2 and 4.3 show the Proposed Development is largely not at risk of fluvial flooding from these river crossings, as the Proposed Development will be running underground. In locations where detailed CFRAM maps are not available, PFRA mapping is used supplementarily, see Figures 4.4 and 4.5.

The Proposed Development is located 33 km west of the coast at an elevation of approximately 70-140m AOD, therefore the Proposed Development is not at risk of coastal flooding.

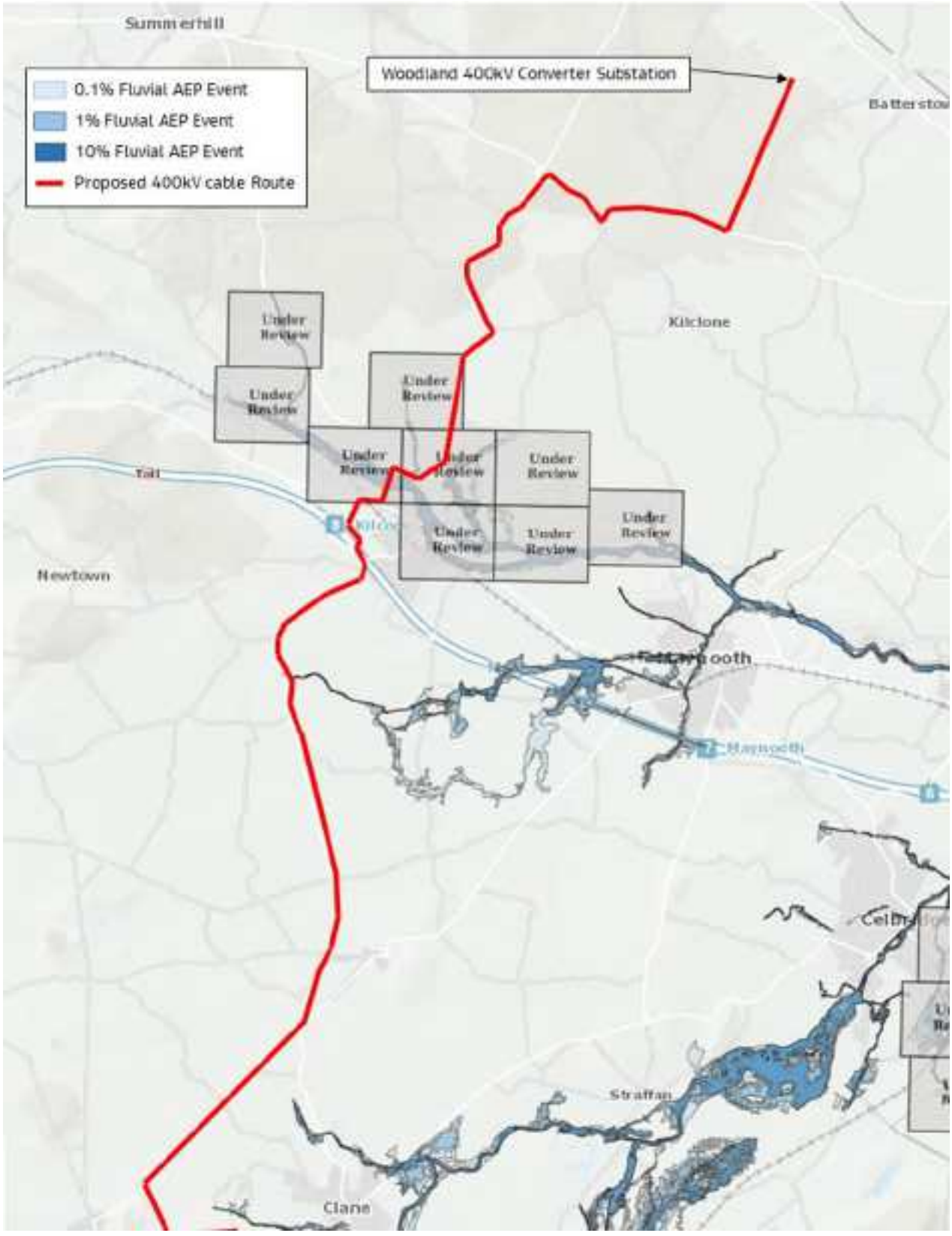


Figure 4.2 Extract of Fluvial Flood Mapping from Eastern CFRAM Study for the Proposed Development, from Woodland Substation to west of Clane.

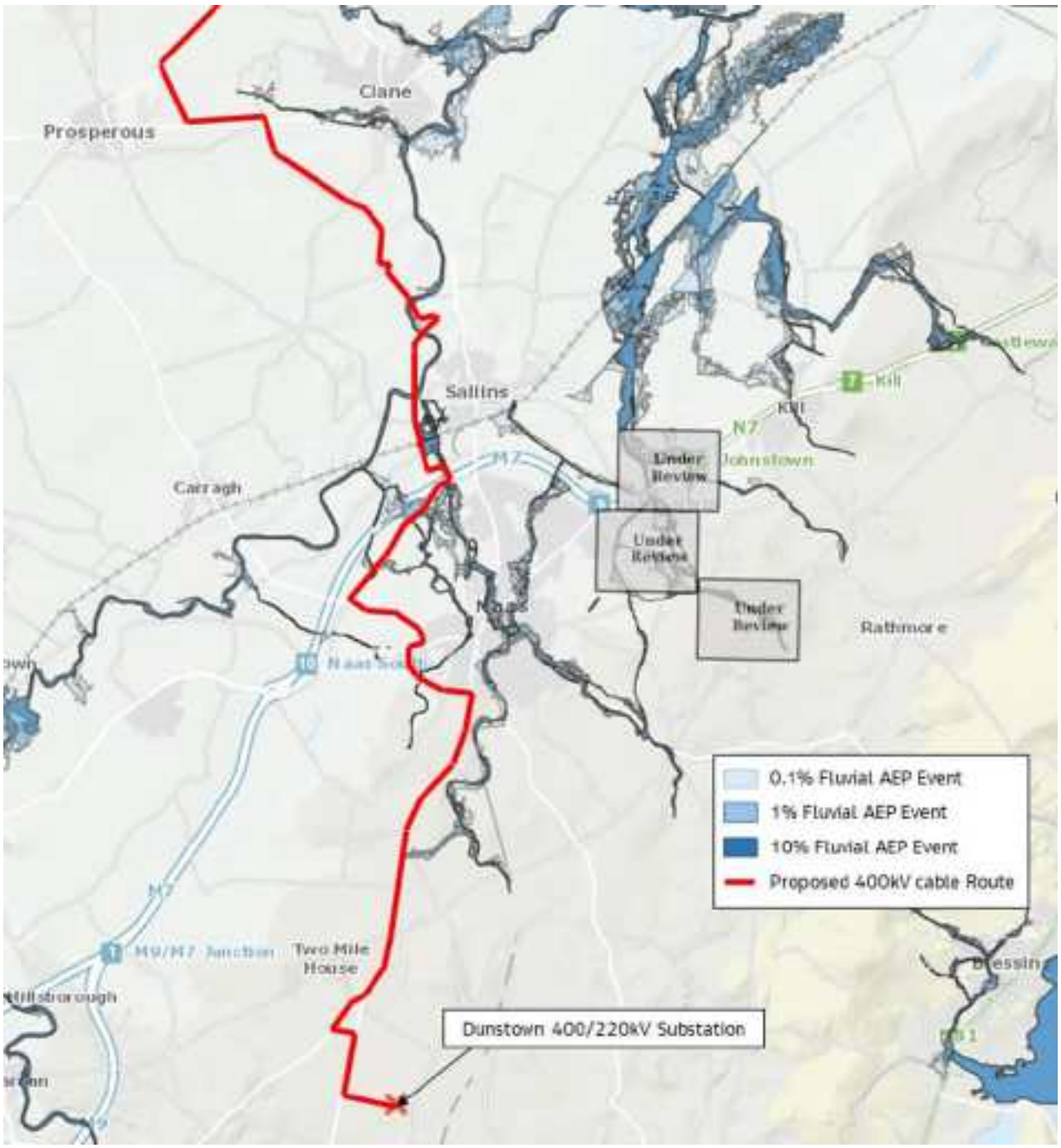


Figure 4.3 Extract of Fluvial Flood Mapping from Eastern CFRAM Study for the Proposed Development, from west of Clane to Dunstown Substation.

Of all the watercourse crossings detailed above, some are located in flood risk areas and are presented in more detail below.

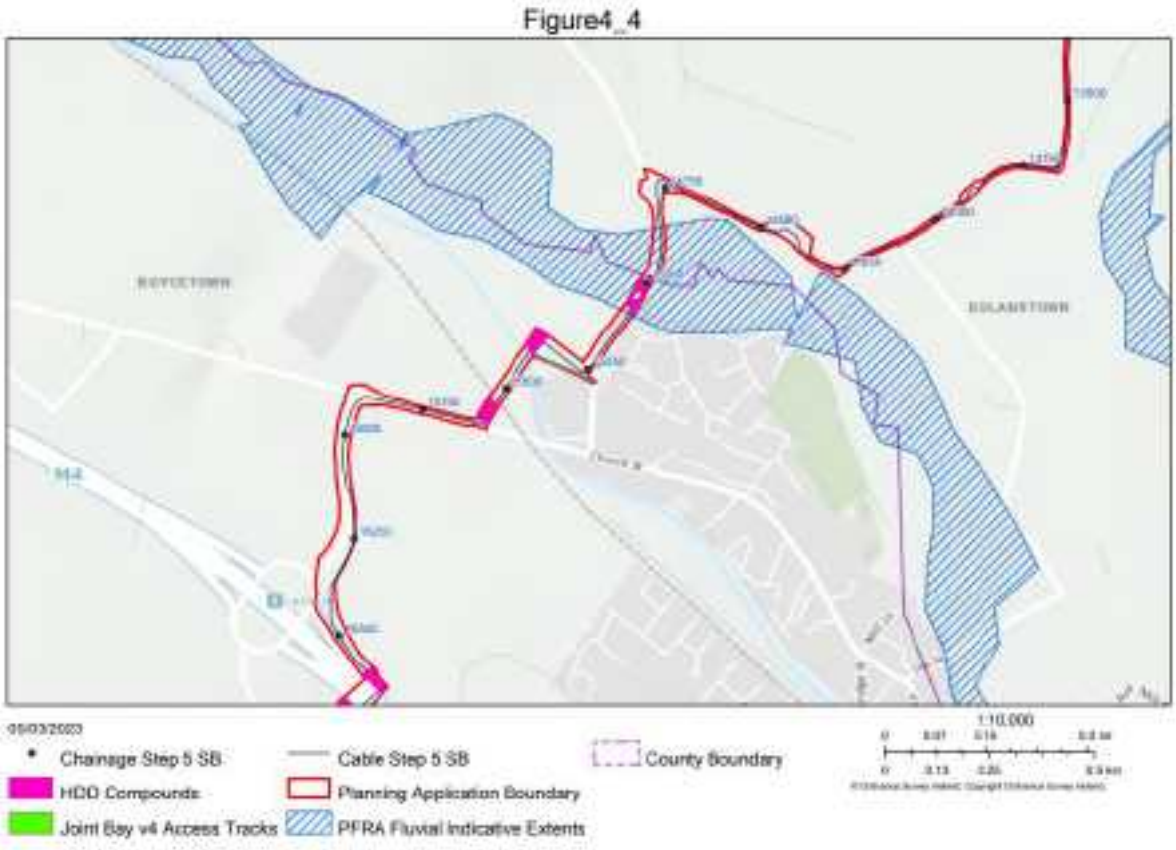


Figure 4.4 Extract of PFRA Fluvial Indicative Extents for notable watercourse crossings WB13 (Rye River) and WB14 (Royal Canal)

Figure 4.5 Extract of PFRA Fluvial Indicative Extents for notable watercourse crossings of the Liffey River (WB35, WB36, WB37)

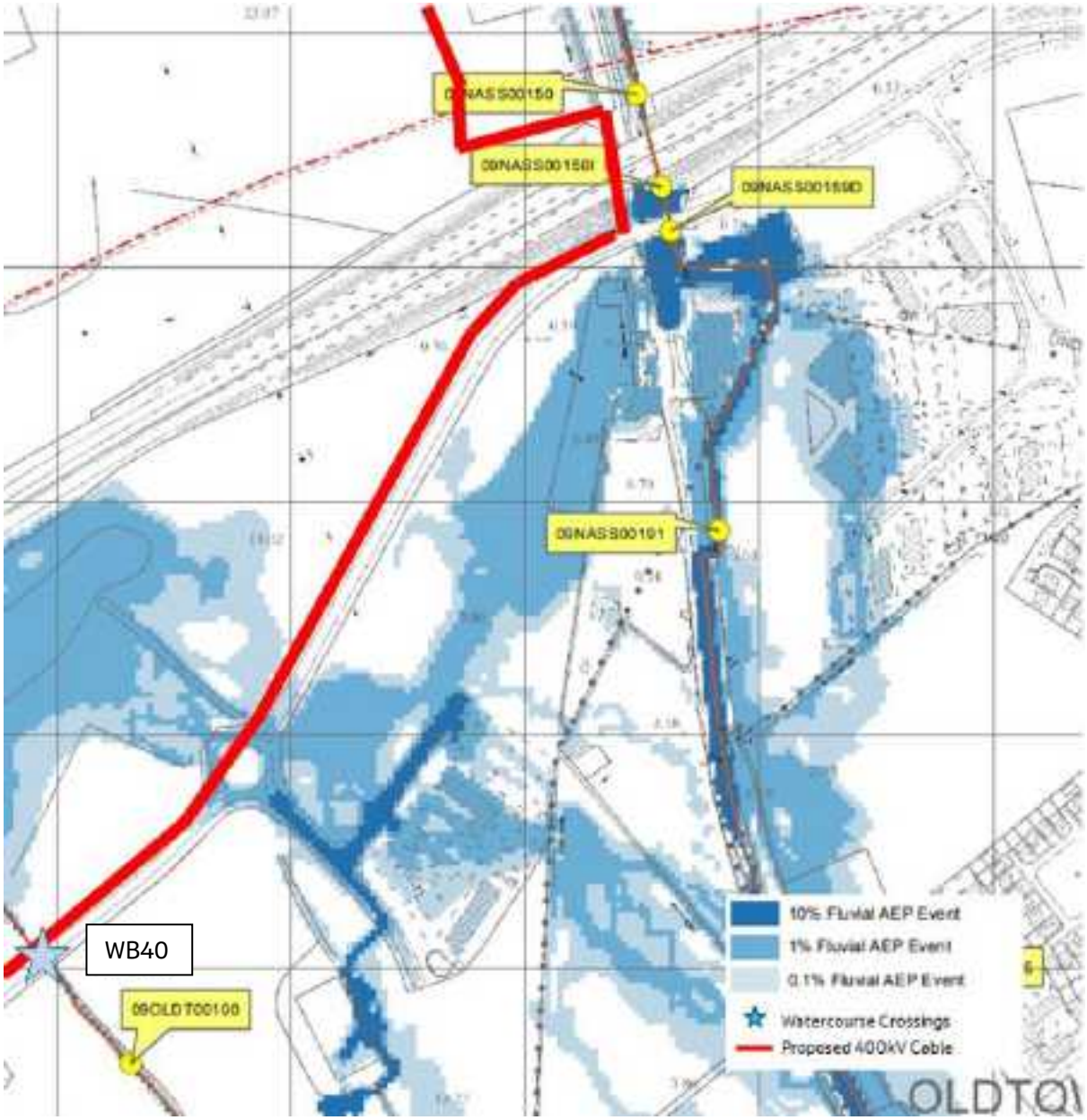


Figure 4.6 Extract of CFRAM fluvial flood mapping on Millennium Parkway

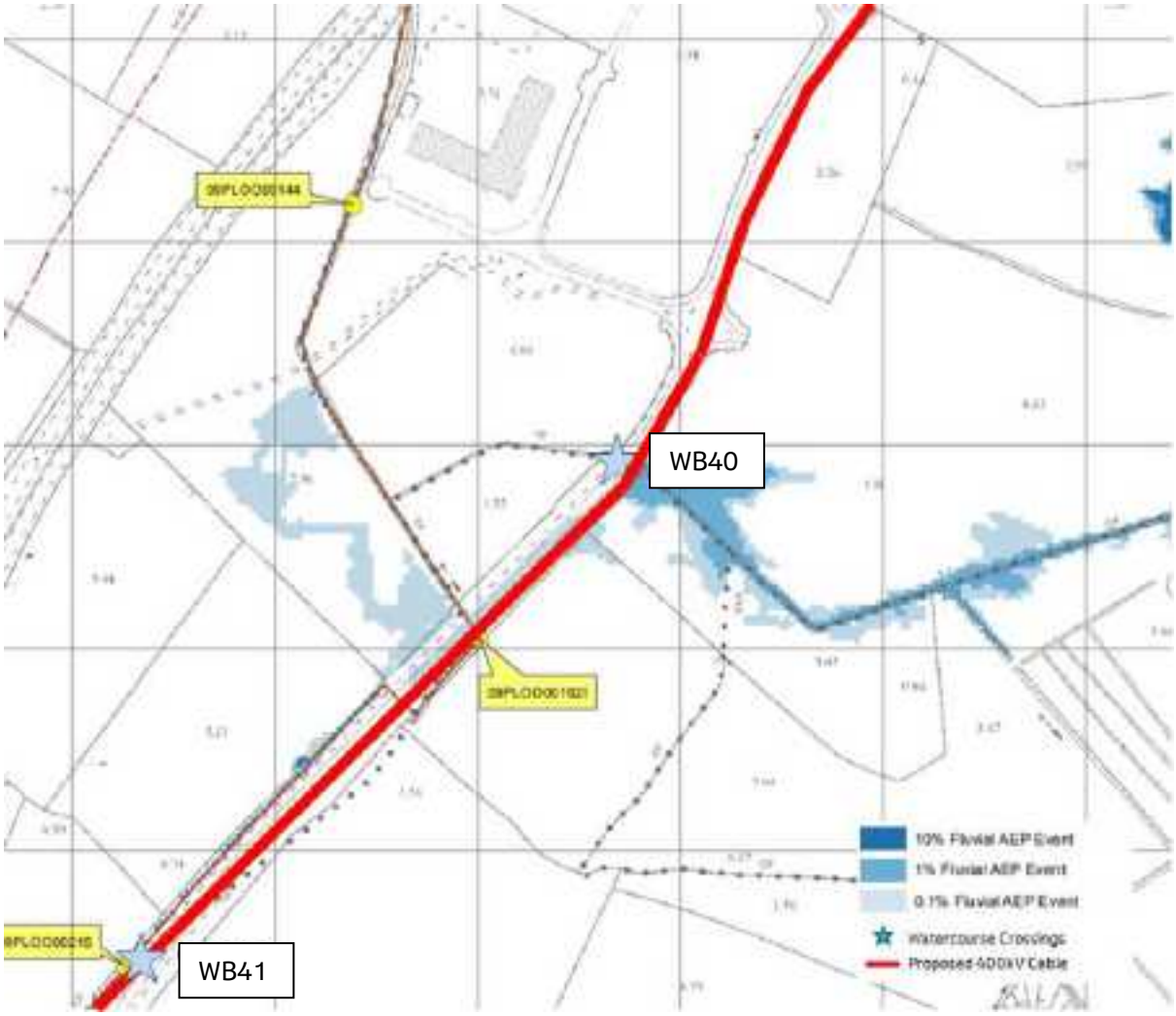


Figure 4.7 Extract of CFRAM fluvial flood mapping on Millennium Parkway

4.3.2 Rainfall/Pluvial Flood Risk

Pluvial flooding occurs during periods of heavy rainfall, when the rainfall rate is greater than the infiltration capacity. It is usually associated with high intensity rainfall events (typically > 30mm/h) resulting in overland flow and ponding in depressions in the topography. In urban situations underground sewerage/drainage systems and surface watercourses may be completely overwhelmed.

Pluvial flood extents are available for areas of Kildare and Meath and provide an indication of the level of risk. The flood mapping considered flood risk in the 10%, 1% and 0.5% AEP rainfall events. The rainfall flood extents at the area of interest were reviewed using a QGIS shapefile, based on data from the OPW Flood info website (available at www.floodinfo.ie), as well as an extract of PFRA pluvial mapping.

There is low risk of pluvial flooding to the Proposed Development overall based on the available pluvial mapping. However, there are a few areas where the Proposed Development crosses pluvial flood zones, see Table 4.3 and Figures 4.8 to 4.12 below for details.

Table 4.3 Locations of possible pluvial flood risk along the proposed 400kV route.

Chainages	Location/Description
3+600	Along the R156 at Barstown
12+750 – 13+250	Along the R125 at Calgath, 3 no. locations
17+500	Along the R407 at Kilcock Commons South
30+250	Along the Maynooth Road near Cott
44+500	At the Naas Sports Centre parking lot

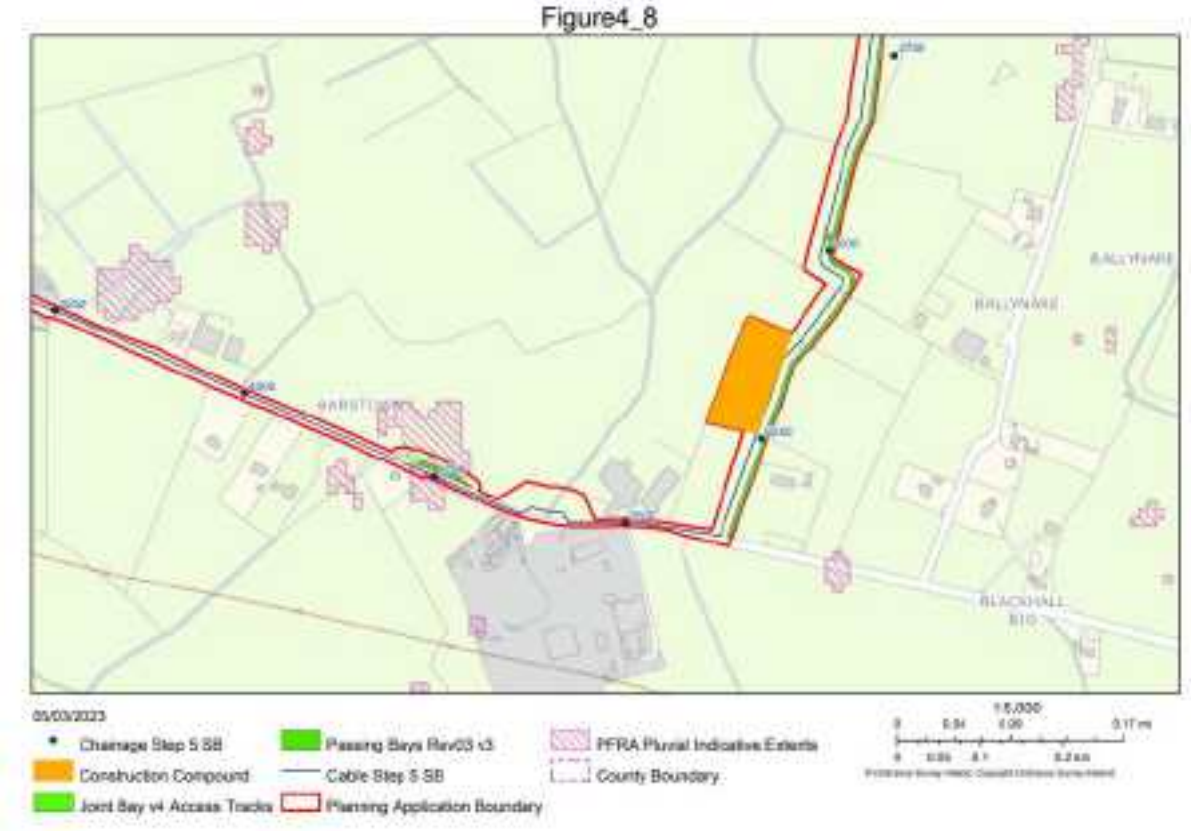


Figure 4.8 Extract of pluvial PFRA mapping along the Proposed Development route, Ch. 3+600.

Figure 4.9 Extract of pluvial PFRA mapping along the Proposed Development route, Ch. 12+750 - 13+250.

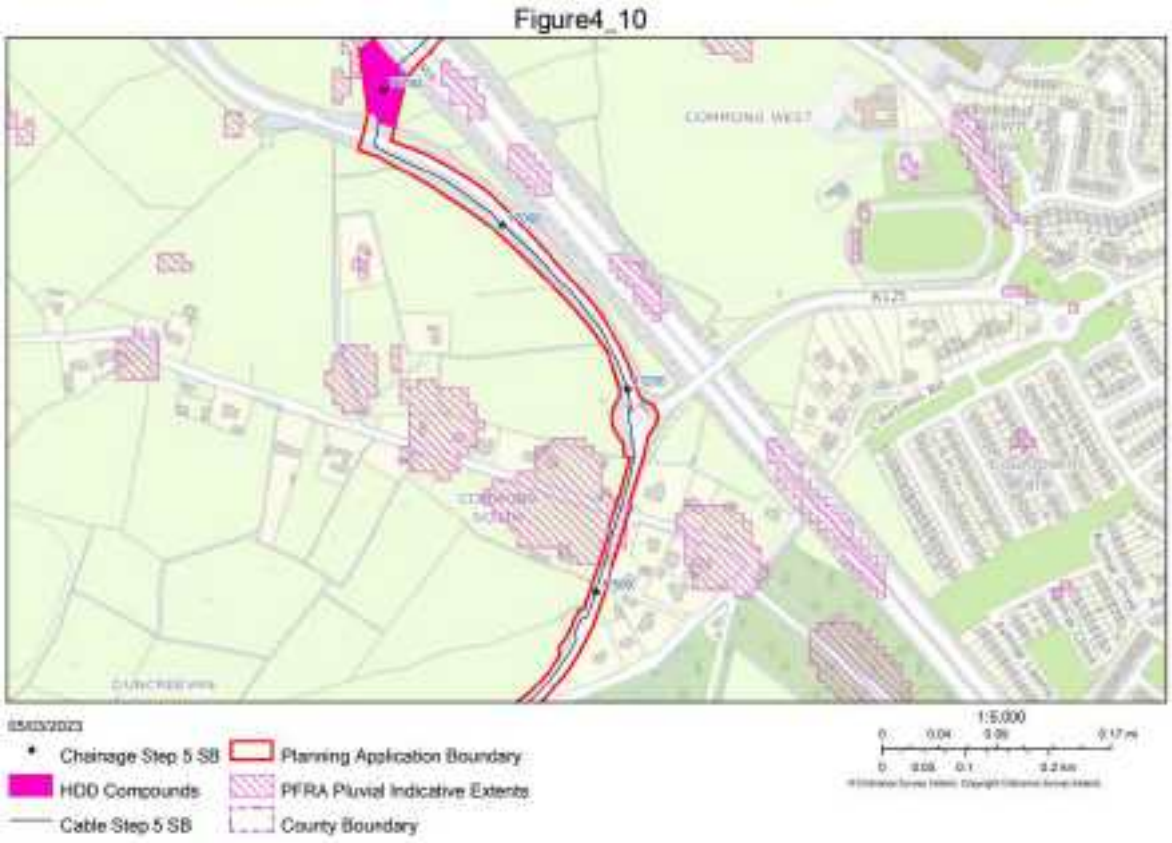


Figure 4.10 Extract of pluvial flood mapping along the Proposed Development route, along the R407 at Courtown Bridge, approximate chainage 17+500m.

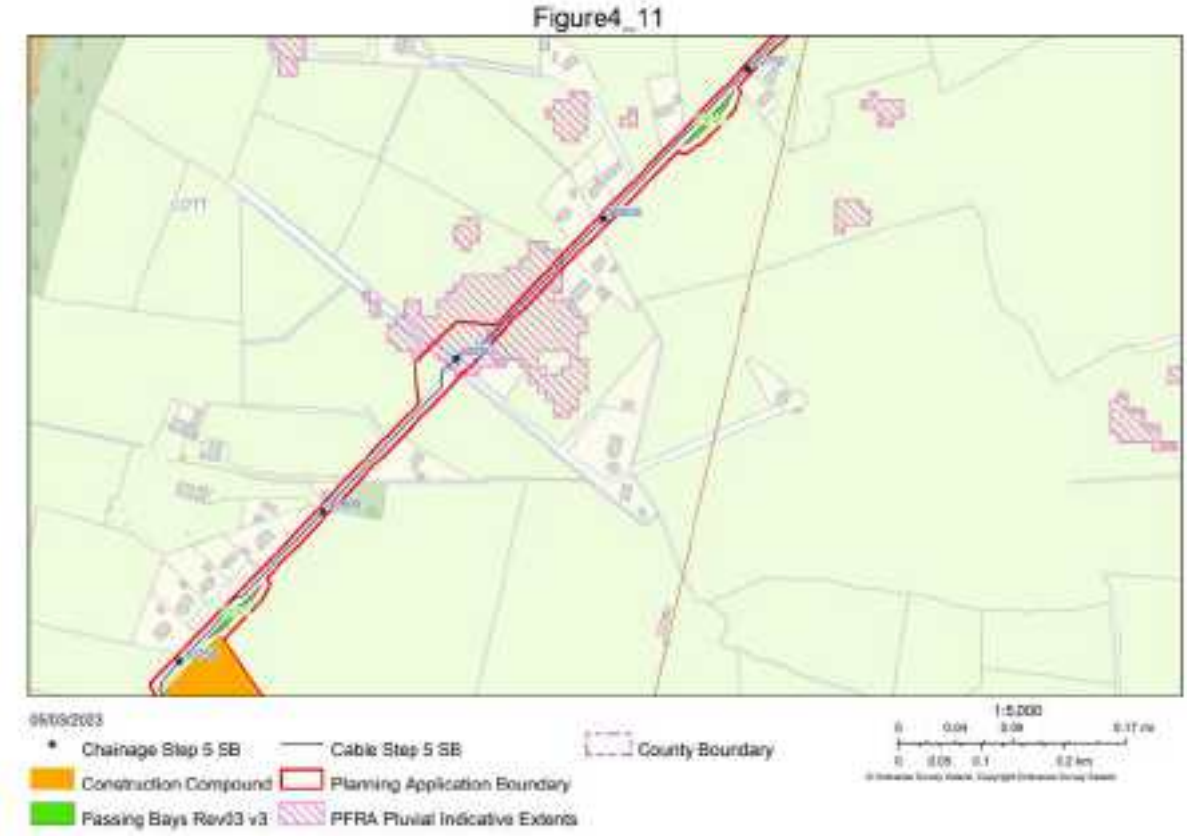


Figure 4.11 Extract of pluvial flood mapping along the Proposed Development route, along Maynooth Road at Cott, approximate chainage 30+250m.

Figure 4.12 Extract of pluvial flood mapping along the Proposed Development route, at the Naas Sports Centre, approximate chainage 44+500m.

4.4 National Indicative Fluvial Mapping (NIFM)

The National Indicative Flood Mapping (NIFM) data was produced for all catchments greater than 5km^2 that were not covered by the National CFRAM Programme. Figures below are extracted from maps available online on www.floodinfo.ie.

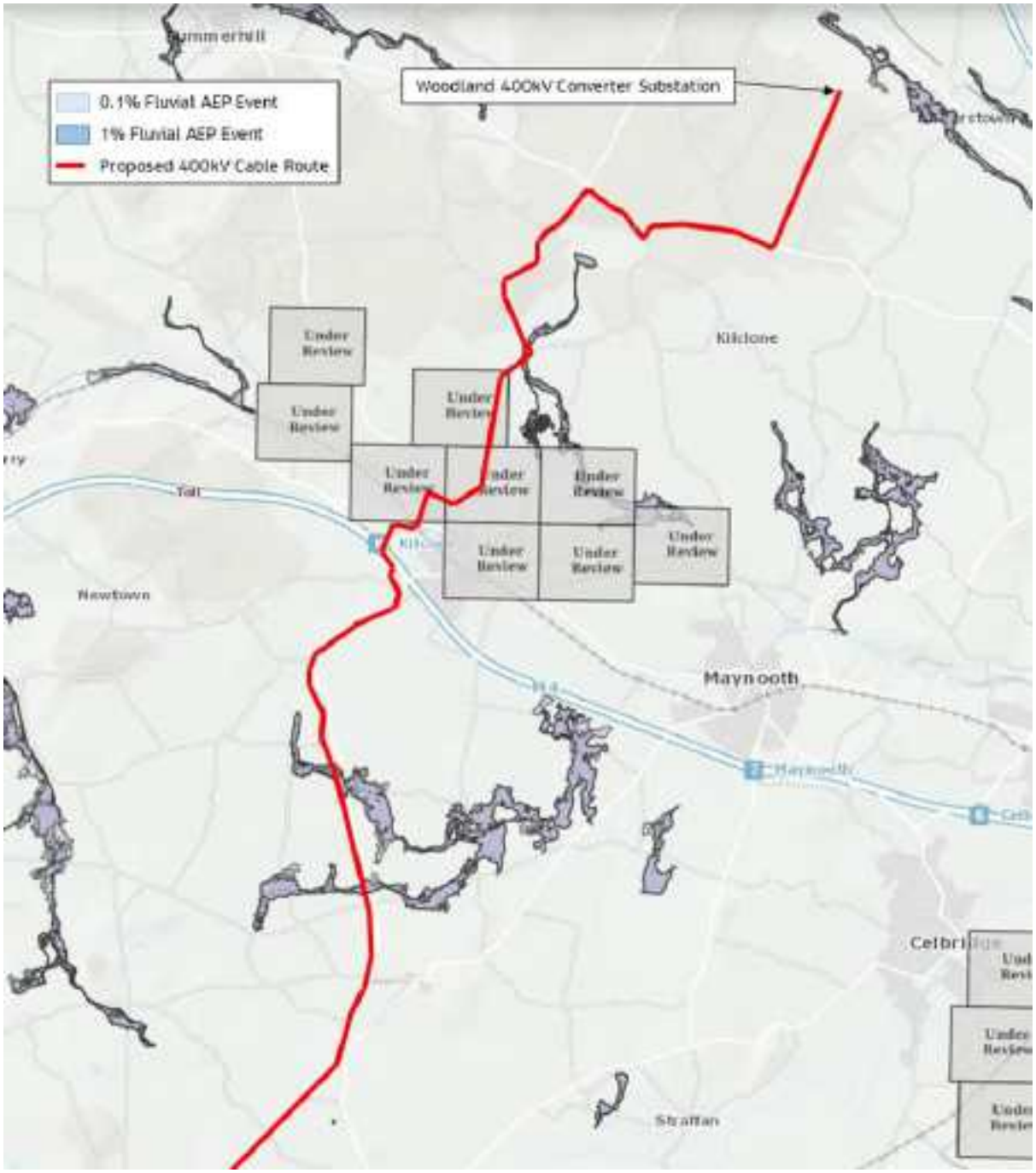


Figure 4.13 Extract of Fluvial Flood Mapping from NIFM for the Proposed Development, from Woodland Substation to west of Clane.

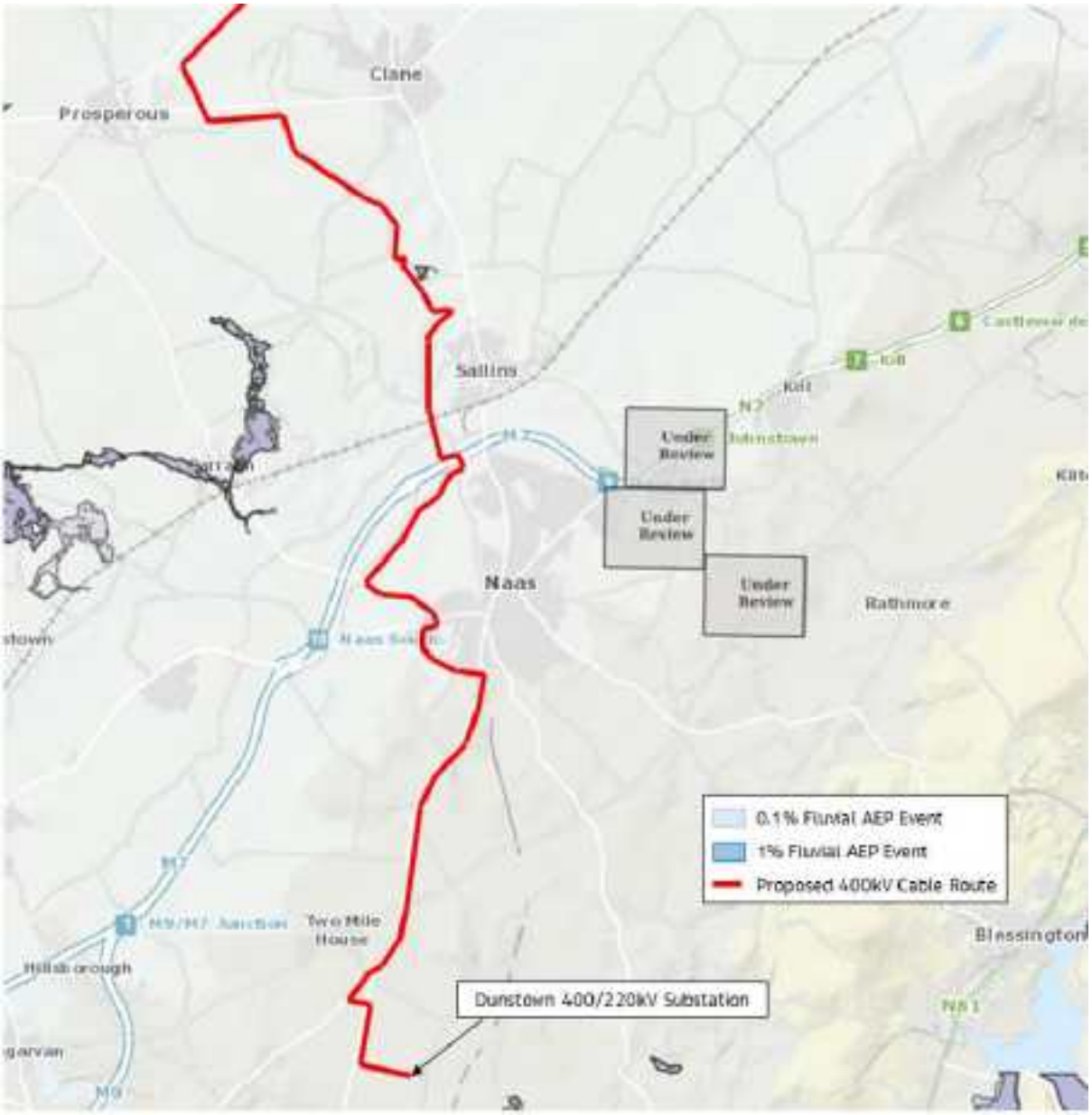


Figure 4.14 Extract of Fluvial Flood Mapping from NIFM study for the Proposed Development, from west of Clane to Dunstown Substation.

As is shown in Figures 4.13 and 4.14 above, risk of fluvial flooding to the proposed works is generally low. In some key areas where watercourses identified by the NIFM will be crossed, the Proposed Development crosses with the 0.1% and 1% AEP fluvial flood risk areas. As the Proposed Development will be underground, there is a low risk of flooding at these areas only during construction. Refer to Stage 2 of this FRA in Chapter 6 for proposed mitigation measures.

4.5 Groundwater Flood Risk

Groundwater flooding occurs when the level of water stored in the ground rises as a result of prolonged rainfall to meet the ground surface and flows out over it, i.e. when the capacity of this underground reservoir is exceeded. Groundwater flooding tends to be very local and results from interactions of site-specific factors such as tidal variations. While water level may rise slowly, it may be in place for extended

periods of time. Hence, such flooding may often result in significant damage to property rather than be a potential risk to life. The OPW National Flood Hazard Mapping website (www.floodinfo.ie) was used to assess the risk of groundwater flooding. Based on the OPW groundwater maps, there is no risk of groundwater flooding to the Proposed Development.

Regarding potential seepage of groundwater into the proposed open cut trenching during construction, existing groundwater protection scheme reports for County Meath and Kildare reveal no significant shallow deposits of groundwater in the area of the Proposed Development. Local borehole testing would reveal the water table level and any potential seepage. However, Geological Survey Ireland (GSI) maps reveal soil permeability along the Proposed Development. As shown in Figure 4.15, soil permeability is generally "Low" around the north end of the development, transitioning into "Medium" around Prosperous and Clane, and local crossings with "High" permeability areas west of Sallins and south of Naas.

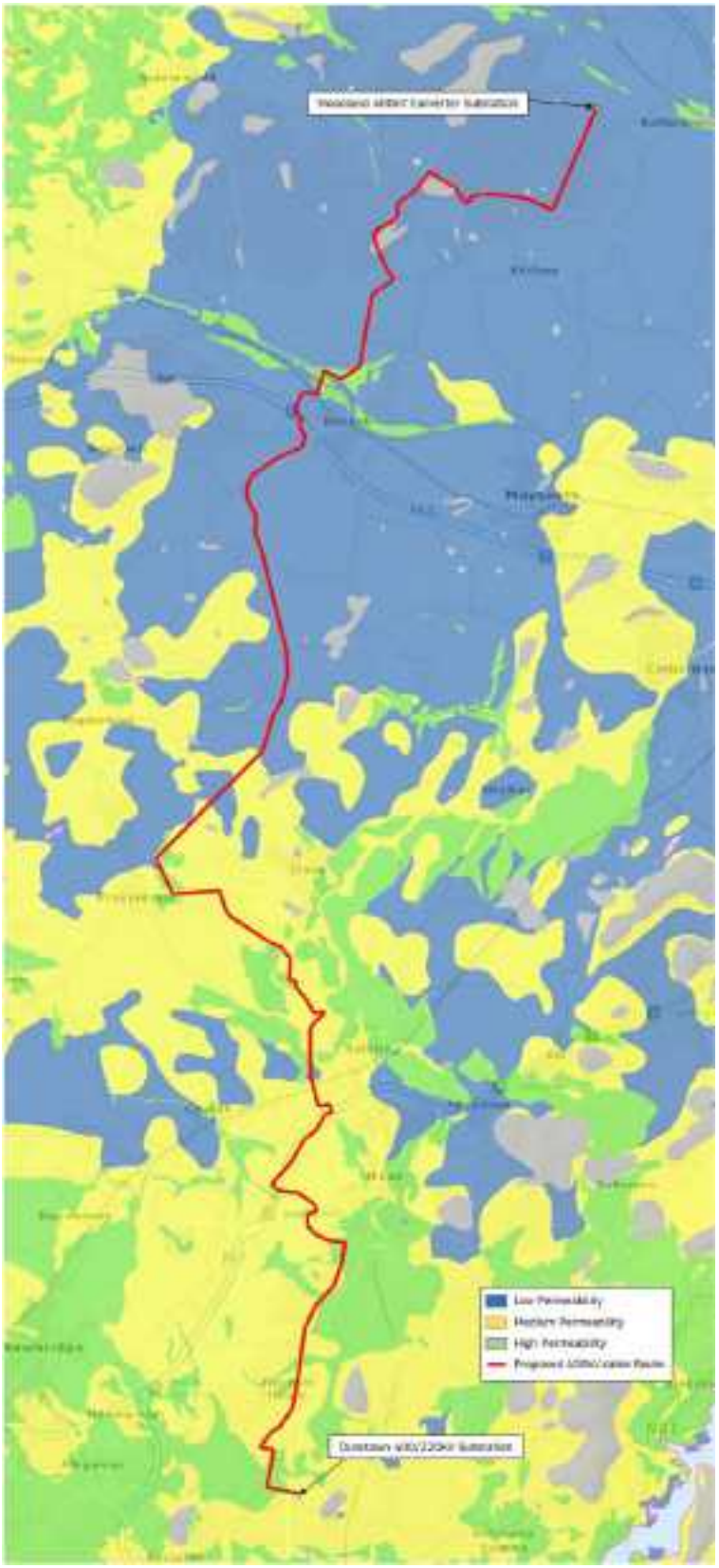


Figure 4.15 Extract of subsoil permeability mapping from the GSI Groundwater Data Viewer mapping at the Proposed Development and surrounding area.

In the event that groundwater seepage into the trenching of the Proposed Development is detected, potential mitigation measures that could be followed are detailed below:

- Dewatering: This method involves pumping out groundwater from the trench, with the aim of lowering the water table and allow for a dry working area. This can be achieved by creating local well points around the trench and extracting the groundwater using pumps.

- Trench boxes: Trench boxes are metal or plastic structures placed in the open cut trench to support it and prevent collapse by creating a water tight seal around its perimeter. However, this method also increases water pressure on the sides of the trench, so dewatering must be carried out first.

4.6 Strategic Flood Risk Assessments (SFRA)

4.6.1 Strategic Flood Risk Assessment for County Meath Development Plan 2020-2026

JBA Consulting was commissioned by Meath County Council in November 2011 to undertake a Strategic Flood Risk Assessment (SFRA). This study informed the Meath County Development Plan for 2020 – 2026. As depicted in Figure 4.16, the majority of the Proposed Development is located in Flood Zone C (defined in Section 3.1), except for local crossings with Flood Zone B and A sites.

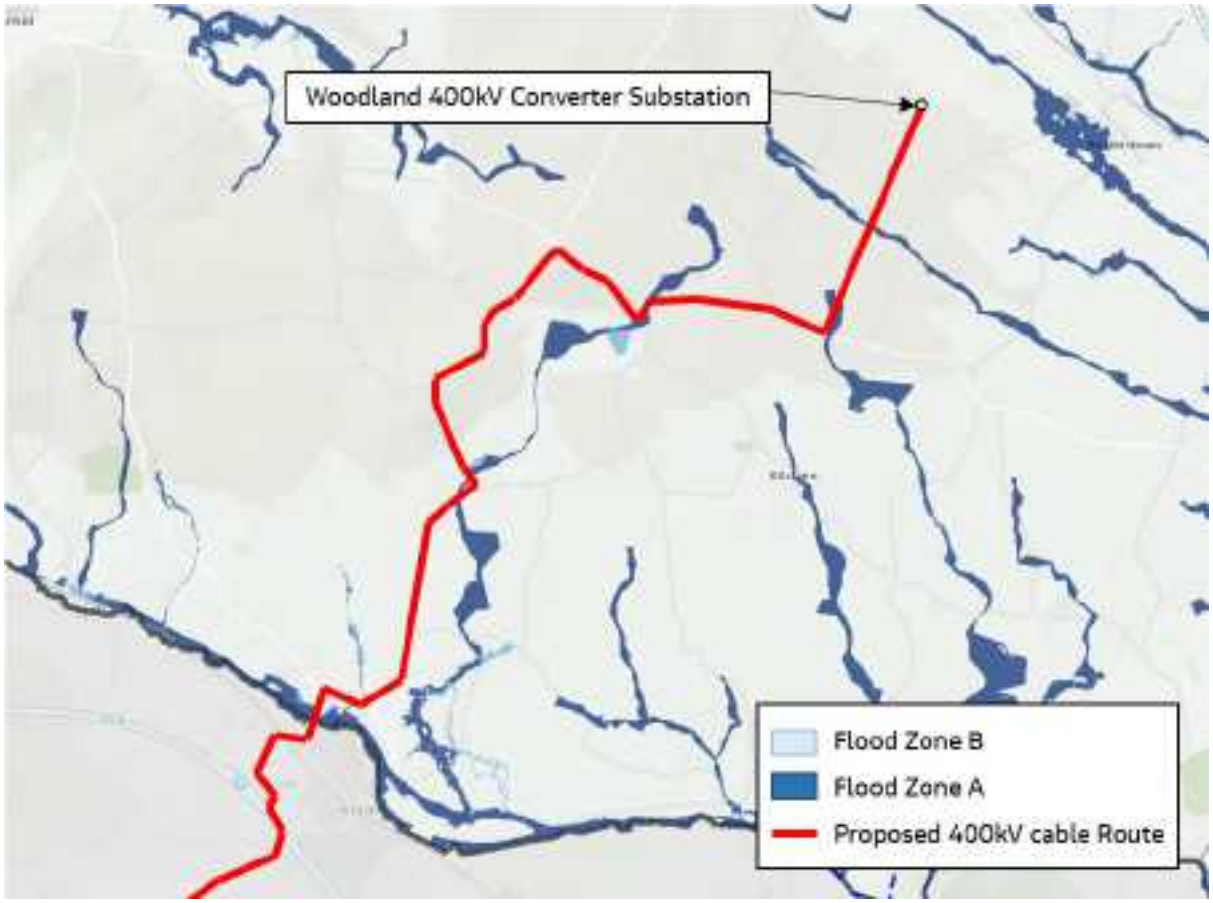


Figure 4.16 Extract of flood zones A and B from Meath County Development Plan 2021-2027 (online Arc Map).

4.6.2 Strategic Flood Risk Assessment for County Kildare Development Plan 2023-2029

RPS Group Ltd was commissioned by Kildare County Council in 2022 to undertake a Strategic Flood Risk Assessment (SFRA). This study informed the Kildare County Development Plan for 2023-2029.

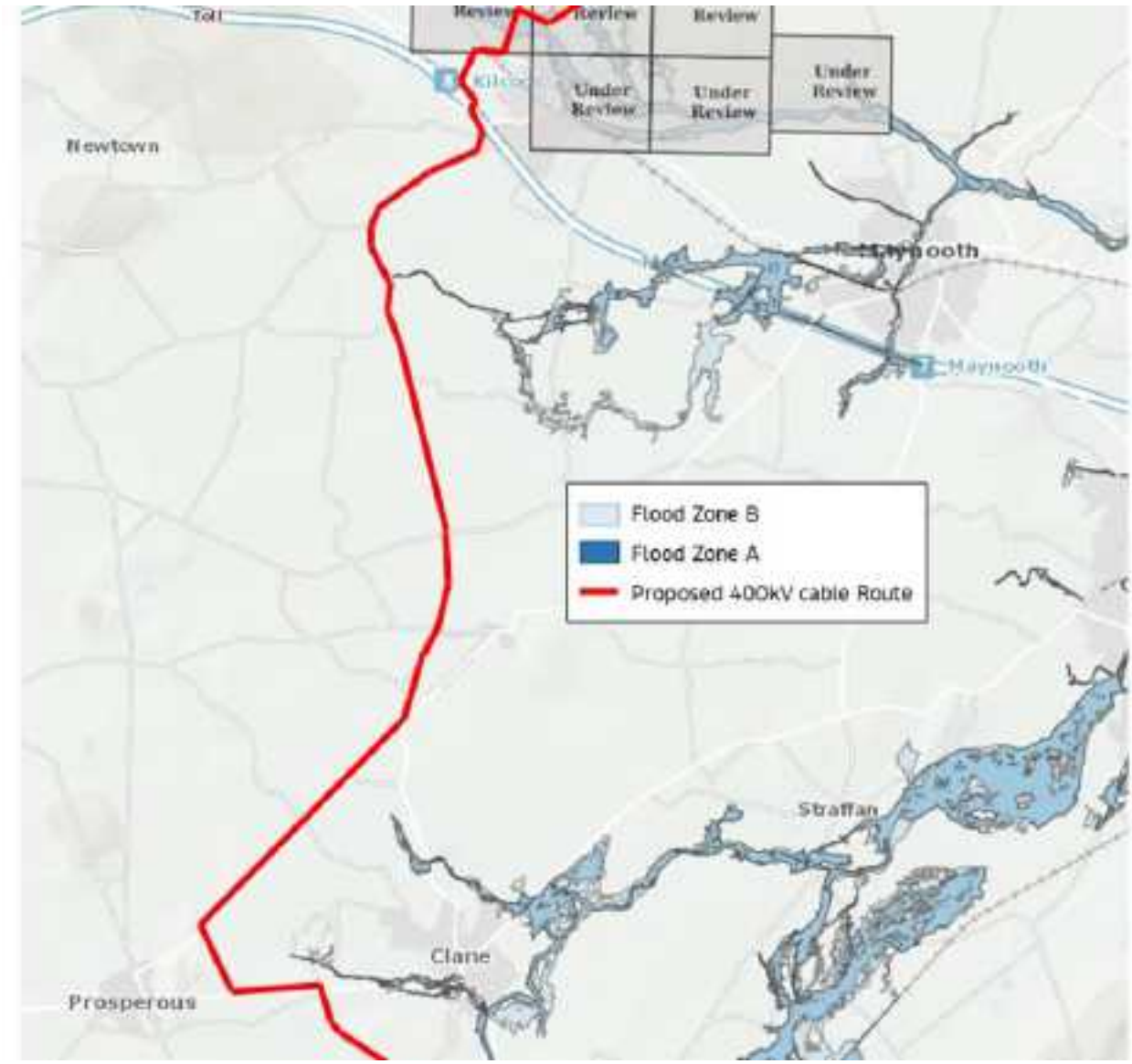


Figure 4.17 Extract of flood zones A and B for County Kildare from OPW Eastern CFRAM study, Kilcock to Prosperous.

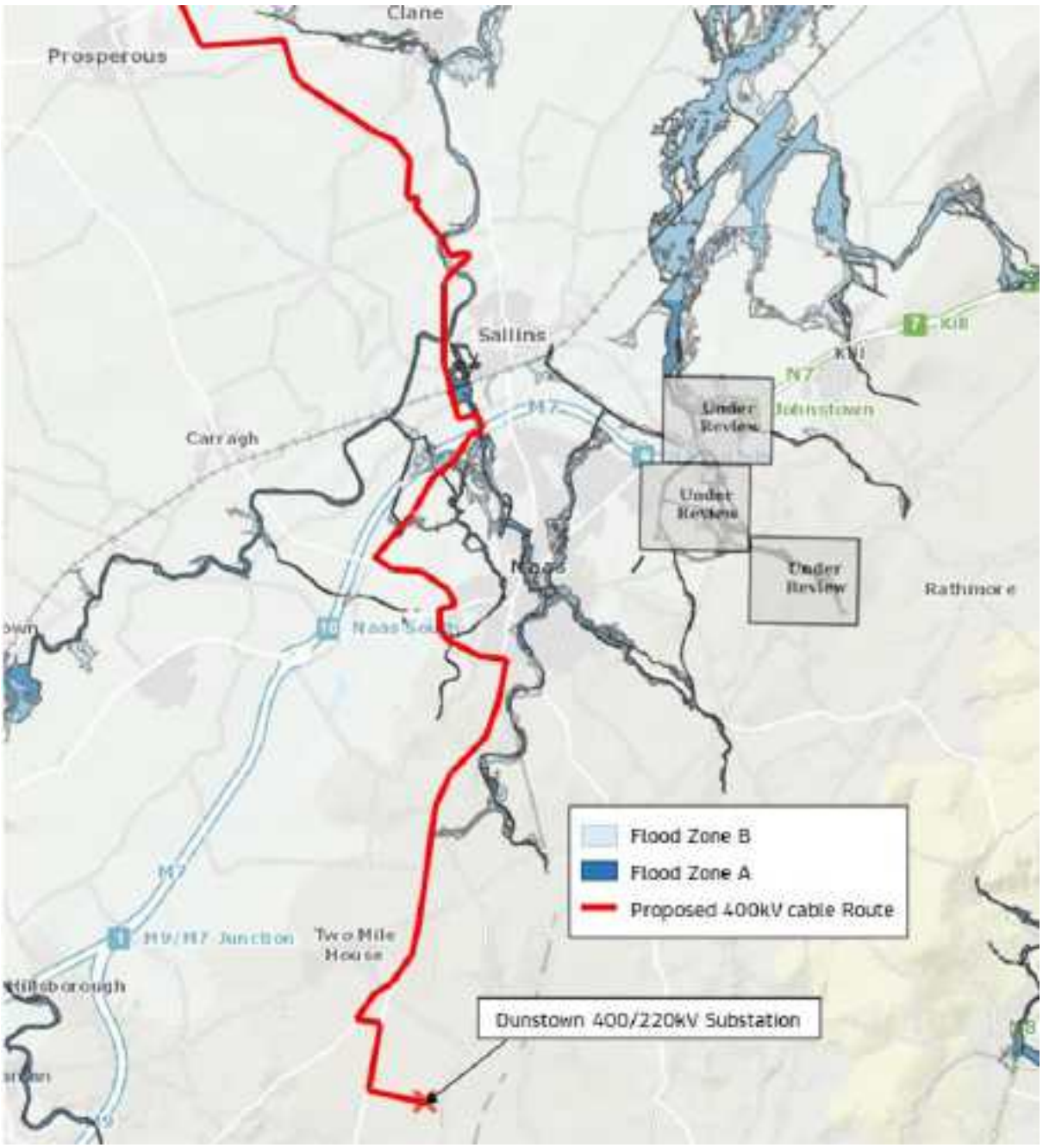


Figure 4.18 Extract of flood zones A and B for County Kildare from OPW Eastern CFRAM study, Prosperous to Dunstown Substation.

For the Proposed Development, the majority is located in Flood Zone C. The site specific reports available in the Kildare County SFRA and Local Area Plans (LAPs) for Sallins and Naas contain further information for the respective locations shown in Table 4.4 below:

Table 4.4 Presence of flood risk indicators along Proposed Development for County Kildare.

Location	Information	OS Historic Mapping Data
Lands south of the Railway Line east and west of the Canal within the Sallins LAP boundary	PFRA mapping indicates that a portion of these lands are at significant risk of flooding.	OS Historic Mapping shows that these lands are characterised by a number of open drainage ditches together with extensive infrastructural development including a spur of the Grand Canal into Naas and a spur from the Great Southern and Western Railway from Sallins Station into Naas.
Lands along both banks of the River Liffey within the Sallins LAP boundary	PFRA mapping indicates that large portions of these lands are at significant risk of flooding.	OS 25" and 6" Historic Mapping shows that the lands are surrounded by numerous drainage features including a network of open land drains and a stream flowing towards the River Liffey.
Lands south of the Grand Canal and east of Main Street within Sallins LAP boundary	These lands were subject to some flooding in November 2009. The lands are close to the location identified on the Floodmaps website as having experienced significant flooding in November 2009. Culverts draining lands which flooded in 2009 pass through these lands before draining into the Grand Canal.	Lands are bounded by the Grand Canal, the Railway Line and open drains. A stream which is fed by a number of springs south of the railway line passes beneath the railway line, through these lands and through the town centre before draining to the River Liffey.
Lands north of Grand Canal divergence and south of the River Liffey within the Sallins LAP boundary	PFRA mapping indicates that large portions of these lands are at significant risk of flooding.	OS 6" and 25" Historic Mapping shows that these lands are traversed and surrounded by numerous small streams and open drainage features flowing towards the River Liffey. A spring is also mapped within these lands. A strip of marshy ground is mapped running between the Grand Canal and the River Liffey.
Community College – Naas Northwest	The SFRA flood zones in this area show a greenfield site where localised areas overlap with Flood Zones A and B. A community school development is currently under construction on the site.	The flood mapping as shown on www.floodinfo.ie for the MRFS scenario indicates an increase in flood extents for Flood Zone A, taking into account climate change within the surrounding area.

5. Stage 2 Initial Flood Risk Assessment

This section assesses the risk of flooding to the Proposed Development once the works are complete from a range of different sources, which is then used to develop a broader understanding of the risk characteristics to the proposed works.

5.1 Potential Sources of Flooding

Based on the online information provided, the Stage 1 assessment identifies a low risk for fluvial and pluvial flooding in certain locations. These have been identified from available mapping in Stage 1, and further mitigation measures where necessary can now be proposed. Finally, there is no known risk for coastal or groundwater flooding.

5.2 Artificial Drainage Systems

Care must be taken during construction, so that the proposed works do not impact surface water or artificial drainage systems following construction. The 400kV cable will be laid at a lower depth (approximately 1600mm) than that expected for drainage systems (700 to 1200mm), so chances of crossing with the existing networks are low. However, there is risk of undermining existing drainage infrastructure when trenching for the Proposed Development, therefore care must be taken to maintain appropriate clearance levels.

5.3 Flood Risk due to Climate Change

Future climate change is predicted to give rise to an increased risk of flooding through rising sea levels and an increase in river flows and the frequency and intensity of extreme rainfall. The OPW has identified two potential scenarios for the impacts of climate change that are known as the Mid-Range Future Scenario (MRFS) and High-End Future Scenario (HEFS).

Table 5.1 summarises the predicted impacts of both scenarios on predicted sea levels, river flows and rainfall depths over the next 100-years.

Table 5.1 Climate Change Forecast

Parameter	Mid-range Future Scenario (MRFS)	High-End Future Scenario (HRFS)
Mean Sea Level Rise	+500mm	+1000mm
River Flows	+20%	+30%
Extreme Rainfall Depths	+20%	+30%

The Mid-Range Future Scenario (MRFS) scenario is intended to represent the 'likely' future scenario based on a range of forecasts. The High-End Future Scenario (HEFS) represents a more extreme forecast that is at the upper end of accepted projections.

Fluvial flood extent maps for the CFRAM and NIFM future scenarios are available below.

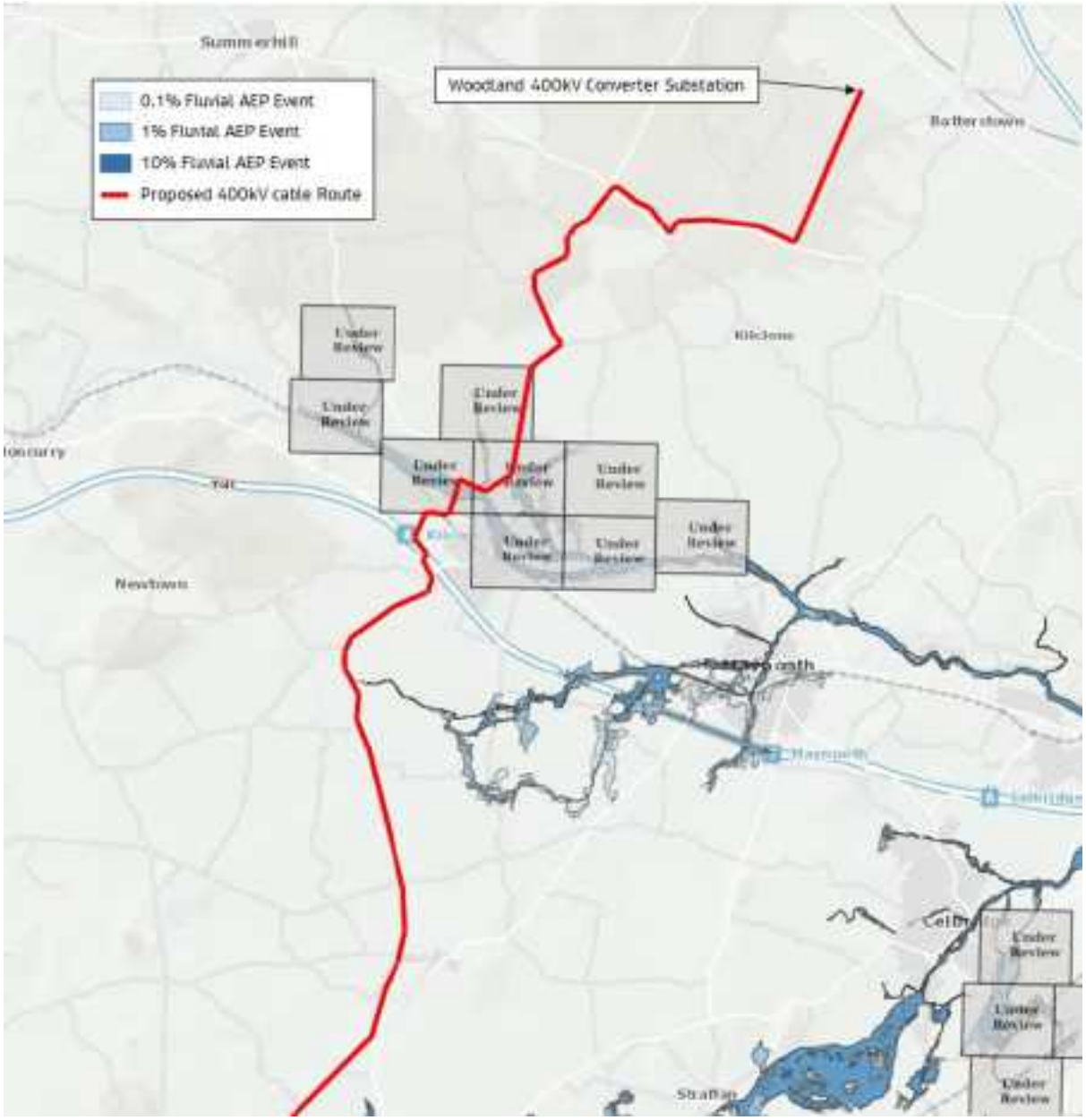


Figure 5.1 Extract from CFRAM study fluvial flood mapping, Mid-Range Future Scenario, Woodland Substation to west of Clane.

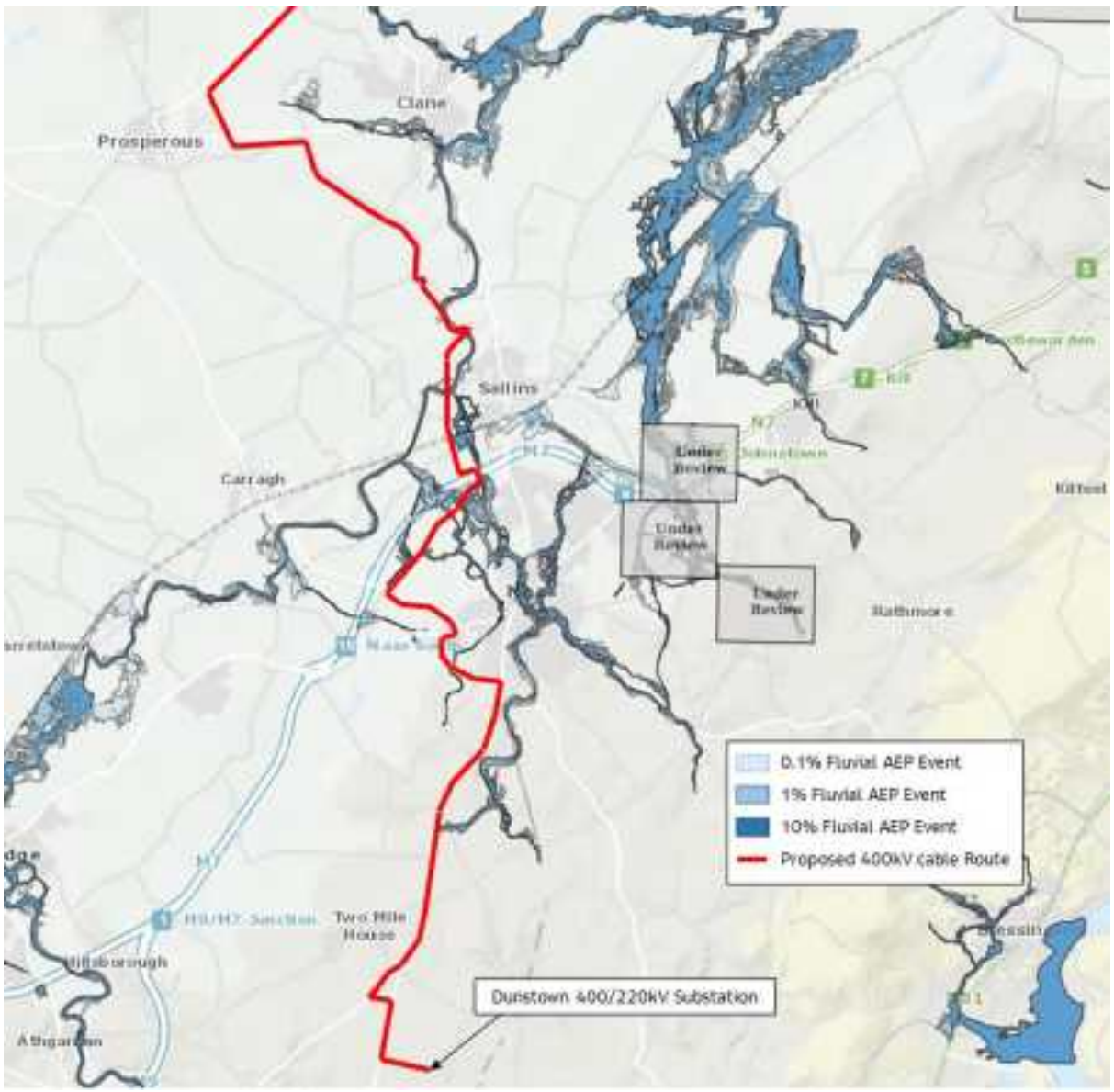


Figure 5.2 Extract from CFRAM study fluvial flood mapping, Mid-Range Future Scenario, west of Clane to Dunstown Substation.

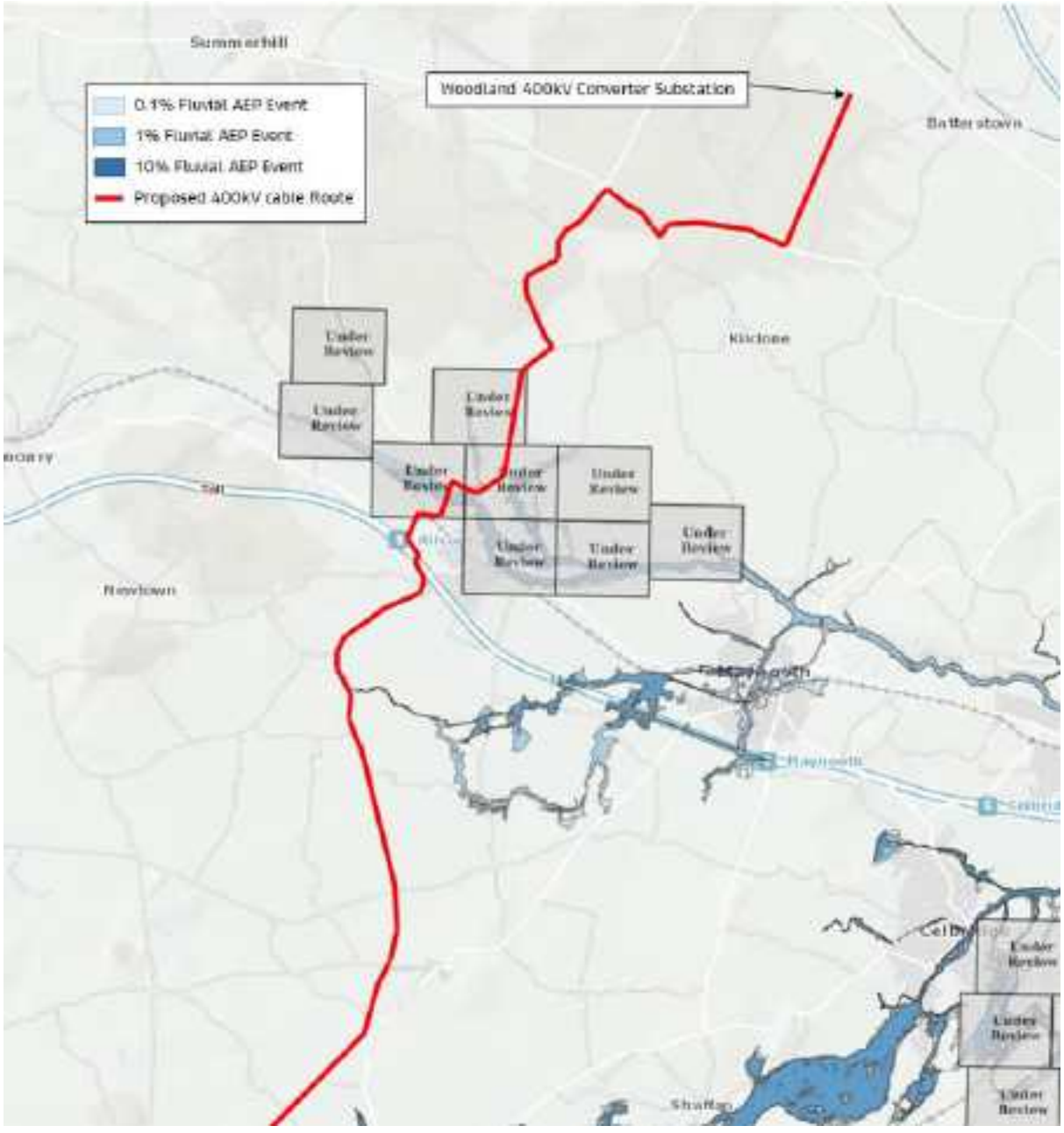


Figure 5.3 Extract from CFRAM study fluvial flood mapping, High-End Future Scenario, Woodland Substation to west of Clane.

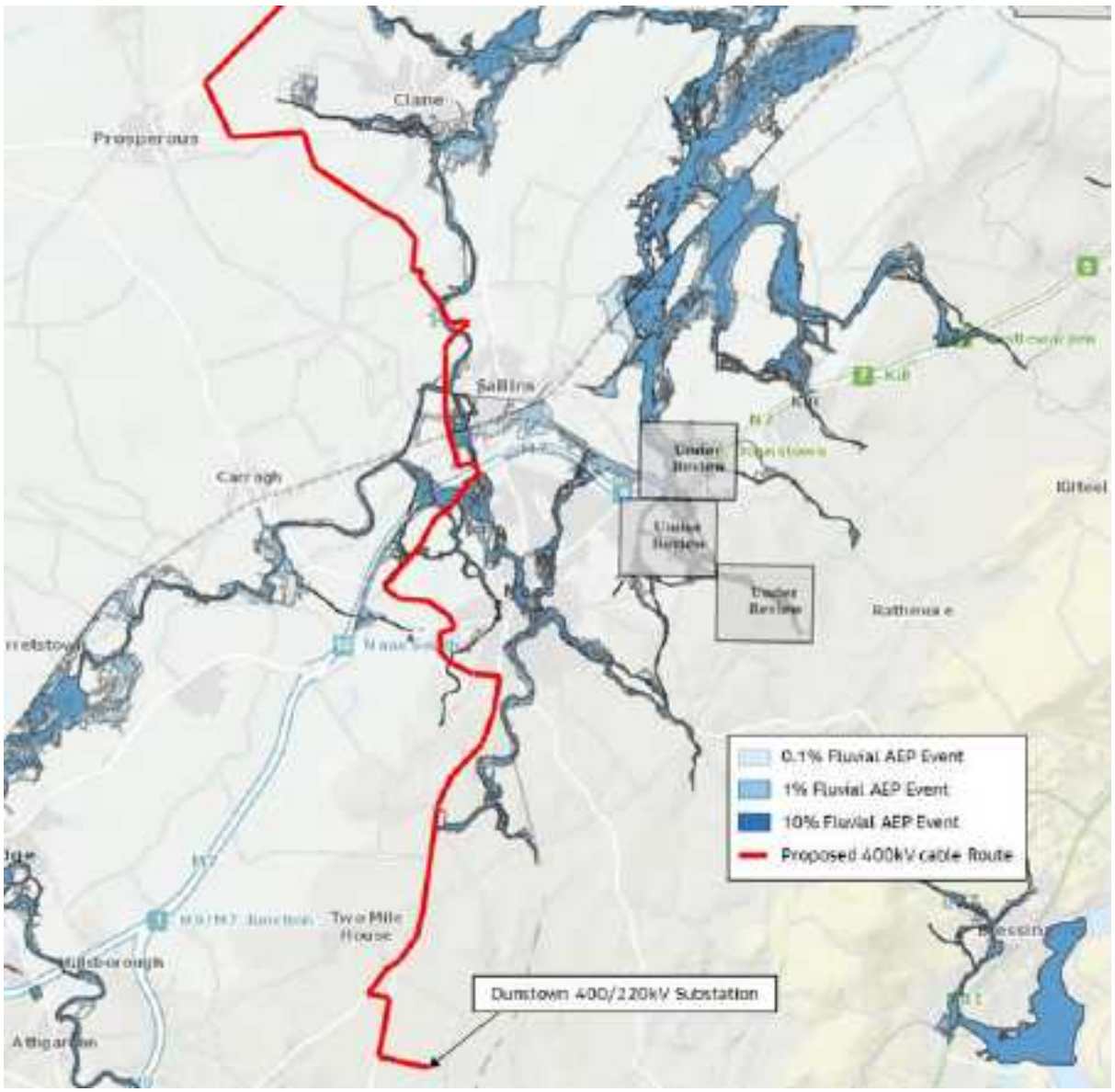


Figure 5.4 Extract from CFRAM study fluvial flood mapping, High-End Future Scenario, west of Clane to Dunstown Substation.

Figure 5.5 Extract from NIFM flood extents for the Mid-Range Future Scenario.

Figure 5.6 Extract from NIFM flood extents for the High-End Future Scenario.

For the purposes of this flood risk assessment, the potential impact of climate change on flood risk to the Proposed Development has been made relative to the MRFS scenario. Table 5.2 summarises the potential flood risk impacts with climate change on the Proposed works.

Table 5.2 Climate Change Impact

Source of Flooding	Likely Impacts of Climate Change	Discussion
Coastal	No change	There is no known existing risk of Coastal Flooding to the Proposed works and climate change will not result in potential flooding of the proposed works from coastal sources.
Fluvial	No change	There is only a temporary risk of flooding during construction. Future climate change will not affect this conclusion.
Estuarine	No change	There is no known risk of estuarine flooding to the proposed works. This conclusion is not changed by the impact of climate change.
Pluvial	No change	There is only a temporary risk of flooding during construction. Future climate change will not affect this conclusion.
Artificial Drainage Systems	No change	The proposed works will have no identified impact on surface water or artificial drainage systems as it is underground, built at a lower depth. Any new impermeable surfaces associated with the works shall be catered for in additional stormwater infrastructure ensuring any additional runoff will not compromise the capacity or performance of the existing drainage systems. All additional stormwater drainage required will be designed to cater for the effects of future climate change.
Groundwater	No change	The proposed works is not at risk from groundwater flooding, based on online information. Future climate change will not affect this conclusion.

5.4 Summary of Flood Risk

The flood risk to the Proposed Development is summarised in Table 5.3 below.

Table 5.3 Summary of Flood Risk to Proposed Development

Flood Risk	Summary of Impact	Notes
Coastal	No change	Based on the information provided online there is no known risk of Coastal Flooding to the proposed works.
Fluvial	Low	The CFRAM fluvial flood extents highlight that there is a low risk of flooding from local watercourses during construction, in key areas where a watercourse will be crossed. Proposed methods of watercourse crossing include HDD, trench crossings and in-road crossings.

Flood Risk	Summary of Impact	Notes
Estuarine	No change	There is no known risk of Estuarine Flooding to the Proposed Development based on the information provided.
Pluvial	Low	The CFRAM pluvial flood extents highlight that there is a low risk of pluvial flooding during construction at certain areas along the Proposed Development. As the method of cable laying here will be open trenching, there is a low impact of pluvial flooding on the Proposed Development during construction.
Artificial Drainage Systems	No change	There is no known risk of flooding from artificial drainage systems to the Proposed Development based on the information provided.
Groundwater	Low	Based on a review of GSI Groundwater Data Viewer mapping and site specific SFRAs for County Kildare, there is potential high permeability of soil in the southern area of the development (west of Sallins, south of Naas). There may be groundwater seepage in these areas, as well as close to proposed river crossings or wherever the proposed trench is adjacent to riverbanks. Borehole testing would be required to confirm the presence of groundwater.

6. Stage 2: Potential Flood Risk Impacts from Proposed Works

Section 5, above, considered the flood risk to the proposed works. This section will consider the potential change in flood risk to the surrounding areas from the works for each source of flooding during construction and operation.

6.1 Impacts on Coastal Flooding

The Proposed Development is not at risk from Coastal Flooding during construction or operation. The proposed works will therefore have no known impact on Coastal Flood Risk based on online information provided by the OPW.

6.2 Impacts on Fluvial Flooding

The Proposed Development is at low risk from fluvial flooding during construction. Any proposed works to watercourses (e.g. instream trenching) will be designed to maintain waterflows and allow the discharge of water without affecting flood risk. Once construction is complete, the proposed development is expected to slightly increase existing impermeable areas at the locations where off-road joint bays are proposed. This is due to the proposed 3m wide hard standing areas and permanent access tracks (4m in width) around 14 no. joint bays. The permanent access tracks located (partially or fully) within the PFRA Fluvial Indicative Extents are those to Joint Bays1-4; JB 8; JB15; JB50; JB54; and JB60. The typical design for the permanent access tracks is shown in Planning Drawing 321084AH-JAC-ZZ-XX-DR-K-2207. Subject to detailed design, there will be 100mm of crushed stone (CL804) on top of 200mm of crushed concrete (6F1) on top of SECUTEX 151 GRK 3C geotextile. The permanent access tracks will be finished to approximately 100mm above existing ground level– subject to detailed design. The hardstanding areas around the off-road joint bay will have a similar construction. All joint bays and link boxes are designed with watertight connections as standard. Drainage sumps are proposed for the joint bays, to provide for additional drainage. It is considered that the hardstanding areas, joint bays, and permanent access tracks will not result in any significant loss of floodplain and will not increase risk of flooding. The proposed works will therefore have no impact on fluvial flood risk based on online information provided by the OPW website.

6.3 Impacts on Estuarine Flooding

The Proposed Development is not at risk from Estuarine Flooding. The Proposed works will therefore have no known impact on Estuarine Flood Risk based on online information.

6.4 Impacts on Pluvial Flooding

In order to assess the increase in Pluvial Flood Risk the following points need to be considered:

- Will the Proposed Development increase the rainfall runoff rate?
- Will the Proposed Development alter existing flow or drainage paths?

The Proposed works will result in an increase in the area of hardstanding surfaces. Please see Section 6.2 for details of the hardstanding areas, joint bays, and permanent access tracks. The permanent access tracks materials are water permeable at a degree but there will be a change from the current greenfield conditions. The permanent access tracks will be sloped to discharge to the adjacent greenfield. There will be no significant change in runoff as a result of the hardstanding areas, joint bays, and permanent access tracks. On the off-road sections, these areas will runoff to the adjacent greenfield areas. The proposed works will therefore have no impact on pluvial flood risk.

6.5 Impacts on Groundwater Flooding

The Proposed Development does involve new works below existing ground levels but it is unlikely that this would contribute to groundwater flooding, based on available online information from the OPW and GSI.

6.6 Impacts on Artificial Drainage Systems

The Proposed Development is not expected to cross any existing artificial drainage systems, as the intended route will be significantly deeper than the expected level of existing drainage networks. During operation, the Proposed Development is also expected to have no impact on same.

6.7 Summary of Potential Flood Risk Impacts from Proposed works

The flood risk impacts from the Proposed works are summarised in Table 6.1.

Table 6.1 Summary of potential flood risk impacts on surrounding areas as a result of the development

Flood Risk	Potential Scheme Impact	Discussion & Mitigation (where Required)	Residual Scheme Impact (with mitigation)
Coastal	No Impact	No known impact as the Proposed works is not at risk of Coastal Flooding.	No impact
Fluvial	Low	Low impact on surrounding areas from fluvial flooding, due to proposed additional hard standing and access tracks around off-road joint bays. Additional drainage sumps will be provided at the joint bays to offset this.	No Impact
Estuarine	No impact	No known impact on surrounding areas due to estuarine flooding.	No impact
Pluvial	Low	Low impact on surrounding areas due to pluvial flooding, due to proposed additional hard standing and access tracks around off-road joint bays. Additional drainage sumps will be provided at the joint bays to offset this.	No impact
Artificial Drainage Systems	No impact	The Proposed Development is not at known risk of surface flooding / impacting artificial drainage systems.	No impact
Groundwater	No impact	Below-ground elements of the works are localised and are unlikely to impact ground water movements.	No impact

7. Flood Risk Management and Evaluation

7.1 Justification Test for the Proposed Development

As defined in section 4.3, the Proposed Development is located in Flood Zone C, apart from minor local areas. For the specific areas where the works are located in Flood Zones A and or B, these require a Justification Test, as illustrated in Figure 7.1.

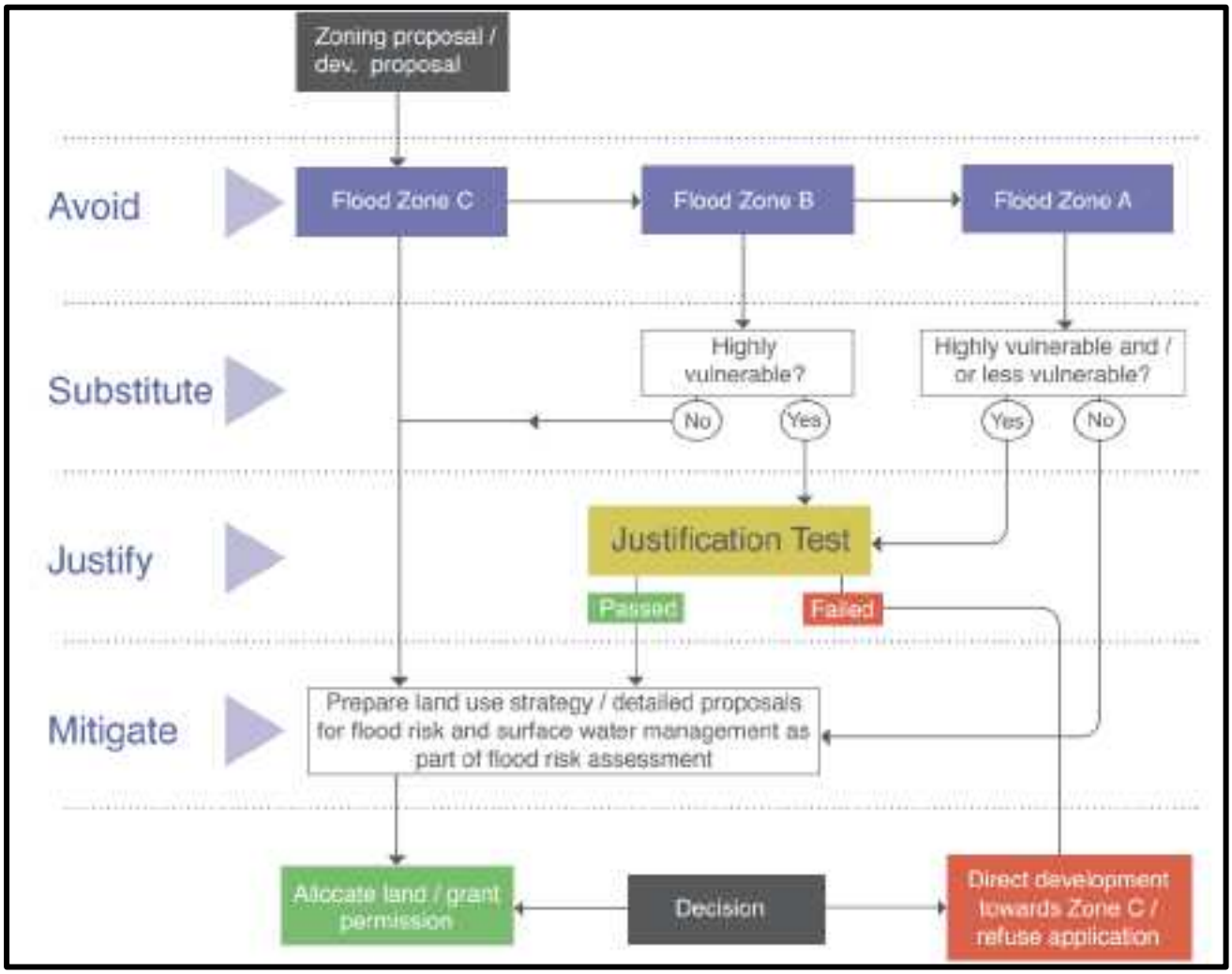
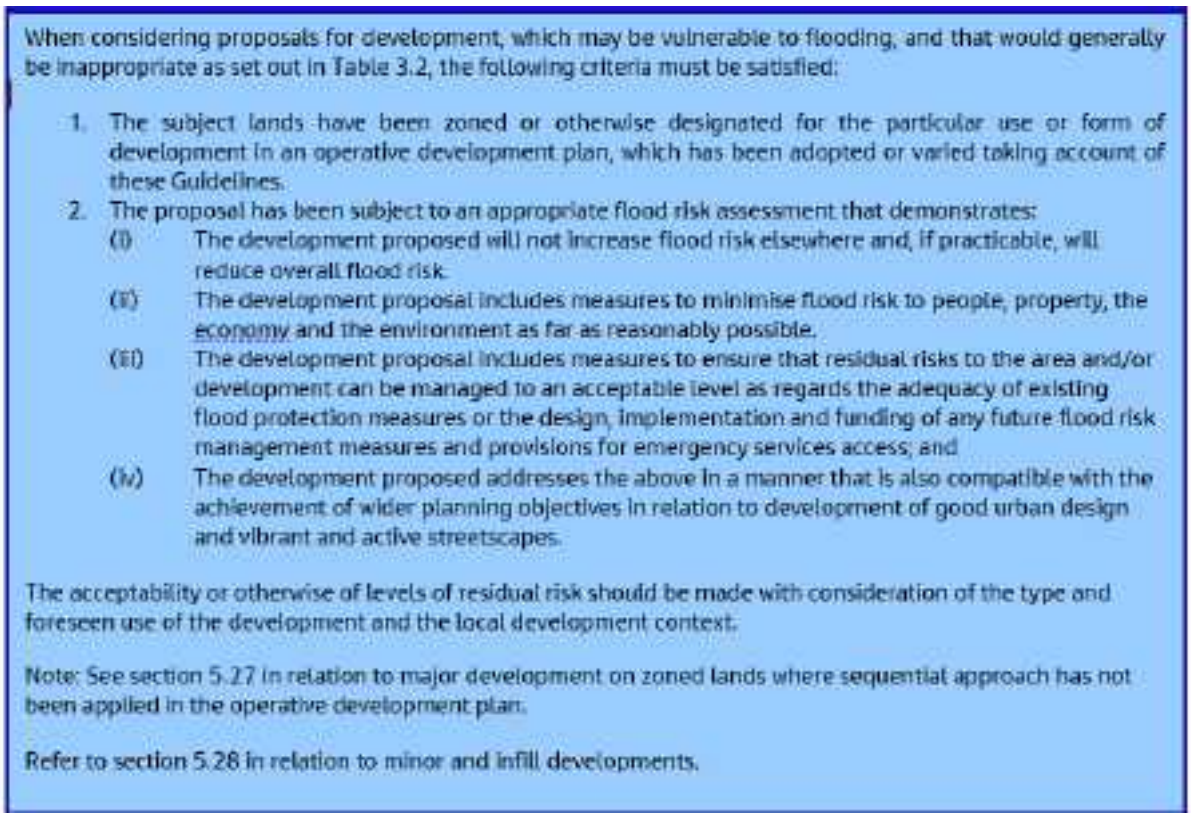


Figure 7.1 Justification Test

'The Planning System and Flood Risk Management, Guidelines for Planning Authorities' (2009)', 5.15, Box 5.1 sets out the criteria for the Justification Test and is replicated below in Figure 7.2. An assessment of the Proposed Scheme against these criteria is presented in Table 7.1 and Table 7.2.



When considering proposals for development, which may be vulnerable to flooding, and that would generally be inappropriate as set out in Table 3.2, the following criteria must be satisfied:

1. The subject lands have been zoned or otherwise designated for the particular use or form of development in an operative development plan, which has been adopted or varied taking account of these Guidelines.
2. The proposal has been subject to an appropriate flood risk assessment that demonstrates:
   - (i) The development proposed will not increase flood risk elsewhere and, if practicable, will reduce overall flood risk.
   - (ii) The development proposal includes measures to minimise flood risk to people, property, the economy and the environment as far as reasonably possible.
   - (iii) The development proposal includes measures to ensure that residual risks to the area and/or development can be managed to an acceptable level as regards the adequacy of existing flood protection measures or the design, implementation and funding of any future flood risk management measures and provisions for emergency services access; and
   - (iv) The development proposed addresses the above in a manner that is also compatible with the achievement of wider planning objectives in relation to development of good urban design and vibrant and active streetscapes.

The acceptability or otherwise of levels of residual risk should be made with consideration of the type and foreseen use of the development and the local development context.

Note: See section 5.27 in relation to major development on zoned lands where sequential approach has not been applied in the operative development plan.

Refer to section 5.28 in relation to minor and infill developments.

Figure 7.2 Justification test for development management to be submitted by the applicant

Table 7.1 Assessment against Justification Test criteria - Fluvial Flood Risk

Criteria to be satisfied	Justification	Criteria Met
The subject lands have been zoned or otherwise designated for the particular use or form of development in an operative development plan, which has been adopted or varied taking account of these Guidelines.	The Proposed Development forms a key part of wider development proposals for the upgrade of the Client's cable network, such as the Grid Implementation Plan 2017-2022.	Yes
The development will not increase flood risk elsewhere, and, if practicable, will reduce overall flood risk.	As shown in Sections 4, 5, and 6, the proposed development will not increase flood risk from any watercourse that is crossed by the scheme.	Yes
The development proposal includes measures to minimise flood risk to people, property, the economy and the environment as far as reasonably practicable.	The proposed development is designed to be resilient to the 0.1% AEP fluvial flood.	Yes
The development proposed includes measures to ensure that residual risks to the area and/or development can be managed to an acceptable level as regards the adequacy of existing flood protection measures or the design, implementation and funding of any future flood risk management measures and provisions for emergency services access.	The proposed development is designed to be resilient to the 0.1% AEP fluvial flood. The Proposed Scheme has no impact on the performance of any existing Flood Relief Schemes.	Yes

Criteria to be satisfied	Justification	Criteria Met
The development proposed addresses the above in a manner that is also compatible with the achievement of wider planning objectives in relation to development of good urban design and vibrant and active streetscapes.	The proposed development meets the objectives set out in the County Meath Development Plan 2020-2026 and in the County Kildare Development Plan 2023 – 2029, as it forms a key part of achieving the required rate of sustainable urban growth by promoting active travel and public transport.	Yes

Table 7.2 Assessment against Justification Test criteria - Pluvial Flood Risk and Surface Water Drainage

Criteria to be satisfied	Justification	Criteria Met
The subject lands have been zoned or otherwise designated for the particular use or form of development in an operative development plan, which has been adopted or varied taking account of these Guidelines.	The Proposed Development forms a key part of wider development proposals for the upgrade of the Client's cable network, such as the Grid Implementation Plan 2017-2022.	Yes
The development will not increase flood risk elsewhere, and, if practicable, will reduce overall flood risk.	As shown in Sections 4 and 5, the proposed development will not increase pluvial flood risk from any receiving watercourse or existing drainage network.	Yes
The development proposal includes measures to minimise flood risk to people, property, the economy and the environment as far as reasonably practicable.	The proposed development is designed to be resilient to the 0.1% AEP pluvial flood.	Yes
The development proposed includes measures to ensure that residual risks to the area and/or development can be managed to an acceptable level as regards the adequacy of existing flood protection measures or the design, implementation and funding of any future flood risk management measures and provisions for emergency services access.	The proposed development has no impact on the performance of any drainage networks as there is no change in existing runoff rates.	Yes
The development proposed addresses the above in a manner that is also compatible with the achievement of wider planning objectives in relation to development of good urban design and vibrant and active streetscapes.	The proposed development meets the objectives set out in the County Meath Development Plan 2020-2026 and in the County Kildare Development Plan 2023 – 2029, as it forms a key part of achieving the required rate of sustainable urban growth by promoting active travel and public transport.	Yes

8. Conclusions and Recommendations

8.1 Conclusions

This report is a flood risk assessment of the Proposed Development. The assessment included desktop investigations into the potential flood risks and an assessment of the potential impacts the development could have on flood risk in the surrounding areas.

8.1.1 Flood Risk to the Proposed Development

The Proposed Development is located in Flood Zone C, apart from minor local areas in close proximity to watercourses. Given the proposed works will be located underground, there is no risk of flooding to them once the works have been completed. During the construction phase, measures have been incorporated into the Construction and Environmental Management Plan to minimise risks during flooding events (see Appendix 5.4 of the PECR).

8.1.2 Flood Risk Impacts from the Proposed Development

The Proposed works is not at risk of flooding nor at risk of impacting flooding in the area based on the online information provided. It is therefore concluded that a Stage 3 Detailed Risk Assessment, including site specific hydraulic modelling, is not required.

Appendix A. Information Sources Checklist

Appendix A: Scheme Drawings – Drainage Design Proposal

No.	Information Source	Status	Reference/Comments
1	OPW Preliminary Flood Risk Assessment indicative fluvial flood maps	✓	Provided by OPW (floodinfo.ie)
2	National Coastal Protection Strategy Study flood and coastal erosion risk maps.	X	Not available
3	Predictive and historic flood maps, and Benefiting Lands Map	✓	Flooding History was provided by OPW floodinfo.ie
4	Predictive flood maps produced under the CFRAM studies	✓	CFRAM maps are available and have been used.
5	River Basin Management Plans and reports	✓	River Basin Management Plan for Ireland (2018-2021)
6	Indicative assessment of existing flood risk under Preliminary Flood Risk Assessment	X	
7	Previous Strategic Flood Risk Assessments	✓	Strategic Flood Risk Assessment for County Meath Development Plan 2020-2026 Strategic Flood Risk Assessment for County Kildare Development Plan 2023-2029
8	Expert advice from OPW who may be able to provide reports containing the results of detailed modelling and flood-mapping studies including critical damage areas, and information on historic flood events and local studies etc.	X	
9	Topographical maps, in particular digital elevation models produced by aerial survey or ground survey techniques.	✓	Topographic Survey Data dated 7th December 2021
10	Information on flood defence condition and performance	N/A	
11	Alluvial deposit maps	N/A	
12	'Liable to Flood' markings on the old 6" Inch Map	X	
13	Local Libraries and newspaper reports	✓	Adequate information on Flooding History was provided by OPW floodmaps.ie
14	Interviews with local people, local history/ natural history societies etc.	X	
15	Walkover survey to assess potential sources of flooding, likely routes for flood water and the site's key features, including flood defences, and their condition	X	

Appendix 13.1 AACH Inventory

Appendix 13.1 Inventory of Archaeology, Architectural Heritage and Cultural Heritage

Table 1: Inventory of Archaeological Constraints

Identification Number	AY_01	Reference Number	ME049-014001
Figure Number	Figure 13.1	Legal Status	-
Townland	Calgath	Site Type	Ritual site - holy well
Easting / Northing	689223 / 742511	Distance from Proposed Development	30m to the west of the PAB
Description	Situated on a rise of a gentle S-facing slope at the centre of the mound (AY_02; ME049-014----). The well is known as St Bride's Well and it was revered in the 19th century when it was described as having a diameter of 12 feet (c. 3.75m) (Cogan 1862-70, 2, 361). It was a small natural spring (diam. c. 1m) at the base of the stump of an ash tree in 1969 (SMR file) but is has been conserved in 2000 and is now a stone-lined well (diam. 0.85m; max. D 1.75m) with water approached by a path and steps from the N while the mound is less prominent. The well is surrounded by a paved path (Wth c. 1.5m) and within an enclosure (diam c. 5m) defined by a hedge and a picket fence, and there are two young trees outside the enclosure, one with rags. (French 2012, 33-4) Depicted on historic mapping as a large circular 'Mound' with 'Brides Well' located off centre towards the eastern limit of the mound. Later mapping depicts the well more centrally linked to a watercourse to the west. The mound is barely perceptible and is surrounded by a modern post and rail fence and low hedges, within a pasture field, west of the R125. The well is described as one of the hot wells in Meath and is said to have sprang up when St Brigid rested in the location. The well is said to cure deafness and ear complaints. The well was described as 'situated on the side of a circular mound or hill, and an aged ash spreads its branches over it; the diameter of this well is twelve feet four inches'. A tree was located on the top of the low mound (1960s); however, this has since been removed. A path runs from the north-north-east corner of the field (from a field entrance) to the mound and the well's enclosure forms part of the field boundary to the south. Majority of holy wells have at least two of the following elements: 1) water source, 2) tree, and 3) stone. St Brigid is one of the most prevalent dedications. Ash was important in the pre-Christian calendar. LI_060: - An ephemeral positive circular feature, measuring approximately 8m in diameter, with linear extending to the north-east. - Corresponds with 'Brides Well' and mound on historic Ordnance Survey mapping (6" to 1 mile, 1837 – 1842, and 25" to 1 mile, 1888-1913). - Tree / shrub boundary to well and trackway noted. - Interpreted as the mound associated with Bride's Well. - Recorded Monument ME049-014001. Located in a small, rectangular pasture field with a footpath leading to north-east corner / gate / R125. High established hedgerow obscures views towards the site. Not visible from road.		

Sources	Archaeological Survey of Ireland SMR Ordnance Survey 6", 1837 – 1842 Ordnance Survey 25", 1888-1913 Online mapping 2011 [07 November 2021] 'St. Brigid's Well', Ireland's Holy Wells County-by-County. Available online: 2021, https://ihwcbc.omeka.net/items/show/416 [Accessed 12.11.2021] https://digital.ucd.ie/view/duchas:49398 [07 November 2021] BlueSky Aerial, 2022 O'Sullivan & Downey, 'Holy Wells', Archaeology Ireland Vol. 20, No. 1, (2006), pp. 35 – 37 LiDAR, 2022 Walkover and site inspection, January 2023

Identification Number	AY_02	Reference Number	ME049-014
Figure Number	Figure 13.1	Legal Status	Recorded Monument
Townland	Calgath	Site Type	Mound
Easting / Northing	689227 / 742510	Distance from Proposed Development	26m to the west of the PAB
Description	Marked on the 1837 ed. of the OS 6-inch map as a small feature and described in gothic lettering as a 'Mound'. It was described as a circular mound (diam. 24m E-W, H 1.6m) truncated by ditch at S and with the holy well (AY_01; ME049-014001-) at the centre (Moore 1987, 34), but the well has been conserved since 1985, and the mound is no longer prominent. Depicted on historic mapping as a large circular 'Mound' with 'Brides Well' located off centre towards the eastern limit of the mound. Later mapping depicts the well more centrally linked to a watercourse to the west. The mound is barely perceptible and is surrounded by a modern post and rail fence and low hedges, within a pasture field, west of the R125. A tree was located on the top of the low mound (1960s); however, this has since been removed. A path runs from the north-north-east corner of the field (from a field entrance) to the mound and the well's enclosure forms part of the field boundary to the south. Majority of holy wells have at least two of the following elements: 1) water source, 2) tree, and 3) stone. St Brigid is one of the most prevalent dedications. Ash was important in the pre-Christian calendar. LI_060: - An ephemeral positive circular feature, measuring approximately 8m in diameter, with linear extending to the north-east. - Corresponds with 'Brides Well' and mound on historic Ordnance Survey mapping (6" to 1 mile, 1837 – 1842, and 25" to 1 mile, 1888-1913). - Tree / shrub boundary to well and trackway noted. - Interpreted as the mound associated with Bride's Well. - Recorded Monument ME049-014001. Located in a small, rectangular pasture field with a footpath leading to north-east corner / gate / R125. High established hedgerow obscures views towards the site. Not visible from road. Circular mound, truncated by a ditch at S (diam. 24m E-W, H 1.6m). Well (Brides Well) has source close to centre of mound.		
Sources	Record of Monuments and Places - County Meath (1996) Ordnance Survey 6", 1837 – 1842 Ordnance Survey 25", 1888-1913 Online mapping 2011 [07 November 2021] https://digital.ucd.ie/view/duchas:49398 [07 November 2021] BlueSky Aerial, 2022 LiDAR, 2022		

	Walkover and site inspection, January 2023 ASI, 1987, Archaeological Inventory of County Meath. Office of Public Works. Dublin.

Identification Number	AY_03	Reference Number	ME049-018
Figure Number	Figure 13.1	Legal Status	Recorded Monument
Townland	Calgath	Site Type	Field system
Easting / Northing	689241 / 741855	Distance from Proposed Development	0m
Description	Located on a gentle S-facing slope. Earthworks of relict field banks and drains covering an area of about 12 acres (c. 5 ha) are visible on aerial photographs (GSIAP: N 605, 606) and some later series. The banks (Wth c. 2m; H c. 0.3m) and ditches (Wth c. 1-2m; D c. 0.2m) create some irregular fields (dims c. 60m x c. 30m to c. 100m x c. 70m) which are covered in cultivation ridges confined to individual fields. There are some wide linear spaces (Wth c. 5-10m) between fields that might be roadways. The defining features are best preserved at the SW angle of the area and some modern houses impinge on it. Archaeological testing (04E0764) by S. Linnane at the S edge of the area produced no related material (excavations.ie 2004:1193). A field system is visible on digital globe aerial imagery as the earthwork banks and ditches, the remains of ridge and furrow, and linear features that may evidence possible tracks or roadways. The fields are irregular in shape and extend into the large field to the north. The field pattern does not correspond with that depicted on historic mapping. Visible as a series of linear features, along with a possible circular feature measuring approximately 34m in diameter, on aerial imagery. LI_063: - A negative 'L'-shaped feature measuring c.92m orientated roughly east-west and c. 30m north-south. Modern cultivation patterns noted. - Corresponds with a field boundary on historic Ordnance Survey mapping (6" to 1 mile, 1837 – 1842). - Extent of field system (ME049-018) visible on aerial imagery (Digital Globe). - Interpreted as part of a field system (ME049-018). The field system is located within a large irregular arable field to the east of the R125. While three residential properties have been built within the southern boundary of the site. Large, irregular, slightly raised field system covering c.14 acres.		
Sources	Record of Monuments and Places - County Meath (1996) Ordnance Survey 6", 1837 – 1842 Ordnance Survey 25", 1888-1913 Online mapping 2011 [07 November 2021] BlueSky Aerial, 2022		

	O'Sullivan & Downey, 'Holy Wells', Archaeology Ireland Vol. 20, No. 1, (2006), pp. 35 – 37 LiDAR, 2022 ASI, 1987, Archaeological Inventory of County Meath. Office of Public Works. Dublin.

Identification Number	AY_07	Reference Number	KD005-024
Figure Number	Figure 13.1	Legal Status	-
Townland	Boycetown	Site Type	Excavation - miscellaneous
Easting / Northing	687822 / 740465	Distance from Proposed Development	0m
Description	Archaeological monitoring (Licence no. 03E1554) was carried out in association with a proposed development of a warehousing facility and ancillary offices, along with associated services, infrastructure, storage and landscaping in an area measuring 13,937m2. Two small pits were observed in the northernmost field at the site. No diagnostic material was recovered from the northern pit. A small amount of burnt-bone fragments were recovered from the other. These have been retained for analysis. Nothing of further archaeological significance was recovered. Possible point is in the wrong location.		
Sources	Archaeological Survey of Ireland SMR https://excavations.ie/report/1970/Kildare/0000029/ [04 November 2021]		

Identification Number	AY_13	Reference Number	KD010-001001
Figure Number	Figure 13.1	Legal Status	Register of Historic Monuments; Recorded Monument
Townland	Ballybrack, Ballyloughan, Clonduff, Clonfert North, Clonfert South, Graiguepottle	Site Type	Linear earthwork
Easting / Northing	686721 / 735896	Distance from Proposed Development	0m
Description	The area which would later be called 'The English Pale', from the Latin 'palus', a stake, and also possibly from the name of an earthen fortification at Calais in France (Lydon 1972, 261), originated in the 14th century when Norman settlers began fortifying their lands in counties Dublin, Kildare, Louth and Meath against attack by the native Irish. By 1435, ongoing attacks, probably primarily aimed at cattle theft (O'Riordáin 1971, 15), prompted the concept of an additional, linear defensive feature, the boundaries of which were defined in a 1488 Act of Parliament as extending, 'from Merrion inclusive to the waters of the Dodder, by the new ditch to Saggard, Rathcoole, Kilheel (Kilteel), Rathmore and Ballymore (Eustace), thence to the county of Kildare into Ballycutlan (Coghlanstown), Harristown and Naas, and so thence to Clane, Kilboyne, and Kilcock' (Mc Neill 1950, 250). In 1494, Parliament directed that, 'every inhabitant, earth tiller and occupier in said marches (borderlands), do build and make a double ditch six feet high above ground at one side or part which meareth next unto Irishmen between this and next Lammas (August 1st.), the said ditches to be kept up and repaired as long as they shall occupy said land.' However, Ellis (Ellis S. G. 'The emergence of the English Pale in Ireland' in Irish Historical Studies) points to a statute in Poyning's parliament in 1495 for 'ditches to be made aboute the Inglishe pale' as the first application of the term to Ireland. The Pale contracted eastwards in subsequent years and it is not certain if its original extent was ever completely ditched. By the seventeenth century, The Pale had ceased to have any real political or defensive significance. Only a few short sections have been positively identified in Co Kildare; in Kilteel Upper/Cupidstown near Rathmore (KD020-008-----), in Bishopsland just SW of Ballymore Eustace (KD029-039----), at Castlebrown or Clongowes (KD010-021----/KD014-008----) and finally, the best preserved, semi-continuous portion which runs for c. 3365m through the townlands of Ballybrack, Ballyloughan, Clonduff, Clonfert South and Graiguepottle, c. 5km N of Clongowes (KD010-001----). There it is traceable from its E end in Clonfert South as a narrow (Wth 3.5m) metalled laneway between two probably recut fosses, running W (L c. 420m), and then veering NW (L c. 365m). [Archaeological test-trenching at one location along this section revealed possible medieval habitation evidence: KD010-001008-.] It then changes direction slightly to head NNW (L c. 660m) as a disused laneway (Wth 4.8m), slightly raised above surrounding field level, and running between two wide, deep fosses (Wth 3.8m; D 2.9m), forming the townland boundary between Clonfert South and Graiguepottle. It then turns sharply to head W (L c. 1085m) mainly as a functioning laneway (Wth 3.5m) between two deep fosses through Clonduff to a point where it appears to divide: one short section (L c. 155m) apparently continues W into Ballyloughan as a metalled laneway (Wth 3.5m) flanked by drains on either side, while the main section turns sharply S (L c. 680m) and continues as a fosse (Wth 2.5m; D 1m), the corresponding bank of which (noted in 1976, SMR file) has been levelled. Along this latter section it forms the townland boundary between Ballyloughan and Graiguepottle. Visible on several aerial photographs (CUCAP AVM 27-8, AHK 4, BDU 41). The monument is included on the Register of Historic Monuments. (Bradley 2011, 51-67) Depicted on historic mapping as a ditch or narrow trackway and identified as 'The Pale'. Aerial photographs show an ephemeral ditch feature aligned north-south running adjacent to the R407, alongside the current field boundary.		

	LI_093: - A linear feature orientated approximately north-south measuring c.565m in length (extends beyond 100m Study Area). Runs parallel to an extant field boundary / ditch. - On the townland boundary between Clonduff, Graiguepottle and Ballyloughan. - Corresponds with linear earthwork (KD010-001001), a Recorded Monument. - Depicted on historic Ordnance Survey mapping. Identified as 'The Pale' on later Ordnance Survey mapping (25" to 1 mile, 1888-1913). Bisected by 'Loughan River'. - Interpreted as a linear earthwork of possible Anglo-Norman date. Linear ditch with low bank (possibly redeposited from recutting), lined with mature trees. Referred to as 'The Pale' by landowner. Located within an area of relatively flat pasture fields, with established hedgerows / mature tree boundaries, as well as modern post-and-rail fencing. Described as a double ditch construction, 6 feet high. Functioned as a fixed defensive structure but also to prevent cattle rustling. Linear ditch with low bank (possibly redeposited from recutting), lined with mature trees. Referred to as 'The Pale' by landowner. Located within an area of relatively flat pasture fields, with established hedgerows / mature tree boundaries, as well as modern post-and-rail fencing.
Sources	Record of Monuments and Places - County Kildare (1995) Kildare County Development Plan (2017 - 2023) Ordnance Survey 25", 1888-1913 https://www.cambridgeairphotos.com/location/bdu041/ [04 November 2021] LiDAR, 2022 Walkover and site inspection, January 2023 Clare, L., 2006, On the edge of the Pale: the rise and decline of an Anglo-Irish community in County Meath, 1170 – 1530. Four Courts Press. Dublin.

Identification Number	AY_24	Reference Number	KD014-001
Figure Number	Figure 13.1	Legal Status	Recorded Monument
Townland	Ballynagappagh	Site Type	Ringfort - rath
Easting / Northing	684904 / 729057	Distance from Proposed Development	36m to the east of the PAB
Description	On a very gentle NW-facing pasture slope. A small, poorly preserved, circular area (diam. 24m) is defined by a low, earthen bank (Wth 2.6-3.8m; int. H 0.4-0.6m; ext. H 0.8-1m) NW-NE-SE, partly hedged as a field boundary NE-E-SE, and abutted externally along N by a landscaped garden. A possible entrance on the N side, noted in 1972 (SMR file), is no longer clearly identifiable. The interior slopes gently down to NW and contains a coppiced hazel stand. Depicted on historic mapping as a sub-circular area with a field boundary abutting its eastern extent. Later mapping shows an earthwork of the north-eastern section only, with an area delimited by a dashed line and shown as tree-covered. Aerial imagery (EirGrid Ortho photography) shows the areas as overgrown with trees / vegetation. LI_116: - Sections of a sub-circular feature, possibly forming a sub-circular bank (c.30m in length), abutted by a field boundary. Possible entrance through bank to north-west. Area approximately 37mx24m. - Depicted on historic Ordnance Survey mapping (6" to 1 mile, 1837 – 1842), possible bank corresponds with an 'L'-shaped section of earthwork depicted on later Ordnance Survey mapping (25" to 1 mile, 1888-1913). - Tree covered and located within a private garden (DSM). - Corresponds with a known Rath - ringfort (KD014-001; a Recorded Monument). - Interpreted as a rath – ringfort dating to the early medieval period (AD 500 – 1169). Identified as a bedrock outcrop or subcrop by the GSI. The rath is located within a private garden, to the east of a house. It is covered in dense trees, with an established field boundary abutting the eastern edge, which limit views to and from the rath.		
Sources	Record of Monuments and Places - County Kildare (1995) Ordnance Survey 6", 1837 – 1842 Ordnance Survey 25", 1888-1913 LiDAR, 2022 Geological Survey Ireland Spatial Resources (arcgis.com) [accessed 31 January 2023]		

Identification Number	AY_26	Reference Number	KD014-032; RPS B14-07
Figure Number	Figure 13.1	Legal Status	Recorded Monument; Protected Structure
Townland	Firmount East	Site Type	Mound
Easting / Northing	686334 / 726464	Distance from Proposed Development	15m to the north-east of the PAB
Description	On a low N-S ridge in mixed tillage and pasture. The monument is a partially overgrown, circular, round-topped, earthen mound (diam. at base c. 22m; diam. at top c. 5.5m; H c. 4m) with gently sloping sides, which are crossed NE-SW by old cultivation ridges. Visible on a 2005 aerial photograph (OSi Orthophoto). A circular mound is depicted on historic mapping, surrounded by a square boundary of trees. Later mapping depicted the circular mound in a field, identified as a 'moat'. A low mound is visible from the L2002, topped with trees. LI_124: - A positive circular feature, measuring approximately 28m in diameter. Appears to have cultivation ridges across the top; however, no other associated features were identified. - Partially covered in trees (DSM). - Corresponds with an earthwork depicted on historic Ordnance Survey mapping (6" to 1 mile, 1837 – 1842) and identified on later Ordnance Survey mapping as a 'Moat' (25" to 1 mile, 1888-1913). Located within the Moatfield House demesne (DL_15). - Corresponds with a known Mound (KD014-032; a Recorded Monument) and Tumulus (B14-07; a Protected Structure). - Interpreted as a mound of possible Anglo-Norman date. A prominent earth mound, with mature trees growing on top, within a private garden. Visible from the L2002. Surrounded by relatively flat, open pasture to the east and north, a house is located to the west. Boundaries modern post-and-rail fencing. A prominent earth mound, with mature trees growing on top, within a private garden. Visible from the L2002. Surrounded by relatively flat, open pasture to the east and north, a house is located to the west. Boundaries modern post-and-rail fencing.		
Sources	Record of Monuments and Places - County Kildare (1995) Ordnance Survey 6", 1837 – 1842 Ordnance Survey 25", 1888-1913 Online mapping 2019 [07 November 2021] LiDAR, 2022 Walkover and site inspection, January 2023		

Identification Number	AY_27	Reference Number	KD014-054
Figure Number	Figure 13.1	Legal Status	-
Townland	Millicent Demesne	Site Type	Font (present location)
Easting / Northing	687361 / 725841	Distance from Proposed Development	N/A
Description	The present location of a font found in the wall of the church tower (KD014-026002-) in Clane village (see KD014-026010- for its original location), but moved to the church of 'St Michael and All Angles' (consecrated in 1883) in Millicent. A plain, square, granite font (dims. L 0.68m; Wth 0.68m) contains a square basin (dims. L 0.49m; Wth 0.49m; D 0.16m). (Bradley et al. 1986, vol. 2, 145)		
Sources	Archaeological Survey of Ireland SMR		

Identification Number	AY_38	Reference Number	KD019-032
Figure Number	Figure 13.1	Legal Status	Preservation Order; Register of Historic Monuments
Townland	Jigginstown	Site Type	Gatehouse
Easting / Northing	687900 / 718970	Distance from Proposed Development	148m to the west of the PAB
Description	Please note this constraint is located outwith the study area; however, has been included as it forms part of the Jigginstown Castle complex. It may be one of two castles (see KD019-034---- also) in the possession of Roland FitzEustace in 1486 (Tickell 1960, 368). On level pasture c. 35m W of 'Jigginstown Castle' (KD019-033001-), a very substantial 17th century building, and c. 90m NNE of 'Castle Rag' (KD019-034----), a small tower house. A now blocked-up and partially ivy-clad, plain, rubble-built arch (dims. Wth 4.55m E-W; H 3.5m) springs from a solid rectangular column (dims. L 2.1m N-S; Wth 1.3m) on the W and from a small, rectangular, three-storied, tower with a substantial base batter (H2.85m) on the E, which projects N (L 1.8m) from the face of the archway (dims. L 3.9m N-S; Wth 2.6m). The tower is entered through a narrow (Wth 0.7m) square-headed doorway at the S end of its W wall, just inside the arch. Immediately inside on the left (N), a short, narrow passageway leads N to a small embrasure (dims. L 1.15m E-W; Wth 0.9m) containing a now blocked loop, looking E. The embrasure is floored with large flags one of which at W is broken and under which a narrow (Wth 0.8m), partially rubble-filled, sub-floor passage running E and then turning to run S can be seen. A spiral staircase, lit by a double-splayed loop looking S, climbs anti-clockwise to first-floor level where a partially robbed doorway leads W to a wall-walk above the archway. The stairs rises towards a second-floor, but the steps are in an unstable condition. Externally, there is a small garderobe opening (dims. Wth 0.3m; H 0.4m) just above ground level (H 1m) near the N end of the E wall. The remains of a bawn wall runs S from the SW angle of the tower (dims. traceable L c. 6.1m; H 2.9m; T 0.8m) and contains a loop. The remains of a tower immediately adjacent to the R445. Overgrown with matures trees in close proximity. A brick and rubblestone wall with substantial buttresses and a rectangular building with a slate roof are located immediately to the west. Forms part of the Jigginstown Castle complex. A belt of established trees and vegetation lines the eastern boundary of the complex. Depicted on historic mapping as part of two long ranges adjacent to the road. Later mapping shows the roofless tower, depicted in a similar style to Castle Rag, with a long attached range extending to the east. Forms part of a coherent group with the main castle building and features associated with the castle complex. In a slightly elevated position above the canal (screened from view), immediately adjacent to the R445. The building overlooks the carriageway to the north, with traffic noise and movement a constant feature of its surroundings. The building is positioned to the west of the gated entrance to a large yard / garden, and a large farm house ('Jigginstown House') set back from the road (outwith the study area).		
Sources	Preservation Orders (2019) Kildare County Development Plan 2017 - 2023 Ordnance Survey 6", 1837 – 1842 Ordnance Survey 25", 1888-1913 Online mapping 2021 [07 November 2021] Walkover and site inspection, January 2023		

Identification Number	AY_39	Reference Number	KD019-033001
Figure Number	Figure 13.1	Legal Status	National Monument; Register of Historic Monuments
Townland	Jigginstown	Site Type	House - 17th century
Easting / Northing	687999 / 718963	Distance from Proposed Development	13m to the west of the PAB
Description	A National Monument (No. 528) in State care. Built in the 1630's by Thomas Wentworth, Earl of Stafford, and Lord Deputy of Ireland (1633-7) as a summer residence for himself and as an intended (but never used) residence for King Charles I. Possibly designed by John Allen, its completion date is uncertain, but by the time of the Civil Survey (1654-6) it was already in ruins (Simington 1952, 66). The Stafford Papers of c. 1665 describe the house as having been, 'A Noble Howse built in Siggenstown by my Lords your ffather which cost £20,000. It is a Double Brick howse all in length, free stone about the Windowes and some Collumes and pavem[en]ts of Marble. The ffront thereof 120 yards and it is the largest and most magnificent front that ever I saw to w[hi]ch proportions the Gardens answere in a Square having a sweet rivulett running through it: fromerly very beautiful in Walles Groves and Trees. But now theise are not only cutt down and defaced but a great [?] of the floores in the middle p[ar]ts of the Howse are fal[l]en downe.' An extremely long (L c. 100m E-W; Wth c. 18m) mainly brick-built, tall single-storey (with possible attic accommodation) over basement structure comprises a central block originally flanked by two slightly projecting (N) wings; the W one of which has been removed. A winged staircase near the E end of the N wall provided access to the main entry, and there were two rear doors; one centrally placed and the second near the W end of the S wall. The basement is walled with mortared stone, lit by mullioned windows and roofed with brick vaulting while the main floor is walled with brick and lit by large, timber framed windows. A central spine-wall (E-W) supported pitched roofs to each side. Massive brick chimney stacks rise from stone bases in the basement, and have wide fireplaces lined with very small red bricks. An ongoing conservation programme was informed by a detailed survey of the building and some archaeological excavation (Licence nos. 01E1109 and 02E1603: www.excavations.ie). Construction debris for the house overlay the truncated remains of a ploughed field, which overlay a number of features (not excavated) probably associated with medieval pottery found in the residual ploughsoil, suggestive of earlier, medieval settlement possibly associated with a spring now located in the basement of the house. One of two large box drains carrying water from the basement (and from the roof via internal downpipes) was found to have failed. During construction, part of the drain close to the house had been exhumed and a temporary sump cut and filled, and a new drain appears to have been quarried into the north-west corner of the basement. The building was originally fully floored, roofed, and plastered internally. Finds suggest the building was roofed with slate and glazed ridge tiles. Part of the formal gardens (KD019-033003-) survive to S and traces of a large, possibly associated enclosure (KD019-030002-) were noted in 1979 (SMR file). An earthen bank set against the S-side of the building, providing a terrace overlooking the garden, had a limekiln (KD019-033004-) built into it, and a midden (KD019-033005-) was also found. (Vicars 1891-5, 19-24; Fitzgerald 1915-17, 491; Strath 1935-45, 343-7; Leask 1941, 148-9; Costello 1946, 422; Costello 1966-7, 268; Killanin and Duignan 1967, 384; Craig 1971, 50-8; Harbison 1975, 122; Bence-Jones 1978, 161; Meagher 1979-80, 118; Fenlon 2011, 207-223) The ruins of a large brick house immediately adjacent to the R445. Overgrown with some mature trees in proximity. A modern metal security fence surrounds the buildings and scaffolding has been erected around both east and west gable ends. Forms part of the Jigginstown Castle complex. A belt of established trees and vegetation lines the eastern boundary of the complex. Jigginstown is depicted on Noble & Keenan's Map of county Kildare (1752) as a crenelated structure.		

	Depicted on historic mapping as a substantial rectangular range, immediately to the south of the road and identified as 'The Buildings (in ruins)' with a rectangular garden and 'Jigginstown House' to the south. Later mapping shows the layout of the roofless house, identified as 'Jigginstown Castle (in ruins)', with a sunken garden and the later house to the south. Belonged to the great family of 'Geraldines' and is dated back to the sixteenth century. It is believed that as there was no means of transport that a human chain of men stretched from Dublin to Naas and passed the stones for the building from man to man. In Kildare the story is still credited. In any case the castle must have been a magnificent structure and a very large one judging by the ruins still remaining. It is still in a fairly good state of preservation. There are underground cellars under the ruins of all the apartments. There is also an underground tunnel which runs from Naas to Newbridge. Situated on the Newbridge Road is the Jigginstown buildings. It was built in the seventeenth century by the Earl of Stafford who was viceroy in Ireland. He built it so to have a mansion suitable to host King Charles if he ever visited Ireland. He got the brick from Denmark. A legend tells us that he had his men lined from Dublin to Naas and they passed the bricks from one to another till they arrived at Jigginstown. It is about one hundred and fifty yards long. There are many underground cellars in it. Before it was finished the Lord Deputy was called over to England and was beheaded for making friends with the Irish. A legend tells us that in one of the cellars is a spring well which used to supply the house with water. It is said that there is gold buried there and that a black dog minds it. There is a tunnel leading to Killashee from Jigginstown. Forms part of a coherent group with the features associated with the castle complex. In a slightly elevated position above the canal (screened from view), on the junction between the R445 and R448. The building overlooks the carriageway to the north, with traffic noise and movement a constant feature of its surroundings, to the east views are largely screened by a mature row of trees. The ruinous buildings are surrounded by a high metal fence and are supported by scaffolding, no access is permitted to the complex. An area of rough ground is located to the east of this boundary, between the complex and the R448.
Sources	National Monuments in State Care: Ownership & Guardianship - Kildare (2009) https://www.logainm.ie/Eolas/Data/Brainse/logainm.ie-map-j-noble-and-j-keenan-1752-grand-jury-kildare-south.jpg [09 November 2021] Ordnance Survey 6", 1837 – 1842 Ordnance Survey 25", 1888-1913 Online mapping 2019 [07 November 2021] https://digital.ucd.ie/view-media/duchas:4952388/canvas?manifest=https://data.ucd.ie/api/img/manifests/duchas:4952388 [07 November 2021] https://digital.ucd.ie/view-media/duchas:4819384/canvas?manifest=https://data.ucd.ie/api/img/manifests/duchas:4819384 [07 November 2021] Walkover and site inspection, January 2023

Identification Number	AY_40	Reference Number	KD019-033004
Figure Number	Figure 13.1	Legal Status	Preservation Order
Townland	Jigginstown	Site Type	Kiln - lime
Easting / Northing	688005 / 718954	Distance from Proposed Development	40m to the west of the PAB
Description	An ongoing conservation programme at Jigginstown House (KD019-033001-) was informed by a detailed survey of the building and some archaeological excavation (Licence nos. 01E1109 and 02E1603: www.excavations.ie). An upcast bank was found, set against the south side of the building, providing a terrace overlooking the large sunken garden (KD019-033003-). A limekiln was built into the bank and was used, perhaps, to provide the lime needed for the internal plaster. No corresponding feature is depicted on historic mapping. Not visible on aerial imagery. Located in a bank to the south of the main building, in a grassed area, encroached on by a clump of mature trees. Forms part of the Jigginstown Castle complex. A belt of established trees and vegetation lines the eastern boundary of the complex. Forms part of a coherent group with the features associated with the castle complex.		
Sources	Preservation Orders (2019) Kildare County Development Plan 2017 – 2023 https://excavations.ie/report/2002/Kildare/0008231/ [09 November 2021] Ordnance Survey 6", 1837 – 1842 Ordnance Survey 25", 1888-1913		

Identification Number	AY_41	Reference Number	KD019-033005
Figure Number	Figure 13.1	Legal Status	-
Townland	Jigginstown	Site Type	Midden
Easting / Northing	688007 / 718953	Distance from Proposed Development	-
Description	An ongoing conservation programme at Jigginstown House (KD019-033001-) was informed by a detailed survey of the building and some archaeological excavation (Licence nos. 01E1109 and 02E1603: www.excavations.ie). A midden was found and contained window glass and kitchen waste, and suggested that the house was occupied before construction was complete.		
Sources	Archaeological Survey of Ireland SMR https://excavations.ie/report/2002/Kildare/0008231/ [05 November 2021]		

Identification Number	AY_42	Reference Number	KD019-033002
Figure Number	Figure 13.1	Legal Status	Preservation Order; Register of Historic Monuments
Townland	Jigginstown	Site Type	Enclosure
Easting / Northing	688013 / 718951	Distance from Proposed Development	33m to the west of the PAB
Description	The E-half (NNE-E-SSE) of a very large, possibly oval enclosure (est. diam. c. 150m N-S) is defined by an inner, flat-bottomed fosse (Wth 3m; D 1.4m), a slight, outer earthen bank, and a second, narrower, outer fosse (Wth 1.5m; D 1.4m). A field wall running N-S over the visible S-limits of the fosses contains two wide, flat, relieving-arches in line with them. These features would appear to have enclosed Jigginstown House (KD019-033001-) and garden (KD019-033003-), together with Castle Rag (KD019-034----) a small tower house, and a medieval gatehouse (KD019-032----). While the fosses may have been partly defensive, they probably also served landscaping and drainage functions. Modern development works have removed some surface elements, but sub-surface features are likely to survive intact. In 1996, archaeological monitoring (Licence no. 96E132: www.excavations.ie) of the excavation of a gas-pipe trench (Wth 0.85m; D 0.95-1.3m) along the main road running E-W through the enclosed area in front of Jigginstown House revealed that the road level had been built up in relatively modern times with an infill deposit of stone and clay which produced modern pottery. The original ground surface, a light yellow clay, lay at 1.3m below existing ground level. No corresponding feature is depicted on historic mapping. An ephemeral earthwork is visible on an historic aerial photograph in a field to the north of the complex. The earthwork comprises two parallel linear features, with a possible bank, running east-west. A similar, equally ephemeral feature is also located in a field to the east of the complex. Forms part of the Jigginstown Castle complex. Forms part of a coherent group with the features associated with the castle complex.		

Sources	Preservation Orders (2019) Kildare County Development Plan 2017 - 2023 Ordnance Survey 6", 1837 – 1842 Ordnance Survey 25", 1888-1913 https://www.cambridgeairphotos.com/location/asw018/ [07 November 2021] https://www.cambridgeairphotos.com/location/asw017/ [07 November 2021]

Identification Number	AY_43	Reference Number	KD019-033003
Figure Number	Figure 13.1	Legal Status	Preservation Order; Register of Historic Monuments
Townland	Jigginstown	Site Type	Designed landscape – formal garden
Easting / Northing	688001 / 718921	Distance from Proposed Development	8m to the west of the PAB
Description	The Stafford Papers of c. 1665 describe Jigginstown House (KD019-033001-) and gardens as having been, 'A Noble Howse built in Siggenstown by my Lords your ffather which cost £20,000. It is a Double Brick howse all in length, free stone about the Windowes and some Collumes and pavem[en]ts of Marble. The ffront thereof 120 yards and it is the largest and most magnificent front that ever I saw to w[hi]ch proportions the Gardens answere in a Square having a sweet rivulett running through it: fromerly very beautiful in Walles Groves and Trees. But now theise are not only cutt down and defaced but a great [?] of the floores in the middle p[ar]ts of the Howse are fal[l]en downe.' According to tradition, the gardens were formally laid out with terraces and fishponds (Bence-Jones 1978, 161). The majority of these features have apparently been levelled by modern road-making and the construction of the Grand Canal, but the remains of a sunken garden (dims. L c. 80m E-W; Wth c. 55m N-S) and gazebo survive to the S of the house. An ongoing conservation programme was informed by a detailed survey of the building and some archaeological excavation (Licence nos. 01E1109 and 02E1603: www.excavations.ie). An upcast bank was found, set against the south side of the building, providing a terrace overlooking the remains of the garden. The bank was built up late in the construction of the house and was built against scaffolding. A limekiln (KD019-033004-) was built into the bank. The terrace around the sunken garden was not completed, sloping away to the east and exposing the rough footings of the house. The bank was poorly surfaced with a narrow path. There was no indication of planting before the current standing trees (planted in the early-20th C). An associated enclosure (KD019-033002-) may have served defensive, drainage and landscaping functions. A rectangular area is depicted to the south of Jigginstown Castle, with Jigginstown House towards the centre on historic mapping. The area is tree-lined and includes a drive from the road, leading to the house, and a smaller square area with trees to the south of the house. Later mapping shows this area to be sunken, with dispersed trees within. Aerial imagery shows the areas as grassed with a clump of mature trees, and a trees lining the eastern boundary. Forms part of the Jigginstown Castle complex. Forms part of a coherent group with the features associated with the castle complex.		
Sources	Preservation Orders (2019)		

	Kildare County Development Plan 2017 - 2023 Ordnance Survey 6", 1837 – 1842 Ordnance Survey 25", 1888-1913

Identification Number	AY_44	Reference Number	KD019-034
Figure Number	Figure 13.1	Legal Status	Preservation Order; Register of Historic Monuments
Townland	Jigginstown	Site Type	Castle – tower house
Easting / Northing	687866 / 718878	Distance from Proposed Development	185m to the west of the PAB
Description	Please note this constraint is located outwith the study area; however, has been included as it forms part of the Jigginstown Castle complex. It may be one of two castles (see KD019-032---- also) in the possession of Roland FitzEustace in 1486 (Tickell 1960, 368). Stands near the top of a short, very gentle, N-facing, pasture slope, c. 100m SSE of a gatehouse (KD019-032----) and c. 110m SSE of Jigginstown House (KD019-033001-). A really small, almost square (ext. dims. L 5.1m ENE-WSW; Wth 4.65m; int. dims. L 3.3m ENE-WSW; Wth 2.85m), two-storied structure with parapets and a slightly projecting (L 0.9m) stairs tower at the N-angle is built of rough, rubble, limestone masonry with large, well-dressed quoins (wall T. 0.9m). The walls are not battered but taper inwards slightly towards the top. Entered through a partially robbed-out doorway in the ENE wall, the ground floor is lit by a double-splayed loop in each of the four walls and roofed by a barrel-vault (E-W) bearing traces of wicker-centring, under which beam-slot holes mark the floor line of a loft, which is lit by narrow loops in the ENE and WSW walls. The very narrow spiral stairs (Wth 0.6m) is accessed through a plain, square-headed doorway in the N corner and is lit between ground and first-floor levels by a loop looking ENE and, above, by a slightly larger rectangular window looking NNW, and between first-floor and parapet level by a rectangular window looking ENE and, above, a loop looking WNW. The first floor is entered through a plain square-headed doorway in the N corner. The floor is lit by two opposing, large, partially robbed-out, square-headed windows with traces of window seats in the ENE and WSW walls, and a blocked loop is visible in the SSE wall. A robbed-out fireplace with red brick mantle-supports in the NNW wall is serviced by a chimney which projects from the outer wall face, supported on two corbels. The battlement level is inaccessible, but lower courses of crenelations and gutters survive on the projecting parapet, and the stairs tower is also crenelated. (Vicars 1891-5, 58; Fitzgerald 1921, 388-91) 'Castle Rag' is depicted on historic mapping in an large field surrounded by dispersed trees to the west of Jigginstown House, and south-west of the other possible tower house (AY_38). Later mapping identifies the tower as 'in ruins' and depicts the building as roofless. The surrounding trees are also no longer depicted. The tower house is surrounded by a rubblestone wall, in a grassy field set back from the road. The tower remains visible from the R445, to the north; however, is screened from the east by a mature tree line. Forms part of the Jigginstown Castle complex. Set back from the R445 within a flat pasture field / grassed enclosure, surrounded by a rubblestone wall. Views outward are across the field towards the R445 (to the north) and a modern residential development (to the south). Forms part of a coherent group with the features associated with the castle complex.		
Sources	Preservation Orders (2019) Kildare County Development Plan 2017 - 2023		

	Ordnance Survey 6", 1837 – 1842 Ordnance Survey 25", 1888-1913 Walkover and site inspection, January 2023

Identification Number	AY_46	Reference Number	KD024-050004
Figure Number	Figure 13.1	Legal Status	-
Townland	Dunstown	Site Type	Enclosure
Easting / Northing	687302 / 712740	Distance from Proposed Development	4m to the south-west of the PAB
Description	One of six, small subrectangular cropmarks (KD024-050001- to KD024-050006-) visible on an aerial photograph (GSI N 337-6). Located in level, well-drained pasture. No earthworks were visible at the time of visit, but there was heavy grass cover. No corresponding features on historic mapping. No above ground remains. Within the boundary for the access track it is likely the ground has been disturbed i.e. earth bunds are located to the north of the access track (likely associated with construction), with an established treeline either side. While the point data is located within the access track / R412, the description for these constraints notes they are located within pasture (likely the field adjacent to the access track) which would not be disturbed. Aerial imagery from 1995 shows this area as possibly disturbed. ASI records indicate AY_46 – 48 are located within a level pasture field adjacent to the R412 and positioned parallel to a field boundary (since removed; CH_103; Deery, 2022). Located within a relatively flat pasture field adjacent to the Dunstown access track. Forms part of a group of enclosures near the entrance to Dunstown Substation (AY_46 – 48), other groups of enclosures were also identified in this area (AY_53 – AY_58).		
Sources	Archaeological Survey of Ireland SMR Ordnance Survey 6", 1837 – 1842 Ordnance Survey 25", 1888-1913 Deery, S., 2022, Dunnstown 400 kV substation, Dunnstown, Brannockstown, Naas, County Kildare, Response to Further information Request 21/1175 Item 1 (a)-(g) - Archaeology. Walkover and site inspection, January 2023		

Identification Number	AY_47	Reference Number	KD024-050005
Figure Number	Figure 13.1	Legal Status	-
Townland	Dunstown	Site Type	Enclosure
Easting / Northing	687328 / 712725	Distance from Proposed Development	0m
Description	One of six, small subrectangular cropmarks (KD024-050001- to KD024-050006-) visible on an aerial photograph (GSI N 337-6). Located in level, well-drained pasture. No earthworks were visible at the time of visit, but there was heavy grass cover. No corresponding features on historic mapping. No above ground remains. Within the boundary for the access track it is likely the ground has been disturbed i.e. earth bunds are located to the north of the access track (likely associated with construction), with an established treeline either side. While the point data is located within the access track / R412, the description for these constraints notes they are located within pasture (likely the field adjacent to the access track) which would not be disturbed. Aerial imagery from 1995 shows this area as possibly disturbed. ASI records indicate AY_46 – 48 are located within a level pasture field adjacent to the R412 and positioned parallel to a field boundary (since removed; CH_103; Deery, 2022). Located within a relatively flat pasture field adjacent to the Dunstown access track. Forms part of a group of enclosures near the entrance to Dunstown Substation (AY_46 – 48), other groups of enclosures were also identified in this area (AY_53 – AY_58).		
Sources	Archaeological Survey of Ireland SMR Ordnance Survey 6", 1837 – 1842 Ordnance Survey 25", 1888-1913 Deery, S., 2022, Dunnstown 400 kV substation, Dunnstown, Brannockstown, Naas, County Kildare, Response to Further information Request 21/1175 Item 1 (a)-(g) - Archaeology. Walkover and site inspection, January 2023		

Identification Number	AY_48	Reference Number	KD024-050006
Figure Number	Figure 13.1	Legal Status	-
Townland	Dunstown	Site Type	Enclosure
Easting / Northing	687335 / 712719	Distance from Proposed Development	0m
Description	One of six, small subrectangular cropmarks (KD024-050001- to KD024-050006-) visible on an aerial photograph (GSI N 337-6). Located in level, well-drained pasture. No earthworks were visible at the time of visit, but there was heavy grass cover. No corresponding features on historic mapping. No above ground remains. Within the boundary for the access track it is likely the ground has been disturbed i.e. earth bunds are located to the north of the access track (likely associated with construction), with an established treeline either side. While the point data is located within the access track / R412, the description for these constraints notes they are located within pasture (likely the field adjacent to the access track) which would not be disturbed. Aerial imagery from 1995 shows this area as possibly disturbed. ASI records indicate AY_46 – 48 are located within a level pasture field adjacent to the R412 and positioned parallel to a field boundary (since removed; CH_103; Deery, 2022). Located within a relatively flat pasture field adjacent to the Dunstown access track. Forms part of a group of enclosures near the entrance to Dunstown Substation (AY_46 – 48), other groups of enclosures were also identified in this area (AY_53 – AY_58).		
Sources	Archaeological Survey of Ireland SMR Ordnance Survey 6", 1837 – 1842 Ordnance Survey 25", 1888-1913 Deery, S., 2022, Dunnstown 400 kV substation, Dunnstown, Brannockstown, Naas, County Kildare, Response to Further information Request 21/1175 Item 1 (a)-(g) - Archaeology. Walkover and site inspection, January 2023		

Identification Number	AY_49	Reference Number	KD014-061
Figure Number	Figure 13.1	Legal Status	-
Townland	Castlesize	Site Type	Enclosure
Easting / Northing	688231 / 724261	Distance from Proposed Development	15m to the north of the PAB
Description	Cropmark of circular-shaped enclosure (approx. diam. 20m) visible on Google maps aerial photograph. A circular cropmark visible on aerial imagery measuring approximately 30m in diameter (external). Approximately 160m to the west of a possible barrow (KD014-062). A second circular feature (AY_59) of similar size is visible as a cropmark on aerial imagery in an adjacent field, approximately 160m to the east. While established field boundaries limit the intervisibility between these sites, it is possible they were contemporary and could form part of a larger complex of activity uncovered during recent archaeological investigations in advance of construction of the Sallins Bypass.		
Sources	Archaeological Survey of Ireland SMR BlueSky Aerial, 2022		

Identification Number	AY_50	Reference Number	KD019-072
Figure Number	Figure 13.1	Legal Status	-
Townland	Osberstown	Site Type	Enclosure
Easting / Northing	687577 / 720658	Distance from Proposed Development	-
Description	Aerial photograph (GB89.AF.18) shows cropmark of an incomplete circular enclosure defined by a fosse and with a curvilinear annexe extending to the north-east. https://excavations.ie/report/2013/Kildare/0023698/ Visible on Ortho 2005 aerial imagery. Area developed.		
Sources	Archaeological Survey of Ireland SMR		

Identification Number	AY_51	Reference Number	KD024-048001
Figure Number	Figure 13.1	Legal Status	Recorded Monument
Townland	Stephenstown South	Site Type	Enclosure
Easting / Northing	687222 / 713231	Distance from Proposed Development	20m to the east of the PAB
Description	One of three, small circular cropmarks (KD024-048001-, KD024-048002- and KD024-048003-) visible on an aerial photograph (GSI N 337-6). Located on a low ridge in well-drained pasture. No visible surface trace survives. No visible above ground remains. Located in a large pasture field, bounded by established hedgerows as well as modern concrete and post-and-wire fencing. Located to the north of an operational farmyard / construction site (substantial ground disturbance noted).		
Sources	Record of Monuments and Places - County Kildare (1995)		

Identification Number	AY_52	Reference Number	KD024-048003
Figure Number	Figure 13.1	Legal Status	-
Townland	Stephenstown South	Site Type	Enclosure
Easting / Northing	687262 / 713171	Distance from Proposed Development	30m to the north of the PAB
Description	One of three, small circular cropmarks (KD024-048001-, KD024-048002- and KD024-048003-) visible on an aerial photograph (GSI N 337-6). Located on a low ridge in well-drained pasture. No visible surface trace survives. No visible above ground remains. Located in a large pasture field, bounded by established hedgerows as well as modern concrete and post-and-wire fencing. Located to the north of an operational farmyard / construction site (substantial ground disturbance noted).		
Sources	Archaeological Survey of Ireland SMR		

Identification Number	AY_53	Reference Number	KD024-052005
Figure Number	Figure 13.1	Legal Status	-
Townland	Dunstown	Site Type	Enclosure
Easting / Northing	687688 / 712279	Distance from Proposed Development	0m
Description	One of six small, roughly rectangular earthworks (KD024-052001- to KD024-052006-) visible as cropmarks on an aerial photograph (GSI N 337-6), arranged in two roughly parallel rows of three over a roughly rectangular area (c. 150m NW-SE; c. 100m NE-SW. In level, improved pasture. No visible surface trace survives. Forms part of a group of enclosures within Dunstown substation (AY_53 – AY_58), other groups of enclosures were also identified in this area near the entrance to Dunstown Substation (AY_46 – 48).		
Sources	Archaeological Survey of Ireland SMR		

Identification Number	AY_54	Reference Number	KD024-052003
Figure Number	Figure 13.1	Legal Status	-
Townland	Dunstown	Site Type	Enclosure
Easting / Northing	687744 / 712275	Distance from Proposed Development	0m
Description	One of six small, roughly rectangular earthworks (KD024-052001- to KD024-052006-) visible as cropmarks on an aerial photograph (GSI N 337-6), arranged in two roughly parallel rows of three over a roughly rectangular area (c. 150m NW-SE; c. 100m NE-SW. In level, improved pasture. No visible surface trace survives. Forms part of a group of enclosures within Dunstown substation (AY_53 – AY_58), other groups of enclosures were also identified in this area near the entrance to Dunstown Substation (AY_46 – 48).		
Sources	Archaeological Survey of Ireland SMR		

Identification Number	AY_55	Reference Number	KD024-052006
Figure Number	Figure 13.1	Legal Status	-
Townland	Dunstown	Site Type	Enclosure
Easting / Northing	687744 / 712275	Distance from Proposed Development	0m
Description	One of six small, roughly rectangular earthworks (KD024-052001- to KD024-052006-) visible as cropmarks on an aerial photograph (GSI N 337-6), arranged in two roughly parallel rows of three over a roughly rectangular area (c. 150m NW-SE; c. 100m NE-SW. In level, improved pasture. No visible surface trace survives. Forms part of a group of enclosures within Dunstown substation (AY_53 – AY_58), other groups of enclosures were also identified in this area near the entrance to Dunstown Substation (AY_46 – 48).		
Sources	Archaeological Survey of Ireland SMR		

Identification Number	AY_56	Reference Number	KD024-052002
Figure Number	Figure 13.1	Legal Status	-
Townland	Dunstown	Site Type	Enclosure
Easting / Northing	687740 / 712199	Distance from Proposed Development	0m
Description	One of six small, roughly rectangular earthworks (KD024-052001- to KD024-052006-) visible as cropmarks on an aerial photograph (GSI N 337-6), arranged in two roughly parallel rows of three over a roughly rectangular area (c. 150m NW-SE; c. 100m NE-SW. Located in level, improved pasture. No visible surface trace survives. Forms part of a group of enclosures within Dunstown substation (AY_53 – AY_58), other groups of enclosures were also identified in this area near the entrance to Dunstown Substation (AY_46 – 48).		
Sources	Archaeological Survey of Ireland SMR		

Identification Number	AY_57	Reference Number	KD024-052004
Figure Number	Figure 13.1	Legal Status	-
Townland	Dunstown	Site Type	Enclosure
Easting / Northing	687682 / 712182	Distance from Proposed Development	20m to the south-west of the PAB
Description	One of six small, roughly rectangular earthworks (KD024-052001- to KD024-052006-) visible as cropmarks on an aerial photograph (GSI N 337-6), arranged in two roughly parallel rows of three over a roughly rectangular area (c. 150m NW-SE; c. 100m NE-SW. Located in level, improved pasture. No visible surface trace survives. Forms part of a group of enclosures within Dunstown substation (AY_53 – AY_58), other groups of enclosures were also identified in this area near the entrance to Dunstown Substation (AY_46 – 48).		
Sources	Archaeological Survey of Ireland SMR		

Identification Number	AY_58	Reference Number	KD024-052001
Figure Number	Figure 13.1	Legal Status	Recorded Monument
Townland	Dunstown	Site Type	Enclosure
Easting / Northing	687777 / 712165	Distance from Proposed Development	0m
Description	One of six small, roughly rectangular earthworks (KD024-052001- to KD024-052006-) visible as cropmarks on an aerial photograph (GSI N 337-6), arranged in two roughly parallel rows of three over a roughly rectangular area (c. 150m NW-SE; c. 100m NE-SW). Located in level, improved pasture. No visible surface trace survives. Forms part of a group of enclosures within Dunstown substation (AY_53 – AY_58), other groups of enclosures were also identified in this area near the entrance to Dunstown Substation (AY_46 – 48).		
Sources	Archaeological Survey of Ireland SMR		

Identification Number	AY_59	Reference Number	KD014-062
Figure Number	Figure 13.1	Legal Status	-
Townland	Castlesize	Site Type	Barrow - unclassified
Easting / Northing	688409 / 724218	Distance from Proposed Development	13m to the north of the PAB
Description	Cropmark of circular-shaped enclosure (approx. diam. 12m) visible on Google maps aerial photograph. A circular cropmark visible on aerial imagery measuring approximately 30m in diameter (external). Approximately 160m to the east of an enclosure (KD014-061). A second circular feature (AY_59) of similar size is visible as a cropmark on aerial imagery in an adjacent field, approximately 160m to the east. While established field boundaries limit the intervisibility between these sites, it is possible they were contemporary and could form part of a larger complex of activity uncovered during recent archaeological investigations in advance of construction of the Sallins Bypass		
Sources	Archaeological Survey of Ireland SMR BlueSky Aerial, 2022		

Identification Number	AY_60	Reference Number	KD024-048002
Figure Number	Figure 13.1	Legal Status	-
Townland	Stephenstown South	Site Type	Enclosure
Easting / Northing	687252 / 713191	Distance from Proposed Development	50m to the north of the PAB
Description	One of three, small circular cropmarks (KD024-048001-, KD024-048002- and KD024-048003-) visible on an aerial photograph (GSI N 337-6). Located on a low ridge in well-drained pasture. No visible surface trace survives. No visible above ground remains. Located in a large pasture field, bounded by established hedgerows as well as modern concrete and post-and-wire fencing. Located to the north of an operational farmyard / construction site (substantial ground disturbance noted).		
Sources	Archaeological Survey of Ireland SMR		

Table 2: Inventory of Architectural Heritage Constraints

Identification Number	AH_01	Reference Number	NIAH 14404905
Figure Number	Figure 13.2	Legal Status	NIAH - Regional
Townland	Phepotstown	Site Type	Country house
Easting / Northing	689355 / 744178	Distance from Proposed Development	0m
Description	Detached five-bay two-storey country house also MH049-107), built c.1780. Recessed single-bay two-storey wing and outbuilding attached to east end. Hipped slate roof with rendered chimneystacks and cast-iron rainwater goods. Timber sash windows with limestone sills. Timber panelled door with cast-iron fanlight above, set in ashlar limestone door surround. Former gate lodge to site, with all openings now blocked. Rendered entrance piers with limestone wheel guards and cast-iron double gates. The modest form of this country house is enhanced by the retention of many original features and materials, such as the slate roofs and timber sash windows. The façade is enlivened by the delicate decorative fanlight. The house forms an interesting group with the other related buildings and structures, such as the outbuildings, walled garden and follies, which were built by Robert Watson and create a picturesque ferme ornée. The house is set within its demesne lands (DL_04) which includes a former gate lodge, mausoleum (MH049-105), and folly (NIAH 14404908), as well as rendered entrance piers with limestone wheel guards and cast-iron double gates. Tradition notes a previous owner believed he would return after death as a fox so constructed a fox-cover in the grounds. Established tree-line obscures Larch Hill house from the R125. Harled and painted gate piers and entrance walls, with shaped stone copes and cast iron gates and lodge beyond noted adjacent to the road. Forms a coherent group forming the ornamental farm.		
Sources	https://www.buildingsofireland.ie/buildings-search/building/14404905/larch-hill-larch-hill-demesne-phepotstown-meath [Accessed 11 October 2021]. Online mapping 2019 [11 October 2021] https://digital.ucd.ie/view-media/duchas:4782508/canvas/duchas:4740627?manifest=https://data.ucd.ie/api/img/manifests/duchas:4782508 [Accessed 4 November 2021]. Gatehouse, T., 2017, 'Larchill: a rediscovered Irish garden and its Australian cousin', in *Australian Garden History*, Volume 29, Number 1, pp. 15 – 20. Walkover and site inspection, January 2023		

Identification Number	AH_06	Reference Number	RPS B10-14; NIAH 11901001
Figure Number	Figure 13.2	Legal Status	Protected Structure
Townland	Moortown	Site Type	Thatched dwelling
Easting / Northing	687159 / 732329	Distance from Proposed Development	48m to the PAB
Description	Detached five-bay single-storey lobby entry thatched house, extant 1837, on an L-shaped plan originally three-bay single-storey on a rectangular plan; single-bay (two-bay deep) single-storey projecting end bay with half-dormer attic (east). Pitched oat straw thatch roof, rope twist ridge with paired exposed stretchers having exposed scallops, rendered dwarf chimney stack on a T-shaped plan having concrete capping, and blind stretchers to eaves having blind scallops; pitched artificial slate roof (east) with ridge tiles, and cast-iron rainwater goods on roughcast eaves with cast-iron downpipes. Roughcast battered walls. Square-headed door opening with concrete threshold, and concealed dressings framing timber boarded door. Square-headed window openings with concrete sills, and concealed dressings framing one-over-one timber sash windows. Street fronted. A house identified as an integral component of the vernacular heritage of County Kildare by such attributes as the lobby entry plan form; the construction in unrefined local materials displaying a feint battered silhouette with sections of "daub" or mud suggested by an entry in the "House and Building Return" Form of the National Census (NA 1901; NA 1911); the disproportionate bias of solid to void in the massing; and the high pitched roof showing an oat straw thatch finish: meanwhile, aspects of the composition clearly illustrate the continued linear development or "improvement" of the house. Having been well maintained, the form and massing survive intact together with quantities of the original fabric, both to the exterior and to the interior, thus upholding much of the character or integrity of a house making a pleasing visual statement in a sylvan street scene. The house is depicted on historic mapping as a rectangular structure immediately adjacent to the road. Later mapping shows the house with other buildings to the east and south. The original single storey range has been joined with a later one and a half storey building to the east, and a single storey extension has been added to the west, with roughcast walls and a slate roof. Positioned immediately on Mooretown Drive, the house overlooks the road. While the view north is directly over the carriageway, views in other directions are screened by the surrounding established vegetation and trees, and other residential buildings. Detached four-bay single-storey lobby-entry thatched house (formerly O'Neill's public house), built c.1850, much enlarged by a single-bay slated accretion to west and a single-bay two-storey thatched section to east, built c.2000 and a single-storey thatched return to rear. Pitched oaten straw thatched roof to the four-bay section, hipped to the two-storey section, both with twisted ridges and exposed scallops. Rendered chimneystack. Rough cast and pebble-dashed rendered walls. Square-headed window openings with concrete sills; one forming bracketed timber sill. Single pane timber sash windows to the original section with two-over-two timber sash windows to the new sections having horns. Square-headed door opening with tongued and grooved timber door and heritage style door furniture, opening onto concrete step. Not visible from the R407 due to established vegetation, mature trees and intervening buildings. Views are across Moortown Drive and are limited by the hedgerow beyond. The building forms part of the local Sylvian streetscape character and its location near a crossroads contributes to the understanding of the historic public function of the building.		
Sources	https://www.buildingsofireland.ie/buildings-search/building/14404905/larch-hill-larch-hill-demesne-phepotstown-meath [Accessed 11 October 2021]. Online mapping 2019 [11 October 2021]		

	https://digital.ucd.ie/view-media/duchas:4782508/canvas/duchas:4740627?manifest=https://data.ucd.ie/api/img/manifests/duchas:4782508 [Accessed 4 November 2021]. Walkover and site inspection, January 2023 Kildare County Council, 2005, The Thatched Houses of County Kildare.

Identification Number	AH_11	Reference Number	RPS B14-36; NIAH 11901401
Figure Number	Figure 13.2	Legal Status	Protected Structure
Townland	Ballynagappagh	Site Type	Thatched House
Easting / Northing	685048 / 729269	Distance from Proposed Development	2m to the east of the PAB
Description	Detached five-bay single-storey direct entry thatched farmhouse, extant 1837, on a rectangular plan with single-bay single-storey lean-to windbreak. Hipped oat straw thatch roof overhanging lean-to slate roof (windbreak), rope twist ridge with grouped exposed stretchers having exposed scallops, rendered dwarf chimney stacks supporting terracotta or yellow terracotta tapered pots, and blind stretchers to eaves having blind scallops. Roughcast battered walls on rendered plinth. Square-headed door opening with concealed dressings framing timber panelled door. Square-headed window openings with concrete or rendered sills, and concealed dressings framing one-over-one timber sash windows. Set perpendicular to road with roughcast piers (south) or roughcast cylindrical piers (north) having capping supporting flat iron double gates. A farmhouse identified as an important component of the vernacular heritage of County Kildare by such attributes as the alignment perpendicular to the road; the elongated rectilinear direct entry plan form; the construction in unrefined local material displaying a battered silhouette with sections of "daub" or mud suggested by an entry in the "House and Building Return" Form of the National Census (NA 1901; NA 1911); the disproportionate bias of solid to massing; and the high pitched roof showing an oat straw thatch finish. Having been well maintained, the form and massing survive intact together with substantial quantities of the original fabric, both to the exterior and to the interior, thus upholding the character or integrity of the composition. Furthermore, adjacent tin roofed outbuildings continue to contribute positively to the group and setting values of a self-contained ensemble making a pleasing visual statement in a rural street scene. The house is depicted on historic mapping as a detached building, rectangular in plan, positioned roughly perpendicular to the road. The building is set within an irregular enclosure, with two other small ancillary buildings to the north-east and north. Later mapping shows further ranges added to the coplex, including a long rectangular range immediately to the north-east, and an 'L'-shaped range to the north. A single-storey range positioned perpendicular to the R408, with an adjacent range extant to the north-east (with later corrugated roof). A low rendered boundary wall (approximately 0.6km in length) bounds the road, with two sets of gatepiers to north-west. A small modern lean-to has been added to the building. Forms part of a working farmyard. Detached five-bay single-storey direct-entry thatched house, built c.1800, with a windbreaker entrance porch and a lean-to return. Hipped oaten straw thatched roof with a twisted and scalloped ridge. Two rendered chimneystacks with clay pots. Natural slate to windbreaker. Rough cast rendered clay walls with a rendered plinth course. Single-pane timber sash windows. Flat-panelled timber shutters visible to interior. Modern timber panelled door. Tongued and grooved timber half-door to rear. Set perpendicular to the road with a large front site, and large farmyard to rear. Good example of the thatched house extended over time in a linear fashion to form a long house. This working farmhouse with its extensive farmyard retains all its external features and is of considerable aesthetic value. Thatched range perpendicular to the R408, with a low harled wall (with gate piers / entrances) and narrow verge. Views across operational farmyard, including modern barns / sheds and vehicle movement, and an open area to the south. R408 traffic visible to / from this constraint. with established fields and hedgerows beyond.		
Sources	Record of Protected Structures <		

	https://www.buildingsofireland.ie/buildings-search/building/11901401/ballynagappagh-clane-ed-kildare [Accessed 11 October 2021] Ordnance Survey 6", 1837 – 1842 Ordnance Survey 25", 1888-1913 Online mapping 2019 [11 October 2021] Walkover and site inspection, January 2023 Kildare County Council, 2005, The Thatched Houses of County Kildare

Identification Number	AH_12	Reference Number	RPS B14-12
Figure Number	Figure 13.2	Legal Status	Protected Structure
Townland	Millicent Demesne	Site Type	Church and Lych Gate
Easting / Northing	687348 / 725849	Distance from Proposed Development	24m (church) 0m (lych gate)
Description	Millicent Church and Lych Gate Located within Millicent House demesne (DL_17), the church comprises a Hiberno-Romanesque building. ;The church was consecrated in 1883. The church is not depicted on historic mapping dating to the mid-19th century; however, is shown on later mapping, with the lych gate to the south-west, surrounded by a rectangular graveyard. Located on a rise towards the centre of the parish of Clane, the church comprises a cruciform plan building, orientated east-west, with short transepts and a central square tower (visible for some distance), a projecting porch is located to the south. ;The lych gate comprises a four bay, rectangular covering to the shallow stepped entrance, with transverse gables, and a gate mid-way. It has a slate pitched roof with decorative ridge pieces and bargeboards. ;The lych gate appears to have been restored in March 2011. The church is set within a rectangular treelined graveyard with an established hedgerow bounding the L2002. A sub-rectangular enclosure, measuring c.98m by c.95m, defined by a bank / ditch surrounding a 19th century church and associated memorials. Linear features bisects the area, running north-east to south-west, to meet the road (L2002). A drive is also present from the western corner running towards the church building (cruciform in plan with square apse and projecting porch). Lych gate and footpath also visible. Obscured on aerial imagery (largely tree-covered; DSM). Church, graveyard and path with lych gate depicted on later historic Ordnance Survey mapping (25" to 1 mile, 1888-1913). Area to the north depicted as an area of woodland. Interpreted as church grounds and the 19th century church Visible from the L2002, although some screening is provided by established boundaries (mature trees / hedges). Churchyard is quiet / tranquil, with intermittent traffic noise. Visual and spatial relationship between the lych gate and church building, and integrity of church/yard as a whole, including monuments.		
Sources	Record of Protected Structures https://www.kildare.ie/ehistory/index.php/church-of-st-michael-and-all-angels-millicent-clane/ [Accessed 11 October 2021] Ordnance Survey 6", 1837 – 1842 Ordnance Survey 25", 1888-1913 Online mapping 2019 [11 October 2021] Online mapping 2011 [11 October 2021]		

	Walkover and site inspection, January 2023

Identification Number	AH_15	Reference Number	RPS B14-27C
Figure Number	Figure 13.2	Legal Status	Protected Structure
Townland	Millicent Demesne	Site Type	House
Easting / Northing	687860 / 724793	Distance from Proposed Development	3m to the north-east of the PAB
Description	Square plan two-storey house with (later?) conservatory and outbuilding. Millicent Estate Houses Located within Millicent Demesne (DL_17), a small rectangular building is depicted on historic mapping to the north of the drive to Millicent House (B14-26), to the west of a small bridge crossing a minor watercourse. ;Later mapping depicts the building as having a projecting bay on the northern elevation and two small projecting porches, and identifies it as a 'lodge'. The building comprises a square plan, two-storey house with a conservatory and outbuilding, both possibly of a later date. The house is surrounded by established gardens and woodland to the south-east. The principal elevation of the house is to the south-east, across a private access track. Millicent Road to the west is screened by an established boundary hedge. Two-storey, three bay house, located within private gardens with established boundary hedges and mature trees. View from house, south-east over a lane towards an area of trees. L2002 located to the west.		
Sources	Record of Protected Structures Ordnance Survey 6", 1837 – 1842 Ordnance Survey 25", 1888-1913 Online mapping 2019 [11 October 2021] Walkover and site inspection, January 2023		

Identification Number	AH_18	Reference Number	RPS NS19-115
Figure Number	Figure 13.2	Legal Status	Protected Structure
Townland	Bluebell	Site Type	Farm house
Easting / Northing	688798 / 717262	Distance from Proposed Development	6m to the west of the PAB
Description	Bluebell Farm House Originally three-bay two-storey Victorian farm house The house is depicted on historic mapping as a rectangular range adjacent to the road between Bluebell and Broadfield. Later mapping shows a projecting bay to the east, and associated ranges to the south forming a yard. The house forms part of a working farmyard and is enclosed by a high rubblestone boundary wall. Views west are towards and across Kilcullen Road (both the former alignment and newer alignment); however, these are largely screened by the boundary wall. Farm complex, on old road alignment. Screened from the road by a high stone wall, and established roadside hedges. Positioned to the west of Kilcullen Road, with modern residential development to the east. Constant traffic movement and noise.		
Sources	Record of Protected Structures Ordnance Survey 6", 1837 – 1842 Ordnance Survey 25", 1888-1913 Online mapping 2017 [11 October 2021] Walkover and site inspection, January 2023		

Identification Number	AH_19	Reference Number	RPS B05-08; NIAH 11900503
Figure Number	Figure 13.2	Legal Status	Protected Structure
Townland	Boycetown	Site Type	Church/chapel
Easting / Northing	687462 / 740306	Distance from Proposed Development	48m to the south of the PAB
Description	Detached four-bay single-storey Gothic-style former Church of Ireland church with dormer attic, built 1868-70, with single-bay single-storey gabled projecting lower porch to north-west, single-bay three-stage tower to north on a circular plan with conical spire, single-bay single-storey bowed apse to east and single-bay single-storey lower vestry projection to south-east. Renovated, c.1990, with dormer attic added to accommodate residential use. Gable-ended roof with slate (gabled to porch and to vestry projection; half-conical to apse). Crested clay ridge tiles. Rendered chimney stacks (cut-stone chimney stack to vestry projection). Cut-stone coping to gables (with cross finial to apex to porch). Square rooflights, c.1990. Cast-iron rainwater gods on cut-stone eaves course. Cut-stone conical roof/spire to tower with wrought iron cross finial to apex. Broken coursed squared rubble stone walls. Cut-stone dressings including quoins to corners and buttresses to nave. Cut-stone walls to third stage to tower on cut-stone stringcourse with cut-stone stringcourse over. Paired pointed-arch window opening to nave in cut-stone pointed-arch frame having block-and-start surround and oculus to arch. Fixed-pane windows. Single pointed arch window openings to apse. Cut-stone block-and-start surrounds with chamfered reveals having hood mouldings over. Fixed-pane windows. Traceried (three-light) window to west in pointed-arch frame having block-and-start surround. Lancet-arch window openings with cinquefoil to arch. Fixed-pane windows (possibly with stained glass panels). Lancet-arch openings to third stage to tower. Cut-stone chamfered reveals. Moulded cut-stone stringcourses to springs of arches. Louvered fittings. Pointed-arch door opening to porch. Cut-stone doorcase with colonettes having hood moulding over. Timber panelled double door. Square-headed door opening to vestry projection. Cut-stone block-and-start shouldered surround. Timber panelled door. Set back from road on own grounds. Landscaped grounds to site. Saint Patrick's Church is an attractive small-scale church on a compact plan that, despite a subsequent change of use, appears to retain most of its original form and character. The church is of considerable social and historic interest for its original intended purpose as the ecclesiastical centre for the Church of Ireland population in the locality. The fine detailing of the church attests to the prosperity of that community in the early nineteenth century and the construction in squared rubble stone attests to the high quality of stone masonry traditionally practised in the locality. A much-ornamented piece, the church is dominated by a soaring picturesque tower and spire that alludes to the Irish round tower, and which serves to articulate the skyline while identifying the building in the landscape. Renovation works undertaken in the course of the conversion to a residential use have been carried out in keeping with the original integrity of the design – many original features and materials are retained to the exterior, including fittings to the openings and slate roofs having cast-iron rainwater goods, while the rooflights are a discrete addition to the composition. It is also possible that some of the original interior spaces remain intact. The church is attractively set in its own grounds, which are apparently undergoing re-landscaping to produce a domestic tone. The cut-stone markers to the attendant graveyard are of some artistic interest, as is the gateway to the entrance of the site, which retains fine examples of early surviving iron work. Positioned within the churchyard, adjacent to the graveyard, south of the R148. Busy road with constant traffic, and roundabout to the north-west. Cars parked immediately adjacent to the boundary.		
Sources	https://www.buildingsofireland.ie/buildings-search/building/11900503/kilbeg-house-boycetown-kilcock-kildare [Accessed 18 January 2023] Walkover and site inspection, January 2023		

Identification Number	AH_20	Reference Number	NIAH 11811035
Figure Number	Figure 13.2	Legal Status	NIAH - Regional
Townland	Osberstown	Site Type	Bridge
Easting / Northing	289130 / 222621	Distance from Proposed Development	10m to the east of the PAB
Description	Single-arch dressed stone railway bridge over road, c.1870, with rock-faced granite voussoirs and dressed stone coping. Renovated, c.1990. Coursed dressed stone walls. Cut-stone stringcourse to spring of arch. Cast-iron tie plates. Cut-stone coping. Replacement concrete block, c.1990, to parapet walls with replacement iron railings over. Single round arch with rock-faced voussoirs and yellow brick soffits. Sited spanning road as part of Great Southern and Western Railway line. This railway bridge is a fine stone structure built as part of the Great South and Western Railway line, forming an imposing feature on the line, and is one of a group of bridges on the section of that railway line that passes through County Kildare. The construction of the arch that has retained its original shape is of technical and engineering merit. The bridge exhibits good quality stone masonry and fine, crisp joints. The bridge is of considerable historical and social significance as a reminder of the railway network development in Ireland, which brought about many technical advances and developed commercial activity in the mid to late nineteenth century. The bridge is depicted on historic mapping forming part of the Great Southern & Western Railway and carries the railway across a local road in an area of fields. Positioned between two earthwork embankments, carrying the operational railway across a single carriageway road. Modern residential properties have been built to the south-east of the bridge, and the Sallins Bypass is located to the west. The bridge forms a group with other historic bridges on this section of the railway.		
Sources	http://www.buildingsofireland.ie/niah/search.jsp?type=record&county=KD&regno=11811035 [Accessed 01 March 2023] Ordnance Survey 25", 1888-1913		

Table 3: Inventory of GDLs

Identification Number	DL_02	Reference Number	-
Figure Number	Figure 13.3	Legal Status	-
Townland	Jenkinstown	Site Type	Garden and designed landscape
Easting / Northing		Distance from Proposed Development	0m
Description	Jenkinstown House Demesne associated with Jenkinstown House. ;Mature trees and a ditch mark the boundary alongside the R156, a roughcast wall, with crenelated cope, square gate piers, and cast-iron gate are located at the entrance / drive. A pair of curved roughcast boundary walls with alternate horizontal and vertical roughly squared copes, pair of squared rubble stone gate piers roughly coursed with tapered copes at entrance with R156. Mature tree line largely screens the house / filters views. An overgrown boundary ditch was also noted.		
Sources	Online mapping (2021) Ordnance Survey 6", 1837 – 1842 Ordnance Survey 25", 1888-1913 Walkover and site inspection, January 2023		

Identification Number	DL_03	Reference Number	NIAH 5151
Figure Number	Figure 13.3	Legal Status	-
Townland	Phepotstown	Site Type	Garden and designed landscape
Easting / Northing		Distance from Proposed Development	0m
Description	Phepotstown House Hedgerows and mature trees, roughcast walls and gate piers, with cast iron gates, leading onto drive / avenue. Wall continues along R125 with battened buttresses and unrendered sections. Mature woodland / hedges bound R125 until second entrance with sections of lower wall, cylindrical columns and decorative cast iron railings and gates onto drive. Earth bank with mature trees on top edges the R125. High stone wall noted at northern entrance (curved, rendered wall at access, then roughly coursed rubblestone construction, with buttresses) - poor condition - ends at bend in R125. Mature trees and hedge (with bank / ditch) mark the boundary to the demesne and continue until return of boundary to the east. Southern entrance harled entrance walls with symmetrical piers with carved ashlar(?) copes, low stone entrance wall to gates (with alternating horizontal and vertical stone copes) with railings.		

Sources	Online mapping (2019 & 2021) Ordnance Survey 6", 1837 – 1842 Ordnance Survey 25", 1888-1913 Walkover and site inspection, January 2023

Identification Number	DL_04	Reference Number	NIAH 5104
Figure Number	Figure 13.3	Legal Status	-
Townland	Phepotstown	Site Type	Garden and designed landscape
Easting / Northing		Distance from Proposed Development	0m
Description	Larch Hill House Buildings indicated, not named Established trees / hedgerows bound the R125, to gate entrance with lodge house (and additional ancillary building). Rendered walls and four square piers with cast iron gates which lead to a second set of piers beyond the lodge, along the drive. Low rubble stone wall runs from entrance to carriageway. Established boundary continues along R125, southern boundary established woodland belt. See also NIAH 14404905. In the early 18th century Larchill was the home farm of Phepotstown House. In 1708 the property was leased to grow flax and the development of the ferme ornée on the home farm began. By 1760 the estate was broken up, and Larchill House assumed its present appearance in about 1780. Its development continued in 1790 under different ownership; however, under later owners it fell into neglect. 25 hectares of gently sloping land with the house (AH_01) and farm buildings on the higher ground to the north with views of lakes and follies and wide panorama of the countryside. Distant views of Maynooth College and the Dublin mountains were also incorporated into the design. Boundaries defined by conifer and broadleaf plantations. From the road to the east a drive with Gothic lodge leads to the Georgian house, framed on either side by mature plantations. Lawn in front of the house is bounded by a ha-ha with an elongated fishpond forming the ditch (LI_048). Extensive farm buildings with a walled garden to the west, including a pond and cockle shell tower. South of the walked garden is an ornamental dairy and to the west is the Gothic model farm. Walks meander through the arcadian landscape, taking in the Chinese prayer statue and lantern, mausoleum, and further walled garden. The ditch separating the lawn in front of the house drains into an eel pond, with eel house, which feeds ponds bounding the south of the lawn. The ditch continues down to the lake which has two ornamental islands. Formerly when the estate was larger, water flowed from the lake down cascades into a canal and then into a second lake before joining a natural stream – probably a fish farm (LI_053). Established belt of trees with external roadside ditch along R125. Rendered and painted entrance walls, with plain tapered ashlar(?) copes halfway down, two pairs of piers, with cast iron gates. Single-storey lodge noted behind the wall with a crenellated two storey building behind. Wheel bollards noted (one damaged). High established hedgerow with mature trees, and roadside ditch, continue south. Section of wall noted at bend north of bridge / watercourse crossing. Established hedgerows continues.		
Sources	https://www.buildingsofireland.ie/buildings-search/site/5104/larch-hill-house-kilmore-co-meath Online mapping (2019 & 2021) Ordnance Survey 6", 1837 – 1842		

	Ordnance Survey 25", 1888-1913 Gatehouse, T., 2017, 'Larchill: a rediscovered Irish garden and its Australian cousin', in *Australian Garden History*, Volume 29, Number 1, pp. 15 – 20. Walkover and site inspection, January 2023

Identification Number	DL_06	Reference Number	NIAH 5697
Figure Number	Figure 13.3	Legal Status	-
Townland	Calgath	Site Type	Garden and designed landscape
Easting / Northing		Distance from Proposed Development	0m
Description	Calgath House A significant number of modern agricultural buildings have been constructed on this site. Mature trees / low hedges to large roughly coursed rubblestone entrance wall / piers, iron gates with modern lanterns atop gate piers, leading to driveway. Along R125 wall replaced by a modern wooden fence, then continues as hedgerow. Established hedgerow and mature treeline, roadside ditch. At entrance splayed rubble stone entrance walls with square piers. Modern fence continues further south.		
Sources	https://www.buildingsofireland.ie/buildings-search/site/5697/calgath-house-co-meath Online mapping (2019 & 2021) Ordnance Survey 6", 1837 – 1842 Ordnance Survey 25", 1888-1913 Walkover and site inspection, January 2023		

Identification Number	DL_07	Reference Number	NIAH 4983
Figure Number	Figure 13.3	Legal Status	-
Townland	Calgath	Site Type	Garden and designed landscape
Easting / Northing		Distance from Proposed Development	0m
Description	Brides Stream House Buildings indicated, not named Rendered entrance walls and gate piers, metal gate (modern replacement). Entrance appears to have been made narrower. R126 bounded by a low stone wall and ditch, with mature hedge / tree line. Southern entrance of bend in R125 comprises a semi-circular recessed entrance, with rendered stone wall, cast iron railings and cylindrical gate piers with cast iron gates. ;Driveway appears to be overgrown / disused. ;Second entrance comprises a rendered stone wall bounding the carriageway with a recessed cast iron gate and square gatepiers. Wall continues along the R125 a short distance with two square piers towards the centre. Entrances either side of the lodge. Walling of the same character appears to run perpendicular to the southern entrance, along the edge of the demesne land. Established hedgerow and mature trees line R125, roadside ditch also noted with a low stone wall lining the ditch (roadside). Wall gradually increased in height. Two entrances on bend in road, one iron railings, one harled walls and square gate piers (to neighboring farm).		
Sources	https://www.buildingsofireland.ie/buildings-search/site/4983/brides-stream-house-rodanstown-co-meath Online mapping (2019 & 2021) Ordnance Survey 6", 1837 – 1842 Ordnance Survey 25", 1888-1913 Walkover and site inspection, January 2023		

Identification Number	DL_10	Reference Number	NIAH 1884
Figure Number	Figure 13.3	Legal Status	-
Townland	Painestown	Site Type	Garden and designed landscape
Easting / Northing		Distance from Proposed Development	0m
Description	Painestown House Buildings indicated, area to west labelled Painestown. Fair amount of woodland from historic OS mapping no longer present. R407 bounded by established hedgerow and mature trees. Pair of small gatepiers and cast-iron gate, recessed from carriageway, leading on to driveway. Hedgerow continues and is replaced by a post and rail fence, with mature trees lining the carriageway. Later entrance further south. The R407 is bounded by established hedgerows and mature trees along with a bank. Modern post-and-rail fences noted, along with modern housing (hedgerow removed but bank and mature trees remain.		
Sources	https://www.buildingsofireland.ie/buildings-search/site/1884/painestown-house-balraheen-co-kildare Online mapping (2019 & 2021) Ordnance Survey 6", 1837 – 1842 Ordnance Survey 25", 1888-1913 Walkover and site inspection, January 2023		

Identification Number	DL_14	Reference Number	NIAH 1882
Figure Number	Figure 13.3	Legal Status	-
Townland	Firmount Demesne	Site Type	Garden and designed landscape
Easting / Northing		Distance from Proposed Development	0m
Description	Firmount House Building indicated, area to north east labelled Firmount East Rendered wall with flat cope immediately adjacent to the L2002, includes small doorway towards north. Modern entrance has been added to north corner as access to new house. Small square building in south-east corner of walled garden (possible gazebo / dovecote). Later entrance also added to south of walled garden (although not replacing a section of the wall as above), leads to tree-lined avenue. L2002 bounded by modern post and rail fence, ditch and tree line. Second entrance completely replaced, with third and forth brick and stone entrances to modern housing. Hedgerow continues. Established hedgerow bound L2002, at field to the north, with modern post-and-rail entrance where boundary meets walled garden. Splayed entrance walls at north of garden, with high rendered stone wall continuing roadside, the to the south. Second entrance rubble stone construction. Modern post-and-rail fence further south, as well as an established hedgerow, ditch and mature trees at fields. boundary punctuated with entrances to later houses.		
Sources	https://www.buildingsofireland.ie/buildings-search/site/1882/firmount-house-clane-co-kildare Online mapping (2019 & 2021) Ordnance Survey 6", 1837 – 1842 Ordnance Survey 25", 1888-1913 Walkover and site inspection, January 2023		

Identification Number	DL_15	Reference Number	NIAH 1883
Figure Number	Figure 13.3	Legal Status	-
Townland	Firmount East	Site Type	Garden and designed landscape
Easting / Northing		Distance from Proposed Development	0m
Description	Moatfield House Building indicated, not named Modern entrance in west corner. ;Ditch and established hedgerow bound the L2002. Two new entrances (including post and rail fencing). Field entrance in same location as historic OS mapping (modern gate, possibly older posts). Recessed stone entrance, rubble stone wall with simple square gate piers and metal gates, drive leads up to house (B14-18) - wide tree-lined avenue. Lodge no longer extant. Low established hedge continues along L2002. Established hedgerow and roadside ditch form boundary to L2002. Concrete block(?) north of entrance, with rubble stone piers and gate.		
Sources	https://www.buildingsofireland.ie/buildings-search/site/1883/moatfield-house-clane-co-kildare Online mapping (2019 & 2021) Ordnance Survey 6", 1837 – 1842 Ordnance Survey 25", 1888-1913 Walkover and site inspection, January 2023		

Identification Number	DL_17	Reference Number	NIAH 1889
Figure Number	Figure 13.3	Legal Status	-
Townland	Millicent Demesne	Site Type	Garden and designed landscape
Easting / Northing		Distance from Proposed Development	0m
Description	Millicent House Woodland and established hedgerow adjacent to carriageway leading to lych gate for church. Hedgerow continues with intermittent field accesses and mature trees, more recent accesses to properties, including section of rendered wall. Modern post and rail fence continues after housing, with a ditch and mature trees adjacent to road. Modern farm entrance on bend (roughcast single storey building depicted on historic OS (25") mapping. Hedgerow and ditch continue along road following farmyard, with sections of mature trees. Following Blundell's Bridge trees and hedge thin / have been removed. Ditch, hedgerows and trees continue beyond new house, however, are replaced by low privet and modern entrances and post and rail fencing further along Millicent Road. Large extant lodge, with rubble stone wall lined entrance and drive up to main house. Rubble stone wall continues along carriageway, some sections showing signs of repair. Replaced by post and rail fence for a section. Wall continues to entrance with second extant lodge, includes square ashlar gate piers and cast-iron gates, with drive leading to main house. Rubble stone wall continues from entrance, lining both sides of carriageway, to Millicent Bridge. Later farmstead on roadside, as well as established hedgerows, ditch and mature trees line the L2002. Church also within demesne, with established boundaries. Modern replacement fencing at various points, including later private gardens (hedges). Rubble stone walls and entrance to south, north of Millicent Bridge.		
Sources	Online mapping (2019 & 2021) Ordnance Survey 6", 1837 – 1842 Ordnance Survey 25", 1888-1913 Walkover and site inspection, January 2023		

Identification Number	DL_20	Reference Number	NIAH 1980
Figure Number	Figure 13.3	Legal Status	-
Townland	Killashee	Site Type	Garden and designed landscape
Easting / Northing		Distance from Proposed Development	0m
Description	Killashee House Buildings indicated, labelled School, area labelled Killashee. R448 cuts through western limit of demesne land until Killashee School. Boundary established hedgerows and ditch, with field accesses and post and rail sections (modern). A section of roughly coursed rubble stone wall to south of demesne, with later recessed entrance on junction with local access. Extant boundary features include established hedgerows and a ditch, and modern post and rail fencing. A section of roughly coursed rubble stone wall is extant to the south of the demesne, along with a later recessed entrance.		
Sources	https://www.buildingsofireland.ie/buildings-search/site/1980/killashee-house-killashee-co-kildare Walkover and site inspection, January 2023		

Table 4: Inventory of Cultural Heritage Constraints

Identification Number	CH_02	Reference Number	-
Figure Number	Figure 13.4	Legal Status	-
Townland	Warrenstown	Site Type	House
Easting / Northing	691765 / 745557	Distance from Proposed Development	47m to the north-west of the PAB
Description	'Jenkinstown House' depicted on historic mapping comprising the main house and a long range to north (other buildings appear to have been replaced). Two-storey, three bay house, with gable stacks, rendered. Later extension added to north gable (one and a half storey). Agricultural range and walled yard appear to remain extant. Principal elevation of house is south-east facing, towards the R156; however, this is screened by a belt of established trees and vegetation. Two-storey, three bay house positioned facing the R156, entrance to north-east of house (Cast iron gates with stone piers). Views across a lawn / garden towards the road, filtered by mature tree line.		
Sources	Ordnance Survey 6", 1837 – 1842 Online mapping various [07 November 2021] Walkover and site inspection, January 2023		

Identification Number	CH_03	Reference Number	-
Figure Number	Figure 13.4	Legal Status	-
Townland	Jenkinstown	Site Type	Public House
Easting / Northing	693262 / 745438	Distance from Proposed Development	0m
Description	A public house depicted on historic mapping comprising a one and a half storey, roughcast immediately adjacent to the R156. Remains of a possibly earlier single storey range to south-east, now with corrugated roof, depicted on 6" OS mapping (without P.H.). One and a half storey roughcast building with two stacks and dormer windows. Modern single, storey additions, including a porch and entrance. Rendered wall adjacent to the carriageway (R156). Overlooks the R156. On a cross-roads / junction (typically). Roadside location, positioned at an angle with the R156, with road widening in front of the buildings / entrance to a yard / car park. Views across the existing road towards modern petrol station forecourt.		
Sources	Ordnance Survey 25", 1888-1913 Online mapping various [07 November 2021] Walkover and site inspection, January 2023		

Identification Number	CH_04	Reference Number	-
Figure Number	Figure 13.4	Legal Status	-
Townland	Jenkinstown	Site Type	Road Bridge
Easting / Northing	691671 / 745333	Distance from Proposed Development	Within the PAB
Description	A low rubble stone bridge that carries the R156 across a small watercourse. Depicted on historic mapping as 'Jenkinstown Bridge'. Low rubble stone parapets with wingwalls to east and north. Modern concrete wall added to south-east end of southern parapet. Low parallel rubble stone parapets, areas of later maintenance / additional masonry work (i.e. horizontal copes on half of southern parapet). Follow the curve of the road. Carries the R156 across a small watercourse.		
Sources	Ordnance Survey 6", 1837 – 1842 Online mapping various [07 November 2021] Walkover and site inspection, January 2023		

Identification Number	CH_06	Reference Number	-
Figure Number	Figure 13.4	Legal Status	-
Townland	Martinstown	Site Type	Road Bridge
Easting / Northing	689725 / 743478	Distance from Proposed Development	0m
Description	A stone road bridge depicted on historic mapping comprising two low parapets with alternate horizontal and vertical copes on the R125. Roughly coursed masonry. Narrow footway along the inside of the south-western parapet. Some damage. Squared, roughly coursed stone road bridge carrying the R125 over a small watercourse. Horizontal & vertical squared copes. Overgrown with ivy & brambles both sides (watercourse not visible).		
Sources	Ordnance Survey 6", 1837 – 1842 Ordnance Survey 25", 1888-1913 Online mapping various [07 November 2021] Walkover and site inspection, January 2023		

Identification Number	CH_07	Reference Number	-
Figure Number	Figure 13.4	Legal Status	-
Townland	Phepotstown; Calgath	Site Type	Road Bridge
Easting / Northing	689372 / 743057	Distance from Proposed Development	0m
Description	A stone road bridge depicted on historic mapping comprising two low stone parapets with rough vertical copes on the R125. Roughly coursed masonry.		
Sources	Ordnance Survey 6", 1837 – 1842 Ordnance Survey 25", 1888-1913 Online mapping various [07 November 2021] Walkover and site inspection, January 2023		

Identification Number	CH_10	Reference Number	-
Figure Number	Figure 13.4	Legal Status	-
Townland	Dolanstown	Site Type	Farm
Easting / Northing	689017 / 740938	Distance from Proposed Development	38m to the south-east of the PAB
Description	A farm depicted on depicted on historic mapping. While some ranges remain extant, the complex has largely been replaced by more recent agricultural buildings. Extant buildings set back from road; however, boundary wall extends along road to the north for some distance (from a very low wall bounding a roadside ditch, to higher entrance walls at the gates to the farm). Two entrance gates (cast iron) with pairs of entrance piers & harled boundary walls.		
Sources	Ordnance Survey 6", 1837 – 1842 Ordnance Survey 25", 1888-1913 Online mapping various [07 November 2021] Walkover and site inspection, January 2023		

Identification Number	CH_12	Reference Number	-
Figure Number	Figure 13.4	Legal Status	-
Townland	Balfeaghan; Boycetown	Site Type	Road Bridge
Easting / Northing	688018 / 740642	Distance from Proposed Development	0m
Description	'Balfeaghan Bridge', depicted on historic mapping, carries the R158 across the River Rye and the Meath-Kildare county boundary. The bridge comprises a slightly humped stone structure with parallel parapets and vertical roughly hewn copes. Coursed rubble stone construction, some modern alterations. Roughly coursed, squared stone road bridge carrying the R158 over the Rye Water. Slightly humped, with three arches, rough hewn vertical copes along approach walls and parallel parapets. Main arch with cutwater / channel. Some damage. Possible ford to west of bridge.		
Sources	Ordnance Survey 6", 1837 – 1842 Online mapping various [07 November 2021] Walkover and site inspection, January 2023		

Identification Number	CH_15	Reference Number	-
Figure Number	Figure 13.4	Legal Status	-
Townland	Commons South	Site Type	House
Easting / Northing	687572 / 739143	Distance from Proposed Development	10 to the west of the PAB
Description	A small single storey vernacular building with a corrugated metal roof, with gable and central stacks. Depicted on historic mapping. Located within an overgrown roadside plot on the R407 and L5028. Not visible from R407. Established vegetation & mature trees along boundary.		
Sources	Ordnance Survey 6", 1837 – 1842 Online mapping various [07 November 2021] Walkover and site inspection, January 2023		

Identification Number	CH_16	Reference Number	-
Figure Number	Figure 13.4	Legal Status	-
Townland	Courtown Great	Site Type	Lodge
Easting / Northing	687151 / 738719	Distance from Proposed Development	9m to the south of the PAB
Description	A single storey rendered lodge with two stacks and slate gabled roof. Adjacent to a lane leading to Courtown House. The lodge is depicted on historic mapping. Positioned adjacent to the lane, perpendicular to the R407. Single storey, three-bay lodge with projecting porch. Positioned perpendicular to the R407 behind harled entrance walls, with gate piers & gates. Screening provided by established garden boundary, although visible from road from the north.		
Sources	Ordnance Survey 6", 1837 – 1842 Ordnance Survey 25", 1888-1913 Online mapping various [07 November 2021] Walkover and site inspection, January 2023		

Identification Number	CH_17	Reference Number	-
Figure Number	Figure 13.4	Legal Status	-
Townland	Portgloriam	Site Type	Agricultural building
Easting / Northing	686497 / 738292	Distance from Proposed Development	30m to east of the PAB
Description	An agricultural range depicted on historic mapping; later mapping identified the building as 'The Mount'. Positioned at an angle to the R407, away from the road, amongst a group of later agricultural buildings.		
Sources	Ordnance Survey 6", 1837 – 1842 Ordnance Survey 25", 1888-1913 Online mapping various [07 November 2021]		

Identification Number	CH_24	Reference Number	-
Figure Number	Figure 13.4	Legal Status	-
Townland	Baltracey	Site Type	Road Bridge
Easting / Northing	687121 / 733948	Distance from Proposed Development	0m
Description	A road bridge depicted on historic mapping. Crosses Baltracey River, carries R407. Squared rubble stone structure with parallel parapets with squared blocks as copes. Roughly coursed masonry construction. Overgrown. Clonshanbo River.		
Sources	Ordnance Survey 6", 1837 – 1842 Online mapping various [07 November 2021]		

Identification Number	CH_37	Reference Number	-
Figure Number	Figure 13.4	Legal Status	-
Townland	Betaghstown	Site Type	House
Easting / Northing	685351 / 729626	Distance from Proposed Development	5m to the north-west of the PAB
Description	A house on Betaghstown Cross Roads, depicted on historic mapping. Comprises a rendered two storey house, with single storey attached range and later additions. A low rendered boundary wall runs along the R408 and L1023. Four bay, two storey rendered farmhouse, with later extensions. Overlooking R408. Set behind a low stone boundary wall, with view across the road, towards the established boundaries of the properties adjacent. Traffic noise and movement.		
Sources	Ordnance Survey 6", 1837 – 1842 Ordnance Survey 25", 1888-1913 Online mapping various [07 November 2021] Walkover and site inspection, January 2023		

Identification Number	CH_39	Reference Number	-
Figure Number	Figure 13.4	Legal Status	-
Townland	Firmount West	Site Type	Farm
Easting / Northing	685606 / 727306	Distance from Proposed Development	0m
Description	Farm complex on Firmount Cross Roads depicted on historic mapping. Arranged in courtyard plan with later buildings and additions. The main house faces onto the R403, with the junction with the L2002 and a local road adjacent. Four bay, two storey rendered farmhouse overlooking busy junction. Associated farm building to the south form part of the complex. Open views across roads / junction.		
Sources	Ordnance Survey 6", 1837 – 1842 Ordnance Survey 25", 1888-1913 Online mapping various [07 November 2021] Walkover and site inspection, January 2023		

Identification Number	CH_41	Reference Number	-
Figure Number	Figure 13.4	Legal Status	-
Townland	Firmount West	Site Type	Field barn
Easting / Northing	685720 / 727075	Distance from Proposed Development	1m to the east of the PAB
Description	Single storey field barn rendered with corrugated gable roof. Perpendicular to the L2002. Field barn perpendicular to the road. Behind modern field gate / established hedgerows.		
Sources	Ordnance Survey 6", 1837 – 1842 Online mapping various [07 November 2021] Walkover and site inspection, January 2023		

Identification Number	CH_42	Reference Number	-
Figure Number	Figure 13.4	Legal Status	-
Townland	Firmount West	Site Type	Outbuilding
Easting / Northing	685788 / 726882	Distance from Proposed Development	11m to the east of the PAB
Description	Single storey outbuilding depicted on historic mapping. Stone and rendered. Partially missing roof.		
Sources	Ordnance Survey 6", 1837 – 1842 Ordnance Survey 25", 1888-1913 Online mapping various [07 November 2021]		

Identification Number	CH_43	Reference Number	-
Figure Number	Figure 13.4	Legal Status	-
Townland	Firmount Demesne	Site Type	House
Easting / Northing	685934 / 726668	Distance from Proposed Development	7m to the south-west of the PAB
Description	A single storey roughcast house, with porch and central stack, slate roof, depicted on historic mapping. Later extensions / additions. Low stone boundary wall, rough cast with horizontal slab cope, two sets of gate piers, bounds the L2002. Single storey house located adjacent to the road behind a low boundary walled plot.		
Sources	Ordnance Survey 6", 1837 – 1842 Ordnance Survey 25", 1888-1913 Online mapping various [07 November 2021] Walkover and site inspection, January 2023		

Identification Number	CH_46	Reference Number	-
Figure Number	Figure 13.4	Legal Status	-
Townland	Millicent South	Site Type	House
Easting / Northing	687359 / 725731	Distance from Proposed Development	19m to the south-west of the PAB
Description	A house depicted on historic mapping, as a 'Vicarage'. Likely associated with Millicent Church and Lych Gate (AH_12). Single storey ranges, parallel to the north of a brick with first floor rendered house. Roadside range has a central brick stack, and gabled roof, of slate. The church tower is glimpsed from plot; however, otherwise the house is largely screened by established trees and vegetation. The existing road already separates the house and church.		
Sources	Ordnance Survey 6", 1837 – 1842 Ordnance Survey 25", 1888-1913 Online mapping various [07 November 2021]		

Identification Number	CH_55	Reference Number	-
Figure Number	Figure 13.4	Legal Status	-
Townland	Killashee	Site Type	House
Easting / Northing	688073 / 716071	Distance from Proposed Development	3m to the east of the PAB
Description	A house depicted on historic mapping. Six bay, one and a half storey rendered building, with gabled roof and stacks (gables and centre). High stone wall adjacent to the R448. Views largely across local road to north towards another property. Glimpsed views to west of road towards hedgerow and fields beyond.		
Sources	Ordnance Survey 6", 1837 – 1842 Online mapping various [07 November 2021] Walkover and site inspection, January 2023		

Identification Number	CH_56	Reference Number	-
Figure Number	Figure 13.4	Legal Status	-
Townland	Oldtown	Site Type	Farm
Easting / Northing	687962 / 715565	Distance from Proposed Development	0m
Description	Courtyard layout farm depicted on historic mapping with later ranges to the west. Two storey farmhouse, with gabled roof, gable stacks, and two-storey central wing. Single storey ranges and a stone roadside wall along the R448. Courtyard farm with views internally focused; however, low roadside wall allows views out to east, across the R448 to fields beyond.		
Sources	Ordnance Survey 6", 1837 – 1842 Online mapping various [07 November 2021] Walkover and site inspection, January 2023		

Identification Number	CH_57	Reference Number	-
Figure Number	Figure 13.4	Legal Status	-
Townland	Mylerstown	Site Type	House
Easting / Northing	687884 / 714478	Distance from Proposed Development	4m to the east of the PAB
Description	A single storey cottage depicted on historic mapping with later additions. Three stacks (one later), slate roof, and gabled porch. Roadside location overlooking the R448. Single storey building with views directly across the R448 to the west. While set back from the road, vehicle movement forms part of this constraint (in use as a garage).		
Sources	Ordnance Survey 6", 1837 – 1842 Online mapping various [07 November 2021] Walkover and site inspection, January 2023		

Identification Number	CH_58	Reference Number	-
Figure Number	Figure 13.4	Legal Status	-
Townland	Stephenstown South	Site Type	House
Easting / Northing	687418 / 713423	Distance from Proposed Development	34m to the south-east of the PAB
Description	Single storey half-thatched cottage, with high pitched roof. Depicted on historic mapping, including attached range which appears to have been removed (attached wall and return still extent). Subject to later additions and modification (double pile (later addition to south-west) with slate roof). Roadside location, with views across junction between R412, and R448.		
Sources	Ordnance Survey 6", 1837 – 1842 Online mapping various [07 November 2021]		

Identification Number	CH_60	Reference Number	-
Figure Number	Figure 13.4	Legal Status	-
Townland	Woodland	Site Type	Ring-ditches
Easting / Northing	694774 / 747813	Distance from Proposed Development	0m
Description	A group of approximately 14 circular cropmarks measuring between approximately 4m and 20m in diameter. Interpreted as a group of ring-ditches - possibly the remains of a barrow cemetery or group of roundhouses of prehistoric date. Locally undulating / tussock-y pasture field, irregular in shape with established hedgerow boundaries (including mature trees, scrub & ditches). Existing substation(s) visible from field, low humming from substation also perceptible. No remains of the ring-ditches were visible above ground. Some variation in grass; however, not discernible with any confidence as cropmarks identified from aerial imagery.		
Sources	BlueSky Aerial (2022) Walkover and site inspection, January 2023		

Identification Number	CH_61	Reference Number	-
Figure Number	Figure 13.4	Legal Status	-
Townland	Woodland	Site Type	Ring-ditches
Easting / Northing	694544 / 747983	Distance from Proposed Development	18m to the north-west of the PAB
Description	A group of small circular cropmarks measuring between approximately 3m and 9m in diameter. Interpreted as a group of ring-ditches - possibly the remains of a barrow cemetery or group of roundhouses of prehistoric date.		
Sources	BlueSky Aerial (2022)		

Identification Number	CH_63	Reference Number	-
Figure Number	Figure 13.4	Legal Status	-
Townland	Woodland	Site Type	Ring-ditches
Easting / Northing	694697 / 747437	Distance from Proposed Development	0m
Description	A group of small circular cropmarks measuring up to approximately 7m in diameter. Interpreted as a group of ring-ditches - possibly the remains of a barrow cemetery or group of roundhouses of prehistoric date.		
Sources	BlueSky Aerial (2022)		

Identification Number	CH_64	Reference Number	-
Figure Number	Figure 13.4	Legal Status	-
Townland	Jenkinstown	Site Type	Farm (Site of)
Easting / Northing	691706 / 745317	Distance from Proposed Development	0m
Description	A roadside farm depicted on historic mapping comprising a long rectangular range, with an attached addition to the southern gable and a detached square ancillary building to the north. Located within a roadside enclosure south-east of 'Jenkinstown Bridge' (CH_04). Later mapping shows the main range with a small attached extension to the northern gable and two additional ancillary buildings in a small field to the north. No remains are visible on aerial imagery or LiDAR. No above ground remains noted. Small enclosed pasture field with high established hedgerows, two mature trees (fenced). Modern post-and-rail fence adjacent to house / drive.		

Sources	Ordnance Survey 6", 1837 – 1842 Ordnance Survey 25", 1888-1913 BlueSky Aerial (2022) Walkover and site inspection, January 2023

Identification Number	CH_65	Reference Number	-
Figure Number	Figure 13.4	Legal Status	-
Townland	Culcommon	Site Type	Enclosure
Easting / Northing	694419 / 746515	Distance from Proposed Development	0m
Description	A faint circular enclosure visible as a cropmark on aerial imagery. Measuring approximately 6m in diameter. ;Tentatively interpreted as a possible enclosure of unknown date.		
Sources	BlueSky Aerial (2022)		

Identification Number	CH_66	Reference Number	-
Figure Number	Figure 13.4	Legal Status	-
Townland	Cullendragh	Site Type	Ring-ditches
Easting / Northing	694195 / 745582	Distance from Proposed Development	0m
Description	A group of five ehemeral curvi-linear cropmarks visible on aerial imagery. Interpreted as a group of ring-ditches - possibly the remains of a barrow cemetery or group of roundhouses of prehistoric date. Relatively flat pasture field, with established field boundaries (hedgerows, mature trees / scrub, ditches). No remains of the cropmarks were visible above ground.		
Sources	BlueSky Aerial (2022) Walkover and site inspection, January 2023		

Identification Number	CH_67	Reference Number	-
Figure Number	Figure 13.4	Legal Status	-
Townland	Cullendragh	Site Type	Building misc.
Easting / Northing	694115 / 745455	Distance from Proposed Development	9m to the north of the PAB
Description	The site of a small roofless rectangular building depicted on historic Ordnance Survey mapping in an irregular field. Not depicted on later mapping. Not visible on aerial imagery; however, a parchmark in this approximate location is visible (GoogleEarth, 2013). However, this could be the result of modern agricultural activity in this location.		
Sources	Ordnance Survey 6", 1837 – 1842 Ordnance Survey 25", 1888-1913 GoogleEarth Jul' 2022		

Identification Number	CH_68	Reference Number	-
Figure Number	Figure 13.4	Legal Status	-
Townland	Cullendragh	Site Type	Field boundary
Easting / Northing	694111 / 745336	Distance from Proposed Development	0m
Description	A linear feature measuring approximately 74m in length, orientation east-west visible on aerial imagery. A field boundary is depicted on historic OS mapping (25") in this location. Viewed from field entrance (no remains visible above ground).		
Sources	Ordnance Survey 25", 1888-1913 BlueSky Aerial (2022)		

Identification Number	CH_69	Reference Number	-
Figure Number	Figure 13.4	Legal Status	-
Townland	Warrenstown	Site Type	Ring-ditches
Easting / Northing	692991 / 745430	Distance from Proposed Development	0m

Description	A group of ephemeral circular and curvi-linear features, measuring approximately 8m in diameter, identified as cropmarks on aerial imagery. Interpreted as a group of ring-ditches - possibly the remains of a barrow cemetery or group of roundhouses of prehistoric date.
Sources	BlueSky Aerial (2022)

Identification Number	CH_70	Reference Number	-
Figure Number	Figure 13.4	Legal Status	-
Townland	Jenkinstown	Site Type	Ring-ditches
Easting / Northing	692066 / 745614	Distance from Proposed Development	0m
Description	Two small ephemeral circular cropmarks identified from aerial imagery, measuring approximately 4-5m in diamter. Interpreted as a group of ring-ditches - possibly the remains of a barrow cemetery or group of roundhouses of prehistoric date.		
Sources	BlueSky Aerial (2022)		

Identification Number	CH_71	Reference Number	-
Figure Number	Figure 13.4	Legal Status	-
Townland	Jenkinstown	Site Type	Enclosure
Easting / Northing	691374 / 745771	Distance from Proposed Development	30m to the north-east of the PAB
Description	An ephemeral hexagonal feature identified as a cropmark on aerial imagery, measuring apporximately 40m in width. No corresponding features are depicted on historic mapping in this location. Tentatively interpreted as a possible enclosure of unknown date.		
Sources	Ordnance Survey 6", 1837 – 1842 Ordnance Survey 25", 1888-1913 BlueSky Aerial (2022)		

Identification Number	CH_72	Reference Number	-
Figure Number	Figure 13.4	Legal Status	-
Townland	Phepotstown	Site Type	Field system
Easting / Northing	689834 / 745361	Distance from Proposed Development	0m
Description	A network of ephemeral linear features visible on aerial imagery. No corresponding features on historic mapping. Tentatively interpreted as a possible field system of unknown date.		
Sources	Ordnance Survey 6", 1837 – 1842 Ordnance Survey 25", 1888-1913 BlueSky Aerial (2022)		

Identification Number	CH_73	Reference Number	-
Figure Number	Figure 13.4	Legal Status	-
Townland	Phepotstown	Site Type	Cropmark
Easting / Northing	689837 / 745183	Distance from Proposed Development	0m
Description	A faint circular cropmark measuring approximately 5m in diamter identified from aerial imagery. Tentatively interpreted as possible settlement activity.		
Setting			
Sources	BlueSky Aerial (2022)		
Type and Level of Impact	No impact		
Mitigation Measures	-		

Identification Number	CH_74	Reference Number	-
Figure Number	Figure 13.4	Legal Status	-
Townland	Phepotstown	Site Type	Ditch
Easting / Northing	689649 / 744705	Distance from Proposed Development	0m

Description	A large 'L'-shaped feature measuring approximately 73m east-west, and approximately 110m north-south identified from aerial imagery. Interpreted as a possible ditch of unknown date.
Sources	BlueSky Aerial (2022)

Identification Number	CH_75	Reference Number	-
Figure Number	Figure 13.4	Legal Status	-
Townland	Phepotstown	Site Type	Cropmarks
Easting / Northing	689392 / 743895	Distance from Proposed Development	0m
Description	A cluster of sub-circular cropmarks identified from aerial imagery. Tentatively interpreted as possible settlement activity of unknown date.		
Sources	BlueSky Aerial (2022).		

Identification Number	CH_76	Reference Number	-
Figure Number	Figure 13.4	Legal Status	-
Townland	Phepotstown	Site Type	Field system
Easting / Northing	689654 / 743743	Distance from Proposed Development	0m
Description	A network of linear features identified from aerial imagery.One corresponds with a field boundary depicted on historic OS mapping. Interpreted as a field system of unknown date.		
Sources	Ordnance Survey 6", 1837 – 1842 Ordnance Survey 25", 1888-1913 BlueSky Aerial (2022)		

Identification Number	CH_77	Reference Number	-
Figure Number	Figure 13.4	Legal Status	-
Townland	Phepotstown	Site Type	Ring-ditches
Easting / Northing	689531 / 743032	Distance from Proposed Development	0m
Description	A number of small circular features measuring up to approximately 6m in diameter, and curviliner features, identified from aerial imagery. Interpreted as a group of ring-ditches - possibly the remains of a barrow cemetery or group of roundhouses of prehistoric date.		
Sources	Ordnance Survey 6", 1837 – 1842 Ordnance Survey 25", 1888-1913 BlueSky Aerial (2022)		

Identification Number	CH_78	Reference Number	-
Figure Number	Figure 13.4	Legal Status	-
Townland	Calgath	Site Type	Ring-ditches
Easting / Northing	689344 / 742924	Distance from Proposed Development	0m
Description	A group of four faint circular features measuring approximately 8m in diameter identified from aerial imagery. Interpreted as a group of ring-ditches - possibly the remains of a barrow cemetery or group of roundhouses of prehistoric date.		
Sources	BlueSky Aerial (2022)		

Identification Number	CH_79	Reference Number	-
Figure Number	Figure 13.4	Legal Status	-
Townland	Calgath	Site Type	Cropmarks
Easting / Northing	688923 / 741263	Distance from Proposed Development	0m
Description	A cluster of small circular and sub-circular features identified from aerial imagery. Tentatively interpreted as possible settlement activity of unknown date.		
Sources	BlueSky Aerial (2022)		

Identification Number	CH_80	Reference Number	-
Figure Number	Figure 13.4	Legal Status	-
Townland	Calgath	Site Type	Drainage
Easting / Northing	688885 / 741004	Distance from Proposed Development	20m to the north of the PAB
Description	A linear feature orientated north-south, measuring approximately 80m in length identified from aerial imagery. A drainage feature is depicted in this location on historic OS mapping.		
Sources	Ordnance Survey 25", 1888-1913 BlueSky Aerial (2022)		

Identification Number	CH_81	Reference Number	-
Figure Number	Figure 13.4	Legal Status	-
Townland	Kilcock	Site Type	Enclosure
Easting / Northing	687328 / 739625	Distance from Proposed Development	0m
Description	A circular feature measuring appoximately 16m in diameter visible on aerial imagery. Interpreted as a possible enclosure of unknown date. A large wayleave is located to the west of the feature.		
Sources	BlueSky Aerial (2022)		

Identification Number	CH_82	Reference Number	-
Figure Number	Figure 13.4	Legal Status	-
Townland	Duncreevan	Site Type	Enclosure
Easting / Northing	686861 / 738475	Distance from Proposed Development	0m
Description	Two ephemeral circular features measuring approximately 10-14m in diameter identified from aerial imagery. Interpreted as possible enclosures of unknown date.		
Sources	BlueSky Aerial (2022)		

Identification Number	CH_83	Reference Number	-
Figure Number	Figure 13.4	Legal Status	-
Townland	Ballybrack	Site Type	Field boundary
Easting / Northing	686458 / 737058	Distance from Proposed Development	0m
Description	A series of linear features identified on aerial imagery. Correspond with field boundaries depicted in this location on historic OS mapping and a ditch on later mapping.		
Sources	BlueSky Aerial (2022) Ordnance Survey 6", 1837 – 1842 Ordnance Survey 25", 1888-1913		

Identification Number	CH_84	Reference Number	-
Figure Number	Figure 13.4	Legal Status	-
Townland	Painestown	Site Type	Enclosure
Easting / Northing	687180 / 733567	Distance from Proposed Development	0m
Description	An ephemeral circular feature measuring approximately 13m in diameter idendtified from aerial imagery. ;Tentatively interpreted as an enclosure of unknown date.		
Sources	BlueSky Aerial (2022)		

Identification Number	CH_85	Reference Number	-
Figure Number	Figure 13.4	Legal Status	-
Townland	Painestown	Site Type	Field boundary
Easting / Northing	687329 / 732995	Distance from Proposed Development	0m
Description	A linear feature measuring approximately 138m in length, orientated west-east, identified from aerial imagery. Corresponds with a field boundary depicted on historic OS mapping in this location.		
Sources	BlueSky Aerial (2022) Ordnance Survey 6", 1837 – 1842 Ordnance Survey 25", 1888-1913		

Identification Number	CH_86	Reference Number	-
Figure Number	Figure 13.4	Legal Status	-
Townland	Painestown	Site Type	Cropmarks
Easting / Northing	686857 / 731948	Distance from Proposed Development	0m
Description	A group of circular and semi-circular features identified on aerial imagery, measuring up to approximately 5m in diameter. Tentatively interpreted as possible settlement activity of unknown date.		
Sources	BlueSky Aerial (2022)		

Identification Number	CH_87	Reference Number	-
Figure Number	Figure 13.4	Legal Status	-
Townland	Boherhole	Site Type	Pits
Easting / Northing	686845 / 731346	Distance from Proposed Development	
Description	A large number of small circular cropmarks identified from aerial imagery. Tentatively interpreted as possible pits of unknown date; however, equally likely to be the result of modern agricultural activities or natural.		
Sources	BlueSky Aerial (2022)		

Identification Number	CH_88	Reference Number	-
Figure Number	Figure 13.4	Legal Status	-
Townland	Boherhole	Site Type	Field boundary
Easting / Northing	686375 / 730756	Distance from Proposed Development	0m
Description	A linear feature measuring approximately 290m, orientated approximately north-west to south-east identified on aerial imagery. Partially corresponds with a field boundary depicted on historic OS mapping located in this position. Bisected by the R408.		
Sources	BlueSky Aerial (2022) Ordnance Survey 6", 1837 – 1842		

	Ordnance Survey 25", 1888-1913

Identification Number	CH_89	Reference Number	-
Figure Number	Figure 13.4	Legal Status	-
Townland	Boherhole	Site Type	Ring-ditches
Easting / Northing	686305 / 730589	Distance from Proposed Development	0m
Description	A group of small circular features, including two bisected by an extant field boundary, identified from aerial imagery. Interpreted as a group of ring-ditches - possibly the remains of a barrow cemetery or group of roundhouses of prehistoric date.		
Sources	BlueSky Aerial (2022)		

Identification Number	CH_90	Reference Number	-
Figure Number	Figure 13.4	Legal Status	-
Townland	Ballynaboley	Site Type	Ditch
Easting / Northing	686023 / 730400	Distance from Proposed Development	0m
Description	A linear feature measuring approximately 89m, orientated west-east, identified from aerial imagery. Corresponds with a ditch depicted on historic OS mapping in this location.		
Sources	BlueSky Aerial (2022) Ordnance Survey 6", 1837 – 1842 Ordnance Survey 25", 1888-1913		

Identification Number	CH_91	Reference Number	-
Figure Number	Figure 13.4	Legal Status	-
Townland	Betaghstown	Site Type	Enclosure
Easting / Northing	685603 / 729962	Distance from Proposed Development	35m to the north-west of the PAB
Description	A circular feature measuring approximately 17m in diameter identified from aerial imagery. Interpreted as a possible enclosure of unknown date.		
Sources	BlueSky Aerial (2022)		

Identification Number	CH_92	Reference Number	-
Figure Number	Figure 13.4	Legal Status	-
Townland	Betaghstown	Site Type	Field boundary
Easting / Northing	685531 / 729929	Distance from Proposed Development	0m
Description	A linear feature measuring approximately 150m (extending outwith the study area) orientated north-west to south-east identified from aerial imagery. Corresponds with a field boundary in this location depicted on historic OS mapping (25”).		
Sources	BlueSky Aerial (2022) Ordnance Survey 6”, 1837 – 1842 Ordnance Survey 25”, 1888-1913		

Identification Number	CH_93	Reference Number	-
Figure Number	Figure 13.4	Legal Status	-
Townland	Ballynagappagh	Site Type	Field system
Easting / Northing	684788 / 729143	Distance from Proposed Development	0m
Description	A series of linears identified from aerial imagery. Largely correspond with field boundaries in this location depicted on historic OS mapping.		
Sources	BlueSky Aerial (2022) Ordnance Survey 6”, 1837 – 1842 Ordnance Survey 25”, 1888-1913		

Identification Number	CH_94	Reference Number	-
Figure Number	Figure 13.4	Legal Status	-
Townland	Curryhills	Site Type	Field system
Easting / Northing	684201 / 727414	Distance from Proposed Development	0m
Description	A series of linears identified from aerial imagery. Correspond with field boundaries, a road and buildings depicted on historic OS mapping in this location. Later mapping depicts this area as fields. No above ground remains visible.		
Sources	BlueSky Aerial (2022) Ordnance Survey 6", 1837 – 1842 Ordnance Survey 25", 1888-1913 Walkover and site inspection, January 2023		

Identification Number	CH_95	Reference Number	-
Figure Number	Figure 13.4	Legal Status	-
Townland	Firmount West	Site Type	Enclosure
Easting / Northing	685261 / 727379	Distance from Proposed Development	28m to the north of the PAB
Description	A faint curvi-linear feature approxiamtely 57m in length, possibly the ditch of a circular enclosure. Identified from aerial imagery.		
Sources	BlueSky Aerial (2022)		

Identification Number	CH_96	Reference Number	-
Figure Number	Figure 13.4	Legal Status	-
Townland	Firmount West	Site Type	Cropmark
Easting / Northing	685771 / 726791	Distance from Proposed Development	
Description	Two ephemeral circular features measuring approximately 5m in diameter identified from aerial imagery. Interpreted as possible settlement activity of unknown date.		
Sources	BlueSky Aerial (2022)		

Identification Number	CH_97	Reference Number	-
Figure Number	Figure 13.4	Legal Status	-
Townland	Firmount East	Site Type	Barrow
Easting / Northing	686820 / 726154	Distance from Proposed Development	19m to the north of the PAB
Description	A circular feature measuring approximately 13m in diameter identified from aerial imagery, exposed stone surface tentatively interpreted as a possible barrow; however, could equally be the result of modern agricultural actity, or natural in origin.		
Sources	BlueSky Aerial (2022)		

Identification Number	CH_98	Reference Number	-
Figure Number	Figure 13.4	Legal Status	-
Townland	Millicent South	Site Type	Field system
Easting / Northing	687446 / 725600	Distance from Proposed Development	0m
Description	A network of ephemeral linear features, and a circular feature measuring approximately 9m in diameter, indentified from aerial imagery. No corresponding features on historic OS mapping. Interpreted as a possible field system of unknown date.		
Sources	BlueSky Aerial (2022) Ordnance Survey 6", 1837 – 1842 Ordnance Survey 25", 1888-1913		

Identification Number	CH_100	Reference Number	-
Figure Number	Figure 13.4	Legal Status	-
Townland	Castlesize	Site Type	Field boundary
Easting / Northing	688129 / 724153	Distance from Proposed Development	0m
Description	A linear feature to the east of the River Liffey identified form aerial imagery. Corresponds with a line of trees depicted on historic OS mapping and a field boundary on later mapping. A row or trees and shrubs is visible on aerial imagery (Digital Globe). Aerial imagery also shows disturbance in this area, possible associated with the construction of the Sallins Bypass.		
Sources	BlueSky Aerial (2022) Ordnance Survey 6", 1837 – 1842 Ordnance Survey 25", 1888-1913 Digital Globe Aerial Imagery Bluesky Ortho (2018 – 2020)		

Identification Number	CH_101	Reference Number	-
Figure Number	Figure 13.4	Legal Status	-
Townland	Osberstown	Site Type	Field system
Easting / Northing	688475 / 721354	Distance from Proposed Development	0m
Description	A series of linear features visible on aerial imagery. Correspond with field boundaries depicted on historic mapping in this location.		
Sources	BlueSky Aerial (2022) Ordnance Survey 6", 1837 – 1842 Ordnance Survey 25", 1888-1913		

Identification Number	CH_102	Reference Number	-
Figure Number	Figure 13.4	Legal Status	-
Townland	Osberstown	Site Type	Field system
Easting / Northing	687977 / 720450	Distance from Proposed Development	0m
Description	A network of linear features identified from aerial imagery. Correspond with field boundaries depicted on historic OS mapping in this location.		
Sources	BlueSky Aerial (2022) Ordnance Survey 6", 1837 – 1842 Ordnance Survey 25", 1888-1913		

Identification Number	CH_103	Reference Number	-
Figure Number	Figure 13.4	Legal Status	-
Townland	Dunstown	Site Type	Field boundary
Easting / Northing	687378 / 712759	Distance from Proposed Development	9m to the north of the PAB
Description	A linear feature measuring approximately 176m, orientated north-south, identified from aerial imagery. Corresponds with a field boundary on later historic OS mapping (25"). Not visible from Dunstown access track		
Sources	BlueSky Aerial (2022) Ordnance Survey 25", 1888-1913 Walkover and site inspection, January 2023		

Identification Number	CH_104	Reference Number	-
Figure Number	Figure 13.4	Legal Status	-
Townland	Kemmins Mill	Site Type	Bridge
Easting / Northing	689875 / 743335	Distance from Proposed Development	0m
Description	The site of a bridge identified on historic mapping (25"). Located across a small unnamed watercourse in pasture fields, south of a local road.		
Sources	Ordnance Survey 25", 1888-1913 Walkover and site inspection, January 2023		

Identification Number	CH_105	Reference Number	-
Figure Number	Figure 13.4	Legal Status	-
Townland	Ballybrack	Site Type	Farm
Easting / Northing	686626 / 736680	Distance from Proposed Development	0m
Description	Farm depicted on historic mapping. Modern farm buildings, incorporating possible earlier fabric.		
Sources	Ordnance Survey 6", 1837 – 1842 Ordnance Survey 25", 1888-1913 Walkover and site inspection, January 2023		

Identification Number	CH_106	Reference Number	-
Figure Number	Figure 13.4	Legal Status	-
Townland	Jenkinstown	Site Type	Boundary stone
Easting / Northing	691682 / 745315	Distance from Proposed Development	0m
Description	Stone roadside boundary / milestone (?) square granite c.1m in height, with '1798' inscribed facing road. At junction between local road and the R156. Floral wreaths left at the marker stone visible on Online mapping. A guidepost is depicted on historic mapping in this location.		
Sources	Walkover and site inspection, January 2023 Online mapping, March 2022, June, 2021, June 2019 Cassini 6!		

Identification Number	CH_107	Reference Number	-
Figure Number	Figure 13.4	Legal Status	-
Townland	Boycetown	Site Type	Thatched dwelling
Easting / Northing	687398 / 740378	Distance from Proposed Development	0m
Description	Roadside location, overgrown, adjacent to the cemetery. Formerly thatched, covered in ivy, corrugated roof. Busy road / view of modern complex beyond. A house is depicted in this location on historic mapping. Former clay walled and thatched cottage on the far side of the cemetery (Green, 2021).		
Sources	Ordnance Survey 6", 1837 – 1842 Ordnance Survey 25", 1888-1913 Walkover and site inspection, January 2023 Green, J., 2021, Former Saint Patrick's, Church of Ireland, Boycetown, Kilcock, Co Kildare. Available online at: https://planningapplication.s3.eu-west-1.amazonaws.com/projects/1041/documents/Architectural%20Built%20Heritage%20Assessment.pdf [accessed 07 February 2023].		

Identification Number	CH_108	Reference Number	-
Figure Number	Figure 13.4	Legal Status	-
Townland	Boycetown	Site Type	Ford
Easting / Northing	687997 / 740654	Distance from Proposed Development	0m
Description	Shallow stony bed of River Rye, west of road bridge, with gently sloping banks down to meet watercourse. Could be a fording point; however, this river was dredged.		
Sources	Walkover and site inspection, January 2023		

Identification Number	CH_109	Reference Number	-
Figure Number	Figure 13.4	Legal Status	-
Townland	Balfeaghan	Site Type	Entrance
Easting / Northing	688359 / 740790	Distance from Proposed Development	0m
Description	Rubble stone entrance walls with pair of square stone gate piers and cast iron gates. Not depicted on historic mapping. Drive beyond no longer in use.		
Sources	Walkover and site inspection, January 2023 Ordnance Survey 6", 1837 – 1842 Ordnance Survey 25", 1888-1913		

Identification Number	CH_110	Reference Number	-
Figure Number	Figure 13.4	Legal Status	-
Townland	Boycetown	Site Type	Canal
Easting / Northing	687225 / 740816	Distance from Proposed Development	0m
Description	Section of the Royal Canal. Depicted on historic mapping and remains extant and operational. This section of canal is located between the Rye Water and the railway ('Midland Great Western Railway') at the border between Counties Meath and Kildare. While the canal corridor cuts through agricultural land to the west, it passes through Kilcock to the east, with modern residential development and crossing roads forming a feature of this constraints setting. In addition, large commercial warehousing is visible from the constraint to the south-west.		

Sources	Walkover and site inspection, January 2023 Ordnance Survey 6", 1837 – 1842 Ordnance Survey 25", 1888-1913

Identification Number	CH_111	Reference Number	-
Figure Number	Figure 13.4	Legal Status	-
Townland	Osberstown	Site Type	Canal
Easting / Northing	688019 / 722610	Distance from Proposed Development	0m
Description	Section of the Grand Canal. Depicted on historic mapping and remains extant and operational. The canal corridor meanders through agricultural land in this location, crossing the River Liffey via the Leinster Aqueduct to the west. Modern development in the form of Sallins Bypass, which crosses the canal via a road bridge, forms part of this constraints setting and traffic noise and movement are a feature.		
Sources	Ordnance Survey 6", 1837 – 1842 Ordnance Survey 25", 1888-1913		

Identification Number	CH_112	Reference Number	-
Figure Number	Figure 13.4	Legal Status	-
Townland	Osberstown	Site Type	Canal
Easting / Northing	688640 / 721641	Distance from Proposed Development	0m
Description	Section of the Grand Canal (Herbertstown Branch). Depicted on historic mapping and remains extant and operational. The canal forms a coherent group with the tow paths, and built heritage along this section of the canal corridor, including Leinster Mills. Modern development in the form of the M7 motorway and Sallins Bypass, forms a permanent part of the canal's setting including traffic noise.		
Sources	Walkover and site inspection, January 2023 Ordnance Survey 6", 1837 – 1842 Ordnance Survey 25", 1888-1913		

Identification Number	CH_113	Reference Number	-
Figure Number	Figure 13.4	Legal Status	-
Townland	Jigginstown	Site Type	Canal
Easting / Northing	688002 / 719101	Distance from Proposed Development	0m
Description	Section of the Grand Canal (Herbertstown Branch). Depicted on historic mapping and remains extant and operational. The canal forms a coherent group with the tow paths, tree-lined corridor and various road and footbridges. Some modern development is perceptible from the canal, including residential development and Naas Sports Centre. Traffic noise and movement is intermittent from the R409, where it crosses the canal.		
Sources	Walkover and site inspection, January 2023 Ordnance Survey 6", 1837 – 1842 Ordnance Survey 25", 1888-1913		

Identification Number	CH_114	Reference Number	-
Figure Number	Figure 13.4	Legal Status	-
Townland	Woodland	Site Type	Field boundaries
Easting / Northing	694632 / 748157	Distance from Proposed Development	0m
Description	Linear features in a field to the west of Woodland substation identified form aerial imagery. Corresponds with field boundaries depicted on historic OS mapping.		
Sources	Ordnance Survey 6", 1837 – 1842 Ordnance Survey 25", 1888-1913 Digital Globe Aerial Imagery GoogleEarth, various dates		

Identification Number	CH_115	Reference Number	-
Figure Number	Figure 13.4	Legal Status	-
Townland	Creemore	Site Type	Field boundaries
Easting / Northing	694994 / 748574	Distance from Proposed Development	0m
Description	Linear features in a field to the north of Woodland substation, as well as a circular feature measuring approximately 40m in diameter, identified form aerial imagery. Some correspond with field boundaries depicted on historic OS mapping; however, the field system and circular feature could be earlier in date. A ringfort (ME044-017; outwith the study area) is located approximately 100m to the west of the circular feature.		
Sources	Ordnance Survey 6", 1837 – 1842 Ordnance Survey 25", 1888-1913 Digital Globe Aerial Imagery GoogleEarth, various dates		

Identification Number	CH_116	Reference Number	-
Figure Number	Figure 13.4	Legal Status	-
Townland	Portan	Site Type	Large enclosure
Easting / Northing	695359 / 748278	Distance from Proposed Development	50m to the east of the PAB
Description	An ephemeral sub-circular cropmark measuring approximately 100m in diameter, identified from aerial imagery (GoogleEarth 3/2022). Towards the northern edge of a large, irregular arable field. Lots of modern field drainage noted (OSi aerial imagery 2005 – 2021). No corresponding features on historic mapping.		
Sources	Ordnance Survey 6", 1837 – 1842 Ordnance Survey 25", 1888-1913 OSi aerial imagery 2005 – 2021 GoogleEarth, various dates		

Identification Number	CH_117	Reference Number	-
Figure Number	Figure 13.4	Legal Status	-
Townland	Mullagh	Site Type	Field boundaries
Easting / Northing	690373 / 745421	Distance from Proposed Development	0m
Description	Two linear features identified from aerial imagery within a large, irregular field. Correspond with two former field boundaries depicted on historic OS mapping.		
Sources	Ordnance Survey 6", 1837 – 1842 Ordnance Survey 25", 1888-1913 Digital Globe Aerial Imagery BlueSky, 2022		

Identification Number	CH_118	Reference Number	-
Figure Number	Figure 13.4	Legal Status	-
Townland	Kemmins Mill	Site Type	Mill race
Easting / Northing	689645 / 743190	Distance from Proposed Development	0m
Description	An 'Old Mill Race' depicted on historic mapping running parallel to the R125, east of a watercourse. The area is now a plantation of mixed trees.		
Sources	Ordnance Survey 6", 1837 – 1842 Ordnance Survey 25", 1888-1913 BlueSky, 2022		

Identification Number	CH_119	Reference Number	-
Figure Number	Figure 13.4	Legal Status	-
Townland	Phepotstown	Site Type	Field boundary
Easting / Northing	689412 / 743048	Distance from Proposed Development	0m
Description	A linear feature measuring approximately 50m in length identified from aerial imagery within a large, irregular field. Correspond with a former field boundary depicted on historic OS mapping.		
Sources	Ordnance Survey 6", 1837 – 1842 Ordnance Survey 25", 1888-1913 BlueSky, 2022		

Identification Number	CH_120	Reference Number	-
Figure Number	Figure 13.4	Legal Status	-
Townland	Calgath	Site Type	Field system
Easting / Northing	689354 / 742115	Distance from Proposed Development	0m
Description	A network of linear features identified from aerial imagery, including possible roads / trackways and former field boundaries, within a large, irregular field, north of a field system of unknown date (AY_03; Recorded Monuments). No corresponding features on historic OS mapping.		
Sources	Ordnance Survey 6", 1837 – 1842 Ordnance Survey 25", 1888-1913 BlueSky, 2022		

Identification Number	CH_121	Reference Number	-
Figure Number	Figure 13.4	Legal Status	-

Townland	Curryhills	Site Type	Field system
Easting / Northing	684158 / 727799	Distance from Proposed Development	0m
Description	A network of linear cropmarks as well as possible circular features, in a large irregular field, identified from aerial imagery (GoogleEarth, 6/2018). Not depicted on historic OS mapping.		
Sources	Ordnance Survey 6", 1837 – 1842 Ordnance Survey 25", 1888-1913 GoogleEarth, 2018		

Identification Number	CH_122	Reference Number	-
Figure Number	Figure 13.4	Legal Status	-
Townland	Phepotstown	Site Type	Drainage
Easting / Northing	689905 / 745184	Distance from Proposed Development	0m
Description	A series of linear features in the corner of a large irregular field, identified from aerial imagery (GoogleEarth, 2012). Not depicted on historic OS mapping.		
Sources	Ordnance Survey 6", 1837 – 1842 Ordnance Survey 25", 1888-1913 GoogleEarth, 2012		

Table 5: Inventory of LiDAR Constraints

Identification Number	LI_001	Reference Number	-
Figure Number	Figure 13.5	Legal Status	-
Townland	Woodland	Site Type	Ditch
Easting / Northing	694685 / 747933	Distance from Proposed Development	0m
Description	• Shallow, negative linear feature, c.197m in length, orientated approximately north-south running between two extant field boundaries. • No corresponding features on historic Ordnance Survey mapping. • Vaguely perceptible on aerial imagery. • No modern utilities noted; however, south-west of Woodland 400kV Converter Substation and parallel to overhead service (identified from DSM). • Interpreted as a possible modern utility or drainage ditch. Ditch appears to be overlain by circular cropmarks visible on aerial imagery (BlueSky Aerial, 2022) which may indicate an earlier date. Locally undulating / tussock-y pasture field, irregular in shape with established hedgerow boundaries (including mature trees, scrub & ditches). Existing substation(s) visible from field, low humming from substation also perceptible. Very faint negative linear feature visible running roughly north-south parallel to the field boundary to the west of the field.		
Sources	Jacobs, 2022, LiDAR Analysis for Kildare-Meath Grid Upgrade. Unpublished report. BlueSky Aerial, 2022 Walkover and site inspection, January 2023		

Identification Number	LI_002	Reference Number	-
Figure Number	Figure 13.5	Legal Status	-
Townland	Woodland	Site Type	Boundary
Easting / Northing	694807 / 747856	Distance from Proposed Development	0m
Description	• Negative linear features forming a rectilinear area, c.80m x 48m, abutting a field boundary to the north-east. Area within boundary disturbed. • Corresponds with a farmstead including a 'U'-shaped cluster of buildings within a sub-rectangular plot, depicted on historic Ordnance Survey mapping (6" to 1 mile, 1837 – 1842, and 25" to 1 mile, 1888-1913). Visible on aerial imagery (BlueSky Aerial, 2022).		
Sources	Jacobs, 2022, LiDAR Analysis for Kildare-Meath Grid Upgrade. Unpublished report. BlueSky Aerial, 2022		

Identification Number	LI_003	Reference Number	-
Figure Number	Figure 13.5	Legal Status	-
Townland	Woodland	Site Type	Field Boundary
Easting / Northing	694585 /747832	Distance from Proposed Development	5m to the south of the PAB
Description	• Shallow negative linear feature, c.73m in length, orientated approximately north-south abutting townland boundary (to south) and an extant field boundary to the north. • Perceptible on aerial imagery. • Corresponds with a field boundary on historic mapping. • Interpreted as a post-medieval field boundary. Visible on aerial imagery (BlueSky Aerial, 2022).		
Sources	Jacobs, 2022, LiDAR Analysis for Kildare-Meath Grid Upgrade. Unpublished report. BlueSky Aerial, 2022		

Identification Number	LI_005	Reference Number	-
Figure Number	Figure 13.5	Legal Status	-

Townland	Woodland	Site Type	Field Boundary
Easting / Northing	694814 / 747782	Distance from Proposed Development	0m
Description	• An ephemeral negative linear feature, c.107m in length, orientated approximately north-south abutting extant field boundaries (to north and south). • Corresponds with a field boundary on historic mapping • Associated with (LI_002). • Interpreted as a post-medieval field boundary. Visible on aerial imagery (BlueSky Aerial, 2022). Locally undulating / tussock-y pasture field, irregular in shape with established hedgerow boundaries (including mature trees, scrub & ditches). Existing substation(s) visible from field, low humming from substation also perceptible. Negative linear feature visible running roughly north-south across the center of the field.		
Sources	Jacobs, 2022, LiDAR Analysis for Kildare-Meath Grid Upgrade. Unpublished report. BlueSky Aerial, 2022 Walkover and site inspection, January 2023		

Identification Number	LI_006	Reference Number	-
Figure Number	Figure 13.5	Legal Status	-
Townland	Gaulstown; Culcommon	Site Type	Field system
Easting / Northing	694445 / 747206	Distance from Proposed Development	0m
Description	• A network of negative linear features and cultivation patterns. • Some linear features correspond with field boundaries on historic mapping. • Some field boundaries remain extant as hedgerows and others are visible as cropmarks on aerial imagery. • Interpreted as a post-medieval field system. Visible as cropmarks on aerial imagery.		
Sources	Jacobs, 2022, LiDAR Analysis for Kildare-Meath Grid Upgrade. Unpublished report. BlueSky Aerial, 2022		

Identification Number	LI_007	Reference Number	-
Figure Number	Figure 13.5	Legal Status	-
Townland	Culcommon	Site Type	Field boundary
Easting / Northing	694531 / 746903	Distance from Proposed Development	9m to the east of the PAB
Description	• An ephemeral linear feature orientated approximately east-west, measuring c.140m in length. Runs between an extant field boundary and townland boundary. • Corresponds with a field boundary on historic mapping. • Interpreted as a post-medieval field boundary.		
Sources	Jacobs, 2022, LiDAR Analysis for Kildare-Meath Grid Upgrade. Unpublished report.		

Identification Number	LI_008	Reference Number	-
Figure Number	Figure 13.5	Legal Status	-
Townland	Gaulstown	Site Type	Ditch
Easting / Northing	694303 / 746626	Distance from Proposed Development	27m to the west of the PAB
Description	• A negative linear feature, orientated approximately north-south, c.216m in length. Runs between an extant field boundary and townland boundary, and bisects a second ditch/former field boundary running perpendicular. • No corresponding features on historic mapping. • Visible on aerial imagery. • Boundary to south is a minor watercourse. • Interpreted as a ditch of unknown date.		
Sources	Jacobs, 2022, LiDAR Analysis for Kildare-Meath Grid Upgrade. Unpublished report.		

Identification Number	LI_009	Reference Number	-
Figure Number	Figure 13.5	Legal Status	-
Townland	Gaulstown	Site Type	Ditch; Unknown
Easting / Northing	694270 / 746590	Distance from Proposed Development	0m
Description	• A negative linear feature, orientated west-east, measuring c. 250m in length (extends beyond 100m Study Area). • No corresponding features on historic Ordnance Survey mapping. Possibly modern drainage. • Visible on aerial imagery. • Located parallel to a minor watercourse. • Interpreted as a ditch of unknown date, possibly modern drainage.		
Sources	Jacobs, 2022, LiDAR Analysis for Kildare-Meath Grid Upgrade. Unpublished report.		

Identification Number	LI_010	Reference Number	-
Figure Number	Figure 13.5	Legal Status	-
Townland	Cullendragh	Site Type	Ditch
Easting / Northing	694293 / 746467	Distance from Proposed Development	32m to the west of the PAB
Description	• A negative linear feature, orientated approximately north-south, measuring c.60m in length. Extends from the townland boundary to the north. • No corresponding features on historic Ordnance Survey mapping. • Vaguely perceptible on aerial imagery. • Northern boundary is a minor watercourse. • Interpreted as a ditch.		
Sources	Jacobs, 2022, LiDAR Analysis for Kildare-Meath Grid Upgrade. Unpublished report.		

Identification Number	LI_011	Reference Number	-
Figure Number	Figure 13.5	Legal Status	-
Townland	Cullendragh	Site Type	Ditch
Easting / Northing	694304 / 746431	Distance from Proposed Development	0m
Description	• A negative 'L'-shaped linear feature, measuring c.53m x c.168m. • No corresponding features on historic Ordnance Survey mapping. • To the south of a minor watercourse. • Interpreted as a ditch of unknown date. Section orientated roughly east-west perceptible running across the field. Located within a large tussock-y pasture field, south of a watercourse.		
Sources	Jacobs, 2022, LiDAR Analysis for Kildare-Meath Grid Upgrade. Unpublished report. Walkover and site inspection, January 2023		

Identification Number	LI_013	Reference Number	-
Figure Number	Figure 13.5	Legal Status	-
Townland	Culcommon	Site Type	Field System
Easting / Northing	694570 /746304	Distance from Proposed Development	0m
Description	• A network of ephemeral negative linear features, located between two townland boundaries, including a pair of north-south orientated linears, a triangular area, and irregular southern boundary. Appear to be overlain by later uniform cultivation patterns. A number of circular features were also noted (likely the result of the wear pattern around modern animal feeding stations). • Some features correspond with historic Ordnance Survey mapping (25" to 1 mile, 1888-1913). • Northern boundary is a minor watercourse. • The location of a large circular enclosure (ME050-001), identified as a 'Fort' on historic Ordnance Survey mapping, is c.600m to the south-east. • Tentatively interpreted as field boundaries and field drains forming part of a field system of pre-19th century date. Later agricultural activity is also noted. Visible as sinuous linear cropmarks on aerial imagery.		
Sources	Jacobs, 2022, LiDAR Analysis for Kildare-Meath Grid Upgrade. Unpublished report. BlueSky Aerial, 2022		

Identification Number	LI_014	Reference Number	-
Figure Number	Figure 13.5	Legal Status	-
Townland	Culcommon	Site Type	Ditch
Easting / Northing	694423 / 746157	Distance from Proposed Development	0m
Description	• A sinuous negative linear feature, measuring c. 123m between townland boundary and a former field boundary. • No corresponding features on historic Ordnance Survey mapping. • Vaguely perceptible on aerial imagery. • No modern utilities noted. • Interpreted as a ditch of unknown date Visible as a sinuous linear cropmark on aerial imagery.		
Sources	Jacobs, 2022, LiDAR Analysis for Kildare-Meath Grid Upgrade. Unpublished report. BlueSky Aerial, 2022		

Identification Number	LI_015	Reference Number	-
Figure Number	Figure 13.5	Legal Status	-
Townland	Cullendragh	Site Type	Buildings
Easting / Northing	694329 / 746085	Distance from Proposed Development	
Description	• Three positive rectangular features: 1) c.8mx6m, 2) c.9mx4m, and 3) c.12mx6m between a negative linear feature and townland boundary. • North of a possible field system (LI_017). • No corresponding features on historic Ordnance Survey mapping and not visible on aerial imagery. • Interpreted as the site of a group of buildings (likely agricultural) of unknown date. Grass covered mounds close to townland boundary (TB_04). No discernible structural (no stone, or other building material noted; however, could be earthen structures, not particularly regular in shape). Located with a tussock-y pasture field, adjacent to the townland boundary.		
Sources	Jacobs, 2022, LiDAR Analysis for Kildare-Meath Grid Upgrade. Unpublished report. Walkover and site inspection, January 2023		

Identification Number	LI_016	Reference Number	-
Figure Number	Figure 13.5	Legal Status	-
Townland	Mullagh	Site Type	Buildings
Easting / Northing	690572 / 746036	Distance from Proposed Development	0m
Description	• Three positive rectangular features, adjacent to the R156: 1) c.20m in length, 2) c.10m x 5m, 3) perpendicular to 2, c.10m x 5m & a negative linear feature to the west. A regular grid of circular features was also noted. • Corresponds with a plot on historic Ordnance Survey mapping (6" to 1 mile, 1837 – 1842); however, buildings are in a different layout. • Visible on aerial imagery. • Interpreted as the site of a group of buildings (likely agricultural) of unknown date. Possibly with a later orchard. Evenly spaced circular features visible on aerial imagery.		
Sources	Jacobs, 2022, LiDAR Analysis for Kildare-Meath Grid Upgrade. Unpublished report. BlueSky Aerial, 2022		

Identification Number	LI_017	Reference Number	-
Figure Number	Figure 13.5	Legal Status	-
Townland	Cullendragh	Site Type	Field System
Easting / Northing	694186 / 746004	Distance from Proposed Development	0m
Description	• A network of negative linear features between two existing field boundaries and a townland boundary. Majority orientated approximately north-south (including one parallel to townland boundary); however, some run perpendicular forming small irregular enclosures. • Possible associated buildings to the north (LI_015). • No corresponding features on historic Ordnance Survey mapping, although the area outline is depicted on historic Ordnance Survey mapping (25" to 1 mile, 1888-1913). • Interpreted as a field system of unknown date. Visible as ditches and rough vegetation on aerial imagery. Tussock-y pasture field, with established field boundaries (hedgerows, mature trees / scrub, ditches). Negative linear features were noted across this field, likely the ditches forming part of the field system, highlighted by scrubby grass.		
Sources	Jacobs, 2022, LiDAR Analysis for Kildare-Meath Grid Upgrade. Unpublished report. BlueSky Aerial, 2022 Walkover and site inspection, January 2023		

Identification Number	LI_018	Reference Number	-
Figure Number	Figure 13.5	Legal Status	-
Townland	Mullagh	Site Type	Field Boundary
Easting / Northing	690488 / 745971	Distance from Proposed Development	4m to the north-west of the PAB
Description	• A number of negative and positive linear features in a pasture field, including a north-south linear measuring c.63m in length and a linear running perpendicular measuring c.58m in length. • Visible on aerial imagery. • One linear corresponds to a field boundary depicted on historic Ordnance Survey mapping. • Some areas of modern disturbance. • Interpreted as field boundaries of unknown date. Visible on aerial imagery.		
Sources	Jacobs, 2022, LiDAR Analysis for Kildare-Meath Grid Upgrade. Unpublished report. BlueSky Aerial, 2022		

Identification Number	LI_020	Reference Number	-
Figure Number	Figure 13.5	Legal Status	-
Townland	Mullagh	Site Type	Road
Easting / Northing	691046 / 745876	Distance from Proposed Development	0m
Description	• A curvilinear feature / area of disturbance within an area of trees immediately adjacent to the R125. • Corresponds with the bend in the road depicted on historic Ordnance Survey mapping (6" to 1 mile, 1837 – 1842, and 25" to 1 mile, 1888-1913). • Visible on aerial imagery as a grassy area with trees growing along the boundary. • Interpreted as the previous alignment of the road.		
Sources	Jacobs, 2022, LiDAR Analysis for Kildare-Meath Grid Upgrade. Unpublished report.		

Identification Number	LI_021	Reference Number	-
Figure Number	Figure 13.5	Legal Status	-
Townland	Culcommon	Site Type	Field System
Easting / Northing	694403 / 745767	Distance from Proposed Development	0m
Description	• A network of negative linear features, forming irregular fields within a larger area. • Linears to the south correspond with field boundaries depicted on historic Ordnance Survey mapping (6" to 1 mile, 1837 – 1842). Only triangular area of trees depicted on later Ordnance Survey mapping (25" to 1 mile, 1888-1913). • Some linears perceptible on aerial imagery as well as triangular area of trees. • Interpreted as part of a field system of unknown date. Visible on aerial imagery.		
Sources	Jacobs, 2022, LiDAR Analysis for Kildare-Meath Grid Upgrade. Unpublished report. BlueSky Aerial, 2022		

Identification Number	LI_022	Reference Number	-
Figure Number	Figure 13.5	Legal Status	-
Townland	Mullagh	Site Type	Mound
Easting / Northing	691295 / 745735	Distance from Proposed Development	12m to the south of the PAB
Description	• A positive circular feature c. 7m in diameter. • No corresponding features on historic Ordnance Survey mapping; however, a quarry was located nearby (c.40m to the north-west). • Vaguely perceptible on aerial imagery (Digital Globe) in arable field. • Tentatively interpreted as a post-medieval deposit of material associated with the nearby quarry.		
Sources	Jacobs, 2022, LiDAR Analysis for Kildare-Meath Grid Upgrade. Unpublished report.		

Identification Number	LI_024	Reference Number	-
Figure Number	Figure 13.5	Legal Status	-
Townland	Jenkinstown	Site Type	Gravel pit / Quarry
Easting / Northing	692130 / 745631	Distance from Proposed Development	12m to the north of the PAB
Description	• Linear negative feature with an irregular negative area towards the centre. • Corresponds with a field boundary and quarry on historic Ordnance Survey mapping (6" to 1 mile, 1837 – 1842) and possible drainage feature on later Ordnance Survey mapping (25" to 1 mile, 1888-1913). • Appears to be in use as drainage from aerial imagery and modern mapping. • Interpreted as the site of a post-medieval quarry, now in use as drainage.		
Sources	Jacobs, 2022, LiDAR Analysis for Kildare-Meath Grid Upgrade. Unpublished report.		

Identification Number	LI_025	Reference Number	-
Figure Number	Figure 13.5	Legal Status	-
Townland	Warrenstown	Site Type	Ditch
Easting / Northing	692630 / 745616	Distance from Proposed Development	4m to the north of the PAB
Description	• A negative linear feature orientated approximately northeast-southwest, c. 205m in length before turning north (beyond 100m Study Area). • Corresponds with a field boundary on historic Ordnance Survey mapping (6" to 1 mile, 1837 – 1842), and a ditch on later Ordnance Survey mapping (25" to 1 mile, 1888-1913) adjacent to the site of a pump and small roadside building (LI_030) to a sheep fold. • Visible on aerial imagery. • Interpreted as a post-medieval drainage ditch. • Visible on aerial imagery.		
Sources	Jacobs, 2022, LiDAR Analysis for Kildare-Meath Grid Upgrade. Unpublished report. BlueSky Aerial, 2022		

Identification Number	LI_026	Reference Number	-
Figure Number	Figure 13.5	Legal Status	-
Townland	Cullendraugh	Site Type	Field system
Easting / Northing	694096 / 745609	Distance from Proposed Development	0m
Description	• A network of negative linear features and cultivation patterns. Some parallel and evenly spaced straight features. • Some linear features correspond with field boundaries on historic Ordnance Survey mapping. • Vaguely perceptible on aerial imagery. • Minor watercourse runs through the centre. • Interpreted as a field system of unknown date, including field drainage. Relatively flat pasture field, with established field boundaries (hedgerows, mature trees / scrub, ditches). Negative linear features were noted, likely the ditches forming part of the field system.		
Sources	Jacobs, 2022, LiDAR Analysis for Kildare-Meath Grid Upgrade. Unpublished report. Walkover and site inspection, January 2023		

Identification Number	LI_027	Reference Number	-
Figure Number	Figure 13.5	Legal Status	-
Townland	Warrenstown	Site Type	Mound
Easting / Northing	692327 / 745583	Distance from Proposed Development	0m
Description	• A positive sub-rectangular feature orientated approximately east-west, measuring c.21mx9m. • Visible on aerial imagery. • No corresponding feature on historic Ordnance Survey mapping. • Interpreted as a mound of unknown date and function. Visible on aerial imagery as rough ground.		
Sources	Jacobs, 2022, LiDAR Analysis for Kildare-Meath Grid Upgrade. Unpublished report. BlueSky Aerial, 2022		

Identification Number	LI_028	Reference Number	-
Figure Number	Figure 13.5	Legal Status	-
Townland	Warrenstown	Site Type	Field Boundary
Easting / Northing	692892 / 745573	Distance from Proposed Development	0m
Description	• A negative linear feature measuring c. 111m, orientated north-south. • Corresponds with a field boundary on historic Ordnance Survey mapping (6" to 1 mile, 1837 – 1842). • Interpreted as a post-medieval field boundary.		
Sources	Jacobs, 2022, LiDAR Analysis for Kildare-Meath Grid Upgrade. Unpublished report.		

Identification Number	LI_029	Reference Number	-
Figure Number	Figure 13.5	Legal Status	-
Townland	Warrenstown	Site Type	Field System
Easting / Northing	693089 / 745566	Distance from Proposed Development	0m
Description	• A small number of ephemeral negative linear features. • No corresponding features on historic Ordnance Survey mapping. • Consolidated into two larger, regular fields with hedgerow / tree boundaries (DSM). • Tentatively interpreted as a possible field system of unknown date. Visible on aerial imagery as cropmarks.		
Sources	Jacobs, 2022, LiDAR Analysis for Kildare-Meath Grid Upgrade. Unpublished report. BlueSky Aerial, 2022		

Identification Number	LI_030	Reference Number	-
Figure Number	Figure 13.5	Legal Status	-
Townland	Warrenstown	Site Type	Building
Easting / Northing	692514 / 745563	Distance from Proposed Development	0m
Description	• A rectangular feature measuring c. 9mx8m. • Corresponds with a building depicted on historic Ordnance Survey mapping, adjacent to a drainage ditch (LI_025). • Within an area of trees (DSM). • Interpreted as the site of a post-medieval roadside building.		
Sources	Jacobs, 2022, LiDAR Analysis for Kildare-Meath Grid Upgrade. Unpublished report.		

Identification Number	LI_031	Reference Number	-
Figure Number	Figure 13.5	Legal Status	-
Townland	Barstown	Site Type	Field System
Easting / Northing	693378 / 745539	Distance from Proposed Development	0m
Description	• A number of linear features, ephemeral linear features and cultivation patterns. • Correspond with field boundaries on historic Ordnance Survey mapping (6" to 1 mile, 1837 – 1842). • Modern drainage channels noted on aerial imagery. • Interpreted as a post-medieval field system. Visible on aerial imagery as defined linear cropmarks.		
Sources	Jacobs, 2022, LiDAR Analysis for Kildare-Meath Grid Upgrade. Unpublished report. BlueSky Aerial, 2022		

Identification Number	LI_032	Reference Number	-
Figure Number	Figure 13.5	Legal Status	-
Townland	Mullagh	Site Type	Building
Easting / Northing	690213 / 745537	Distance from Proposed Development	0m
Description	• An irregular area of disturbance. • Corresponds with the location of a roadside building depicted on historic Ordnance Survey mapping (6" to 1 mile, 1837 – 1842), removed by later edition (25" to 1 mile, 1888-1913). • Not visible on aerial imagery. • Interpreted as a post-medieval roadside building.		
Sources	Jacobs, 2022, LiDAR Analysis for Kildare-Meath Grid Upgrade. Unpublished report .		

Identification Number	LI_033	Reference Number	-
Figure Number	Figure 13.5	Legal Status	-
Townland	Warrenstown	Site Type	Ring Ditch
Easting / Northing	692480 / 745479	Distance from Proposed Development	47m to the south of the PAB
Description	• Four circular features approximately 10m in diameter. • No corresponding feature on historic Ordnance Survey mapping. • Not visible on aerial imagery. • Interpreted as a group of possible prehistoric ring ditches, likely a group of ploughed out prehistoric ring barrows.		
Sources	Jacobs, 2022, LiDAR Analysis for Kildare-Meath Grid Upgrade. Unpublished report.		

Identification Number	LI_035	Reference Number	-
Figure Number	Figure 13.5	Legal Status	-
Townland	Warrenstown	Site Type	Ditch
Easting / Northing	692463 / 745463	Distance from Proposed Development	50m to the south of the PAB
Description	• An ephemeral 'L'-shaped negative linear feature, c.75m and >107m (extends beyond extent of 100m Study Area) in length. • No corresponding features on historic Ordnance Survey mapping. • Located between two possible ring ditches (LI_033). • Interpreted as a ditch of unknown date.		
Sources	Jacobs, 2022, LiDAR Analysis for Kildare-Meath Grid Upgrade. Unpublished report		

Identification Number	LI_036	Reference Number	-
Figure Number	Figure 13.5	Legal Status	-
Townland	Warrenstown	Site Type	Field Boundary
Easting / Northing	693094 / 745389	Distance from Proposed Development	4m to the south of the PAB
Description	• Two negative linear features, orientated approximately northeast-southwest & another perpendicular, c. 200m in length. • Correspond with field boundaries depicted on historic Ordnance Survey mapping (6" to 1 mile, 1837 – 1842, and 25" to 1 mile, 1888-1913). • Interpreted as post-medieval field boundaries. Visible on aerial imagery as a linear cropmark.		
Sources	Jacobs, 2022, LiDAR Analysis for Kildare-Meath Grid Upgrade. Unpublished report. BlueSky Aerial, 2022		

Identification Number	LI_037	Reference Number	-
Figure Number	Figure 13.5	Legal Status	-
Townland	Jenkinstown	Site Type	Drainage
Easting / Northing	691859 / 745378	Distance from Proposed Development	37m to the south-east of the PAB
Description	• Ephemeral evenly spaced group of parallel linears. • No corresponding features on historic Ordnance Survey mapping. • Interpreted as a possible cultivation patterns or field drainage of unknown date.		
Sources	Jacobs, 2022, LiDAR Analysis for Kildare-Meath Grid Upgrade. Unpublished report		

Identification Number	LI_038	Reference Number	-
Figure Number	Figure 13.5	Legal Status	-
Townland	Barstown	Site Type	Field System
Easting / Northing	693766 / 745351	Distance from Proposed Development	0m
Description	• Two intersecting linears orientated north-west to south-east (measuring c.220m in length) and north-south (measuring c.160m in length). Some addition ephemeral linears also noted. Between townland boundary and road. • Correspond with field boundaries on historic Ordnance Survey mapping (6" to 1 mile, 1837 – 1842). • Interpreted as a field system of post-medieval date. Visible on aerial imagery. No remains visible above ground.		
Sources	Jacobs, 2022, LiDAR Analysis for Kildare-Meath Grid Upgrade. Unpublished report. BlueSky Aerial, 2022 Walkover and site inspection, January 2023		

Identification Number	LI_040	Reference Number	-
Figure Number	Figure 13.5	Legal Status	-
Townland	Jenkinstown	Site Type	Field System
Easting / Northing	691536 / 745284	Distance from Proposed Development	0m
Description	• A network of negative linear features, including an irregular north-south feature measuring c. 130m in length. • Some correspond with field boundaries on historic Ordnance Survey mapping (6" to 1 mile, 1837 – 1842). • Historic field boundaries remain largely extant • Minor watercourse to south-western extent. • Interpreted as a post-medieval field system, with possible earlier trackway and cultivation patterns / field drainage. Visible on aerial imagery. No remains visible above ground.		
Sources	Jacobs, 2022, LiDAR Analysis for Kildare-Meath Grid Upgrade. Unpublished report. BlueSky Aerial, 2022 Walkover and site inspection, January 2023		

Identification Number	LI_041	Reference Number	-
Figure Number	Figure 13.5	Legal Status	-
Townland	Barstown	Site Type	Field System
Easting / Northing	693371 / 745278	Distance from Proposed Development	0m
Description	• A number of ephemeral linear features. • Some correspond with field boundaries on historic Ordnance Survey mapping. • Interpreted as a field system of unknown date. Faintly visible on aerial imagery.		
Sources	Jacobs, 2022, LiDAR Analysis for Kildare-Meath Grid Upgrade. Unpublished report. BlueSky Aerial, 2022		

Identification Number	LI_042	Reference Number	-
Figure Number	Figure 13.5	Legal Status	-
Townland	Barstown	Site Type	Building; Post-medieval
Easting / Northing	693832 / 745230	Distance from Proposed Development	0m
Description	• A positive rectangular feature measuring c. 15m x 6m, adjacent to the R156. With negative linear features to the north and west, forming an enclosure. • Corresponds with a building depicted on historic Ordnance Survey mapping, perpendicular to the road, with associated boundary features. • Building footings visible on aerial imagery. • Interpreted as the site of a post-medieval roadside building. Footprint of rectangular building perpedicular to the road, and boundary features, visible on aerial imagery. Remains of a structure orientated perpendicular to the road, adjacent to the field boundary. Footings are <1m in height and comprise grass-covered squared-coursed masonry, some tumble noted, as well as corrugated iron. In-filled. Located within a large irregular pasture field along with the remains of a post-medieval field system (LI_038).		
Sources	Jacobs, 2022, LiDAR Analysis for Kildare-Meath Grid Upgrade. Unpublished report. BlueSky Aerial, 2022 Walkover and site inspection, January 2023		

Identification Number	LI_043	Reference Number	-
Figure Number	Figure 13.5	Legal Status	-
Townland	Kilclone	Site Type	Field System
Easting / Northing	693636 / 745131	Distance from Proposed Development	26m to the south of the PAB
Description	• A number of intersecting linear features. • Correspond with field boundaries on historic Ordnance Survey mapping (6" to 1 mile, 1837 – 1842). • Interpreted as a post-medieval field system.		
Sources	Jacobs, 2022, LiDAR Analysis for Kildare-Meath Grid Upgrade. Unpublished report.		

Identification Number	LI_044	Reference Number	-
Figure Number	Figure 13.5	Legal Status	-
Townland	Phepotstown	Site Type	Ditch
Easting / Northing	689847 / 745035	Distance from Proposed Development	13m to the west of the PAB
Description	• A negative linear feature measuring c. 75m in length, orientated north-south. • Visible on aerial photographs. Parallel to R125. • No corresponding features on historic Ordnance Survey mapping. • No corresponding modern utilities. • Interpreted as a possible ditch on unknown date. Visible on aerial imagery.		
Sources	Jacobs, 2022, LiDAR Analysis for Kildare-Meath Grid Upgrade. Unpublished report. BlueSky Aerial, 2022		

Identification Number	LI_045	Reference Number	-
Figure Number	Figure 13.5	Legal Status	-
Townland	Phepotstown	Site Type	Road
Easting / Northing	689582 / 744738	Distance from Proposed Development	0m
Description	• An irregular negative feature adjacent to the R125 measuring c.16m x c.9m. • Corresponds with a roadside recess depicted on historic Ordnance Survey mapping (25" to 1 mile, 1888-1913) adjacent to a road bridge. • Visible on aerial imagery as a tree covered area. • Interpreted as a possible post-medieval roadside refuge point or recess adjacent to the road.		
Sources	Jacobs, 2022, LiDAR Analysis for Kildare-Meath Grid Upgrade. Unpublished report		

Identification Number	LI_046	Reference Number	DL_03
Figure Number	Figure 13.5	Legal Status	-
Townland	Phepotstown	Site Type	Ditch
Easting / Northing	689358 / 744456	Distance from Proposed Development	17m to the east of the PAB
Description	• Sinuous negative feature, measuring c.182m in length, orientated approximately north-south. • Within DL_03, adjacent to a path depicted on historic Ordnance Survey mapping. ;No corresponding features depicted on mapping. • Visible on aerial imagery (2005 Ortho). • No modern utilities noted. • Interpreted as a possible ditch of unknown date. Visible on aerial imagery.		
Sources	Jacobs, 2022, LiDAR Analysis for Kildare-Meath Grid Upgrade. Unpublished report. BlueSky Aerial, 2022		

Identification Number	LI_047	Reference Number	DL_04
Figure Number	Figure 13.5	Legal Status	-
Townland	Phepotstown	Site Type	Ditch
Easting / Northing	689282 / 744230	Distance from Proposed Development	40m to the west of the PAB
Description	• Ephemeral sinuous negative linear features, cutting cultivation patterns. Orientated north-south measuring c.103m and east-west measuring c.50m. • Located within DL_04. No corresponding features on historic Ordnance Survey mapping. • No corresponding features on aerial imagery. • Interpreted as possible drainage ditches of unknown date.		
Sources	Jacobs, 2022, LiDAR Analysis for Kildare-Meath Grid Upgrade. Unpublished report.		

Identification Number	LI_048	Reference Number	DL_04
Figure Number	Figure 13.5	Legal Status	-
Townland	Phepotstown	Site Type	Designed Landscape Feature
Easting / Northing	689248 / 744113	Distance from Proposed Development	34m to the west of the PAB
Description	• A linear feature c. 169m comprising positive and negative features. • Within DL_04. Corresponds with demesne features depicted on historic Ordnance Survey mapping. • Interpreted as a haha associated with DL_04. Forms part of the 19th century ornamental farm and designed landscape at Larch Hill.		
Sources	Jacobs, 2022, LiDAR Analysis for Kildare-Meath Grid Upgrade. Unpublished report. 'Larchill: a rediscovered Irish garden and its Australian cousin', T. Gatehouse, Australian Garden History, Vol. 29, No. 1 (2017), pp. 15-20.		

Identification Number	LI_050	Reference Number	DL_04
Figure Number	Figure 13.5	Legal Status	-
Townland	Phespotstown	Site Type	Ditch
Easting / Northing	689374 / 743914	Distance from Proposed Development	0m
Description	• Three ephemeral linear features running roughly north-east to south-west, between the R125 and 'Larch Hill Lake', measuring between c.145m and c.190m in length. • Visible on aerial imagery. • Located within DL_04; however, no corresponding features on historic Ordnance Survey mapping. • One coincides with an existing field entrance and trackway. Other cultivation patterns noted (DTM). • Interpreted as ditches of unknown date.		
Sources	Jacobs, 2022, LiDAR Analysis for Kildare-Meath Grid Upgrade. Unpublished report.		

Identification Number	LI_052	Reference Number	DL_04
Figure Number	Figure 13.5	Legal Status	-
Townland	Phepotstown	Site Type	Field System
Easting / Northing	689536 / 743522	Distance from Proposed Development	0m
Description	• A network of negative linear features. • Located within DL_04. Some corresponding field boundaries depicted on historic Ordnance Survey mapping. • Visible on aerial imagery (inc. Ortho 2000 & 2005). • Interpreted as a possible field system of unknown date. Visible on aerial imagery.		
Sources	Jacobs, 2022, LiDAR Analysis for Kildare-Meath Grid Upgrade. Unpublished report. BlueSky Aerial, 2022		

Identification Number	LI_054	Reference Number	-
Figure Number	Figure 13.5	Legal Status	-
Townland	Martinstown	Site Type	Drainage
Easting / Northing	689790 / 743440	Distance from Proposed Development	0m
Description	• Ephemeral negative linear features, straight and parallel, in a herringbone-type pattern. • While there are no corresponding features depicted on historic Ordnance Survey mapping, these features are located within fields depicted on historic Ordnance Survey mapping (6" to 1 mile, 1837 – 1842, and 25" to 1 mile, 1888-1913). • Vaguely perceptible on aerial imagery. • Minor watercourse noted to north and west of the area. • Interpreted as post-medieval or modern field drainage.		
Sources	Jacobs, 2022, LiDAR Analysis for Kildare-Meath Grid Upgrade. Unpublished report.		

Identification Number	LI_055	Reference Number	-
Figure Number	Figure 13.5	Legal Status	-
Townland	Martinstown	Site Type	Building
Easting / Northing	689769 / 743327	Distance from Proposed Development	0m
Description	• Negative linear feature orientated approximately east-west, measuring approximately 54m, with two perpendicular linears, measuring approximately 22m and 12m, respectively, forming the boundary to a rectangular enclosure on a bend in the R125. In addition, an ephemeral rectangular feature is perceptible in the western corner of the enclosure, measuring c. 18m x 8m. • These features correspond with a plot depicted on historic Ordnance Survey mapping (6" to 1 mile, 1837 – 1842), with only the rectangular feature depicted on later Ordnance Survey mapping (25" to 1 mile, 1888-1913). • Interpreted as the site of a post-medieval building and enclosure.		
Sources	Jacobs, 2022, LiDAR Analysis for Kildare-Meath Grid Upgrade. Unpublished report.		

Identification Number	LI_056	Reference Number	-
Figure Number	Figure 13.5	Legal Status	-
Townland	Kemmins Hill	Site Type	Drainage
Easting / Northing	689838 / 743298	Distance from Proposed Development	0m
Description	• Ephemeral negative linear features. • While there are no corresponding features depicted on historic Ordnance Survey mapping, these features are located within fields depicted on historic Ordnance Survey mapping (6" to 1 mile, 1837 – 1842, and 25" to 1 mile, 1888-1913). • Not visible on aerial imagery. • Minor watercourse noted to east of the area. • Interpreted as drainage of post-medieval or modern date.		
Sources	Jacobs, 2022, LiDAR Analysis for Kildare-Meath Grid Upgrade. Unpublished report		

Identification Number	LI_057	Reference Number	DL_04
Figure Number	Figure 13.5	Legal Status	-
Townland	Phepotstown	Site Type	Ditch
Easting / Northing	689382 / 743191	Distance from Proposed Development	0m
Description	• Ephemeral linear feature, orientated north-south, measuring c. >98m in length (extends beyond the 100m Study Area). • Located within DL_04. No corresponding features on historic Ordnance Survey mapping. • Visible on aerial imagery. • Interpreted as a ditch of unknown date.		
Sources	Jacobs, 2022, LiDAR Analysis for Kildare-Meath Grid Upgrade. Unpublished report		

Identification Number	LI_058	Reference Number	-
Figure Number	Figure 13.5	Legal Status	-
Townland	Phepotstown	Site Type	Enclosure
Easting / Northing	689526 / 743166	Distance from Proposed Development	0m
Description	• Two negative linear features measuring c.100m and c.108m in length respectively forming two sides and a corner (obscured) of a square ditched enclosure, within DL_04. ;Cultivation marks / woodland overlies these features. ;Possible continuation on the opposite side of the road. • No corresponding features on historic Ordnance Survey mapping, although boundary / tree line still perceptible cutting the feature. Minor watercourse to east. • Visible on aerial imagery. • Tentatively interpreted as a possible square enclosure, although positioning near a watercourse may indicate this is a drainage feature. Corner of a possible square enclosure visible, with ephemeral lineare features to the north, on aerial imagery.		
Sources	Jacobs, 2022, LiDAR Analysis for Kildare-Meath Grid Upgrade. Unpublished report. BlueSky Aerial, 2022		

Identification Number	LI_059	Reference Number	-
Figure Number	Figure 13.5	Legal Status	-
Townland	Calgath	Site Type	Ditch
Easting / Northing	689131 / 742772	Distance from Proposed Development	0m
Description	• Two large parallel negative curvilinear features, that curve to their eastern extents. Measuring >c.230m in length (extend beyond the 100m Study Area). Bisected by a ditch. • Visible on aerial imagery. • No modern utilities noted. • Minor watercourse in ditch bisects these features, running from Brides Well (to the south). • Interpreted as ditches of unknown date and function.		
Sources	Jacobs, 2022, LiDAR Analysis for Kildare-Meath Grid Upgrade. Unpublished report.		

Identification Number	LI_061	Reference Number	-
Figure Number	Figure 13.5	Legal Status	-
Townland	Calgath	Site Type	Building
Easting / Northing	689287 / 742336	Distance from Proposed Development	0m
Description	• A rectangular feature measuring c. 9m x c.3m. • Corresponds with a roadside building depicted on historic Ordnance Survey mapping (6" to 1 mile, 1837 – 1842). • Not visible on aerial imagery. • Interpreted as the site of a post-medieval building. Visible as an area of rough ground on aerial imagery.		
Sources	Jacobs, 2022, LiDAR Analysis for Kildare-Meath Grid Upgrade. Unpublished report. BlueSky Aerial, 2022		

Identification Number	LI_062	Reference Number	-
Figure Number	Figure 13.5	Legal Status	-
Townland	Calgath	Site Type	Boundary
Easting / Northing	689103 / 742268	Distance from Proposed Development	18m to the north-west of the PAB
Description	• Diffuse negative linear features forming an irregular enclosure, bounded by a local road to the east and watercourse/ditch to the south. Linear features also noted within enclosure. • Corresponds with a building plot on historic Ordnance Survey mapping (6" to 1 mile, 1837 – 1842). • Interpreted as the boundary of a post-medieval farmstead.		
Sources	Jacobs, 2022, LiDAR Analysis for Kildare-Meath Grid Upgrade. Unpublished report		

Identification Number	LI_064	Reference Number	-
Figure Number	Figure 13.5	Legal Status	-
Townland	Calgath	Site Type	Field System
Easting / Northing	689035 / 741810	Distance from Proposed Development	0m
Description	• Area of negative linear features, including two parallel linears orientated north-south measuring c. 155m in length, overlying cultivation patterns. • Exterior feature corresponds with field boundaries on historic Ordnance Survey mapping (6" to 1 mile, 1837 – 1842). • Visible on aerial imagery. • No corresponding modern utilities. • Archaeological testing noted a raised field system in this area; however, no archaeological material was recovered during excavation (Licence Number: 04E0764; http://excavations.ie/report/2004/Meath/0012315). • Interpreted as a post-medieval field system, including possible trackway and drainage of unknown date.		
Sources	Jacobs, 2022, LiDAR Analysis for Kildare-Meath Grid Upgrade. Unpublished report.		

Identification Number	LI_065	Reference Number	-
Figure Number	Figure 13.5	Legal Status	-
Townland	Calgath	Site Type	Mill - Corn
Easting / Northing	689114 / 741549	Distance from Proposed Development	0m
Description	• An irregular area of disturbance measuring c.150m x c.50m. • Corresponds with the location of 'Calgath Corn Mill' depicted on historic Ordnance Survey mapping (6" to 1 mile, 1837 – 1842). • The 'Mill Dam' has been redeveloped; however, boundaries still vaguely perceptible on aerial imagery. • Interpreted as the site of a post-medieval corn mill.		
Sources	Jacobs, 2022, LiDAR Analysis for Kildare-Meath Grid Upgrade. Unpublished report.		

Identification Number	LI_066	Reference Number	DL_07
Figure Number	Figure 13.5	Legal Status	-
Townland	Calgath	Site Type	Enclosure
Easting / Northing	689074 / 741218	Distance from Proposed Development	26m to the east of the PAB
Description	• A sub-circular negative feature, c.58mx33m, with ephemeral linear features extending to the north and east. Appears to be cut by a later track or former boundary to the south, with cultivation patterns abutting/cut by this feature (none within the enclosure). • No corresponding features are depicted on historic Ordnance Survey mapping (or modern mapping); however, located within Brides Stream House demesne (DL_07). • Visible on aerial imagery. Livestock noted within the field. • Tentatively interpreted as a possible enclosure of unknown date and function; however, while it feature is not shown on modern Ordnance Survey mapping, it ;could equally be a modern animal run / outdoor arena. Visible on aerial imagery (BlueSky Aerial 2022).		
Sources	Jacobs, 2022, LiDAR Analysis for Kildare-Meath Grid Upgrade. Unpublished report. BlueSky Aerial, 2022		

Identification Number	LI_067	Reference Number	DL_07
Figure Number	Figure 13.5	Legal Status	-
Townland	Calgath	Site Type	Field System; Unknown
Easting / Northing	689120 / 741213	Distance from Proposed Development	0m
Description	• A network of negative linear features, including cultivation patterns. Irregular area of disturbance to the south. • Located within DL_07. Features do not correspond with field boundaries on historic Ordnance Survey mapping (6" to 1 mile, 1837 – 1842, and 25" to 1 mile, 1888-1913) - depicted as an area of parkland, bisected by driveway to Bridestream House. ;'Sand Pits' depicted to the south. • Vaguely perceptible on aerial imagery. • Interpreted as a field system of unknown date, with disturbance from a post-medieval gravel Pit/Quarry. Visible on aerial imagery.		
Sources	Jacobs, 2022, LiDAR Analysis for Kildare-Meath Grid Upgrade. Unpublished report. BlueSky Aerial, 2022		

Identification Number	LI_069	Reference Number	-
Figure Number	Figure 13.5	Legal Status	-
Townland	Balfeaghan	Site Type	Building
Easting / Northing	687999 / 740999	Distance from Proposed Development	47m to the north of the PAB
Description	• A rectangular feature measuring c.7m x c.4m. • Corresponds with a building depicted on historic Ordnance Survey mapping (25" to 1 mile, 1888-1913). • Not visible on aerial imagery. Interpreted as a post-medieval building.		
Sources	Jacobs, 2022, LiDAR Analysis for Kildare-Meath Grid Upgrade. Unpublished report.		

Identification Number	LI_070	Reference Number	-
Figure Number	Figure 13.5	Legal Status	-
Townland	Balfeaghan	Site Type	Gravel pit / Quarry
Easting / Northing	688109 / 740973	Distance from Proposed Development	3m to the north of the PAB
Description	• A large irregular area measuring c.166m across. • Corresponds with a 'Gravel Pit' depicted on historic Ordnance Survey mapping (6" to 1 mile, 1837 – 1842). • Interpreted as a post-medieval gravel pit.		
Sources	Jacobs, 2022, LiDAR Analysis for Kildare-Meath Grid Upgrade. Unpublished report.		

Identification Number	LI_072	Reference Number	-
Figure Number	Figure 13.5	Legal Status	-
Townland	Dolanstown	Site Type	Field System
Easting / Northing	688937 / 740811	Distance from Proposed Development	0m
Description	• Negative linear features. • Correspond with field boundaries on historic Ordnance Survey mapping (6" to 1 mile, 1837 – 1842). • Interpreted as a post-medieval field system. A linear feature orientated east-west is visible on aerial imagery.		
Sources	Jacobs, 2022, LiDAR Analysis for Kildare-Meath Grid Upgrade. Unpublished report. BlueSky Aerial, 2022		

Identification Number	LI_073	Reference Number	-
Figure Number	Figure 13.5	Legal Status	-
Townland	Balfeaghan	Site Type	Pits
Easting / Northing	687901 / 740754	Distance from Proposed Development	50m to the west of the PAB
Description	• A number of negative circular features measuring c.3m in diameter. • No corresponding features on historic Ordnance Survey mapping. • Visible on aerial imagery in pasture field (Digital Globe shows the field as silage). • Tentatively interpreted as pits of unknown date and function; however, could relate to agriculture (former field boundaries and modern cultivation in this area) or be natural.		
Sources	Jacobs, 2022, LiDAR Analysis for Kildare-Meath Grid Upgrade. Unpublished report		

Identification Number	LI_074	Reference Number	-
Figure Number	Figure 13.5	Legal Status	-
Townland	Balfeaghan	Site Type	Field Boundary
Easting / Northing	687953 / 740751	Distance from Proposed Development	0m
Description	• Three negative linear features orientated east-west, running from the R158, measuring c.250m in length. • Correspond with field boundaries on historic Ordnance Survey mapping (6" to 1 mile, 1837 – 1842, and 25" to 1 mile, 1888-1913). • Interpreted as post-medieval field boundaries.		
Sources	Jacobs, 2022, LiDAR Analysis for Kildare-Meath Grid Upgrade. Unpublished report		

Identification Number	LI_075	Reference Number	-
Figure Number	Figure 13.5	Legal Status	-
Townland	Dolanstown; Balfeaghan	Site Type	Gravel pit / Quarry
Easting / Northing	688538 / 740707	Distance from Proposed Development	0m
Description	• A large irregular area measuring c.150m across. Bisected by the R125. • 'Gravel Pit' and 'Sand Pits' depicted on historic Ordnance Survey mapping (6" to 1 mile, 1837 – 1842, and 25" to 1 mile, 1888-1913) to the north-west and south-east. • Vaguely perceptible on aerial imagery. • Archaeological testing in this area identified features relating to quarrying (Licence Number: 11E239; 11R87; http://excavations.ie/report/2011/Meath/0022718). • Interpreted as post-medieval gravel pit.		
Sources	Jacobs, 2022, LiDAR Analysis for Kildare-Meath Grid Upgrade. Unpublished report		

Identification Number	LI_076	Reference Number	-
Figure Number	Figure 13.5	Legal Status	-
Townland	Boycetown	Site Type	Field Boundary
Easting / Northing	687679 / 740540	Distance from Proposed Development	18m to the north-west of the PAB
Description	• Negative linear feature orientated roughly north-south, measuring c.282m in length. Between the Rye Water in the north to the Midland Great Western Railway in the south. ;Bisected by the Royal Canal. • Corresponds with a field boundary on historic Ordnance Survey mapping (6" to 1 mile, 1837 – 1842). • Interpreted as a post-medieval field boundary. Visible on aerial imagery.		
Sources	Jacobs, 2022, LiDAR Analysis for Kildare-Meath Grid Upgrade. Unpublished report. BlueSky Aerial, 2022		

Identification Number	LI_077	Reference Number	-
Figure Number	Figure 13.5	Legal Status	-
Townland	Boycetown	Site Type	Drainage
Easting / Northing	687490 / 740249	Distance from Proposed Development	4m to the south of the PAB
Description	• A network of very ephemeral linear features perpendicular to cultivation patterns. • No corresponding features on historic Ordnance Survey mapping (overall field shape reflects historic Ordnance Survey mapping (25" to 1 mile, 1888-1913). • No corresponding modern utilities, although minor watercourses noted to east and south. • Interpreted as field drainage of unknown date.		
Sources	Jacobs, 2022, LiDAR Analysis for Kildare-Meath Grid Upgrade. Unpublished report.		

Identification Number	LI_078	Reference Number	-
Figure Number	Figure 13.5	Legal Status	-
Townland	Boycetown	Site Type	Field Boundary
Easting / Northing	687226 / 740193	Distance from Proposed Development	0m
Description	• Negative linear feature orientated roughly north-east to south-west, measuring c.109m in length. • Corresponds with a field boundary on historic Ordnance Survey mapping (6" to 1 mile, 1837 – 1842, and 25" to 1 mile, 1888-1913). • Visible on aerial imagery. • Archaeological testing in this area identified cultivation ridges; however, these were interpreted as modern agricultural activity (Licence Number: 02E0144; http://excavations.ie/report/2002/Kildare/0008192/). • Interpreted as a post-medieval field boundary. Visible on aerial imagery.		
Sources	Jacobs, 2022, LiDAR Analysis for Kildare-Meath Grid Upgrade. Unpublished report. BlueSky Aerial, 2022		

Identification Number	LI_079	Reference Number	-
Figure Number	Figure 13.5	Legal Status	-
Townland	Pitchfordstown	Site Type	Field system
Easting / Northing	687190 / 739685	Distance from Proposed Development	9m to the west of the PAB
Description	• A network of intersecting linear features and cultivation patterns. A circular feature (measuring c.20m in diameter) is located to the south incorporated into field boundaries (outwith study area). • Some of which correspond to field boundaries on historic Ordnance Survey mapping (6" to 1 mile, 1837 – 1842). • Archaeological testing in this area failed to reveal any associated archaeological remains; however, cultivation activity was interpreted as more recent in date (Licence Number: 02E0147; http://excavations.ie/report/2002/Kildare/0008297/ & https://repository.dri.ie/catalog/td96zh281). • Interpreted as a field system of unknown date. Linear features visible on aerial imagery, along with two possible circular features.		
Sources	Jacobs, 2022, LiDAR Analysis for Kildare-Meath Grid Upgrade. Unpublished report. BlueSky Aerial, 2022		

Identification Number	LI_080	Reference Number	-
Figure Number	Figure 13.5	Legal Status	-
Townland	Kilcock	Site Type	Field system
Easting / Northing	687392 / 739418	Distance from Proposed Development	0m
Description	• A number of intersecting negative linear features and cultivation patterns. • Correspond to field boundaries on historic Ordnance Survey mapping (6" to 1 mile, 1837 – 1842). • Archaeological testing in this area failed to reveal any archaeological remains and cultivation was interpreted as the remains of relatively recent farming (Licence Number: 02E0148; http://excavations.ie/report/2002/Kildare/0008226/). • Interpreted as a post-medieval field system.		
Sources	Jacobs, 2022, LiDAR Analysis for Kildare-Meath Grid Upgrade. Unpublished report.		

Identification Number	LI_081	Reference Number	-
Figure Number	Figure 13.5	Legal Status	-
Townland	Duncreevan	Site Type	Ditch
Easting / Northing	687439 / 738928	Distance from Proposed Development	0m
Description	• A linear feature measuring c. 82m in length and orientated roughly north-south adjacent to a possible roadside building (LI_082). • No corresponding features on historic Ordnance Survey mapping. • Visible on aerial imagery. • No modern utilities noted. • Interpreted as a ditch of unknown date. Linear feature visible on aerial imagery.		
Sources	Jacobs, 2022, LiDAR Analysis for Kildare-Meath Grid Upgrade. Unpublished report. BlueSky Aerial, 2022		

Identification Number	LI_082	Reference Number	-
Figure Number	Figure 13.5	Legal Status	-
Townland	Duncreevan	Site Type	Building
Easting / Northing	687444 / 738892	Distance from Proposed Development	0m
Description	• A rectangular feature measuring c.17m x c.12, positioned perpendicular to the R407. • Corresponds with a group of buildings depicted on historic Ordnance Survey mapping (6" to 1 mile, 1837 – 1842) and a single building on later Ordnance Survey mapping (25" to 1 mile, 1888-1913). • Interpreted as site of a post-medieval roadside building.		
Sources	Jacobs, 2022, LiDAR Analysis for Kildare-Meath Grid Upgrade. Unpublished report		

Identification Number	LI_083	Reference Number	-
Figure Number	Figure 13.5	Legal Status	-
Townland	Duncreevan	Site Type	Building
Easting / Northing	687372 / 738848	Distance from Proposed Development	0m
Description	• A positive rectangular feature measuring approximately 13m x 6m, parallel to the R407. • Corresponds with one of a small group of buildings on historic Ordnance Survey mapping (6" to 1 mile, 1837 – 1842). ; • An extant building is visible on aerial imagery (Ortho 1995). • Interpreted as the site of a roadside building of unknown date and function.		
Sources	Jacobs, 2022, LiDAR Analysis for Kildare-Meath Grid Upgrade. Unpublished report		

Identification Number	LI_084	Reference Number	-
Figure Number	Figure 13.5	Legal Status	-
Townland	Duncreevan	Site Type	Building
Easting / Northing	687321 / 738831	Distance from Proposed Development	0m
Description	• A rectangular feature measuring c.17m by c.11m adjacent to the R407. • No corresponding feature on historic Ordnance Survey mapping (although a group of roadside buildings are depicted on historic Ordnance Survey mapping nearby; 6" to 1 mile, 1837 – 1842). • Interpreted as the site of a possible roadside building or enclosure.		
Sources	Jacobs, 2022, LiDAR Analysis for Kildare-Meath Grid Upgrade. Unpublished report		

Identification Number	LI_085	Reference Number	-
Figure Number	Figure 13.5	Legal Status	-
Townland	Duncreevan	Site Type	Field system
Easting / Northing	686826 / 738521	Distance from Proposed Development	0m
Description	• A series of negative linear features c.90m in length, orientated roughly north-south, south of the R407. • Corresponding to field boundaries on the historic Ordnance Survey mapping (6" to 1 mile, 1837 – 1842). • Interpreted as a post-medieval field system.		
Sources	Jacobs, 2022, LiDAR Analysis for Kildare-Meath Grid Upgrade. Unpublished report		

Identification Number	LI_086	Reference Number	-
Figure Number	Figure 13.5	Legal Status	-
Townland	Portgloriam	Site Type	Building
Easting / Northing	686102 / 737822	Distance from Proposed Development	0m
Description	• A rectangular feature measuring c.39m x c.10m adjacent to the existing road (R407). • Corresponds with a roadside house within an enclosed plot depicted on historic Ordnance Survey mapping. • Not visible on aerial imagery (obscured by trees). • Archaeological monitoring identified the foundations of a trapezoidal building and associated ash pit (Licence Number: 10E0445; http://excavations.ie/report/2010/Kildare/0021615/). • Interpreted as the plot associated with a post-medieval roadside house.		
Sources	Jacobs, 2022, LiDAR Analysis for Kildare-Meath Grid Upgrade. Unpublished report		

Identification Number	LI_087	Reference Number	-
Figure Number	Figure 13.5	Legal Status	-
Townland	Portgloriam	Site Type	Building
Easting / Northing	686115 / 737483	Distance from Proposed Development	0m
Description	• A rectangular feature measuring c.6m x 5m. • Corresponds with a roadside building on historic Ordnance Survey mapping (6" to 1 mile, 1837 – 1842). • Not visible on aerial imagery. • Interpreted as a post-medieval roadside building.		
Sources	Jacobs, 2022, LiDAR Analysis for Kildare-Meath Grid Upgrade. Unpublished report		

Identification Number	LI_088	Reference Number	-
Figure Number	Figure 13.5	Legal Status	-
Townland	Portgloriam	Site Type	Ditch
Easting / Northing	686094 / 737465	Distance from Proposed Development	2m to the west of the PAB
Description	• An ephemeral negative linear feature, orientated north-east to south-west, measuring c. 53m between two extant boundaries. • No corresponding features on historic Ordnance Survey mapping. • Not visible on aerial imagery. • No modern utilities noted. • Interpreted as a ditch of unknown date.		
Sources	Jacobs, 2022, LiDAR Analysis for Kildare-Meath Grid Upgrade. Unpublished report		

Identification Number	LI_090	Reference Number	-
Figure Number	Figure 13.5	Legal Status	-
Townland	Ballybrack	Site Type	Enclosure
Easting / Northing	686297 / 737037	Distance from Proposed Development	0m
Description	• Ephemeral negative linear features. Appear to form two sides and a corner of a possible square ditched enclosure, measuring c. 60m in width. ;Possibly truncated by the R407. • No corresponding feature on historic Ordnance Survey mapping. • Not visible on aerial imagery. • Located north of linear earthwork (KD010-001001), identified as 'The Pale' on historic Ordnance Survey mapping (25" to 1 mile, 1888-1913). • Interpreted as a possible square enclosure; however, could equally be a drainage feature.		
Sources	Jacobs, 2022, LiDAR Analysis for Kildare-Meath Grid Upgrade. Unpublished report		

Identification Number	LI_092	Reference Number	-
Figure Number	Figure 13.5	Legal Status	-
Townland	Ballyloughan	Site Type	Field system
Easting / Northing	686653 / 736010	Distance from Proposed Development	0m
Description	• A network of ephemeral linear features including cultivation patterns. • Located within a field depicted on historic Ordnance Survey mapping (6" to 1 mile, 1837 – 1842), including field boundaries and 'Loughan River'. • Visible on aerial imagery (https://www.cambridgeairphotos.com/location/bdu041) in proximity to a rath (KD010-002) and linear earthwork (KD010-001001). • Interpreted as a post-medieval field system. Faint linear features are visible on aerial imagery, including a former linear ditch running north-west to south-east, depicted on historic OS mapping.		
Sources	Jacobs, 2022, LiDAR Analysis for Kildare-Meath Grid Upgrade. Unpublished report. BlueSky Aerial, 2022		

Identification Number	LI_094	Reference Number	-
Figure Number	Figure 13.5	Legal Status	-
Townland	Baltracey	Site Type	Field system
Easting / Northing	686938 / 734800	Distance from Proposed Development	0m
Description	• A negative curvilinear feature with cultivation patterns, as well as a linear feature extending to the east. • Corresponds with field boundary on historic Ordnance Survey mapping (6" to 1 mile, 1837 – 1842) and drainage ditches on later Ordnance Survey mapping (25" to 1 mile, 1888-1913). Associated with a farmstead to the east. • Visible on aerial imagery. • Interpreted as a post-medieval field system.		
Sources	Jacobs, 2022, LiDAR Analysis for Kildare-Meath Grid Upgrade. Unpublished report		

Identification Number	LI_095	Reference Number	-
Figure Number	Figure 13.5	Legal Status	-
Townland	Baltracey	Site Type	Field system
Easting / Northing	686770 / 734677	Distance from Proposed Development	0m
Description	• A network of ephemeral linear features including cultivation patterns and possible field drainage. • Correspond with field boundaries depicted on historic Ordnance Survey mapping (6" to 1 mile, 1837 – 1842, and 25" to 1 mile, 1888-1913). • Interpreted as a post-medieval field system.		
Sources	Jacobs, 2022, LiDAR Analysis for Kildare-Meath Grid Upgrade. Unpublished report		

Identification Number	LI_096	Reference Number	-
Figure Number	Figure 13.5	Legal Status	-
Townland	Baltracey	Site Type	Field system
Easting / Northing	686846 / 734434	Distance from Proposed Development	0m
Description	• A network of ephemeral linear features. • Correspond with field boundaries depicted on historic Ordnance Survey mapping (6" to 1 mile, 1837 – 1842, and 25" to 1 mile, 1888-1913). • Visible on aerial imagery. • Interpreted as a post-medieval field system.		
Sources	Jacobs, 2022, LiDAR Analysis for Kildare-Meath Grid Upgrade. Unpublished report		

Identification Number	LI_098	Reference Number	-
Figure Number	Figure 13.5	Legal Status	-
Townland	Baltracey	Site Type	Field boundary
Easting / Northing	687013 / 734033	Distance from Proposed Development	3m to the west of the PAB
Description	• A negative linear feature measuring c. 160m. • Corresponds with a field boundary on historic Ordnance Survey mapping (6" to 1 mile, 1837 – 1842). • Interpreted as a post-medieval field boundary.		
Sources	Jacobs, 2022, LiDAR Analysis for Kildare-Meath Grid Upgrade. Unpublished report		

Identification Number	LI_100	Reference Number	-
Figure Number	Figure 13.5	Legal Status	-
Townland	Baltracey	Site Type	Field boundary
Easting / Northing	687033 / 733814	Distance from Proposed Development	3m to the west of the PAB
Description	• A sinuous linear feature measuring c. 240m in length. • Corresponds with a field boundary depicted on historic Ordnance Survey mapping (6" to 1 mile, 1837 – 1842, and 25" to 1 mile, 1888-1913). • Interpreted as a post-medieval field boundary.		
Sources	Jacobs, 2022, LiDAR Analysis for Kildare-Meath Grid Upgrade. Unpublished report		

Identification Number	LI_101	Reference Number	-
Figure Number	Figure 13.5	Legal Status	-
Townland	Baltracey	Site Type	Gravel pit / Quarry
Easting / Northing	687208 / 733803	Distance from Proposed Development	0m
Description	• A large irregular depression c.63m across, cultivation patterns overlay the feature. • No corresponding features on historic Ordnance Survey mapping; however, possible extraction site (none noted nearby on historic Ordnance Survey mapping). • Not visible on aerial imagery. • Interpreted as a possible Gravel pit /Quarry of unknown date or possible natural feature.		
Sources	Jacobs, 2022, LiDAR Analysis for Kildare-Meath Grid Upgrade. Unpublished report		

Identification Number	LI_102	Reference Number	DL_10
Figure Number	Figure 13.5	Legal Status	-
Townland	Painestown	Site Type	Field system
Easting / Northing	687308 / 732586	Distance from Proposed Development	23m to the east of the PAB
Description	• A network of negative linear features including cultivation patterns and possible trackway. • Located within DL_10. No corresponding features on historic Ordnance Survey mapping. Depicted on historic Ordnance Survey mapping (6" to 1 mile, 1837 – 1842) as an area of parkland. • Visible on aerial imagery. • Interpreted as a field system, including possible trackway, of unknown date. Visible on aerial imagery.		
Sources	Jacobs, 2022, LiDAR Analysis for Kildare-Meath Grid Upgrade. Unpublished report. BlueSky Aerial, 2022		

Identification Number	LI_104	Reference Number	-
Figure Number	Figure 13.5	Legal Status	-
Townland	Painestown	Site Type	Field boundary
Easting / Northing	686870 / 32045	Distance from Proposed Development	0m
Description	• A negative linear feature measuring c. 111m orientated east-west between the road and townland boundary. • Corresponds with a field boundary on historic Ordnance Survey mapping. • Interpreted as a post-medieval field boundary.		
Sources	Jacobs, 2022, LiDAR Analysis for Kildare-Meath Grid Upgrade. Unpublished report		

Identification Number	LI_105	Reference Number	-
Figure Number	Figure 13.5	Legal Status	-
Townland	Painestown	Site Type	Mound
Easting / Northing	686909 / 732008	Distance from Proposed Development	4m to the west of the PAB
Description	• A positive circular feature measuring c.6m in diameter. • No corresponding features on historic Ordnance Survey mapping. • Visible on aerial imagery (2000 orthos). • Interpreted as a possible mound, or modern agricultural feature.		
Sources	Jacobs, 2022, LiDAR Analysis for Kildare-Meath Grid Upgrade. Unpublished report		

Identification Number	LI_106	Reference Number	-
Figure Number	Figure 13.5	Legal Status	-
Townland	Painestown	Site Type	Field boundary
Easting / Northing	686982 / 731960	Distance from Proposed Development	45m to the east of the PAB
Description	• A sinuous negative linear feature measuring c. 74m in length. Orientated north-south. • Corresponds with a field boundary / townland boundary between Moortown and Painestown on historic Ordnance Survey mapping. • Interpreted as a field boundary used as a townland boundary.		
Sources	Jacobs, 2022, LiDAR Analysis for Kildare-Meath Grid Upgrade. Unpublished report		

Identification Number	LI_107	Reference Number	-
Figure Number	Figure 13.5	Legal Status	-
Townland	Painestown	Site Type	Mound
Easting / Northing	686831 / 731924	Distance from Proposed Development	50m to the west of the PAB
Description	• An irregular positive feature measuring c. 8m in width. • No corresponding features on historic Ordnance Survey mapping. • Visible on aerial imagery (1995 orthos / 2005 orthos). • Interpreted as a possible mound, or modern agricultural feature.		
Sources	Jacobs, 2022, LiDAR Analysis for Kildare-Meath Grid Upgrade. Unpublished report		

Identification Number	LI_108	Reference Number	-
Figure Number	Figure 13.5	Legal Status	-
Townland	Boherhole	Site Type	Field system
Easting / Northing	686775 / 731565	Distance from Proposed Development	0m
Description	• A network of negative linear features. • Some of which correspond with field boundaries on historic Ordnance Survey mapping, with some forming subdivisions. • Interpreted as a possible post-medieval field system. Linear features visible on aerial imagery, including two in field to the north (east of the R407) running east-west. Corresponding with field boundaries depicted on historic OS mapping.		
Sources	Jacobs, 2022, LiDAR Analysis for Kildare-Meath Grid Upgrade. Unpublished report. BlueSky Aerial, 2022		

Identification Number	LI_109	Reference Number	-
Figure Number	Figure 13.5	Legal Status	-
Townland	Boherhole	Site Type	Mound
Easting / Northing	686675 / 731240	Distance from Proposed Development	25m to the west of the PAB
Description	• A small ephemeral circular feature measuring c. 6m in diameter. • No corresponding features on historic Ordnance Survey mapping. • Not visible on aerial imagery. • Interpreted as a possible mound with a ditch around the circumference; however, could equally be the site of a modern animal feeder.		
Sources	Jacobs, 2022, LiDAR Analysis for Kildare-Meath Grid Upgrade. Unpublished report		

Identification Number	LI_110	Reference Number	-
Figure Number	Figure 13.5	Legal Status	-
Townland	Boherhole	Site Type	Field system
Easting / Northing	686743 / 731069	Distance from Proposed Development	11m to the east of the PAB
Description	• A network of ephemeral negative linears. • Correspond with buildings and field boundaries depicted on historic Ordnance Survey mapping. • Interpreted as a post-medieval field system and associated buildings.		
Sources	Jacobs, 2022, LiDAR Analysis for Kildare-Meath Grid Upgrade. Unpublished report		

Identification Number	LI_111	Reference Number	-
Figure Number	Figure 13.5	Legal Status	-
Townland	Boherhole	Site Type	Gravel pit / Quarry
Easting / Northing	686664 / 730948	Distance from Proposed Development	15m to the south of the PAB
Description	• Three positive sub-circular features measuring c. 4 - 7m in diameter. • No corresponding features on historic Ordnance Survey mapping; however, possibly associated with a 'Gravel Pit' on historic Ordnance Survey mapping (25" to 1 mile, 1888-1913), or modern dumped material. • Also in proximity to an enclosure (KD010-037), c. 100m to the south-east (other side of the R407). • Interpreted as possible material associated with a gravel pit, or modern deposited material.		
Sources	Jacobs, 2022, LiDAR Analysis for Kildare-Meath Grid Upgrade. Unpublished report		

Identification Number	LI_112	Reference Number	-
Figure Number	Figure 13.5	Legal Status	-
Townland	Boherhole	Site Type	Ditch
Easting / Northing	686503 / 730761	Distance from Proposed Development	38m to the south-east of the PAB
Description	• An ephemeral negative linear feature measuring c. 121m. • No corresponding features on historic Ordnance Survey mapping. • Not visible on aerial imagery. • No corresponding modern utilities. • Interpreted as a possible ditch of unknown date.		
Sources	Jacobs, 2022, LiDAR Analysis for Kildare-Meath Grid Upgrade. Unpublished report		

Identification Number	LI_113	Reference Number	-
Figure Number	Figure 13.5	Legal Status	-
Townland	Ballynaboley	Site Type	Field boundary
Easting / Northing	686177 / 730424	Distance from Proposed Development	0m
Description	• A linear feature measuring c. 168m orientated roughly north-east to south-west. • Corresponds with a field boundary on historic Ordnance Survey mapping (6" to 1 mile, 1837 – 1842). • Visible on aerial imagery. • Interpreted as a post-medieval field boundary. Visible on aerial imagery.		
Sources	Jacobs, 2022, LiDAR Analysis for Kildare-Meath Grid Upgrade. Unpublished report. BlueSky Aerial, 2022		

Identification Number	LI_115	Reference Number	-
Figure Number	Figure 13.5	Legal Status	-
Townland	Betaghstown	Site Type	Field system
Easting / Northing	685235 / 729580	Distance from Proposed Development	0m
Description	• A network of negative linear features. • Some of which correspond with field boundaries on historic Ordnance Survey mapping (6" to 1 mile, 1837 – 1842, and 25" to 1 mile, 1888-1913). • Interpreted as a post-medieval field system.		
Sources	Jacobs, 2022, LiDAR Analysis for Kildare-Meath Grid Upgrade. Unpublished report		

Identification Number	LI_117	Reference Number	-
Figure Number	Figure 13.5	Legal Status	-
Townland	Cott	Site Type	Field boundary
Easting / Northing	684255 / 728607	Distance from Proposed Development	10m to the north-west of the PAB
Description	• A negative linear feature measuring c. 266m, orientated roughly north-south. • Corresponds with a field boundary on historic Ordnance Survey mapping. • Interpreted as a post-medieval field boundary.		
Sources	Jacobs, 2022, LiDAR Analysis for Kildare-Meath Grid Upgrade. Unpublished report		

Identification Number	LI_118	Reference Number	-
Figure Number	Figure 13.5	Legal Status	-
Townland	Longtown North	Site Type	Field boundary
Easting / Northing	684443 / 727450	Distance from Proposed Development	0m
Description	• A broad linear feature measuring c. 107m orientated roughly north-east to south-west. • Corresponds with a field boundary on historic Ordnance Survey mapping. • Interpreted as a post-medieval field boundary.		
Sources	Jacobs, 2022, LiDAR Analysis for Kildare-Meath Grid Upgrade. Unpublished report		

Identification Number	LI_119	Reference Number	-
Figure Number	Figure 13.5	Legal Status	-
Townland	Longtown North	Site Type	Field system
Easting / Northing	684651 / 727206	Distance from Proposed Development	0m
Description	• An area of negative linear features and cultivation patterns. • Some of the linear features correspond with field boundaries on historic Ordnance Survey mapping. • Interpreted as a field system of unknown date. Visible on aerial imagery.		
Sources	Jacobs, 2022, LiDAR Analysis for Kildare-Meath Grid Upgrade. Unpublished report. BlueSky Aerial, 2022		

Identification Number	LI_120	Reference Number	-
Figure Number	Figure 13.5	Legal Status	-
Townland	Firmount West	Site Type	Building
Easting / Northing	685588 / 727084	Distance from Proposed Development	0m
Description	• An area of disturbance with a north-south linear to the west. Negative linear features and cultivation patterns also noted. • Corresponds with a cluster of buildings on historic Ordnance Survey mapping (6" to 1 mile, 1837 – 1842). ;Negative linear features correspond with field boundaries and a drive. • Not perceptible on aerial imagery. • Interpreted as the site of a post-medieval house and grounds.		
Sources	Jacobs, 2022, LiDAR Analysis for Kildare-Meath Grid Upgrade. Unpublished report		

Identification Number	LI_121	Reference Number	-
Figure Number	Figure 13.5	Legal Status	-
Townland	Firmount Demesne	Site Type	Earthwork (site of)
Easting / Northing	685808 / 726714	Distance from Proposed Development	30m to the south-west of the PAB
Description	• Ephemeral negative circular feature measuring c.18m in diameter (with a further ephemeral feature to the west). • Vaguely perceptible on aerial imagery. Modern animal feeding station marks noted nearby. Bisected by a modern fence. Appears to be a circular depression with a tree growing within it (Online mapping; May 2019). • No corresponding features on historic Ordnance Survey mapping; however, a rath (KD014-025) is located c. 180m to the north-east. • This feature could be the site of an enclosure or mound that has been levelled; therefore, it has been tentatively interpreted as the site of an earthwork of unknown date.		
Sources	Jacobs, 2022, LiDAR Analysis for Kildare-Meath Grid Upgrade. Unpublished report		

Identification Number	LI_122	Reference Number	DL_14
Figure Number	Figure 13.5	Legal Status	-
Townland	Firmount Demesne	Site Type	Designed Landscape Feature
Easting / Northing	686034 / 726597	Distance from Proposed Development	10m to the south-west of the PAB
Description	• An ephemeral rectangular feature measuring c.140m in length. Parallel to the road. • Corresponds with a rectangular feature depicted on historic Ordnance Survey mapping (25" to 1 mile, 1888-1913). Possibly associated with DL_14. • Tentatively interpreted as a possible post-medieval landscape feature.		
Sources	Jacobs, 2022, LiDAR Analysis for Kildare-Meath Grid Upgrade. Unpublished report		

Identification Number	LI_123	Reference Number	-
Figure Number	Figure 13.5	Legal Status	-
Townland	Firmount Demesne	Site Type	Field system
Easting / Northing	685963 / 726537	Distance from Proposed Development	43m to the south-west of the PAB
Description	• A network of negative linear features and ephemeral cultivation patterns. • Corresponds with field boundaries depicted on historic Ordnance Survey mapping (6" to 1 mile, 1837 – 1842). • Interpreted as a post-medieval field system.		
Sources	Jacobs, 2022, LiDAR Analysis for Kildare-Meath Grid Upgrade. Unpublished report		

Identification Number	LI_125	Reference Number	DL_15
Figure Number	Figure 13.5	Legal Status	-
Townland	Firmount East	Site Type	Field boundary
Easting / Northing	686597 / 726329	Distance from Proposed Development	0m
Description	• A negative linear feature, orientated roughly north-east to south-west, measuring c. 115m in length. • Corresponds with a field boundary on historic Ordnance Survey mapping. Forms part of a field associated with 'Moatfield House' within DL_15. • Interpreted as a post-medieval field boundary. Visible on aerial imagery.		
Sources	Jacobs, 2022, LiDAR Analysis for Kildare-Meath Grid Upgrade. Unpublished report. BlueSky Aerial, 2022		

Identification Number	LI_126	Reference Number	DL_15
Figure Number	Figure 13.5	Legal Status	-
Townland	Firmount East	Site Type	Field boundary
Easting / Northing	686650 / 726290	Distance from Proposed Development	6m to the north-east of the PAB
Description	• A linear feature measuring c. >93m orientated roughly north-east to south-west. • Corresponds with a field boundary on historic Ordnance Survey mapping. Border of DL_15. • Interpreted as a post-medieval field boundary. Visible on aerial imagery.		
Sources	Jacobs, 2022, LiDAR Analysis for Kildare-Meath Grid Upgrade. Unpublished report. BlueSky Aerial, 2022		

Identification Number	LI_127	Reference Number	DL_15
Figure Number	Figure 13.5	Legal Status	-
Townland	Firmount East	Site Type	Earthwork (site of)
Easting / Northing	686686 / 726259	Distance from Proposed Development	37m to the north-east of the PAB
Description	• A negative circular feature measuring c.12m in diameter. • Located to the south of DL_15. No corresponding features on historic Ordnance Survey mapping. • A feature is visible in this location on aerial imagery (Digital Globe) as a parchmark in a pasture field. Could also be natural. • This feature could be the site of an enclosure or mound that has been levelled; therefore, it has been tentatively interpreted as the site of an earthwork of unknown date.		
Sources	Jacobs, 2022, LiDAR Analysis for Kildare-Meath Grid Upgrade. Unpublished report. BlueSky Aerial, 2022		

Identification Number	LI_128	Reference Number	-
Figure Number	Figure 13.5	Legal Status	-
Townland	Firmount East	Site Type	Field boundary
Easting / Northing	686791 / 726244	Distance from Proposed Development	4m to the north-east of the PAB
Description	• A linear feature measuring c. 181m orientated roughly north-east to south-west with undulations within the feature. • Corresponds with a field boundary on historic Ordnance Survey mapping. • Visible on aerial imagery. • Interpreted as a post-medieval field boundary.		
Sources	Jacobs, 2022, LiDAR Analysis for Kildare-Meath Grid Upgrade. Unpublished report.		

Identification Number	LI_129	Reference Number	-
Figure Number	Figure 13.5	Legal Status	-
Townland	Firmount Demesne	Site Type	Earthwork (site of)
Easting / Northing	686807 / 726081	Distance from Proposed Development	13m to the south-west of the PAB
Description	• Ephemeral negative circular feature measuring c.18m in diameter. • Visible on aerial imagery. • No corresponding features on historic Ordnance Survey mapping. • Appears to be a circular depression; possible relating to a modern animal feeding station as livestock noted in the field and area appears trampled (Online mapping March 2011). • This feature could be the site of an enclosure or mound that has been levelled; therefore, it has been tentatively interpreted as the site of an earthwork of unknown date.		
Sources	Jacobs, 2022, LiDAR Analysis for Kildare-Meath Grid Upgrade. Unpublished report.		

Identification Number	LI_130	Reference Number	-
Figure Number	Figure 13.5	Legal Status	-
Townland	Clane	Site Type	Building
Easting / Northing	686950 / 726049	Distance from Proposed Development	0m
Description	• A rectangular feature measuring c. 10m by c.8m, appears truncated to south-east by crossroads. • Corresponds with a building depicted on historic Ordnance Survey mapping on 'Millicent Cross Roads'. • Not visible on aerial imagery. • Interpreted as the site of a post-medieval roadside building.		
Sources	Jacobs, 2022, LiDAR Analysis for Kildare-Meath Grid Upgrade. Unpublished report		

Identification Number	LI_133	Reference Number	-
Figure Number	Figure 13.5	Legal Status	-
Townland	Millicent Demesne	Site Type	Ditch
Easting / Northing	687663 / 725071	Distance from Proposed Development	15m to the east of the PAB
Description	• A negative linear feature orientated north-south, measuring c. 89m. • No corresponding features on historic Ordnance Survey mapping. • Not visible on aerial imagery. • No corresponding modern utilities, although adjacent to a minor watercourse. • Interpreted as a possible ditch of unknown date.		
Sources	Jacobs, 2022, LiDAR Analysis for Kildare-Meath Grid Upgrade. Unpublished report		

Identification Number	LI_134	Reference Number	DL_17
Figure Number	Figure 13.5	Legal Status	-
Townland	Millicent Demesne	Site Type	Designed Landscape Feature
Easting / Northing	687613 / 725042	Distance from Proposed Development	0m
Description	• An irregular negative feature measuring c.20m across. • Corresponds with a drainage feature on historic Ordnance Survey mapping (25" to 1 mile, 1888-1913). Located within DL_17. • Interpreted as a post-medieval drainage feature associated with DL_17. Feature located at the intersection of two field boundaries, in a small copse of trees		
Sources	Jacobs, 2022, LiDAR Analysis for Kildare-Meath Grid Upgrade. Unpublished report Walkover and site inspection, January 2023		

Identification Number	LI_135	Reference Number	-
Figure Number	Figure 13.5	Legal Status	-
Townland	Millicent South	Site Type	Field system
Easting / Northing	687520 / 724883	Distance from Proposed Development	27m to the south-west of the PAB
Description	• A network of linears including cultivation patterns. • Some correspond with field boundaries depicted on historic Ordnance Survey mapping, associated with a roadside building. • Not visible on aerial imagery. • Interpreted as a post-medieval field system.		
Sources	Jacobs, 2022, LiDAR Analysis for Kildare-Meath Grid Upgrade. Unpublished report		

Identification Number	LI_136	Reference Number	-
Figure Number	Figure 13.5	Legal Status	-
Townland	Millicent South	Site Type	Drainage
Easting / Northing	687847 / 724517	Distance from Proposed Development	5m to the west of the PAB
Description	• A series of regular parallel linear features measuring c.105m in length. Orientated roughly north-south. • No corresponding features on historic Ordnance Survey mapping. • Visible on aerial imagery (2000 ortho). Located c.50m to the west of the River Liffey. • No corresponding modern utilities. • Interpreted as drainage. Visible on aerial imagery.		
Sources	Jacobs, 2022, LiDAR Analysis for Kildare-Meath Grid Upgrade. Unpublished report. BlueSky Aerial, 2022		

Identification Number	LI_137	Reference Number	-
Figure Number	Figure 13.5	Legal Status	-
Townland	Barrettstown	Site Type	Track
Easting / Northing	687983 / 723640	Distance from Proposed Development	0m
Description	• A negative linear feature orientated west-east, measuring c. 236m. • Corresponds with a track on historic Ordnance Survey mapping (6" to 1 mile, 1837 – 1842) running from a house in the west to a 'Brick Field' adjacent to the river. • Visible on aerial imagery. • Interpreted as a post-medieval track. Visible on aerial imagery.		
Sources	Jacobs, 2022, LiDAR Analysis for Kildare-Meath Grid Upgrade. Unpublished report. BlueSky Aerial, 2022		

Identification Number	LI_138	Reference Number	-
Figure Number	Figure 13.5	Legal Status	-
Townland	Waterstown	Site Type	Field system
Easting / Northing	687916 / 723347	Distance from Proposed Development	0m
Description	• A network of linear features and cultivation patterns. Bisected by the Sallins Bypass. • Some linears correspond with field boundaries on historic Ordnance Survey mapping. • Visible on aerial imagery. • An isolated find (1990:136 Head Of Bronze Enamelled Hand Pin) was recovered in this location. • Interpreted as a post-medieval field system. Visible on aerial imagery.		
Sources	Jacobs, 2022, LiDAR Analysis for Kildare-Meath Grid Upgrade. Unpublished report. BlueSky Aerial, 2022		

Identification Number	LI_139	Reference Number	-
Figure Number	Figure 13.5	Legal Status	-
Townland	Osberstown	Site Type	Track
Easting / Northing	687896 / 722959	Distance from Proposed Development	0m
Description	• A linear feature measuring c.296m running south-east from the river and truncated by the bypass roundabout. • Corresponds with a track depicted on historic Ordnance Survey mapping running from a brick field (north of the river, via a ford) to the road. • Visible on aerial imagery. Truncated by Sallins Bypass roundabout. • Interpreted as a post-medieval track. Visible on aerial imagery with some additional linears interpreted as former field boundaries.		
Sources	Jacobs, 2022, LiDAR Analysis for Kildare-Meath Grid Upgrade. Unpublished report. BlueSky Aerial, 2022		

Identification Number	LI_140	Reference Number	-
Figure Number	Figure 13.5	Legal Status	-
Townland	Osberstown	Site Type	Field boundary
Easting / Northing	688162 / 722732	Distance from Proposed Development	0m
Description	• A negative linear feature measuring c.177m running from the river and truncated by the Sallins Bypass roundabout. • Corresponds with a field boundary depicted on historic Ordnance Survey mapping. • Archaeological testing recovered modern pottery sherds and fragments of clay-pipe stem from this area, as well as a fragmented flint arrowhead or knife (Licence Number: 09E0147; http://excavations.ie/report/2009/Kildare/0020828/). • Interpreted as a post-medieval field boundary. Visible on aerial imagery.		
Sources	Jacobs, 2022, LiDAR Analysis for Kildare-Meath Grid Upgrade. Unpublished report. BlueSky Aerial, 2022		

Identification Number	LI_142	Reference Number	-
Figure Number	Figure 13.5	Legal Status	-
Townland	Osberstown	Site Type	Field system
Easting / Northing	688391 / 722096	Distance from Proposed Development	7m to the east of the PAB
Description	• A network of negative linear features with three rectangular features (c. 11m x 7m). Two parallel linear features demarcate the south, running east-west. • No corresponding features on historic Ordnance Survey mapping. • Not visible on aerial imagery. • To the west of the river. No features visible on Online mapping (Sept 2021). • Tentatively interpreted as a possible field system and buildings of unknown date. Could equally be modern drainage associated with the road.		
Sources	Jacobs, 2022, LiDAR Analysis for Kildare-Meath Grid Upgrade. Unpublished report		

Identification Number	LI_143	Reference Number	-
Figure Number	Figure 13.5	Legal Status	-
Townland	Osberstown	Site Type	Field system
Easting / Northing	688314 / 721737	Distance from Proposed Development	0m
Description	• A network of negative linear features, including cultivation patterns. • Some correspond with field boundaries and a mill race associated with 'Osberstown House' / 'Leinster Flour Mills' depicted on historic Ordnance Survey mapping. • Some linear features visible on aerial imagery. Bisected by Sallins Bypass and the M7. • Interpreted as a post-medieval field system, associated with Osberstown House and mill. Some faint linear features vaguely perceptible from field entrance.		
Sources	Jacobs, 2022, LiDAR Analysis for Kildare-Meath Grid Upgrade. Unpublished report Walkover and site inspection, January 2023		

Identification Number	LI_144	Reference Number	-
Figure Number	Figure 13.5	Legal Status	-
Townland	Osberstown	Site Type	Field boundary
Easting / Northing	688154 / 721189	Distance from Proposed Development	7m to the north-west of the PAB
Description	• An 'L'-shaped negative linear feature measuring c. 104m x c.145m. • Corresponds with a field boundary on historic Ordnance Survey mapping. • Visible on aerial imagery. Truncated by Osberstown Millenium Park road. • Interpreted as a post-medieval field boundary. Visible on aerial imagery.		
Sources	Jacobs, 2022, LiDAR Analysis for Kildare-Meath Grid Upgrade. Unpublished report. BlueSky Aerial, 2022		

Identification Number	LI_145	Reference Number	-
Figure Number	Figure 13.5	Legal Status	-
Townland	Osberstown	Site Type	Field boundary
Easting / Northing	687750 / 720637	Distance from Proposed Development	0m
Description	• A negative linear feature, measuring c. 270m in length orientated roughly north-west to south-east. • Corresponds with a field boundary on historic Ordnance Survey mapping. • Bisected by the Osberstown Millenium Park road. • Interpreted as a post-medieval field boundary. Visible on aerial imagery. Estant field boundary bisecting an area of scrubby, disturbed ground adjacent to modern commerical development. Very overgrown (brambles), continues on the otherside of Millenium Parkway as a more legible field boundary (hedgerow / trees).		
Sources	Jacobs, 2022, LiDAR Analysis for Kildare-Meath Grid Upgrade. Unpublished report. BlueSky Aerial, 2022 Walkover and site inspection, January 2023		

Identification Number	LI_146	Reference Number	KD019-016
Figure Number	Figure 13.5	Legal Status	-
Townland	Ploopluck	Site Type	Mound
Easting / Northing	687641 / 720239	Distance from Proposed Development	39m to the south-east of the PAB
Description	• A negative area measuring c. 70m across comprising a cluster of five circular features. • No corresponding features on historic Ordnance Survey mapping. • Visible on aerial imagery. • Finds recovered in this area during gravel extraction included skeletons and food vessels (1935:544-8 R.I.A Burial Finds Including; Burial I, Food Vessel; Burial II, Food Vessel and Skeleton; Burial III, Food Vessel; Burial IV, Skeleton). • Prehistoric pit burials (KD019-017; NS19-093) are recorded in this location on the RMP. • Interpreted as part of KD019-017/NS19-093 (prehistoric pit burials). Faintly visible on aerial imagery.		

Sources	Jacobs, 2022, LiDAR Analysis for Kildare-Meath Grid Upgrade. Unpublished report. BlueSky Aerial, 2022

Identification Number	LI_147	Reference Number	KD019-016
Figure Number	Figure 13.5	Legal Status	-
Townland	Ploopluck	Site Type	Mound
Easting / Northing	687548 / 720191	Distance from Proposed Development	38m to the south-east of the PAB
Description	• A sub-circular feature measuring c. 6m in diameter with an area of disturbance to the south-west. • No corresponding features on historic Ordnance Survey mapping. • In proximity to prehistoric pit burials (KD019-017; NS19-093). • Sewer noted to south. • Finds recovered in this area included skeletons and food vessels (1935:544-8 R.I.A Burial Finds Including; Burial I, Food Vessel; Burial II, Food Vessel and Skeleton; Burial III, Food Vessel; Burial IV, Skeleton). • Interpreted as part of KD019-017 (prehistoric pit burials).		
Sources	Jacobs, 2022, LiDAR Analysis for Kildare-Meath Grid Upgrade. Unpublished report.		

Identification Number	LI_148	Reference Number	-
Figure Number	Figure 13.5	Legal Status	-
Townland	Osberstown	Site Type	Ditch
Easting / Northing	687145 / 719942	Distance from Proposed Development	14m to the north-west of the PAB
Description	• A series of parallel negative linear features orientated roughly north-east to south-west measuring c. 144m in length. • Corresponds with field boundary and ditch on historic Ordnance Survey mapping. • Visible on aerial imagery. • Interpreted as a ditch of post-medieval date. Visible on aerial imagery.		
Sources	Jacobs, 2022, LiDAR Analysis for Kildare-Meath Grid Upgrade. Unpublished report.		

	BlueSky Aerial, 2022

Identification Number	LI_149	Reference Number	-
Figure Number	Figure 13.5	Legal Status	-
Townland	Jigginstown	Site Type	Field system
Easting / Northing	687172 / 719586	Distance from Proposed Development	7m to the south of the PAB
Description	• A network of negative linears and cultivation patterns. • Some of linears correspond with field boundaries depicted on historic Ordnance Survey mapping. • Vaguely perceptible on aerial imagery. • Interpreted as a post-medieval field system.		
Sources	Jacobs, 2022, LiDAR Analysis for Kildare-Meath Grid Upgrade. Unpublished report		

Identification Number	LI_151	Reference Number	AY_39; KD019-033001
Figure Number	Figure 13.5	Legal Status	-
Townland	Jigginstown	Site Type	Designed Landscape Feature
Easting / Northing	688048 / 718919	Distance from Proposed Development	0m
Description	• A negative linear feature orientated north-south, measuring c. 144m in length. • Corresponds with the drive associated with Jigginstown Castle on historic Ordnance Survey mapping (located to the east of the 17th century house). • Visible on aerial imagery. Runs south from the R445 (https://www.cambridgeairphotos.com/location/asw018/). • Archaeological testing nearby recovered red brick and mortar fragments, and sherds roof tile of 17th–18th-century date (Licence Number: C000238; E3600; http://excavations.ie/report/2007/Kildare/0017795/). • Isolated finds recovered from this area comprise Medieval Glazed Potsherd (1979:13). • Interpreted as the drive to east of Jigginstown Castle.		
Sources	Jacobs, 2022, LiDAR Analysis for Kildare-Meath Grid Upgrade. Unpublished report		

Identification Number	LI_152	Reference Number	-
Figure Number	Figure 13.5	Legal Status	-
Townland	Naas West	Site Type	Field system
Easting / Northing	688308 / 718366	Distance from Proposed Development	9m to the south-east of the PAB
Description	• An area of very ephemeral linear features and possible cultivation patterns. • No corresponding features on historic Ordnance Survey mapping. Abut townland boundary. • Possible features visible on aerial imagery (1995 Ortho). • Interpreted as a possible field system of unknown date.		
Sources	Jacobs, 2022, LiDAR Analysis for Kildare-Meath Grid Upgrade. Unpublished report		

Identification Number	LI_154	Reference Number	-
Figure Number	Figure 13.5	Legal Status	-
Townland	Naas West	Site Type	Field system
Easting / Northing	688852 / 718227	Distance from Proposed Development	0m
Description	• An area of negative linear features and cultivation patterns. • Correspond with field boundaries on historic Ordnance Survey mapping. • Visible on aerial imagery as partially extant field boundaries (hedgerows). • An isolated find of a Bronze Pin (1969:75) was recovered from this area. • Interpreted as a post-medieval field system.		
Sources	Jacobs, 2022, LiDAR Analysis for Kildare-Meath Grid Upgrade. Unpublished report		

Identification Number	LI_155	Reference Number	-
Figure Number	Figure 13.5	Legal Status	-
Townland	Naas East	Site Type	Ditch
Easting / Northing	689060 / 717728	Distance from Proposed Development	40m to the east of the PAB
Description	• A negative feature measuring c. 97m, orientated east-west. • Does not appear to correspond with any features on historic Ordnance Survey mapping. A disused 'Gravel Pit' is depicted to the south-west (25" to 1 mile, 1888-1913). • No modern utilities noted. • Not visible on aerial imagery. Located to the west of a minor watercourse. • Archaeological testing nearby identified drains and recent agricultural activity; however, an early medieval ecclesiastical enclosure was also identified near an existing church IKD024-003) (Licence Number: 04E0355 ext.; http://excavations.ie/report/2006/Kildare/0015709/). • Interpreted as a ditch of unknown date, possibly drainage.		
Sources	Jacobs, 2022, LiDAR Analysis for Kildare-Meath Grid Upgrade. Unpublished report		

Identification Number	LI_156	Reference Number	-
Figure Number	Figure 13.5	Legal Status	-
Townland	Rathasker	Site Type	Building
Easting / Northing	688050 / 716174	Distance from Proposed Development	0m
Description	• A rectangular area of disturbance measuring c. 82m x c.59m. • Located on the junction between Kilcullen Road and a local access. • Corresponds with a building and associated boundary depicted on later historic Ordnance Survey mapping (25" to 1 mile, 1888-1913). • Area overgrown. • Interpreted as the site of a post-medieval roadside house and boundary.		
Sources	Jacobs, 2022, LiDAR Analysis for Kildare-Meath Grid Upgrade. Unpublished report		

Identification Number	LI_157	Reference Number	-
Figure Number	Figure 13.5	Legal Status	-
Townland	Killashee	Site Type	Smithy
Easting / Northing	688058 / 715980	Distance from Proposed Development	5m to the east of the PAB
Description	• A wedge-shaped area of disturbance between Kilcullen Road and a local road. • Corresponds with a 'Pound' on historic Ordnance Survey mapping (6" to 1 mile, 1837 – 1842) and on later Ordnance Survey mapping as a 'Smithy' and 'Pump' (25" to 1 mile, 1888-1913). • Some buildings appear to remain extant on aerial imagery. • Interpreted as the site of a post-medieval smithy.		
Sources	Jacobs, 2022, LiDAR Analysis for Kildare-Meath Grid Upgrade. Unpublished report		

Identification Number	LI_158	Reference Number	-
Figure Number	Figure 13.5	Legal Status	-
Townland	Killashee	Site Type	Building
Easting / Northing	687991 / 715782	Distance from Proposed Development	0m
Description	• An area of ephemeral features west of Kilcullen Road. • Corresponds with a building and boundarie depicted on historic Ordnance Survey mapping (6" to 1 mile, 1837 – 1842). • Located north of a minor watercourse, modern linear feature visible on aerial imagery. • Interpreted as the site of a post-medieval building.		
Sources	Jacobs, 2022, LiDAR Analysis for Kildare-Meath Grid Upgrade. Unpublished report		

Identification Number	LI_159	Reference Number	-
Figure Number	Figure 13.5	Legal Status	-
Townland	Mylerstown	Site Type	Gravel pit / Quarry
Easting / Northing	687752 / 714028	Distance from Proposed Development	0m
Description	• A wedge-shaped area of disturbance adjacent to the R448 and a field boundary. • Corresponding with an area of quarrying / extraction with associated buildings depicted on historic Ordnance Survey mapping (6" to 1 mile, 1837 – 1842). • Visible on aerial imagery as an area of scrub / rough ground. • Interpreted as the location of a post-medieval quarry.		
Sources	Jacobs, 2022, LiDAR Analysis for Kildare-Meath Grid Upgrade. Unpublished report		

Identification Number	LI_161	Reference Number	-
Figure Number	Figure 13.5	Legal Status	-
Townland	Dunnstown	Site Type	Track
Easting / Northing	687204 / 712701	Distance from Proposed Development	5m to the west of the PAB
Description	• A network of linears within an area of woodland, including a north-south orientated linear feature with sinuous perpendicular linears branching off. • Area of mixed woodland on historic Ordnance Survey mapping (6" to 1 mile, 1837 – 1842). One linear feature corresponds with a track through the trees depicted on later Ordnance Survey mapping (25" to 1 mile, 1888-1913). • Interpreted as plantation / cultivation patterns and associated track.		
Sources	Jacobs, 2022, LiDAR Analysis for Kildare-Meath Grid Upgrade. Unpublished report		

Identification Number	LI_162	Reference Number	-
Figure Number	Figure 13.5	Legal Status	-
Townland	Dunnstown	Site Type	Field system
Easting / Northing	687376 / 712444	Distance from Proposed Development	6m to the south of the PAB
Description	• A network of negative linear features. • Correspond with field boundaries and ditches on historic Ordnance Survey mapping (6" to 1 mile, 1837 – 1842, and 25" to 1 mile, 1888-1913). ;Later mapping shows the areas as wooded. • Vaguely perceptible on aerial imagery. • Interpreted as a post-medieval field system.		
Sources	Jacobs, 2022, LiDAR Analysis for Kildare-Meath Grid Upgrade. Unpublished report		

Table 6: Inventory of Townland Boundaries

Townland Boundary Reference Number	Townland Names	Description
TB_01	Gaulstown - Woodland	Extant field boundary comprising an established hedgerow, with a watercourse (tributary of the River Tolka).
TB_02	Gaulstown - Culcommon	Extant field boundary comprising an established hedgerow, sparce in areas.
TB_03	Gaulstown - Cullendragh	Extant field boundary comprising an established hedgerow, with a watercourse (Dunboyne Stream).
TB_04	Culcommon - Cullendragh	Established boundary formed of mature trees, shrubbery and hedges. Includes a ditch (likely recut given the presence of deposits of material adjacent to the ditch possibly as a result of ditch clearance / drainage). Ditch is dry in some areas, in others comprises a watercourse (Dunboyne Stream).
TB_05	Warrenstown - Jenkinstown	Extant field boundaries and road (R156).
TB_06	Jenkinstown - Mullagh	Extant field boundaries and road (R156).
TB_07	Barstown - Warrenstown	Extant field boundaries and road (R156).
TB_08	Mullagh - Phepotstown	Jenkinstown Stream, crossed by a road (R125).
TB_09	Cullendragh - Barstown	Watercourse (tributary of the Rye Water) with established vegetation on either side, including scrub and trees.
TB_10	Phepotstown - Martinstown	Jenkinstown Stream, crossed by a road (R125).
TB_11	Martinstown - Kemmins Mill	Extant field boundaries and road (R125).
TB_12	Kemmins Mill - Phepotstown	Waterfilled drainage ditch, possibly straightened, crossed by the road (R125).
TB_13	Phepotstown - Calgath	Unnamed watercourse, crossed by the road (R125).
TB_14	Calgath - Dolanstown	Newtownmoy Aghy Stream and road (R125).
TB_15	Dolanstown - Balfeaghan	Extant road (R125) and dry drainage ditch.
TB_16	Balfeaghan - Boycetown	Rye Water, crossed by the road (R158).
TB_17	Boycetown - Pitchfordstown	No longer extant (R407 and M4 Junction 8 occupy this location).
TB_18	Pitchfordstown - Kilcock	Extant field boundary comprising an established hedgerow and drainage ditch. Partially obliterated by development (R407 and M4 Junction 8).
TB_19	Kilcock - Commons South	Local road, crossed by the R407.

Townland Boundary Reference Number	Townland Names	Description
TB_20	Commons South - Duncreevan	Extant field boundary (hedgerow and drainage ditch), crossed by the road (R407). Residential development to the east has removed any historic features associated with this boundary.
TB_21	Duncreevan - Courtown Great	Extant roads (inc. R407).
TB_22	Duncreevan - Portgloriam	Extant field boundaries and road (R407).
TB_23	Hodgestown - Portgloriam	Extant field boundaries and road (R407).
TB_24	Portgloriam - Ballybrack	Extant field boundaries and road (R407).
TB_25	Ballybrack - Ballyloughan	Extant road (R407), trackways and drainage ditch.
TB_26	Ballyloughan - Baltracey	Watercourse (tributary of the River Liffey).
TB_27	Graiguepottle - Baltracey	Watercourse (tributary of the River Liffey).
TB_28	Baltracey - Painestown	Extant local road and established hedgerow.
TB_29	Painestown - Boherhole	Watercourse (Clonshanbo River), crossed by the road (R407).
TB_30	Boherhole - Ballynaboley	Field boundary and extant road (R408).
TB_31	Ballynabolley - Bataghstown	Extant field boundary, crossed by the road (R408).
TB_32	Betaghstown - Ballynagappagh	Extant field boundary and unnamed watercourse, crossed by the road (R408).
TB_33	Cott - Ballynagappagh	Extant field boundary and drainage ditch, crossed by the road (R408).
TB_34	Cott - Curryhills	Drainage ditch, crossed by the road (R408).
TB_35	Curryhills - Longtown North	Field boundaries comprising established hedgerows and a substantial ditch, crossed by the road (R403).
TB_36	Longtown North - Firmount West	Extant field boundaries, crossed by the road (R403).
TB_37	Firmount West - Firmount Demesne	Extant field boundaries, crossed by the road (L2002).
TB_38	Firmount Demesne - Hoganswood	Extant road (L2002).
TB_39	Clane - Millicent North	Extant local road.

Townland Boundary Reference Number	Townland Names	Description
TB_40	Firmount East - Firmount Demesne	Extant road (L2002).
TB_41	Clane - Firmount Demesne	Extant road (L2002).
TB_42	Millicent North - Firmount East	Extant road (L2002).
TB_43	Millicent North - Millicent South	Extant road (L2002).
TB_44	Millicent North - Millicent Demesne	Extant boundary comprising an established hedgerow along churchyard boundary.
TB_45	Firmount Demesne - Firmount East	Extant local road.
TB_46	Millicent South - Millicent Demesne	Extant road (L2002).
TB_47	Castlesize - Millicent South	River Liffey.
TB_48	Castlesize - Barrettstown	River Liffey.
TB_49	Barrettstown - Waterstown	Extant field boundary (hedgerow), crossed by the road (Sallins Bypass).
TB_50	Waterstown - Osberstown	River Liffey, crossed by the road (Sallins Bypass).
TB_51	Osberstown - Ploopluck	Drainage ditches and road (Osberstown Millennium Park).
TB_52	Ploopluck - Jigginstown	Some sections of hedgerow; however, otherwise, no longer extant, Location occupied by the road (R409).
TB_53	Jigginstown - Naas West	Unnamed watercourse (crossed by road; R448) and modern development
TB_54	Naas West - Naas East	Extant road (R448).
TB_55	Naas East - Broadfield	Extant road (R448).
TB_56	Bluebell - Broadfield	Extant road (R448).
TB_57	Killashee - Bluebell	Extant road (R448).
TB_58	Broadfield - Killashee	Extant road (R448).

Townland Boundary Reference Number	Townland Names	Description
TB_59	Rathasker - Killashee	Extant road (R448).
TB_60	Rathasker - Killashee	Extant road (R448).
TB_61	Killashee - Oldtown	Unnamed watercourse, crossed by the road (R448).
TB_62	Newland West - Oldtown	Hedgerow (some removed) and road (R448).
TB_63	Oldtown - Mylerstown	Hedgerow and road (R448).
TB_64	Newland West - Mylerstown	Hedgerow (some removed) and road (R448).
TB_65	Mylerstown - Stephenstown South	Hedgerow and road (R448).
TB_66	Stephenstown South - Walterstown	Hedgerow and road (R448).
TB_67	Dunnstown - Stephenstown South	Hedgerow, extant wall and road (R448).
TB_68	Ballyloughan - Graiguepottle	Extant field boundary and ditch (likely recut given the presence of deposits of material adjacent to the ditch possibly as a result of ditch clearance / drainage). Identified as 'The Pale' (AY_13; RHM; see above)
TB_69	Harristown Common - Dunnstown	Extant field boundary.
TB_70	Bluebell - Naas East	Local access road
TB_71	Jigginstown - Osberstown	Hedgerow (some removed)
TB_72	Firmount East - Millicent South	Extant field boundary
TB_73	Firmount East - Clane	Hedgerow (some removed)
TB_74	Firmount East - Hoganswood	Extant field boundary / trackway
TB_75	Firmount West - Hoganswood	Extant field boundary
TB_76	Ballynaboley - Mainhaim	Gollymochy River
TB_77	Boherhole - Mainhaim	Extant field boundary

Townland Boundary Reference Number	Townland Names	Description
TB_78	Kilcock - Boycetown	Extant field boundary
TB_79	Balfeaghan - Calgath	Extant field boundary (some removed)
TB_80	Dolanstown - Balfeaghan	Extant road (R125) and field boundary
TB_81	Creemore - Woodland	Watercourse
TB_82	Woodland - Portan	Extant field boundary (some removed)
TB_83	Creemore - Portan	Watercourse
TB_84	Barstown - Kilclone	Extant field boundary
TB_85	Ballybrack - Clonduff	Hedgerow and watercourse
TB_86	Moortown - Painestown	Extant field boundary (some removed) and watercourse
TB_87	Stephenstown South - Harristown Common	Extant field boundary (some removed)
TB_88	Walterstown - Dunstown	Hedgerow

Appendix 13.2 AACH Impact Assessment

Table 1: Effects on Archaeology during Construction

Route Section	Townland	County	Unique Reference Number	Legal Status	Effect	Description	Pre-Mitigation Significance	Mitigation
On-road	Calgath	Meath	AY_02	Recorded Monument	Direct negative	The PAB is located within the Zone of Notification of this Recorded Monument (AY_02). While the PAB is within the existing roadline in this location, which is likely to have removed or truncated any archaeological remains associated with this monument that may have been present, construction would have a direct impact on any archaeological remains that may survive.	Slight	Archaeological monitoring during construction
Watercourse Crossings (WB17, WB18 and WB19) / HDD of Lyreen tributary of the Liffey	Various	Kildare	AY_13	Recorded Monument	Direct negative	The PAB is located within the Zone of Notification of this Recorded Monument (AY_13). Where the PAB is within the existing roadline it is likely any archaeological remains associated with this monument that may have been present have been removed or truncated; however, construction would have a direct impact on any archaeological remains that may survive particularly in off-road areas required for the watercourse crossings (WB17, WB18 and WB19) between ch. 21,200 and ch. 21,700 and HDD of the Lyreen tributary of the River Liffey at ch.22,000.	Moderate	Archaeological excavation. This would be informed by archaeological geophysical survey and archaeological test excavation
On-road	Ballynagappagh	Kildare	AY_24	Recorded Monument	Direct negative	The PAB is located within the Zone of Notification of this Recorded Monument (AY_24). While the PAB is within the existing roadline in this location, which is likely to have removed or truncated any archaeological remains associated with this monument that may have been present, construction would have a direct impact on any archaeological remains that may survive.	Slight	Archaeological monitoring during construction
On-road	Firmount East	Kildare	AY_26	Recorded Monument	Direct negative	The PAB is located within the Zone of Notification of this Recorded Monument (AY_26). While the PAB is within the existing roadline in this location, which is likely to have removed or truncated any archaeological remains associated with this monument that may have been present, construction would have a direct impact on any archaeological remains that may survive.	Slight	Archaeological monitoring during construction
Joint Bay 60 / HDD	Jigginstown	Kildare	AY_38	Preservation Order	Indirect negative	Construction of the Proposed Project would be within 40m of this constraint. Noise and visual intrusion	Imperceptible	None proposed

Route Section	Townland	County	Unique Reference Number	Legal Status	Effect	Description	Pre-Mitigation Significance	Mitigation
under the Grand Canal and R445						from construction plant would have an indirect impact on this constraint; however, the relationship with the complex would be unaffected and it is anticipated any intrusion would be temporary (lasting the duration of construction in this location) and would be largely screened by the intervening buildings.		
Joint Bay 60 / HDD under the Grand Canal and R445	Jigginstown	Kildare	AY_39	National Monument	Indirect negative	Construction of the Proposed Project would be within 5m of this constraint. Noise and visual intrusion from construction plant would have an indirect impact on this constraint. However, traffic noise and vehicle movement form part of this constraints setting and the relationship with the complex would be unaffected. In addition, it is anticipated any intrusion would be temporary (lasting the duration of construction in this location) and would be largely screened by the mature trees along the eastern boundary of the complex.	Slight	None proposed
Joint Bay 60 / HDD under the Grand Canal and R445	Jigginstown	Kildare	AY_40	Preservation Order	Indirect negative	While noise and visual intrusion from construction plant would have an indirect impact on this constraint, construction would be screened by the intervening buildings and the relationship with the complex would be unaffected. In addition, it is anticipated any intrusion would be temporary (lasting the duration of construction in this location).	Imperceptible	None proposed
Joint Bay 60 / HDD under the Grand Canal and R445	Jigginstown	Kildare	AY_42	Preservation Order	Indirect negative	While noise and visual intrusion from construction plant would have an indirect impact on this constraint, construction would be screened by the intervening buildings and the relationship with the complex would be unaffected. In addition, it is anticipated any intrusion would be temporary (lasting the duration of construction in this location).	Imperceptible	None proposed
Joint Bay 60 / HDD under the Grand Canal and R445	Jigginstown	Kildare	AY_43	Preservation Order	Indirect negative	While noise and visual intrusion from construction plant would have an indirect impact on this constraint, construction would be screened by the intervening buildings and mature trees along the eastern boundary of the complex and the relationship with the complex would be unaffected. In addition, it is anticipated any intrusion would be temporary (lasting the duration of construction in this location).	Imperceptible	None proposed

Route Section	Townland	County	Unique Reference Number	Legal Status	Effect	Description	Pre-Mitigation Significance	Mitigation
Joint Bay 60 / HDD under the Grand Canal and R445	Jigginstown	Kildare	AY_44	Preservation Order	Indirect negative	Noise and visual intrusion from construction plant would have an indirect impact on this constraint. However, traffic noise and vehicle movement form part of this constraints setting and the relationship with the complex would be unaffected. In addition it is anticipated any intrusion would be temporary (lasting the duration of construction in this location) and distant.	Imperceptible	None proposed
Off-road	Stephenstown South	Kildare	AY_51	Recorded Monument	Direct negative	The PAB is located within the Zone of Notification of this Recorded Monument (AY_51) and construction would have a direct impact on any archaeological remains that may be present. However, within the PAB in this location extensive disturbance which is likely to have removed any remains associated within this constraint already.	Slight	Archaeological excavation. This would be informed by archaeological geophysical survey and archaeological test excavation
Within Dunstown Substation	Dunstown	Kildare	AY_58	Recorded Monument	Direct negative	The PAB is located within the Zone of Notification of this Recorded Monument (AY_58). It is likely any archaeological remains associated with this monument that may have been present have been removed or truncated as a result of the construction of the substation; however, construction would have a direct impact on any archaeological remains that may survive.	Slight	Archaeological monitoring during construction

Table 2: Effects on Architectural Heritage during Construction

Route Section	Townland	County	Unique Reference Number	Legal Status	Effect	Description	Significance	Mitigation
On-road	Phepotstown	Meath	AH_01	None	Direct negative	There is the potential for accidental damage to the boundary walls forming part of this constraint given their location partially within the PAB.	Moderate	Preservation in situ; protection during construction
Watercourse crossing	Moortown	Kildare	AH_06	Protected Structure	Indirect negative	While noise and visual intrusion from construction plant would have an indirect impact on this constraint, this would be distant, largely be screened by established vegetation, mature trees and intervening buildings and it is anticipated any intrusion would be temporary (lasting the duration of construction in this location).	Imperceptible	None proposed
Watercourse crossing and joint bay	Ballynagappagh	Kildare	AH_11	Protected Structure	Direct negative	There is the potential for accidental damage to the boundary walls associated with this constraint.	Moderate	Preservation in situ; protection during construction
					Indirect negative	There would be an indirect impact on the setting of this constraint during construction due to noise and visual intrusion from construction plant and removal of hedgerow beyond the R408 for the joint bay. However, it is anticipated any intrusion would be temporary (lasting the duration of construction in this location) and the hedgerow will be re-instated. The relationship with farm would be maintained.	Slight	None proposed
On-road	Millicent Demesne	Kildare	AH_12	Protected Structure	Direct negative	There is the potential for accidental damage to the lych gate associated with this constraint.	Moderate	Preservation in situ; protection during construction
					Indirect negative	Noise and visual intrusion from construction plant and the construction compound to the south would have an indirect impact on this constraint; however, the relationship between the church, lych gate and surrounding churchyard would be unaffected.	Slight	None proposed
On-road / Off-road	Millicent Demesne	Kildare	AH_15	Protected Structure	Indirect negative	There would be an indirect impact on the setting of this constraint during construction due to noise and visual intrusion from construction plant.	Slight	None proposed
On-road	Bluebell	Kildare	AH_18	Protected Structure	Indirect negative	While there is potential for an indirect impact on the setting of this constraint during construction due to noise and visual intrusion from construction plant, it is anticipated any intrusion would be temporary (lasting the duration of construction in each location) and	Imperceptible	None proposed

Route Section	Townland	County	Unique Reference Number	Legal Status	Effect	Description	Significance	Mitigation
						would largely be screened by the high stone boundary wall adjacent to the road.		
On-road	Boycetown	Kildare	AH_19	Protected Structure	Indirect negative	There would be an indirect impact on the setting of this constraint during construction due to noise and visual intrusion from construction plant. However, traffic noise and vehicle movement form part of this constraints setting and the relationship between the former church and the surrounding churchyard and adjacent cemetery would be maintained.	Slight	None proposed
On-road	Osberstown	Kildare	AH_20	None	Indirect negative	Noise and visual intrusion from construction plant and the construction compounds to the east would have an indirect impact on this constraint; however, the relationship between the bridge and railway would be unaffected.	Slight	None proposed

Table 3: Effects on GDLs during Construction

Route Section	Townland	County	Unique Reference Number	Legal Status	Effect	Description	Significance	Mitigation
Passing Bay 46	Firmount Demesne	Kildare	DL_14	None	Direct negative	Construction of Passing Bay 46 would remove approximately 100m of established hedgerow and the ditch along the boundary to this constraint.	Slight	Photographic and written record of the impacted elements of GDLs
Passing Bay 46	Firmount East	Kildare	DL_15	None	Direct negative	Construction of Passing Bay 46 would remove approximately 118m of established hedgerow and the ditch along the boundary to this constraint. While the entrance wall and gate pier to the south of the entrance is within the PAB, it is assumed this feature would be retained.	Slight	Photographic and written record of the impacted elements of GDLs
Joint Bay 48 / Off-road	Millicent Demesne	Kildare	DL_17	None	Direct negative	Joint Bay 48 would remove approximately 120m of established hedgerow along the boundary of this constraint, as well as internal boundaries depicted on historic OS mapping within the demesne in the off-road section between ch.36,200 - ch.36,500.	Slight	Photographic and written record of the impacted elements of GDLs

Table 4: Effects on Cultural Heritage during Construction

Route Section	Townland	County	Unique Reference Number	Legal Status	Effect	Description	Significance	Mitigation
					Direct negative	The Proposed Project is located adjacent to this structure and therefore there is the potential for accidental damage to its historic fabric as a result of construction.	Slight	Preservation in situ; protection during construction
On-road	Jenkinstown	Meath	CH_03	None	Indirect negative	There would be an indirect impact on the setting of this constraint during construction due to noise and visual intrusion from construction plant. However, this constraint will still be understandable as a roadside public house.	Slight	None proposed
Watercourse crossing	Jenkinstown	Meath	CH_04	None	Direct negative	While this road bridge would be retained, the Proposed Project is located adjacent to this structure and therefore there is the potential for accidental damage to its historic fabric as a result of construction.	Slight	Preservation in situ; protection during construction
Watercourse crossing	Martinstown	Meath	CH_06	None	Direct negative	While this road bridge would be retained, the Proposed Project is located adjacent to this structure and therefore there is the potential for accidental damage to its historic fabric as a result of construction.	Slight	Preservation in situ; protection during construction
Watercourse crossing (WB09)	Phepotstown; Calgath	Meath	CH_07	None	Direct negative	While this road bridge would be retained, the Proposed Project is located adjacent to this structure and therefore there is the potential for accidental damage to its historic fabric as a result of construction.	Slight	Preservation in situ; protection during construction
Watercourse crossing	Baltracey	Kildare	CH_24	None	Direct negative	While this road bridge would be retained, the Proposed Project is located adjacent to this structure and therefore there is the potential for accidental damage to its historic fabric as a result of construction.	Slight	Preservation in situ; protection during construction
On-road	Betaghstown	Kildare	CH_37	None	Indirect negative	There would be an indirect impact on the setting of this constraint during construction due to noise and visual intrusion from construction plant.	Slight	None proposed
On-road	Firmount West	Kildare	CH_39	None	Indirect negative	There would be an indirect impact on the setting of this constraint during construction due to noise and visual intrusion from construction plant.	Slight	None proposed

Route Section	Townland	County	Unique Reference Number	Legal Status	Effect	Description	Significance	Mitigation
On-road	Firmount West	Kildare	CH_41	None	Indirect negative	There would be an indirect impact on the setting of this constraint during construction due to noise and visual intrusion from construction plant.	Slight	None proposed
On-road	Firmount West	Kildare	CH_42	None	Indirect negative	There would be an indirect impact on the setting of this constraint during construction due to noise and visual intrusion from construction plant.	Slight	None proposed
On-road	Firmount Demesne	Kildare	CH_43	None	Indirect negative	There would be an indirect impact on the setting of this constraint during construction due to noise and visual intrusion from construction plant.	Slight	None proposed
On-road	Millicent South	Kildare	CH_46	None	Indirect negative	There would be an indirect impact on the setting of this constraint during construction due to noise and visual intrusion from construction plant.	Slight	None proposed
On-road	Killashee	Kildare	CH_55	None	Indirect negative	There would be an indirect impact on the setting of this constraint during construction due to noise and visual intrusion from construction plant.	Slight	None proposed
On-road	Oldtown	Kildare	CH_56	None	Indirect negative	There would be an indirect impact on the setting of this constraint during construction due to noise and visual intrusion from construction plant.	Slight	None proposed
On-road	Mylerstown	Kildare	CH_57	None	Indirect negative	There would be an indirect impact on the setting of this constraint during construction due to noise and visual intrusion from construction plant.	Slight	None proposed
Off-road	Woodland	Meath	CH_60	None	Direct negative	Construction of the off-road section between ch.50 - ch.550, including excavation of the cable trench, provision of access track & work areas / storage of material would remove ring-ditches forming part of this constraint present within the PAB.	Significant	Archaeological excavation. This would be informed by archaeological geophysical survey and archaeological test excavation
Joint Bay 8 / watercourse crossing (WB04)	Jenkinstown	Meath	CH_64	None	Direct negative	Construction of Joint Bay 8, including provision of access track, and the watercourse crossing between ch.5,920 - ch.6,000 would remove the remains of the post-medieval farmstead (depicted on Historic 6" mapping).	Significant	Archaeological excavation. This would be informed by archaeological geophysical survey and archaeological test excavation
Off-road	Cullendraugh	Meath	CH_66	None	Direct negative	Construction of the off-road section between ch.2,875 - ch.3,030, including excavation of the cable trench, Joint Bay 4, provision of access track & work areas / storage of material would remove curvi-linear features forming part of this constraint present within the PAB.	Significant	Archaeological excavation. This would be informed by archaeological geophysical survey

Route Section	Townland	County	Unique Reference Number	Legal Status	Effect	Description	Significance	Mitigation
								and archaeological test excavation
Off-road section / construction compound	Cullendraugh	Meath	CH_68	None	Direct negative	Construction of the off-road section between ch.3,000 - ch.3,250, including excavation of the cable trench, provision of access track & work areas / storage of material, as well as the establishment of the construction compound, would remove this former field boundary.	Slight	Archaeological excavation. This would be informed by archaeological geophysical survey and archaeological test excavation
Passing Bay 6	Warrenstown	Meath	CH_69	None	Direct negative	Construction of Passing Bay 6 between ch.4,450 - ch.4,580 would remove curvi-linear features forming part of this constraint present within the PAB.	Significant	Archaeological excavation. This would be informed by archaeological geophysical survey and archaeological test excavation
Passing Pay 13	Phepotstown	Meath	CH_74	None	Direct negative	Construction of Passing Bay 13 between ch. 9,100 - ch. 9,200 would remove approximately one third of the ditch identified from aerial imagery present within the PAB.	Slight	Archaeological excavation. This would be informed by archaeological geophysical survey and archaeological test excavation
Joint Bay 15 / watercourse crossing (WB07)	Phepotstown	Meath	Ch_76	None	Direct negative	Construction of the watercourse crossing between ch.10,630 - ch.10,720, including provision of access track, and would remove any remains of a field system of unknown date present within the PAB in this location.	Slight	Archaeological excavation. This would be informed by archaeological geophysical survey and archaeological test excavation
HDD under the M4 motorway	Kilcock	Kildare	CH_81	None	Direct negative	The HDD reception pit required for the HDD under the M4 motorway at ch. 16,750 would remove an enclosure identified from aerial imagery present within the PAB.	Significant	Archaeological excavation. This would be informed by archaeological geophysical survey and archaeological test excavation
Passing Bay 38	Betaghstown	Kildare	CH_92	None	Direct negative	Construction of Passing Bay 38 between ch. 28,150 - ch. 28,300 would remove less than 10m of the former field boundary present within the PAB.	Slight	Archaeological excavation. This would be informed

Route Section	Townland	County	Unique Reference Number	Legal Status	Effect	Description	Significance	Mitigation
								by archaeological geophysical survey and archaeological test excavation
Off-road	Curryhills	Kildare	CH_94	None	Direct negative	Construction of the off-road section between ch.31,350 - ch.31,700, including excavation of the cable trench, provision of access track & work areas / storage of material would remove two approximately 20m sections of former field boundary associated with this field system present within the PAB.	Slight	Archaeological excavation. This would be informed by archaeological geophysical survey and archaeological test excavation
Off-road	Castlesize	Kildare	CH_100	None	Direct negative	Construction of the off-road section ch.35,500, including excavation of the cable trench, provision of access track & work areas / storage of material would remove approximately 30m of this former field boundary present within the PAB.	Slight	Archaeological excavation. This would be informed by archaeological geophysical survey and archaeological test excavation
Watercourse crossing (WB24)	Jenkinstown	Kildare	CH_106	None	Direct negative	Construction of the watercourse crossing at ch.6,000 would remove this constraint.	Significant	Written and photographic survey Reinstatement following construction
On-road	Boycetown	Kildare	CH_107	None	Indirect negative	There would be an indirect impact on the setting of this constraint during construction due to noise and visual intrusion from construction plant. However, this would be temporary and largely screened by established vegetation. Its roadside location and relationship with the cemetery would be maintained.	Slight	None proposed
Watercourse Crossing (WB12)	Balfeaghan	Meath	CH_109	None	Direct negative	There is the potential for accidental damage to this entrance given its location within the PAB.	Slight	Preservation in situ; protection during construction
HDD under Royal Canal	Boycetown	Kildare	CH_110	None	Indirect negative	Noise and visual intrusion from operation of plant adjacent to canal	Slight	None proposed
On-road	Osberstown	Kildare	CH_112	None	Indirect negative	Noise and visual intrusion from operation of plant adjacent to canal	Slight	None proposed
HDD under Grand Canal	Jigginstown	Kildare	CH_113	None	Indirect negative	Noise and visual intrusion from operation of plant adjacent to canal	Slight	None proposed

Route Section	Townland	County	Unique Reference Number	Legal Status	Effect	Description	Significance	Mitigation
Watercourse Crossing (WB06)	Mullagh	Meath	CH_117	None	Direct negative	Construction of the watercourse crossing at ch.8,080 would remove approximately 40m of former field boundary that forms part of this constraint.	Slight	Archaeological excavation. This would be informed by archaeological geophysical survey and archaeological test excavation
Watercourse Crossing (WB08)	Kemmins Mill	Meath	CH_118	None	Direct negative	Construction of the watercourse crossing at ch.11,180 would remove approximately 50m of the Old Mill Race identified from historic mapping (Ordnance Survey 6", 1837 – 1842).	Slight	Archaeological excavation. This would be informed by archaeological geophysical survey and archaeological test excavation
Joint Bay 16	Phepotstown	Meath	CH_119	None	Direct negative	Construction of Joint Bay 16 between ch. 11,350 - ch. 11,430 would remove approximately 30m of this former field boundary present within the PAB.	Slight	Archaeological excavation. This would be informed by archaeological geophysical survey and archaeological test excavation
Joint Bay 17 / Watercourse Crossing (WB10)	Calgath	Meath	CH_120	None	Direct negative	Construction of Joint Bay 16 and the watercourse crossing (WB10) between ch.12,200 - ch.12,450 would remove any remains of a field system of unknown date present within the PAB in this location.	Slight	Archaeological excavation. This would be informed by archaeological geophysical survey and archaeological test excavation
Off-road	Curryhills	Kildare	CH_121	None	Direct negative	Construction of the off-road section between ch.31,000 and ch.31,350, including excavation of the cable trench and provision of work areas / storage of material would partially remove former field boundaries and partially remove a possible rath present within the PAB.	Moderate	Archaeological excavation. This would be informed by archaeological geophysical survey and archaeological test excavation
Joint Bay 12	Phepotstown	Meath	CH_122	None	Direct negative	Construction of Joint Bay 12 between ch.8,560 - ch.8,600 would partially remove the drainage features present within the PAB in this location.	Slight	Archaeological excavation. This would be informed by archaeological geophysical survey

Route Section	Townland	County	Unique Reference Number	Legal Status	Effect	Description	Significance	Mitigation
								and archaeological test excavation

Table 5: Effects on LiDAR Constraints during Construction

Route Section	Townland	County	Unique Reference Number	Legal Status	Effect	Description	Significance	Mitigation
Off-road	Woodland	Meath	LI_001	None	Direct negative	Construction of the off-road section between ch.50m - ch.250, including excavation of the cable trench, provision of access track & work areas / storage of material, would remove this constraint.	Slight	Archaeological excavation. This would be informed by archaeological geophysical survey and archaeological test excavation
Off-road	Gaulstown; Culcommon	Meath	LI_006	None	Direct negative	Construction of the off-road section between ch.775m - ch.1,500, including excavation of the cable trench, provision of access track & work areas / storage of material, would remove former field boundaries and areas of cultivation patterns associated with this constraint present within the PAB.	Slight	Archaeological excavation. This would be informed by archaeological geophysical survey and archaeological test excavation
Off-road	Gaulstown	Meath	LI_009	None	Direct negative	Construction of the off-road section at ch.1,800, including excavation of the cable trench, provision of access track & work areas / storage of material would remove approximately 28m of this ditch present within the PAB.	Slight	Archaeological excavation. This would be informed by archaeological geophysical survey and archaeological test excavation
Off-road	Cullendraugh	Meath	LI_011	None	Direct negative	Construction of the off-road section at ch.1,950, including excavation of the cable trench, provision of access track & work areas / storage of material would remove approximately 32m of this ditch present within the PAB.	Slight	Archaeological excavation. This would be informed by archaeological geophysical survey and archaeological test excavation

Route Section	Townland	County	Unique Reference Number	Legal Status	Effect	Description	Significance	Mitigation
Off-road	Cullendraugh	Meath	LI_015	None	Direct negative	Construction of the off-road section between ch.2,375 and ch.2,425, including excavation of the cable trench, provision of access track & work areas / storage of material would remove this constraint.	Significant	Topographical survey (written, photographic and drawn survey) Archaeological excavation. This would be informed by archaeological geophysical survey and archaeological test excavation
Off-road	Cullendraugh	Meath	LI_017	None	Direct negative	Construction of the off-road section between ch.2,425 and ch.2,600, including excavation of the cable trench, provision of access track & work areas / storage of material would remove a linear feature and cultivation patterns present within the PAB associated with this constraint.	Slight	Archaeological excavation. This would be informed by archaeological geophysical survey and archaeological test excavation
Off-road / Joint Bay 4	Cullendraugh	Meath	LI_026	None	Direct negative	Construction of the off-road section between ch.2,875 and ch.3,050, including excavation of the cable trench, provision of access track & work areas / storage of material and Joint Bay 4 would remove a linear feature and field drainage present within the PAB associated with this constraint.	Slight	Archaeological excavation. This would be informed by archaeological geophysical survey and archaeological test excavation
Passing Bay 7	Warrenstown	Meath	LI_027	None	Direct negative	Construction of Passing Bay 7 between ch.5,150 and ch.5,250 would remove this constraint.	Significant	Topographical survey (written, photographic and drawn survey) Archaeological excavation. This would be informed by archaeological

Route Section	Townland	County	Unique Reference Number	Legal Status	Effect	Description	Significance	Mitigation
								geophysical survey and archaeological test excavation
Passing Bay 11	Mullagh	Meath	LI_032	None	Direct negative	Construction of Passing Bay 11 between ch.7,950 and ch.8,050 would remove this constraint.	Significant	Topographical survey (written, photographic and drawn survey) Archaeological excavation. This would be informed by archaeological geophysical survey and archaeological test excavation
Joint Bay 5	Barstown	Meath	LI_038	None	Direct negative	Construction of Joint Bay 5 between ch.3,700 and ch.3,800 would remove approximately 16m of a former field boundary forming part of this field system present within the PAB.	Slight	Archaeological excavation. This would be informed by archaeological geophysical survey and archaeological test excavation
Watercourse crossing (WB03)	Barstown	Meath	LI_042	None	Direct Negative	Construction of the watercourse crossing at ch. 3,600 would remove the footings of the roadside building and approximately 20m of the former boundary associated with this building.	Moderate	Topographical survey (written, photographic and drawn survey) Archaeological excavation. This would be informed by archaeological geophysical survey and archaeological test excavation

Route Section	Townland	County	Unique Reference Number	Legal Status	Effect	Description	Significance	Mitigation
Joint Bay 15	Martinstown	Meath	LI_054	None	Direct Negative	Construction of Joint Bay 15, including the access track, between ch.10,700 and ch.10,900 would remove drainage forming part forming part of this field system present within the PAB.	Slight	Archaeological excavation. This would be informed by archaeological geophysical survey and archaeological test excavation
Construction compound	Kemmins Mill	Meath	LI_056	None	Direct negative	Establishment of the construction compound at Martinstown would remove this constraint.	Slight	Archaeological excavation. This would be informed by archaeological geophysical survey and archaeological test excavation
Joint Bay 18	Calgath	Meath	LI_065	None	Direct negative	Construction of Joint Bay 18 would remove approximately a quarter of the site of 'Calgath Corn Mill', including any remains of two buildings associated with the complex depicted on Historic OS mapping present within the PAB. ch.13,000 and ch.13,100	Moderate	Topographical survey (written, photographic and drawn survey) Archaeological excavation. This would be informed by archaeological geophysical survey and archaeological test excavation
Joint Bay 29 / Watercourse crossings (WB17, WB18 and WB19)	Ballyloughan	Kildare	LI_092	None	Direct negative	Construction of Joint Bay 29 and the watercourse crossings between ch. 21,250 and ch.21,650 would remove former field drainage / cultivation patterns present within the PAB.	Slight	Archaeological excavation. This would be informed by archaeological geophysical survey and archaeological test excavation

Route Section	Townland	County	Unique Reference Number	Legal Status	Effect	Description	Significance	Mitigation
Joint Bay 31	Baltracey	Kildare	LI_096	None	Direct negative	Construction of Joint Bay 31, and associated access track, between ch. 22,975 and ch.23,025 would remove a 55m section of extant field boundary associated within this constraint present within the PAB.	Slight	Archaeological excavation. This would be informed by archaeological geophysical survey and archaeological test excavation
Watercourse crossing	Ballynaboley	Kildare	LI_113	None	Direct negative	Construction of the watercourse crossings between ch. 27,500 and ch.27,600 would remove approximately 40m of this former field boundary present within the PAB.	Slight	Archaeological excavation. This would be informed by archaeological geophysical survey and archaeological test excavation
Passing Bay 43	Longtown North	Kildare	LI_119	None	Direct negative	Construction of Passing Bay 43 between ch. 32,000 and ch.32,125 would remove approximately 20m of former field boundary and sections of extant field boundaries forming part of this constraint that are present within the PAB.	Slight	Archaeological excavation. This would be informed by archaeological geophysical survey and archaeological test excavation
Joint Bay 46	Firmount East	Kildare	LI_125	None	Direct negative	Construction of Joint Bay 46 at ch. 34,480 would remove approximately 15m of former field boundary that is present within the PAB.	Slight	Archaeological excavation. This would be informed by archaeological geophysical survey and archaeological test excavation
Off-road	Millicent Demesne	Kildare	LI_134	None	Direct negative	Construction of the off-road section between ch.36,300 and ch.36,400, including excavation of the cable trench, provision of access track & work areas / storage of material would remove a possible	Slight	Topographical survey (written, photographic and drawn survey)

Route Section	Townland	County	Unique Reference Number	Legal Status	Effect	Description	Significance	Mitigation
						drainage feature associated with Millicent Demesne (DL_17) present within the PAB.		Archaeological excavation. This would be informed by archaeological geophysical survey and archaeological test excavation
Off-road / Joint Bay 54	Osberstown	Kildare	LI_143	None	Direct negative	Construction of the off-road section between ch.40,250 and ch.40,600, including excavation of the cable trench, provision of access track & work areas / storage of material, as well as Joint Bay 54, would remove former field boundaries and drainage features forming part of this constraint present within the PAB.	Slight	Archaeological excavation. This would be informed by archaeological geophysical survey and archaeological test excavation
Construction compound	Osberstown	Kildare	LI_145	None	Direct negative	Construction of the Proposed Project, including the establishment of the construction compound at Osberstown, would remove approximately 167m of this constraint.	Slight	Archaeological excavation. This would be informed by archaeological geophysical survey and archaeological test excavation
On-road	Rathasker	Kildare	LI_156	None	Direct negative	Construction of the Proposed Project between ch. 48,600 and ch.48,650 would remove any archaeological remains associated with this constraint that present within the roadside verge.	Slight	Archaeological excavation. This would be informed by archaeological geophysical survey and archaeological test excavation
Watercourse crossing (WB44)	Killashee	Kildare	LI_158	None	Direct negative	Construction of the watercourse crossing at ch. 49,000 would remove this constraint.	Moderate	Topographical survey (written, photographic and drawn survey)

Route Section	Townland	County	Unique Reference Number	Legal Status	Effect	Description	Significance	Mitigation
								Archaeological excavation. This would be informed by archaeological geophysical survey and archaeological test excavation

Table 6: Effects on Townland Boundaries during Construction

Route Section	Townland	County	Unique Reference Number	Legal Status	Effect	Description	Significance	Mitigation
Off-road / watercourse crossing (WB01)	Gaulstown - Woodland	Meath	TB_01	None	Direct negative	Construction of the off-road section at ch. 800, including excavation of the cable trench, provision of access track & work areas / storage of material, as well as the watercourse crossing (WB01; in-stream trenching), would remove approximately 40m of hedgerow within the PAB.	Moderate	Townland boundary survey
Off-road / watercourse crossing	Gaulstown - Cullendragh	Meath	TB_03	None	Direct negative	Construction of the off-road section at ch.1,900, including excavation of the cable trench, provision of access track & work areas / storage of material, as well as the watercourse crossing (WB02; in-stream trenching), would remove approximately 30m of hedgerow within the PAB.	Moderate	Townland boundary survey
Watercourse crossing	Mullagh - Phepotstown	Meath	TB_08	None	Direct negative	Construction of the watercourse crossing (WB06) at ch.8,080, via in-stream trenching, would remove a section of this townland boundary within the PAB.	Slight	Townland boundary survey
Watercourse crossing	Cullendragh - Barstown	Meath	TB_09	None	Direct negative	Construction of the watercourse crossing (WB03) at ch.3,615, via in-stream trenching, would remove a section of this townland boundary within the PAB.	Slight	Townland boundary survey
Watercourse crossing	Phepotstown - Martinstown	Meath	TB_10	None	Direct negative	Construction of the watercourse crossing (WB07) at ch. 10,700, via in-stream trenching, and the access track would remove a section of this townland boundary within the PAB.	Slight	Townland boundary survey
Watercourse crossing	Kemmins Mill - Phepotstown	Meath	TB_12	None	Direct negative	Construction of the watercourse crossing (WB08) at ch. 11,180, via in-stream trenching, would remove a section of this townland boundary within the PAB.	Slight	Townland boundary survey
Watercourse crossing WB40 / Joint Bay 16	Phepotstown - Calgath	Meath	TB_13	None	Direct negative	While the cable would cross the watercourse at this location within the existing road, construction of the passing bay associated with Joint Bay 16 at ch. 11,180, would remove a section of this townland boundary within the PAB.	Slight	Townland boundary survey

Route Section	Townland	County	Unique Reference Number	Legal Status	Effect	Description	Significance	Mitigation
Watercourse crossing	Ballybrack - Ballyloughan	Kildare	TB_25	None	Direct negative	Construction of the watercourse crossing (WB17) at ch. 21,250, via in-stream trenching, would remove a section of this townland boundary within the PAB.	Slight	Townland boundary survey
Watercourse crossing	Killashee - Oldtown	Kildare	TB_61	None	Direct negative	Construction of the watercourse crossing (WB44) at ch. 49,000, via in-stream trenching, would remove a section of this townland boundary within the PAB.	Slight	Townland boundary survey

Table 7: Effects on Archaeology during Operation

Route Section	Townland	County	Unique Reference Number	Legal Status	Effect	Description	Significance	Mitigation
Joint Bay 60 / HDD under the Grand Canal and R445	Jigginstown	Kildare	AY_39	National Monument	Indirect negative	During the operation of the Proposed Project the presence of new infrastructure in the form of the concrete cap for Joint Bay 60 and access track to the east of this complex, would introduce a new source of visual intrusion in the setting of this constraint.	Imperceptible	None proposed

No further direct or indirect impacts were identified for archaeology, architectural heritage and cultural heritage, including LiDAR constraints and townland boundaries, during operation.

Appendix 13.3 LiDAR Analysis

Jacobs

LiDAR Analysis for Kildare Meath Grid Upgrade

Revision no: 1

EirGrid
Kildare Meath Grid Upgrade
12 August 2022

LiDAR Analysis for Kildare Meath Grid Upgrade

Client name:	EirGrid		
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Revision no:	1	**Prepared by:**	Abby Cooper
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Revision	Date	Description	Author	Checked	Reviewed	Approved
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Jacobs Engineering Ireland Limited

Merrion House
Merrion Road
Dublin 4, D04 R2C5
Ireland

T +353 (0)1 269 5666
F +353 1 269 5497
www.jacobs.com

Executive summary

Jacobs were commissioned by EirGrid to undertake a review of Light Detection and Ranging (LiDAR) data captured for the Kildare Meath Grid Upgrade project. The aim of the review was to inform the archaeology, architectural heritage and cultural heritage baseline for Step 5 of the Kildare Meath Grid Upgrade project by gathering additional information on the form, extent and condition of known archaeological constraints and identifying, mapping and interpreting any previously unrecorded potential archaeological features. This report presents the results of the review of the LiDAR data undertaken by Jacobs.

Contents

Appendices

Figures

1. Introduction

Jacobs were commissioned by EirGrid to undertake a review of Light Detection and Ranging (LiDAR) data captured for the Kildare Meath Grid Upgrade project to identify previously unrecorded potential archaeological features and gather additional information on known archaeological constraints. High-resolution LiDAR data was captured for the preferred cable route option (Option A (Red)) extending approximately 53km from Woodland 400kV Converter Substation, near Batterstown in County Meath, to Dunstown 400/220kV Substation, near Two Mile House in County Kildare.

This technical note presents the results of the review of the LiDAR data following the visualisation of the LiDAR data as single direction hillshade models, a multi-directional hillshade model and Simple Local Relief Model.

Section 2 of this technical note provides the background to the review of the LiDAR data as well as a summary of the receiving environment, including topographical and geological background. Section 3 outlines the methodology used for the review of the LiDAR data, including supplementary sources of information consulted to verify the interpretations of potential archaeological features. Section 4 presents a summary of the results of the review of the LiDAR data and Section 5 discusses the results. An inventory identifying all potential archaeological features identified during the review of the LiDAR data is also provided (Appendix A) and an overview of the locations of potential archaeological features is shown on Figure 1.

1.1 Aims and Objectives

The aim of the review of the LiDAR data was to inform the archaeology, architectural heritage and cultural heritage baseline for Step 5 of the Kildare Meath Grid Upgrade project by gathering additional information on the form, extent and condition of known archaeological constraints and identifying, mapping and interpreting any previously unrecorded potential archaeological features within the 100m Study Area (see below).

This was achieved through:

- processing and visualising the LiDAR data acquired for the Kildare Meath Grid Upgrade project;
- undertaking a review of the visualisations to identify, map and interpret any potential archaeological features;
- verifying the results against other sources (see below); and
- the production of a shapefile and inventory of the results of the review of the LiDAR data, as well as this technical note summarising the results.

2. Receiving Environment

2.1 Location, Topography and Geology

The preferred cable route option (Option A (Red)) extends south from Woodland in County Meath to Dunstown in County Kildare (Figure 1). The preferred cable route option (Option A (Red)) is located within a mainly rural landscape, largely within the existing carriageways of regional and local roads; however, the option also includes a number of offline sections. It passes through rural linear settlements characterised by detached buildings, roadside farms and equestrian studs, and clusters of houses focussed along existing roads. While largely agricultural, more recent development includes the M4 and M7 motorways and Sallins Bypass. The preferred cable route option (Option A (Red)) also crosses the River Liffey and the Rye Water, as well as a number of minor watercourses.

The underlying geology is largely limestone, with several areas of outcropping bedrock noted to the north of the preferred cable route option (Option A (Red)) in Barstown, Jenkinstown, and Mullagh. Superficial deposits comprise till, gravel, areas of alluvium, and lacustrine sediments.

2.2 Archaeology, Architectural Heritage, and Cultural Heritage

A summary of archaeology, architectural heritage, and cultural heritage constraints identified within the Step 3 Project Study Area along with a discussion on the general character and nature of the constraints present is presented in the Environmental Constraints Report (Jacobs, 2021) and has not been duplicated here. Further baseline information on archaeology, architectural heritage and cultural heritage constraints can also be found in Appendix B.1 (Archaeology, Architectural Heritage, and Cultural Heritage Baseline Information) of the Step 4A Report.

There are 23 known archaeological constraints located within the 100m Study Area (including one redundant record and one excavation; see Table 1). These are largely characterised by enclosures of unknown date (ten), features associated with the 17th century Jigginstown Castle complex (five) and evidence of domestic and religious activity dating from the medieval period onwards.

Table 1: Known archaeological constraints identified from the SMR and/or RMP within the 100m Study Area.

Type	Count
Designed landscape - formal garden	1
Enclosure	10
Excavation - miscellaneous	1
Field system	1
Font (present location)	1
Gatehouse	1
House - 17th century	1
Kiln - lime	1
Midden	1
Mound	2
Redundant record	1
Ringfort - rath	1
Ritual site - holy well	1

3. Methodology

LiDAR is a remote sensing technique for determining three-dimensional data points through '*the use of laser light to determine distance to an object or surface*' (Historic Environment Scotland, 2018). The resulting data provides accurate topographic information which can aid the identification of archaeological remains, even very indistinct earthworks, including within areas of thick vegetation (Lambrick, 2008).

LiDAR data for the Kildare Meath Grid Upgrade project was acquired by Bluesky on behalf of EirGrid using a 2 MHz Leica Terrain Mapper scanner mounted to a Beech Craft King Air twin-prop fixed wing aircraft in March 2022 (Bluesky, 2022). The raw laser data was processed and classified to create a three-dimensional point cloud. Digital Elevation Models (DEMs), both a Digital Surface Model (DSM) and a Digital Terrain Model (DTM), were produced from the point cloud in ASCII format. A DSM is a model that '*contains elevations of natural terrain features including objects on it, i.e. vegetation and cultural features such as buildings*' whereas a DTM '*represents the elevation of 'bare earth', i.e. the shape of terrain without any objects on it*' (Kokalj and Hesse, 2017, p. 76). Data were tied to Irish Transverse Mercator (ITM).

The LiDAR data were converted from ASCII to raster format using ArcGIS 10.6.1. A mosaic of the converted data was created and used to produce visualisations using the ArcToolbox and the methodologies in *Processing and Working with LiDAR Data in ArcGIS: A Practical Guide for Archaeologists* (Davis, 2012) and *LiDAR-derived Local Relief Models – a new tool for archaeological prospection* (Hesse, 2010).

A number of complementary visualisations were created to review the LiDAR data. These comprised:

- Single direction hillshades – a technique based on the '*hypothetical illumination of a surface… to show subtle changes in the topography of DEMs with the use of shadow*' (Historic England, 2018, p.90). Hillshade models of the DEMs were produced using various azimuths to allow for comparison and the identification of features which may be imperceptible when lit from certain angles (i.e. linear earthworks).
- Multi-directional hillshade – a technique that produces a composite of a number of single direction hillshades lit from different directions (commonly 16 directions) containing information from all the separate elements. This technique can be used to counter the issue of certain features being imperceptible when lit from certain angles; however, features may become 'washed out' as a result of over exposed areas.
- Simple Local Relief Model (LRM) – a technique that '*separates local small-scale features from large scale landscape forms*' which enhances the visibility of shallow topographic features irrespective of the illumination (Kokalj and Hesse, 2017, p. 77; Hesse, 2010). Local relief can be presented in simple colours which enhance the readability of the model.

A study area comprising the preferred cable route option (Option A (Red)) and an area extending 100m either side was overlaid on each visualisation (see below) for the review of the LiDAR data. To facilitate the review, the 100m Study Area was also divided into 1km grid squares.

For each grid square the visualisations produced from the LiDAR data were reviewed and the extents of potential archaeological features were digitised. In addition, the locations of known archaeological constraints identified from the SMR and/or RMP were reviewed to gather additional information about the form, extent and condition of these constraints, including digitising any visible features. Potential archaeological features were reviewed against a range of sources to verify their interpretation comprising:

- aerial imagery available online, including BlueSky Ortho imagery via ProjectMapper;
- publicly accessible historic Ordnance Survey mapping (6" to 1 mile, 1837 – 1842, and 25" to 1 mile, 1888-1913);
- modern mapping, including Google and Google StreetView; and
- known archaeological constraints identified as part of the Environmental Constraints Report (Jacobs, 2021) and as part of the Step 4A Report (Appendix B.1: Archaeology, Architectural Heritage, and Cultural Heritage Baseline Information).

A shapefile of the results was created capturing the following information:

- 1km grid square number – the unique reference given to the 1km^2 grid square the potential archaeological feature is located within or, where a feature overlaps grid squares, the grid square the majority of the feature is located within;
- unique Reference Number – the unique reference number, prefixed with 'LI', ascribed to all potential archaeological features identified, including previously recorded archaeological constraints;
- associated known constraint reference (if relevant) – known archaeology, architectural heritage and cultural heritage constraints located in proximity to the potential archaeological feature that may be associated;
- national dataset reference (if relevant) – the corresponding Record of Monuments and Place (RMP) or Sites and Monuments Record (SMR) reference number for the potential archaeological feature;
- Easting and Northing – ITM coordinates of the centroid of the feature;
- Townland – the name of the townland the potential archaeological feature is located within;
- Sources – the sources which were referred to inform and verify the interpretation of the potential archaeological feature;
- confidence:
    - High – strong possibility the feature is as interpreted;
    - Medium – the feature is tentatively interpreted; and
    - Low – limited possibility the feature is as interpreted; and
- site type – the type of site based on the interpretation of the potential archaeological feature.

Some potential archaeological features identified from the LiDAR data were found to be non-archaeological following review against other sources (see above), such as the circular wear patterns around modern animal feeders and mounds of modern material. These were not recorded and are not discussed below.

A summary of the results is presented below (Section 4). Full details for the potential archaeological features identified are provided in Appendix A (Inventory of Potential Archaeological Features) and an overview of the locations of potential archaeological features is shown on Figure 1.

3.1 Limitations

While processing the LiDAR data in GIS enables the visualisation and analysis of the data, the use of raster surfaces can result in the loss of some original data during processing.

LiDAR provides topographic information which can aid the identification of potential archaeological features. However, many archaeological features do not have an above ground expression and therefore not all archaeological features that may be present can be identified from LiDAR and there is the potential for further previously unrecorded buried archaeological features to be present.

4. Results

This section presents a summary of the results of the review of LiDAR data. Further details for the potential archaeological features identified are provided in Appendix A (Inventory of Potential Archaeological Features) and an overview of the locations of potential archaeological features is shown on Figure 1.

4.1 Overview

The review of the LiDAR data for the Kildare Meath Grid Upgrade project has identified 158 potential archaeological features within the 100m Study Area (Table 2; see Figure 1). Of these 31 potential archaeological features were identified as possibly being associated with known constraints within the 100m Study Area, such as archaeological monuments identified on the SMR and/or RMP (i.e. LI_124; Figure 2) as well as designed landscape features of demesne lands identified from historic Ordnance Survey mapping (i.e. LI_053; Figure 3). However 127 previously unrecorded potential archaeological features were identified.

Table 2: Summary classification of all potential archaeological features identified within the 100m Study Area.

Type	Count
Boundary	2
Building	19
Church / church yard	1
Designed landscape feature	7
Ditch	22
Drainage	5
Earthwork (Site of)	4
Enclosure	3
Field boundary	23
Field system	39
Gravel pit / Quarry	7
Linear earthwork	2
Mill - corn	1
Mound	12
Pits	1
Rath - ringfort	1
Ring ditch	2
Road	2
Smithy	1
Track	4

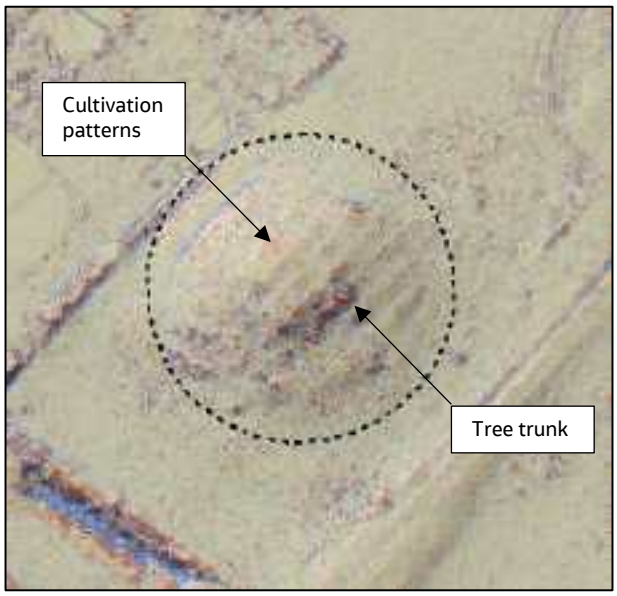


Figure 2: A mound in Firmount East (LI_124; AY_26) of possible Anglo-Norman date (National Monuments Service, 2012) recorded on the RMP (KD014-032) and on the Record of Protected Structures (B14-07). The evenly spaced parallel linear features visible on the surface of the mound may be the result of ploughing or lazy bedding. The circular features on the surface likely represent the trunks of established trees located on top of the mound.

Simple Local Relief Model (40% transparency) over Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.

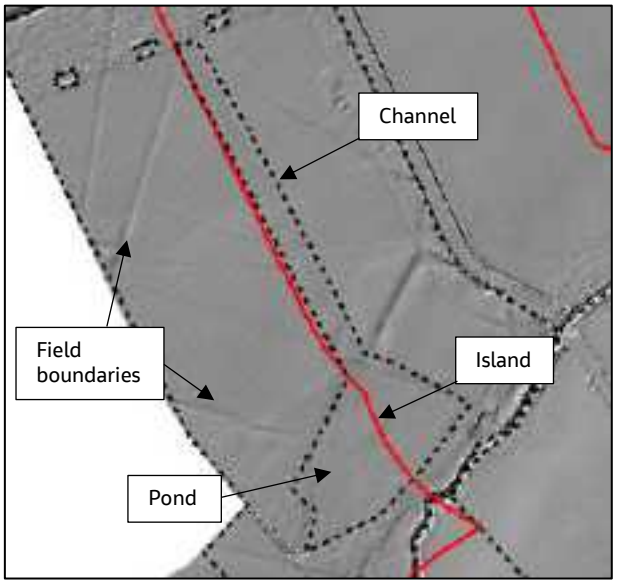


Figure 3: Faint earthworks of a channel and pond with circular island (LI_053) within Larch Hill House demesne (DL_04), as well as contemporary former field boundaries (outwith the 100m Study Area; red line), depicted on First Edition Ordnance Survey mapping (6" to 1 mile, 1837 – 1842).

Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.

A total of 19 sites of previously unrecorded buildings were identified from the LiDAR data (LI_015, LI_016 (Figure 4), LI_030, LI_032, LI_042 (Figure 5), LI_051, LI_055, LI_061, LI_069, LI_082, LI_083, LI_084, LI_086, LI_087, LI_120, LI_130, LI_141, LI_156 and LI_158). These are characterised by individual or small groups of rectangular features, often corresponding with buildings depicted on historic Ordnance Survey mapping. However, three of these buildings (LI_015 (Figure 6), LI_051 and LI_084) comprise possible buildings not depicted on modern mapping or historic Ordnance Survey mapping and therefore may pre-date these. The boundaries associated with two previously unrecorded farmsteads (LI_002 and LI_062), depicted on Ordnance Survey mapping (6" to 1 mile, 1837 – 1842), were also identified.

Figure 4: Rectangular features in Mullagh (LI_016) interpreted as the footings of buildings with evidence of a possible orchard (visible as an evenly spaced grid of small circular features characteristic of tree stumps).

Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.

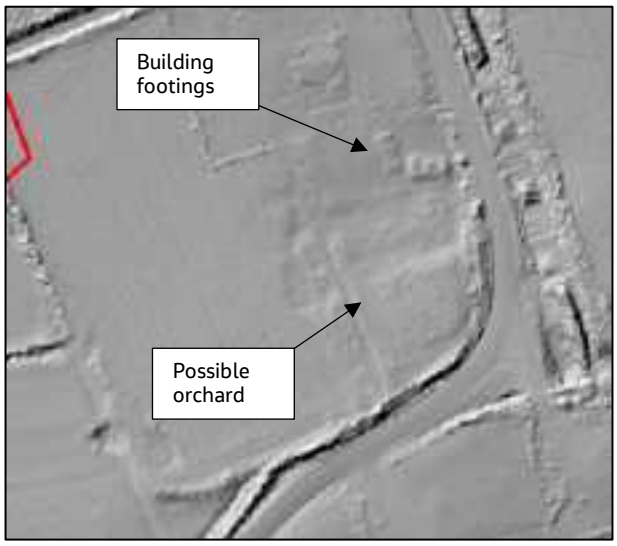


Figure 5: A rectangular feature (LI_042) in Barstown positioned perpendicular to the road that corresponds with a roadside building depicted on First Edition Ordnance Survey mapping (6" to 1 mile, 1837 – 1842). Boundary features demarcate the associated plot depicted on later Ordnance Survey mapping (25" to 1 mile, 1888-1913).

Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.

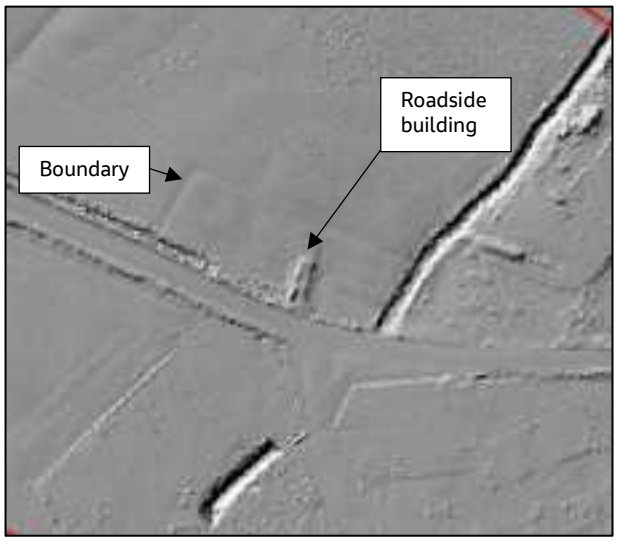
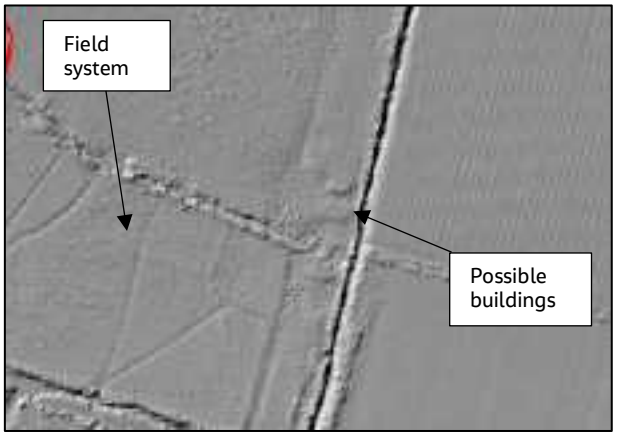


Figure 6: A cluster of rectangular features in Cullendragh (LI_015). These are not depicted on historic Ordnance Survey mapping but are similar to other buildings visible on historic Ordnance Survey mapping. Located to the north of a field system of unknown date (LI_17).

Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.



Seven designed landscape features, forming part of the grounds associated with large houses, were identified from the LiDAR data (LI_048, LI_053 (Figure 3), LI_099 (Figure 7), LI_122, LI_134, LI_150 and LI_151 (Figure 8)). Two of these (LI_099 and LI_150; Figures 7 and 8)) comprise an avenue and former field boundaries, and a sunken garden recorded on the RMP (KD010-011 and KD019-033003 respectively). The remaining features identified are associated with known houses and demesnes depicted on First Edition Ordnance Survey mapping (6" to 1 mile, 1837 – 1842).

A church / church yard (LI_131) recorded on the Recorded of Protected Structures (AH_12; B14-12) was also identified. The church yard is a sub-rectangular enclosure defined by a bank / ditch, measuring c.98m by 95m, surrounding a cruciform church with square apse and projecting porch.

Figure 7: The site of buildings (east of the 100m Study Area) in Baltracey that correspond with an 18th/19th century house (KD010-011) identified on the SMR, as well as earthworks associated with landscape features, including the remains of an avenue and former field boundaries (LI_099).

Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.

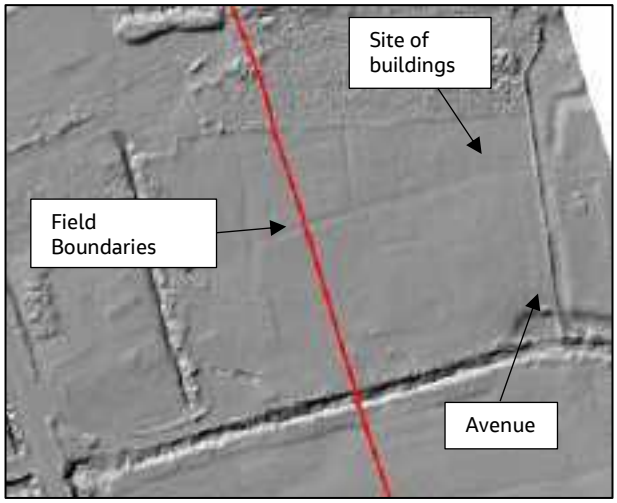
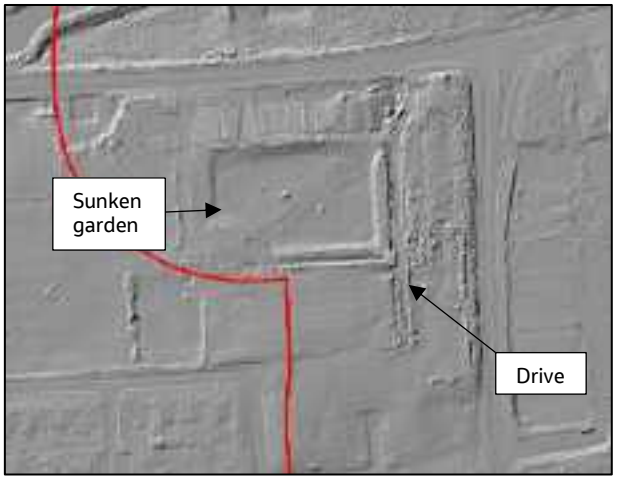


Figure 8: The sunken garden (LI_150; also AY_43) and drive (LI_151) associated with Jigginstown Castle (AY_39).

Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.



A total of 22 linear features, interpreted as ditches, were identified from the LiDAR data (LI_001, LI_008, LI_009, LI_010, LI_011, LI_014, LI_019, LI_025, LI_035, LI_044, LI_046, LI_047, LI_050, LI_57, LI_059, LI_081, LI_088, LI_112, LI_133, LI_148, LI_155, and LI_160). A further ditch feature (LI_093) corresponds with a linear earthwork recorded on the RMP (KD010-001001) on the townland boundary between Clonduff, Graiguepottle and Ballyloughan and may comprise a section of earthwork thought to have been constructed by the Anglo-Normans 14th and 15th centuries to protect Norman lands against the Irish. While four of the remaining ditches are located within demesne lands (LI_046, LI_047, LI_050, and LI_57) there are no corresponding features depicted on historic Ordnance Survey mapping, and the remaining ditches comprise

individual linear features with no diagnostic features and therefore the date and function of these are unknown.

A rath – ringfort (LI_116) recorded on the RMP (KD014-001) was visible on the LiDAR data (Figure 9). This feature was defined by a sub-circular bank. The rath – ringfort comprises a low, earthen bank with a possible entrance to the north-west (Figure 9). Previously unrecorded ring ditches, circular or near circular ditches, which are usually seen as cropmarks and are typically the remains of ploughed out round barrows (circular mounds, surrounded by one or more ditches and often accompanied by a bank, constructed to contain burials) or round houses (circular structures, defined by one or more rings of post holes and/or a gulley, and usually interpreted as being of domestic function), were also identified from the LiDAR data. These comprise a single circular feature (LI_049) noted on a raised area in Phepotstown, measuring approximately 5m in diameter (Figure 10), and a group of four circular ditches (LI_033) noted in Warrenstown, measuring c.10m in diameter (Figure 11).

Figure 9: A rath – ringfort (LI_116) recorded on the RMP (AY_24; KD014-001) in Ballynagappagh. A field boundary abuts the rath – ringfort to the east and a modern landscaped garden is located to the west and south.

Simple Local Relief Model (40% transparency) over Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.

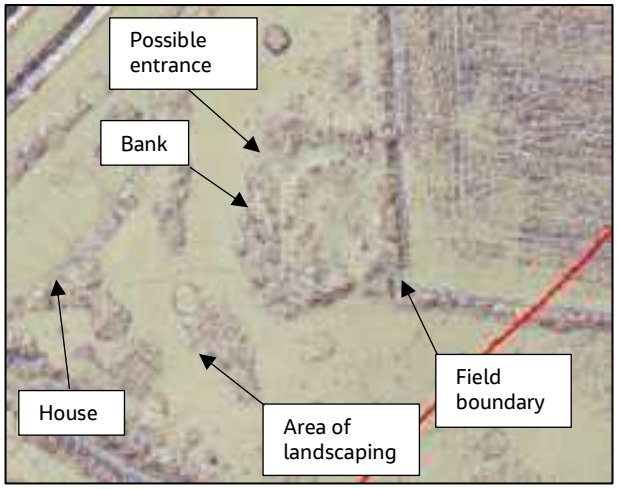


Figure 10: A small circular feature tentatively interpreted as a possible ring ditch (LI_049) in Phepostown.

Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.

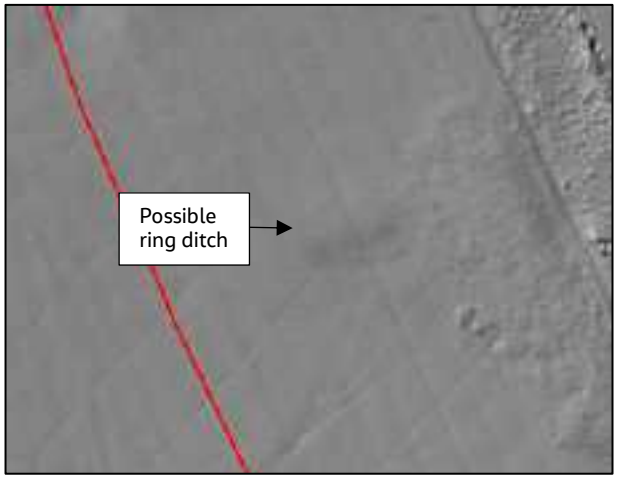
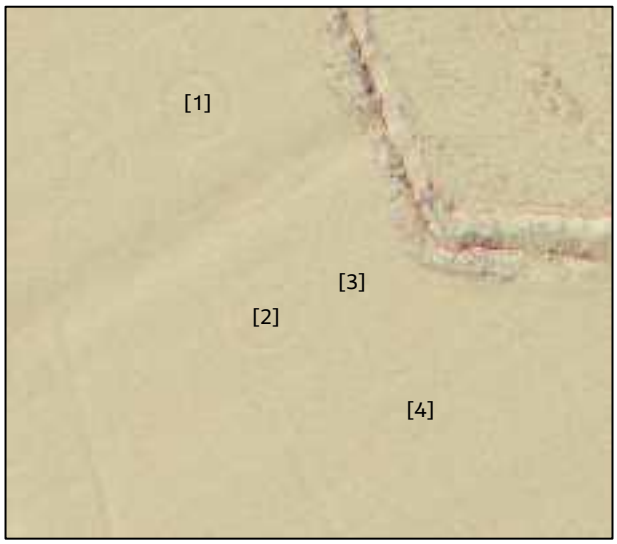


Figure 11: Group of four circular features interpreted as ring ditches (LI_033) (identified as 1,2,3,4) in Warrenstown.

Simple Local Relief Model (40% transparency) over Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.



A sub-circular feature (LI_066), larger in diameter than the ring ditches described above (between c. 58m by 33m) and less regular in shape, has been interpreted as a possible enclosure not recorded on the SMR or RMP. While this feature could be the remains of a ringfort (an early medieval site constructed from ditches and an earthen bank enclosing a farmstead), given these are commonly circular and LI_066 is larger than typical ringforts, which are usually between 25 and 50m in diameter (Department of the Environment, Heritage and Local Government, 2004), this potential archaeological feature has been interpreted as an enclosure of unknown date and function.

Two large square enclosures were also identified (LI_058 and LI_090; Figures 12 and 13) in proximity to known medieval sites. Two linear earthworks (LI_091 and LI_093) were identified. LI_091 is c. 250m long and is not shown on historic Ordnance Survey mapping. LI_093 is c.565m long. It is marked on historic Ordnance Survey mapping, labelled as 'The Pale' and is a Recorded Monument ((KD010-001001). While these earthworks may comprise part of The Pale, which was a defensive or territorial boundary of Anglo-Norman date, large linear earthworks were also constructed in the late Bronze Age and Iron Age (c. 1200 BC - AD 500).

Figure 12: Two linear features interpreted as the two sides and a corner of possible square enclosure truncated by the road and partially covered by trees in Phepotstown (LI_058). Partially obscured by disturbance.

Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.

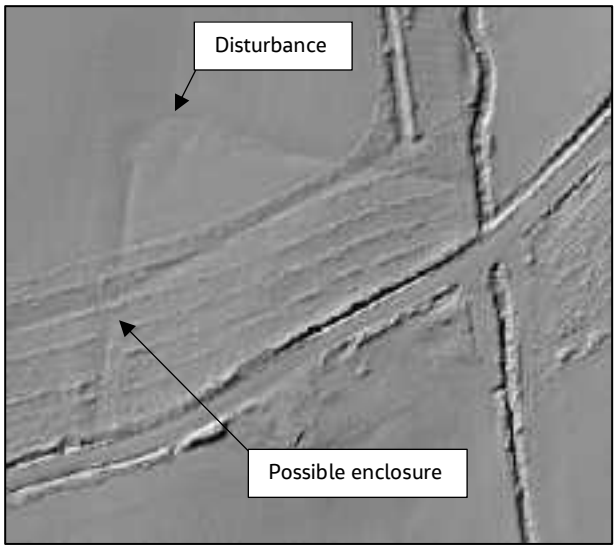
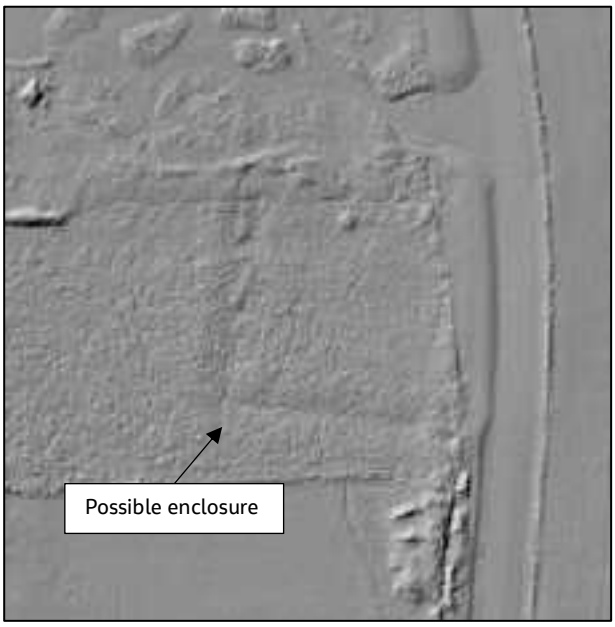


Figure 13: Two linear features interpreted as two sides and a corner of a possible square enclosure in Ballybrack (LI_090). Partially located under an area of woodland.

Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.



A total of 12 mounds (LI_012, LI_022, LI_023, LI_027, LI_060, LI_103, LI_105 (Figure 14), LI_107, LI_109, LI_124 (Figure 2), LI_146 (Figure 15), LI_147 (Figure 16)) were identified. Four of these (LI_060, LI_124 (Figure 2), LI_146 (Figure 15) and LI_147 (Figure 16)) correspond with sites recorded on the RMP comprising the mound of a ritual well (ME049-014001), a medieval motte (KD014-032), and prehistoric burial mounds (KD019-017). The remaining mounds have been interpreted as being of unknown date and function. These could equally be prehistoric burials as non-archaeological in nature.

Four potential features (LI_114, LI_121, LI_127 and LI_129; Figure 17) comprising negative circular feature between c.12m and 28m in diameter were identified. While these could be the sites of small circular enclosures or mounds that have been removed, they are equally likely to be the result of mineral extraction or non-archaeological in origin. They have however been assessed to be potentially archaeological features and have been classified as earthworks (site of).

Figure 14: A circular mound (LI_105), measuring approximately 6m in diameter, in Painestown. Tentatively interpreted as being an archaeological feature; however, equally likely to be related to modern activity (i.e. agricultural mounds / dumped material) given its location adjacent to a field entrance.

Simple Local Relief Model (40% transparency) over Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.

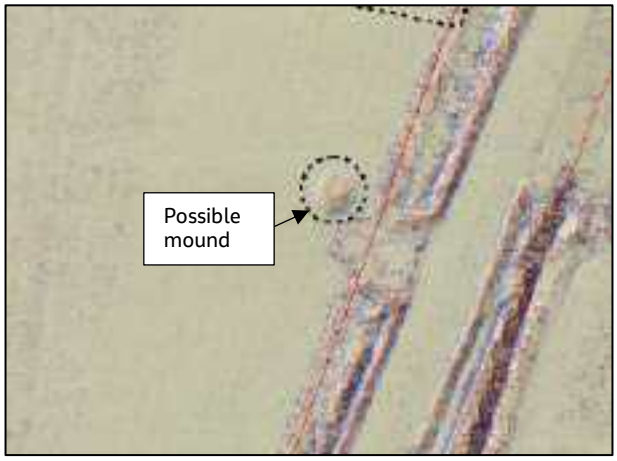


Figure 15: Cluster of circular features (LI_146) and a possible associated sub-circular features (LI_147) interpreted as part of a cemetery of pit burials (KD019-017; NS19-093).

Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.

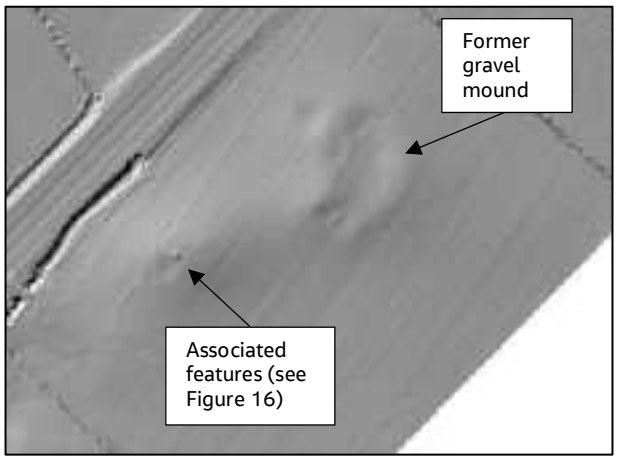


Figure 16: Possible sub-circular features (LI_147), including a possible burial mound, tentatively interpreted as forming part of a cemetery of pit burials to the north (KD019-017; NS19-093).

Simple Local Relief Model (40% transparency) over Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.

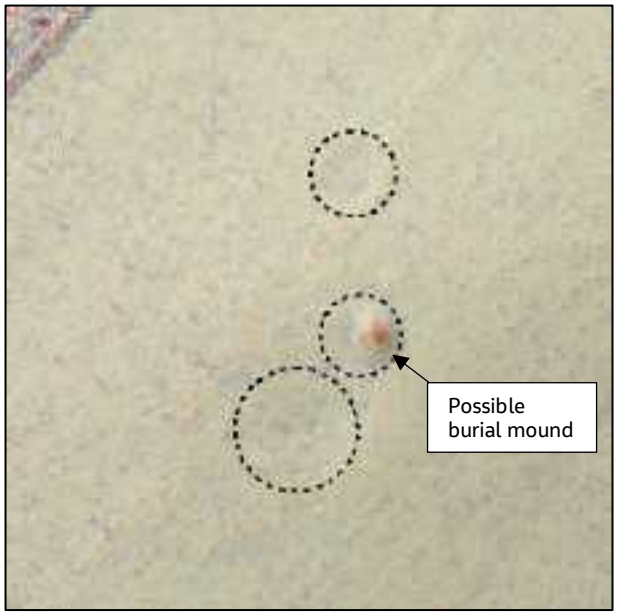
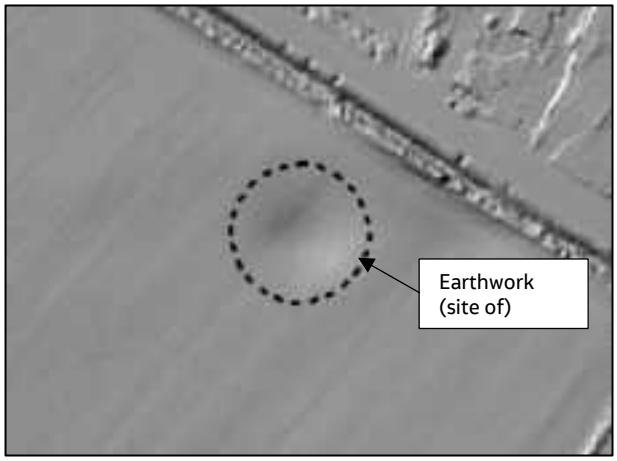


Figure 17: Possible former site of an earthwork now removed (LI_129) in Firmount Demesne.

Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.



A group of possible pits (LI_073), up to c.3m in diameter, were also identified in Balfeaghan; however, this interpretation is tentative, and these features may comprise evidence of agricultural activity or be natural in origin.

A total of 39 field systems were identified from the LiDAR data (LI_004, LI_006, LI_013, LI_017, LI_021, LI_026, LI_029, LI_031, LI_038, LI_040, LI_041, LI_043, LI_052, LI_063, LI_064, LI_067, LI_072, LI_079, LI_080, LI_085, LI_092, LI_094, LI_095, LI_096 (Figure 18), LI_097 (Figure 19), LI_102, LI_108, LI_110, LI_115, LI_119, LI_123, LI_135, LI_138, LI_142, LI_143, LI_149, LI_152, LI_154, and LI_162). While the majority of these reflect the field pattern depicted on First Edition Ordnance Survey mapping (6" to 1 mile, 1837 – 1842), some may pre-date these. In addition, 23 individual field boundaries that correspond with First Edition Ordnance Survey mapping (6" to 1 mile, 1837 – 1842) were also identified (LI_003, LI_005, LI_007, LI_018, LI_028, LI_036, LI_039, LI_074, LI_076, LI_078, LI_098, LI_100, LI_104, LI_106, LI_113, LI_117, LI_118, LI_125, LI_126, LI_128, LI_140, LI_144, and LI_145).

Figure 18: The remains of a former field system in Baltracey (LI_096) comprising a north-south linear feature with perpendicular linears (extending west beyond the 100m Study Area; red line) forming straight-sided fields as depicted on historic Ordnance Survey mapping (6" to 1 mile, 1837 – 1842, and 25" to 1 mile, 1888-1913).

Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.

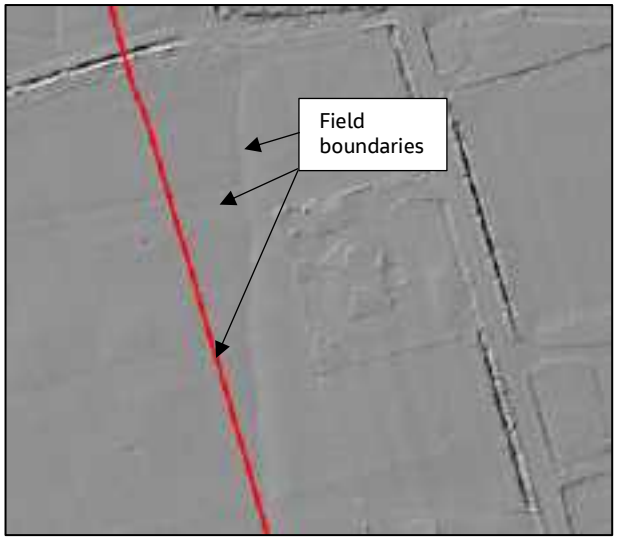
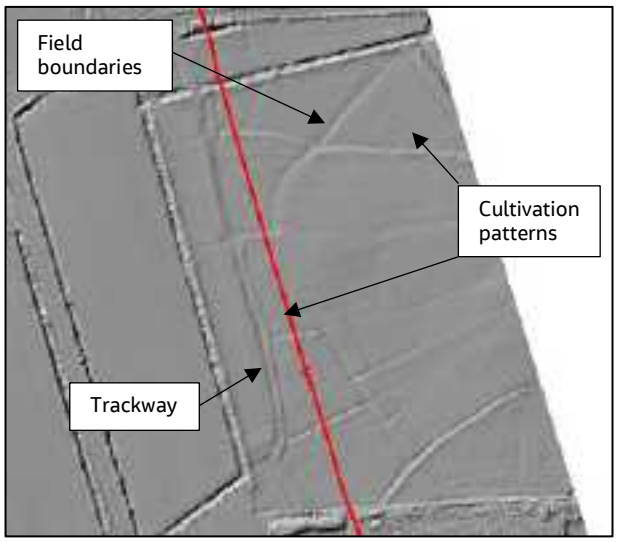


Figure 19: Linear and curvilinear features in Baltracey interpreted as former field boundaries forming small and irregular fields that comprise a field system of unknown date (LI_097) (extends east beyond the 100m Study Area; red line). Cultivation patterns as well as a possible trackway were also noted.

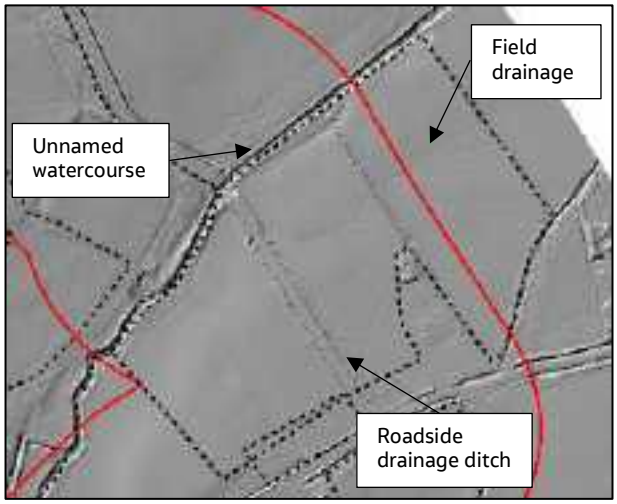
Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.



Five possible drainage features were identified from the LiDAR data (LI_037, LI_054 (Figure 20), LI_056, li_077 and LI_136). These comprise networks of linear features located within fields close to watercourses and are likely to be more recent in date.

Figure 20: A network of faint linear features largely arranged in a 'herringbone' formation across a number of large fields in Martinstown (LI_054) to the south of an unnamed watercourse and bisected by a roadside drainage ditch, interpreted as field drainage of post-medieval or modern date (extends beyond the 100m Study Area; red line).

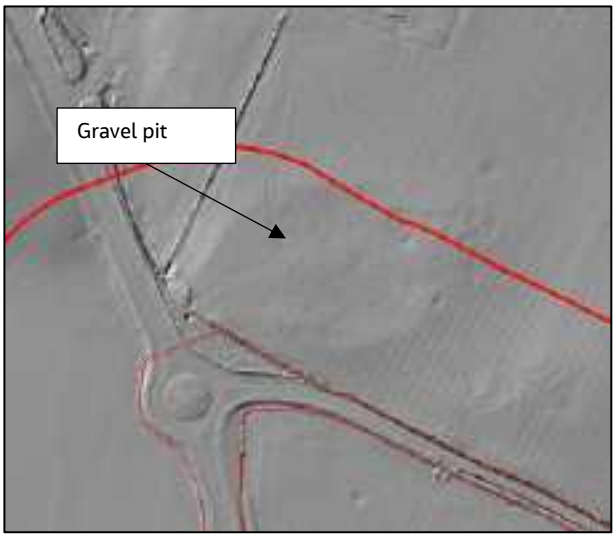
Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.



Seven gravel pits and quarries (LI_024, LI_068, LI_070 (Figure 21), LI_075, LI_101, LI_111, and LI_159), and the site of a corn mill (LI_065) and smithy (LI_157) were identified from the LiDAR data. These are characterised by areas of disturbance that correspond with sites depicted on historic Ordnance Survey mapping.

Figure 21: An irregular feature (LI_070) corresponding with a gravel pit in Balfeaghan depicted on First Edition Ordnance Survey mapping (6" to 1 mile, 1837 – 1842).

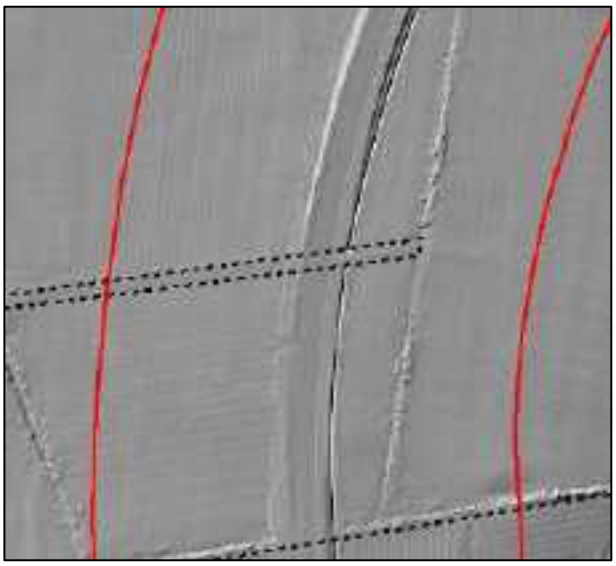
Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.



The former alignment of a road (LI_020) and a roadside recess or bay (LI_045) both depicted on historic Ordnance Survey mapping were also identified. The road comprises a curvi-linear feature adjacent to the current R125 and corresponds to the alignment of the road depicted on historic Ordnance Survey mapping. The recess comprises a possible roadside refuge point adjacent to the road depicted on historic Ordnance Survey mapping. In addition, two trackways associated with brickworks (LI_137 (Figure 22) and LI_139) were also identified running from the site of the brickworks to the River Liffey and two further linear features were identified (LI_153 and LI_161) and interpreted as possible tracks.

Figure 22: A linear feature (LI_137) that corresponds with a track leading from a brick field to the river depicted on First Edition Ordnance Survey mapping (6" to 1 mile, 1837 – 1842) in Barrettstown.

Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.



Further information on the potential archaeological features including known archaeological constraints identified during the review of the LiDAR data is presented in Appendix A (Inventory of Potential Archaeological Features) and an overview of the locations of potential archaeological features is shown on Figure 1.

4.2 Summary of Findings

Table 2 provides a summary of the classification of potential archaeological features identified within the 100m Study Area. A summary of the main site types are provided below, and a detailed inventory is presented in Appendix A.

Field Systems and Agricultural Activity

The majority of potential archaeological features identified were interpreted as evidence of agricultural activity. A total of 39 field systems (groups of fields that form a coherent group), 23 field boundaries, and five areas of drainage were identified within the 100m Study Area. The modern field pattern appears to have been created through the removal of earlier field boundaries and the amalgamation of smaller fields. Some of these former field boundaries were identified and correspond with the field pattern depicted on historic Ordnance Survey mapping (for example, LI_096 in Baltracey; Figure 18).

Possible earlier examples were also identified comprising groups of smaller and more irregular field shapes, such as LI_097 in Baltracey (Figure 19). This field pattern pre-dates the historic Ordnance Survey field pattern in this area; however, it is not possible to date these with any certainty from information from the sources consulted.

A total of 22 individual linear features and five areas of evenly spaced, more ephemeral, linear features running across fields were also noted that, while within fields depicted on historic Ordnance Survey mapping, do not correspond with any features depicted on mapping themselves. While the date or function of these features is uncertain, some of these features are located in proximity to minor watercourses and were tentatively interpreted as possible networks of field drainage (i.e. LI_054; Figure 20).

Buildings and their Environs

A total of 19 individual and clusters of possible buildings were identified within the 100m Study Area. These largely correspond with buildings depicted on historic Ordnance Survey mapping (6" to 1 mile, 1837 – 1842, and 25" to 1 mile, 1888-1913), such as LI_042 in Barstown (Figure 5).

Similar features, such as LI_015 in Cullendragh (Figure 6), while not depicted on historic Ordnance Survey mapping were also tentatively interpreted as possible buildings. From the sources listed in Section 3 the date

and function of these remains uncertain; however, given these possible buildings are also not depicted on modern mapping they may have been destroyed before historic Ordnance Survey mapping and therefore pre-date this.

In addition, landscape features associated with houses and farms were identified such as boundaries and enclosures (i.e. LI_099 in Baltracey; Figure 7), driveways, and the remains of possible orchards (i.e. LI_016 in Mullagh; Figure 9). In addition, landscape features associated with larger houses were also identified such as those associated with Jigginstown Castle, including the sunken garden (LI_150) and drive (LI_151) (see Figure 8) and landscape features of demesne lands previously identified from First Edition Ordnance Survey mapping (6" to 1 mile, 1837 – 1842), such as those identified associated with Larch Hill House demesne (DL_04) (see Figure 2).

Ring Ditches and Mounds

Two sites of ring ditches were identified within the 100m Study Area: a group of four circular features in Warrenstown (LI_033; Figure 11) and a single circular ditch in Phepostown (LI_049; Figure 10). Given their size these features are likely to be ploughed out prehistoric ring barrows (Department of the Environment, Heritage and Local Government, 2004).

A total of 12 mounds were identified within the 100m Study. LI_124 is an Anglo-Norman motte which is a Recorded Monument (KD014-032) and a Protected Structure (B14-07). Mottes are artificial, steep-sided, earthen mound on or in which is set the principal tower of a stone or timber castle. LI_147 consists of the mound into which a holy well depicted on historic mapping as 'Brides Well' is located. Both the well and mound are Recorded Monuments (ME049-014001 and ME049-014).

LI_146 is the remains of a group of prehistoric pit burials identified in Ploopluck which is both a Recorded Monument and Protected Structure (KD019-017; NS19-093). A pit-burial can vary from an oval or sub-rectangular pit large enough to accommodate a crouched inhumation to a small circular pit with only space for a deposit of cremated bone or a cinerary urn. They date to the Bronze (c. 2400-500 BC) and Iron Ages (c. 500 BC - AD 400). A possibly associated sub-circular feature (LI_147) is located approximately 70m to the south-west of LI_146. These are located in the same general area as a cemetery of pit burials removed by gravel extraction in the 1930s (Mount, Buckley and Lynch, 1998).

While the non-diagnostic form of this type makes interpretation of these features difficult, information from the sources listed in Section 3 enabled the differentiation between non-archaeological mounds (i.e. agricultural mounds / dumped material) and those which may be of archaeological interest (such as burnt mounds or burial mounds); however, it should be noted the interpretation of the mounds identified within the 100m Study Area is tentative and these features are equally likely to be non-archaeological.

Enclosures

Two possible square enclosures were identified during the review of the LiDAR data: LI_058 in Phepotstown (Figure 12) and LI_090 in Ballybrack (Figure 13). These comprise linear features interpreted as ditches, which may form part of larger square enclosures, that have been partially removed by local roads. These could be the remains of moated sites, which are square or rectangular medieval defensive enclosures surrounding a house and outbuildings and often located on the edge of Anglo-Norman territory (Department of the Environment, Heritage and Local Government, 2004; Ryan 2006). A possible moated site (ME049-011002) is located approximately 1.7km to the east of LI_058 and LI_090 is located close to an earthwork identified on Ordnance Survey 25" map, 1888 - 1913 as a section of 'The Pale' which was a boundary built by the Anglo-Normans. However given their locations near to watercourses these features may also be drainage ditches.

LI_116 is a rath or ringfort recorded on the RMP (KD014-001). Raths or ringforts comprise of a roughly circular or oval area surrounded by an earthen bank with an external ditch. Some examples have two (bivallate) or three (trivallate) banks and ditches. They are likely to have been farmsteads and broadly date to the Early Medieval period (c.500 to 1000 AD).

LI_066 is a sub-circular feature measuring c.58m by 33m. The lack of diagnostic features does not allow further interpretation or classification and it could date to any period from the early prehistoric period onwards.

Linear Earthworks

Two substantial linear earthworks were identified from the LiDAR data. LI_093 is a Recorded Monument (KD010-001001) and is shown on historic Ordnance Survey mapping, labelled as 'The Pale'. LI_091 was previously unrecorded, is not shown on historic Ordnance Survey mapping and is not a Record Monument. These earthworks may comprise part of The Pale, which was a defensive or territorial boundary of Anglo-Norman date. However large linear earthworks were also constructed in the late Bronze Age and Iron Age (c. 1200 BC - AD 500).

Earthworks (site of)

LI_114, LI_121, LI_127 and LI_129 (Figure 17) were identified in Ballynabolley, Firmount Demesne and Firmount East. These comprise depressions which may be the remains of levelled mounds or circular enclosures that have been removed. These features are located close to known archaeological sites of this type such as LI_127 which is located approximately 400m to the south-west of a mound recorded on the RMP (KD014-032) and LI_129 which is located approximately 450m to the north-east of a barrow (KD014-093) identified on the SMR. However, given their undiagnostic form the interpretation of these features is tentative, and they could equally be discrete areas of historic mineral extraction or natural undulations.

Mineral Extraction

A total of seven quarries and gravel pits, evidencing post-medieval mineral extraction, were identified within the 100m Study Area. These features, comprising large irregular areas, largely corresponding with the location of quarries and gravel pits depicted on First Edition Ordnance Survey mapping (6" to 1 mile, 1837 – 1842) such as the gravel pit in Balfeaghan (LI_070; Figure 21). In addition, evidence of associated infrastructure was also noted including trackways associated with brick fields (such as LI_137; Figure 22).

5. Discussion

The review of the LiDAR data for the Kildare Meath Grid Upgrade project identified 158 potential archaeological features, 31 of which are possibly associated with known constraints within the 100m Study Area. The interpretations of the potential archaeological features identified was informed by information gathered from the sources listed in Section 3.

Of the 158 potential archaeological features identified six previously unrecorded potential archaeological features may comprise sites of some significance:

- A possible ring ditch in Phepotstown (LI_049; Figure 10) comprising a circular ditch measuring approximately 5m in diameter, located on a locally prominent position within Larch Hill House demesne (DL_04).
- A group of four ring ditches in Warrenstown (LI_033), approximately 10m in diameter (Figure 11), interpreted as possible prehistoric ring barrows.
- A field system, comprising small and irregular fields, a trackway, and cultivation patterns (Figure 19), in Baltracey (LI_097) that pre-dates the field pattern visible on historic Ordnance Survey in this area.
- Two possible large square enclosures (LI_058 and LI_090; Figures 12 and 13) in proximity to known archaeological sites of medieval date.
- A linear earthwork (LI_091) in Ballybrack. This was also identified in proximity to, and may relate to, a linear earthwork (KD010-001001), identified as 'The Pale' on historic Ordnance Survey mapping which may have been a defensive or territorial boundary feature.

5.1 Recommendations

Based on the results of the LiDAR data review the following is recommended at Step 5:

- Potential archaeological features should be ground truthed to validate the findings of the review of the LiDAR data.
- Where possible the route of the preferred cable route option (Option A (Red)) should be refined to avoid potential archaeological features.

Where avoidance of impact is not possible, and the nature of the potential archaeological feature cannot be determined by visual inspection, there may be some benefit in undertaking geophysical survey of the more significant archaeological features at Stage 5 to inform the interpretation and assessment of value, magnitude and significance of effect and the design of any mitigation. The requirement for this should be agreed with EirGrid and in consultation with the National Monuments Service.

6. References

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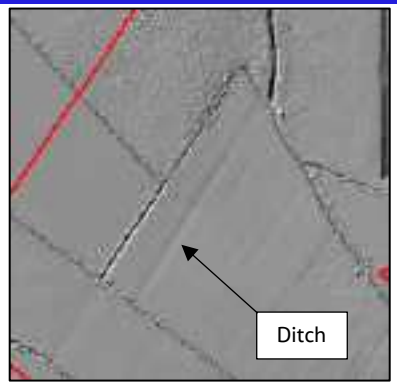
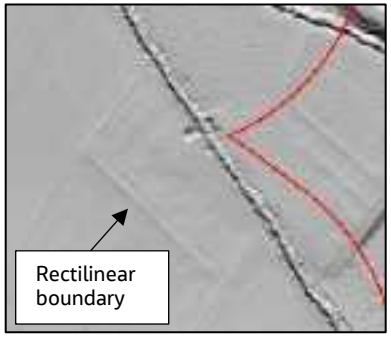
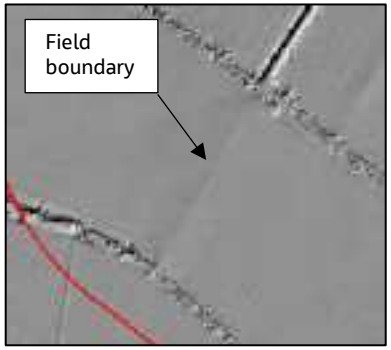
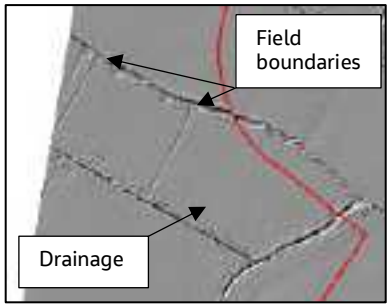
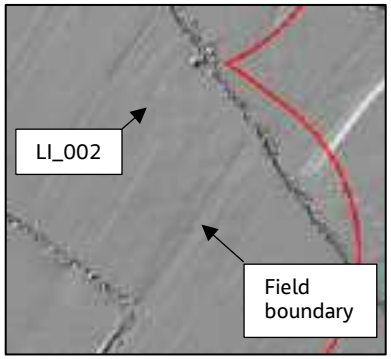
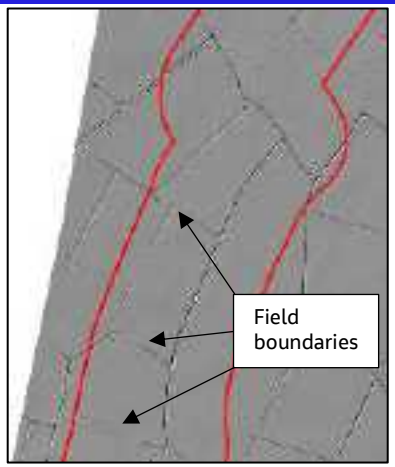
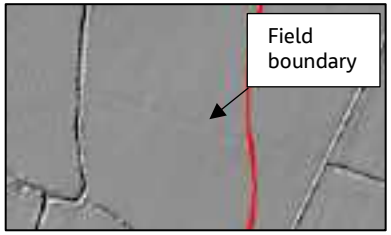
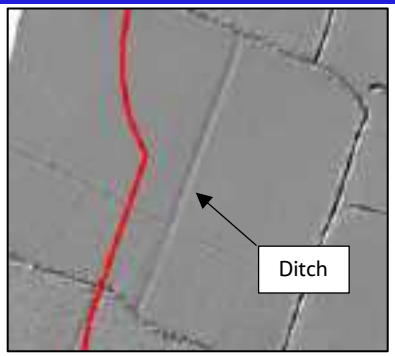
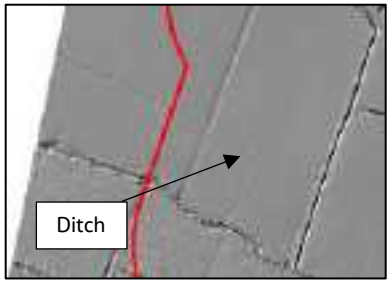
Appendix A. Inventory of Potential Archaeological Features

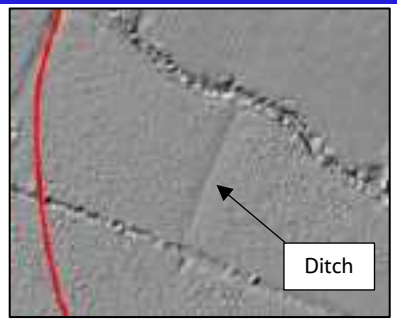
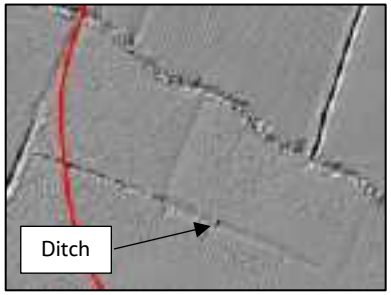
Unique Reference Number	Easting / Northing	Townland	Site Type	Summary Description	Constraint Reference Number (if applicable)	Confidence Rating	Figure
LI_001	694685 / 747933	Woodland	Ditch	- Shallow, negative linear feature, c.197m in length, orientated approximately north-south running between two extant field boundaries. - No corresponding features on historic Ordnance Survey mapping. - Vaguely perceptible on aerial imagery. - No modern utilities noted; however, south-west of Woodland 400kV Converter Substation and parallel to overhead service (identified from DSM). - Interpreted as a possible modern utility or drainage ditch.	-	Medium	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.
LI_002	694807 / 747856	Woodland	Boundary	- Negative linear features forming a rectilinear area, c.80m x 48m, abutting a field boundary to the north-east. Area within boundary disturbed. - Corresponds with a farmstead including a 'U'-shaped cluster of buildings within a sub-rectangular plot, depicted on historic Ordnance Survey mapping (6" to 1 mile, 1837 – 1842, and 25" to 1 mile, 1888-1913).	-	High	 Single Direction Hillshade Model: DTM azimuth 180° and altitude 45°.

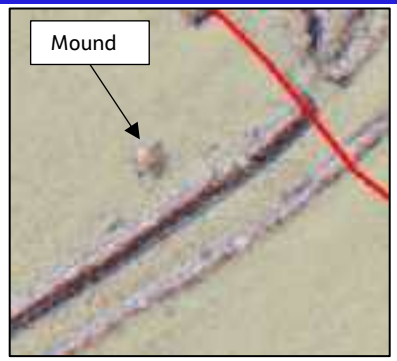
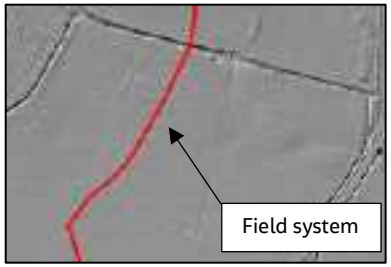
Unique Reference Number	Easting / Northing	Townland	Site Type	Summary Description	Constraint Reference Number (if applicable)	Confidence Rating	Figure
				- Faintly perceptible on aerial imagery. - Interpreted as the boundary of a post-medieval farmstead.			
LI_003	694585 /747832	Woodland	Field Boundary	- Shallow negative linear feature, c.73m in length, orientated approximately north-south abutting townland boundary (to south) and an extant field boundary to the north. - Perceptible on aerial imagery. - Corresponds with a field boundary on historic Ordnance Survey mapping (6" to 1 mile, 1837 – 1842, and 25" to 1 mile, 1888-1913). - Interpreted as a post-medieval field boundary.	-	High	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.
LI_004	694485 / 747791	Hayestown	Field system	- A network of narrow negative linear features immediately to the south of a townland boundary. A number of more pronounced linears, orientated approximately north-south, with more ephemeral linears running perpendicular across the area. Smaller subdivisions are also apparent. - Visible on aerial imagery. - No corresponding features on historic Ordnance Survey mapping although area boundaries are depicted on historic Ordnance Survey mapping (6" to 1 mile, 1837 –	-	Medium	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.

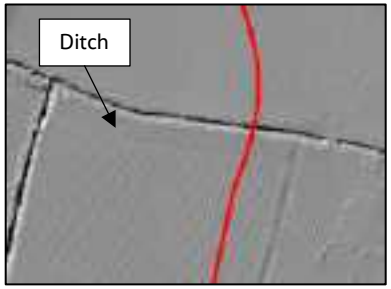
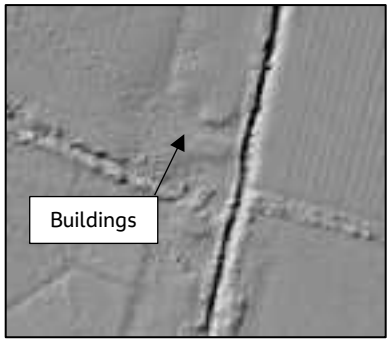
Unique Reference Number	Easting / Northing	Townland	Site Type	Summary Description	Constraint Reference Number (if applicable)	Confidence Rating	Figure
				1842, and 25" to 1 mile, 1888-1913). - Northern and eastern boundaries are a small watercourse (townland boundary). - Interpreted as field boundaries and field drains forming a field system of unknown date.			
LI_005	694814 / 747782	Woodland	Field Boundary	- An ephemeral negative linear feature, c.107m in length, orientated approximately north-south abutting extant field boundaries (to north and south). - Corresponds with a field boundary on historic Ordnance Survey mapping (6" to 1 mile, 1837 – 1842, and 25" to 1 mile, 1888-1913). - Associated with (LI_002). - Interpreted as a post-medieval field boundary.	-	High	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.

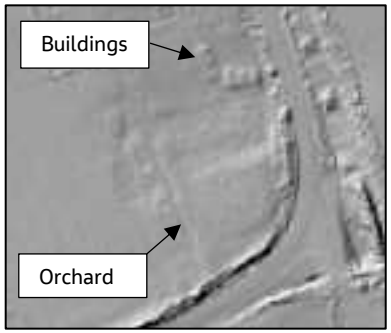
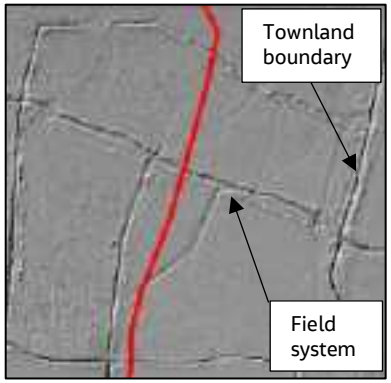
Unique Reference Number	Easting / Northing	Townland	Site Type	Summary Description	Constraint Reference Number (if applicable)	Confidence Rating	Figure
LI_006	694445 / 747206	Gaulstown; Culcommon	Field system	- A network of negative linear features and cultivation patterns. - Some linear features correspond with field boundaries on historic Ordnance Survey mapping. - Some field boundaries remain extant as hedgerows and others are visible as cropmarks on aerial imagery. - Interpreted as a post-medieval field system.	-	High	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.
LI_007	694531 / 746903	Culcommon	Field Boundary	- An ephemeral linear feature orientated approximately east-west, measuring c.140m in length. Runs between an extant field boundary and townland boundary. - Corresponds with a field boundary on historic Ordnance Survey mapping (6" to 1 mile, 1837 – 1842, and 25" to 1 mile, 1888-1913). - Interpreted as a post-medieval field boundary.	-	High	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.

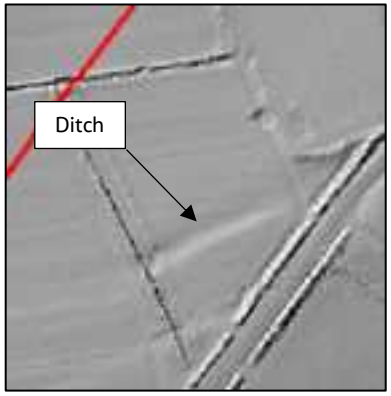
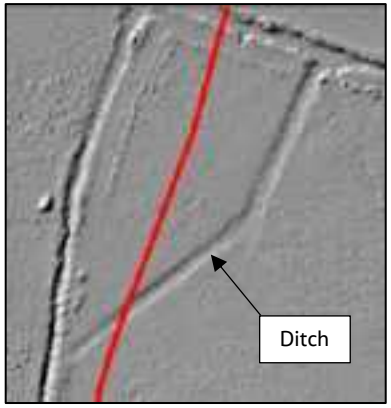
Unique Reference Number	Easting / Northing	Townland	Site Type	Summary Description	Constraint Reference Number (if applicable)	Confidence Rating	Figure
LI_008	694303 / 746626	Gaulstown	Ditch	- A negative linear feature, orientated approximately north-south, c.216m in length. Runs between an extant field boundary and townland boundary, and bisects a second ditch/former field boundary running perpendicular. - No corresponding features on historic Ordnance Survey mapping. - Visible on aerial imagery. - Boundary to south is a minor watercourse. - Interpreted as a ditch of unknown date	-	High	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.
LI_009	694270 / 746590	Gaulstown	Ditch	- A negative linear feature, orientated west-east, measuring c. >250m in length (extends beyond 100m Study Area). - No corresponding features on historic Ordnance Survey mapping. Possibly modern drainage. - Visible on aerial imagery. - Located parallel to a minor watercourse. - Interpreted as a ditch of unknown date, possibly modern drainage.	-	Medium	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.

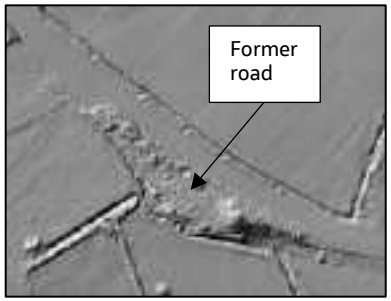
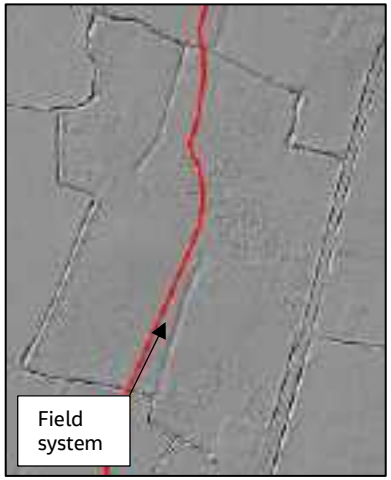
Unique Reference Number	Easting / Northing	Townland	Site Type	Summary Description	Constraint Reference Number (if applicable)	Confidence Rating	Figure
LI_010	694293 / 746467	Cullendragh	Ditch	- A negative linear feature, orientated approximately north-south, measuring c.60m in length. Extends from the townland boundary to the north. - No corresponding features on historic Ordnance Survey mapping. - Vaguely perceptible on aerial imagery. - Northern boundary is a minor watercourse. - Interpreted as a ditch	-	Medium	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.
LI_011	694304 / 746431	Cullendragh	Ditch	- A negative 'L'-shaped linear feature, measuring c.53m x c.168m. - No corresponding features on historic Ordnance Survey mapping. - To the south of a minor watercourse. - Interpreted as a ditch of unknown date	-	Medium	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.

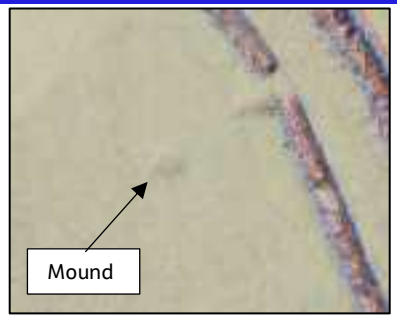
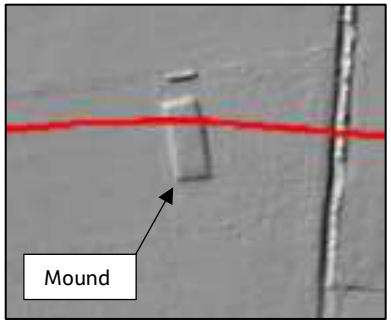
Unique Reference Number	Easting / Northing	Townland	Site Type	Summary Description	Constraint Reference Number (if applicable)	Confidence Rating	Figure
LI_012	690686 / 746317	Mullagh	Mound	- A positive circular feature measuring c.5m in diameter. Features of similar character noted in proximity. - Located near the boundary of DL_01. No corresponding features on historic Ordnance Survey mapping. - Not visible on aerial imagery. - Interpreted as mound of unknown date and function.	DL_01	Low	 Simple Local Relief Model (40% transparency) over Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.
LI_013	694570 /746304	Culcommon	Field System	- A network of ephemeral negative linear features, located between two townland boundaries, including a pair of north-south orientated linears, a triangular area, and irregular southern boundary. Appear to be overlain by later uniform cultivation patterns. A number of circular features were also noted (likely the result of the wear pattern around modern animal feeding stations). - Some features correspond with historic Ordnance Survey mapping (25" to 1 mile, 1888-1913). - Northern boundary is a minor watercourse. - The location of a large	-	High	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.

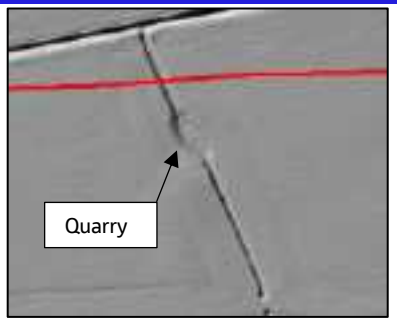
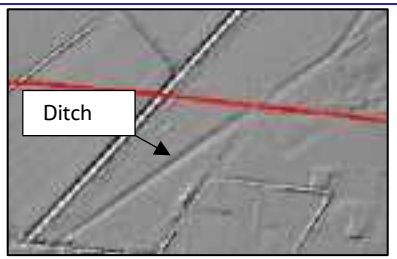
Unique Reference Number	Easting / Northing	Townland	Site Type	Summary Description	Constraint Reference Number (if applicable)	Confidence Rating	Figure
				circular enclosure (ME050-001), identified as a 'Fort' on historic Ordnance Survey mapping, is c.600m to the south-east. - Tentatively interpreted as field boundaries and field drains forming part of a field system of pre-19th century date. Later agricultural activity is also noted.			
LI_014	694423 / 746157	Culcommon	Ditch	- A sinuous negative linear feature, measuring c. 123m between townland boundary and a former field boundary. - No corresponding features on historic Ordnance Survey mapping. - Vaguely perceptible on aerial imagery. - No modern utilities noted. - Interpreted as a ditch of unknown date.	-	Medium	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.
LI_015	694329 / 746085	Cullendragh	Buildings	- Three positive rectangular features: 1) c.8mx6m, 2) c.9mx4m, and 3) c.12mx6m between a negative linear feature and townland boundary. - North of a possible field system (LI_017). - No corresponding features on historic Ordnance Survey mapping and not visible on aerial imagery. - Interpreted as the site of a	-	Medium	

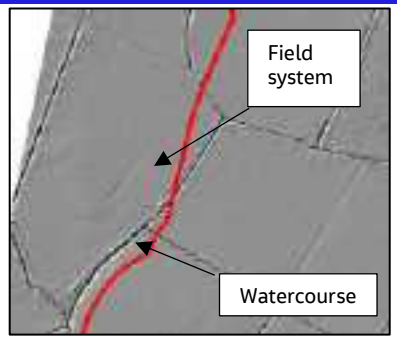
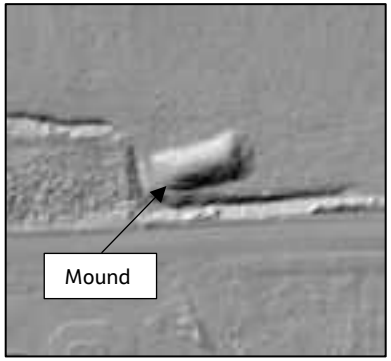
Unique Reference Number	Easting / Northing	Townland	Site Type	Summary Description	Constraint Reference Number (if applicable)	Confidence Rating	Figure
				group of buildings (likely agricultural) of unknown date.			Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.
LI_016	690572 / 746036	Mullagh	Buildings	- Three positive rectangular features, adjacent to the R156: 1) c.20m in length, 2) c.10m x 5m, 3) perpendicular to 2, c.10m x 5m, & a negative linear feature to the west. A regular grid of circular features was also noted. - Corresponds with a plot on historic Ordnance Survey mapping (6" to 1 mile, 1837 – 1842); however, buildings are in a different layout. - Visible on aerial imagery. - Interpreted as the site of a group of buildings (likely agricultural) of unknown date. Possibly with a later orchard.	-	Medium	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.
LI_017	694186 / 746004	Cullendragh	Field System	- A network of negative linear features between two existing field boundaries and a townland boundary. Majority orientated approximately north-south (including one parallel to townland boundary); however, some run perpendicular forming small irregular enclosures. - Possible associated buildings to the north (LI_015). - No corresponding features on historic Ordnance Survey mapping, although the area outline is depicted on historic	-	Medium	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.

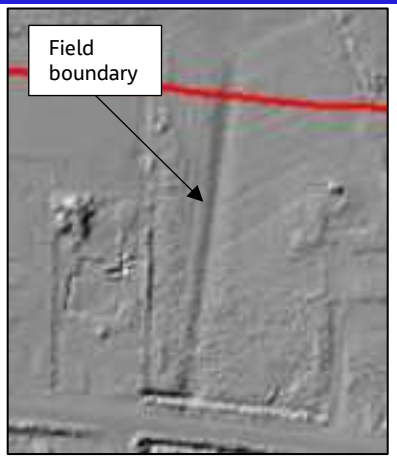
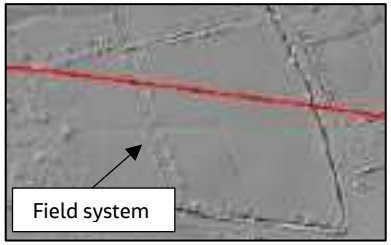
Unique Reference Number	Easting / Northing	Townland	Site Type	Summary Description	Constraint Reference Number (if applicable)	Confidence Rating	Figure
				Ordnance Survey mapping (25" to 1 mile, 1888-1913). - Interpreted as a field system of unknown date.			
LI_018	690488 / 745971	Mullagh	Field Boundary	- A number of negative and positive linear features in a pasture field, including a north-south linear measuring c.63m in length and a linear running perpendicular measuring c.58m in length. - Visible on aerial imagery. - One linear corresponds to a field boundary depicted on historic Ordnance Survey mapping. - Some areas of modern disturbance. - Interpreted as field boundaries of unknown date.	-	Medium	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.
LI_019	694188 / 745968	Cullendragh	Ditch	- An irregular linear feature, running between two minor watercourses. - No corresponding features on historic Ordnance Survey mapping. - Interpreted as a ditch of unknown date.	-	Medium	

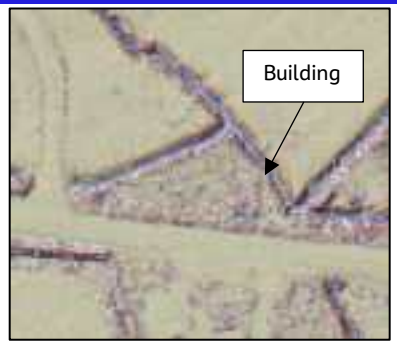
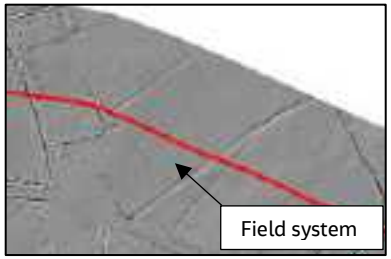
Unique Reference Number	Easting / Northing	Townland	Site Type	Summary Description	Constraint Reference Number (if applicable)	Confidence Rating	Figure
							Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.
LI_020	691046 / 745876	Mullagh	Road	- A curvilinear feature / area of disturbance within an area of trees immediately adjacent to the R125. - Corresponds with the bend in the road depicted on historic Ordnance Survey mapping (6" to 1 mile, 1837 – 1842, and 25" to 1 mile, 1888-1913). - Visible on aerial imagery as a grassy area with trees growing along the boundary. - Interpreted as the previous alignment of the road.	-	High	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.
LI_021	694403 / 745767	Culcommon	Field System	- A network of negative linear features, forming irregular fields within a larger area. - Linears to the south correspond with field boundaries depicted on historic Ordnance Survey mapping (6" to 1 mile, 1837 – 1842). Only triangular area of trees depicted on later Ordnance Survey mapping (25" to 1 mile, 1888-1913). - Some linears perceptible on aerial imagery as well as triangular area of trees. - Interpreted as part of a field system of unknown date.	-	Medium	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.

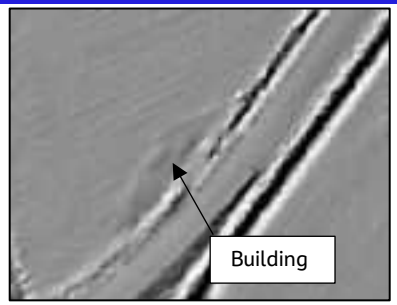
Unique Reference Number	Easting / Northing	Townland	Site Type	Summary Description	Constraint Reference Number (if applicable)	Confidence Rating	Figure
LI_022	691295 / 745735	Mullagh	Mound	- A positive circular feature c. 7m in diameter. - No corresponding features on historic Ordnance Survey mapping; however, a quarry was located nearby (c.40m to the north-west). - Vaguely perceptible on aerial imagery (Digital Globe) in arable field. - Tentatively interpreted as a post-medieval deposit of material associated with the nearby quarry.	-	Medium	 Simple Local Relief Model (40% transparency) over Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.
LI_023	692362 / 745668	Warrenstown	Mound	- A positive sub-rectangular feature orientated approximately north-south, measuring 24mx12m. - Visible on aerial imagery, including Digital Globe predating nearby house. Similar feature nearby; however, this appears more recent. - No corresponding feature on historic Ordnance Survey mapping. - Interpreted as a mound of unknown date and function.	-	Low	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.

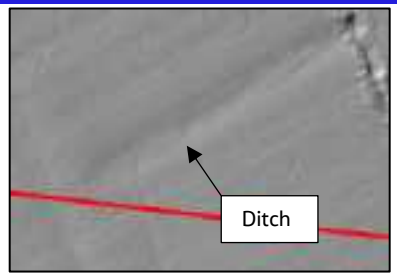
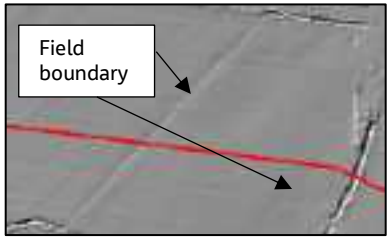
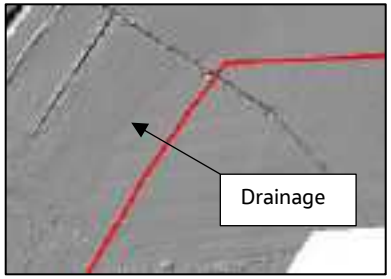
Unique Reference Number	Easting / Northing	Townland	Site Type	Summary Description	Constraint Reference Number (if applicable)	Confidence Rating	Figure
LI_024	692130 / 745631	Jenkinstown	Gravel pit / Quarry	- Linear negative feature with an irregular negative area towards the centre. - Corresponds with a field boundary and quarry on historic Ordnance Survey mapping (6" to 1 mile, 1837 – 1842) and possible drainage feature on later Ordnance Survey mapping (25" to 1 mile, 1888-1913). - Appears to be in use as drainage from aerial imagery and modern mapping. - Interpreted as the site of a post-medieval quarry, now in use as drainage.	-	High	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.
LI_025	692630 / 745616	Warrenstown	Ditch	- A negative linear feature orientated approximately northeast-southwest, c. 205m in length before turning north (beyond 100m Study Area). - Corresponds with a field boundary on historic Ordnance Survey mapping (6" to 1 mile, 1837 – 1842), and a ditch on later Ordnance Survey mapping (25" to 1 mile, 1888-1913) adjacent to the site of a pump and small roadside building (LI_030) to a sheep fold. - Visible on aerial imagery. - Interpreted as a post-medieval drainage ditch.	-	High	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.

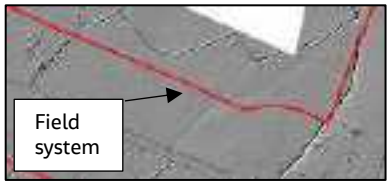
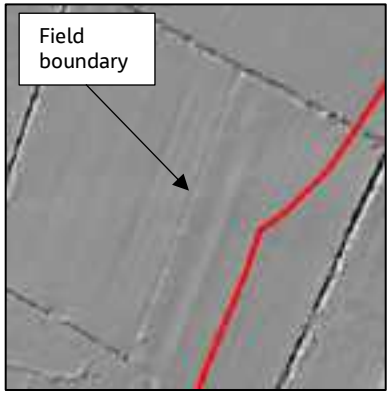
Unique Reference Number	Easting / Northing	Townland	Site Type	Summary Description	Constraint Reference Number (if applicable)	Confidence Rating	Figure
LI_026	694096 / 745609	Cullendraugh	Field system	- A network of negative linear features and cultivation patterns. Some parallel and evenly spaced straight features. - Some linear features correspond with field boundaries on historic Ordnance Survey mapping. - Vaguely perceptible on aerial imagery. - Minor watercourse runs through the centre. - Interpreted as a field system of unknown date, including field drainage.	-	Medium	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.
LI_027	692327 / 745583	Warrenstown	Mound	- A positive sub-rectangular feature orientated approximately east-west, measuring c.21mx9m. - Visible on aerial imagery. - No corresponding feature on historic Ordnance Survey mapping. - Interpreted as a mound of unknown date and function.	-	Low	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.

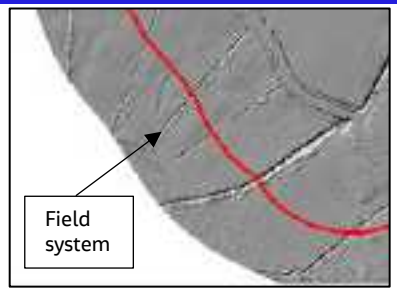
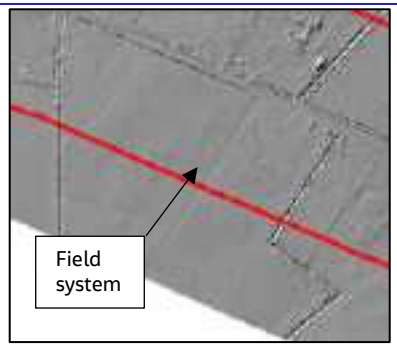
Unique Reference Number	Easting / Northing	Townland	Site Type	Summary Description	Constraint Reference Number (if applicable)	Confidence Rating	Figure
LI_028	692892 / 745573	Warrenstown	Field Boundary	- A negative linear feature measuring c. 111m, orientated north-south. - Corresponds with a field boundary on historic Ordnance Survey mapping (6" to 1 mile, 1837 – 1842). - Interpreted as a post-medieval field boundary.	-	High	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.
LI_029	693089 / 745566	Warrenstown	Field System	- A small number of ephemeral negative linear features. - No corresponding features on historic Ordnance Survey mapping. - Consolidated into two larger, regular fields with hedgerow / tree boundaries (DSM). - Tentatively interpreted as a possible field system of unknown date.	-	Medium	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.

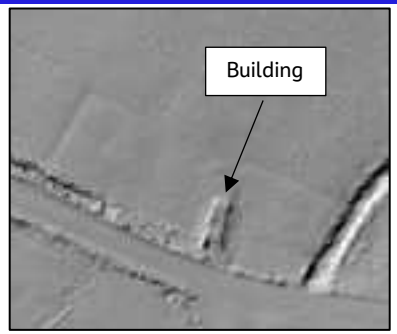
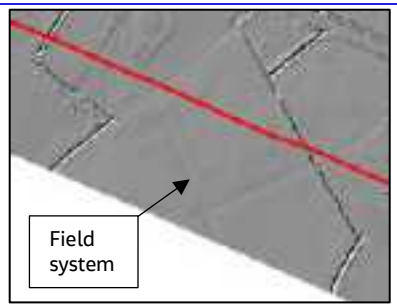
Unique Reference Number	Easting / Northing	Townland	Site Type	Summary Description	Constraint Reference Number (if applicable)	Confidence Rating	Figure
LI_030	692514 / 745563	Warrenstown	Building	- A rectangular feature measuring c. 9mx8m. - Corresponds with a building depicted on historic Ordnance Survey mapping, adjacent to a drainage ditch (LI_025). - Within an area of trees (DSM). - Interpreted as the site of a post-medieval roadside building.	-	High	 Simple Local Relief Model (40% transparency) over Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.
LI_031	693378 / 745539	Barstown	Field System	- A number of linear features, ephemeral linear features and cultivation patterns. - Correspond with field boundaries on historic Ordnance Survey mapping (6" to 1 mile, 1837 – 1842). - Modern drainage channels noted on aerial imagery. - Interpreted as a post-medieval field system.	-	High	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.

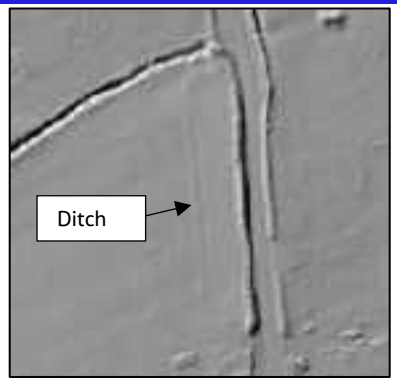
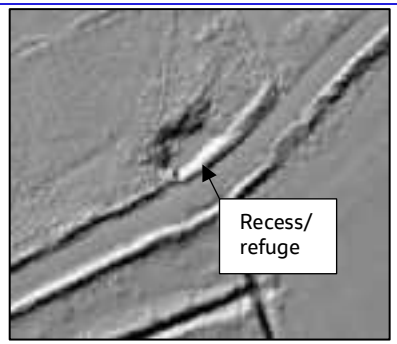
Unique Reference Number	Easting / Northing	Townland	Site Type	Summary Description	Constraint Reference Number (if applicable)	Confidence Rating	Figure
LI_032	690213 / 745537	Mullagh	Building	- An irregular area of disturbance. - Corresponds with the location of a roadside building depicted on historic Ordnance Survey mapping (6" to 1 mile, 1837 – 1842), removed by later edition (25" to 1 mile, 1888-1913). - Not visible on aerial imagery. - Interpreted as a post-medieval roadside building.	-	High	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.
LI_033	692480 / 745479	Warrenstown	Ring Ditch	- Four circular features approximately 10m in diameter. - No corresponding feature on historic Ordnance Survey mapping. - Not visible on aerial imagery. - Interpreted as a group of possible prehistoric ring ditches, likely a group of ploughed out prehistoric ring barrows.	-	Medium	 Simple Local Relief Model (40% transparency) over Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.
LI_034	Number not used.						

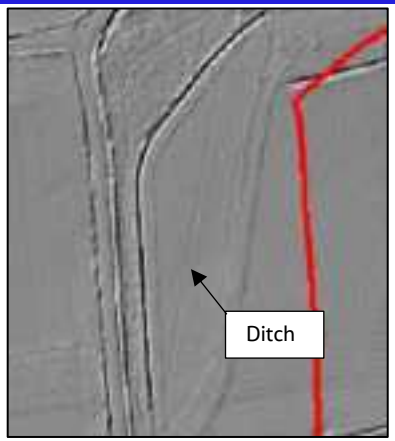
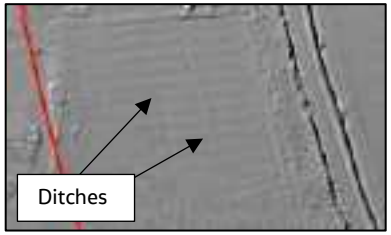
Unique Reference Number	Easting / Northing	Townland	Site Type	Summary Description	Constraint Reference Number (if applicable)	Confidence Rating	Figure
LI_035	692463 / 745463	Warrenstown	Ditch	- An ephemeral 'L'-shaped negative linear feature, c.75m and >107m (extends beyond extent of 100m Study Area) in length. - No corresponding features on historic Ordnance Survey mapping. - Located between two possible ring ditches (LI_033). - Interpreted as a ditch of unknown date.	-	Medium	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.
LI_036	693094 / 745389	Warrenstown	Field Boundary	- Two negative linear features, orientated approximately northeast-southwest & another perpendicular, c. 200m in length. - Correspond with field boundaries depicted on historic Ordnance Survey mapping (6" to 1 mile, 1837 – 1842, and 25" to 1 mile, 1888-1913). - Interpreted as post-medieval field boundaries.	-	High	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.
LI_037	691859 / 745378	Jenkinstown	Drainage	- Ephemeral evenly spaced group of parallel linears. - No corresponding features on historic Ordnance Survey mapping. Interpreted as a possible cultivation patterns or field drainage of unknown date.	-	Medium	

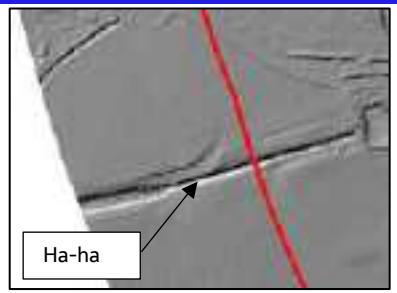
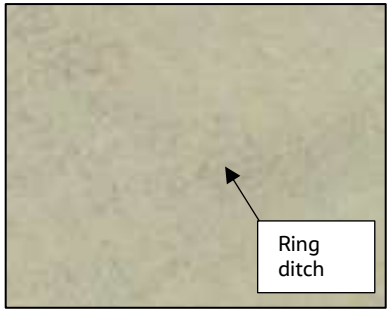
Unique Reference Number	Easting / Northing	Townland	Site Type	Summary Description	Constraint Reference Number (if applicable)	Confidence Rating	Figure
							Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.
LI_038	693766 / 745351	Barstown	Field System	- Two intersecting linears orientated north-west to south-east (measuring c.220m in length) and north-south (measuring c.160m in length). Some addition ephemeral linears also noted. Between townland boundary and road. - Correspond with field boundaries on historic Ordnance Survey mapping (6" to 1 mile, 1837 – 1842). - Interpreted as a field system of post-medieval date.	-	High	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.
LI_039	694223 / 745325	Cullendragh	Field Boundary	- A negative linear feature, orientated approximately north-south, running between two extant field boundaries, c. 124m in length. - Corresponds with a field boundary on later Ordnance Survey mapping (25" to 1 mile, 1888-1913). - Aerial imagery shows a small number of trees along this alignment. - Interpreted as a post-medieval field boundary.	-	High	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.

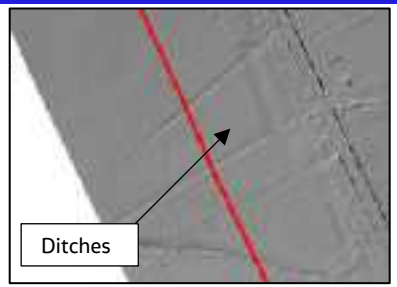
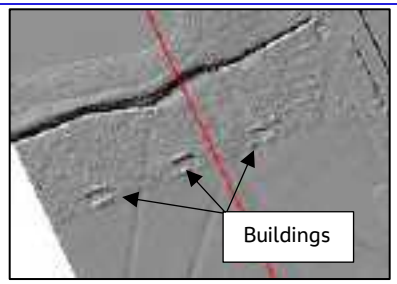
Unique Reference Number	Easting / Northing	Townland	Site Type	Summary Description	Constraint Reference Number (if applicable)	Confidence Rating	Figure
LI_040	691536 / 745284	Jenkinstown	Field System	- A network of negative linear features, including an irregular north-south feature measuring c. 130m in length. - Some correspond with field boundaries on historic Ordnance Survey mapping (6" to 1 mile, 1837 – 1842). - Historic field boundaries remain largely extant - Minor watercourse to south-western extent. - Interpreted as a post-medieval field system, with possible earlier trackway and cultivation patterns / field drainage.	-	High	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.
LI_041	693371 / 745278	Barstown	Field System	- A number of ephemeral linear features. - Some correspond with field boundaries on historic Ordnance Survey mapping. - Interpreted as a field system of unknown date.	-	Medium	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.

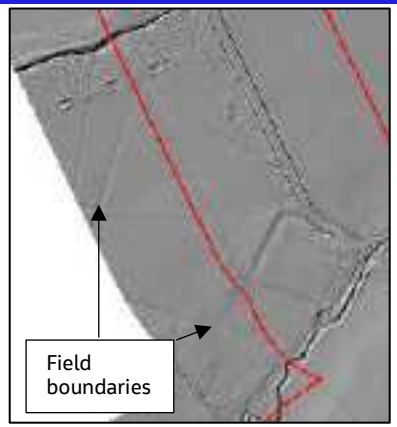
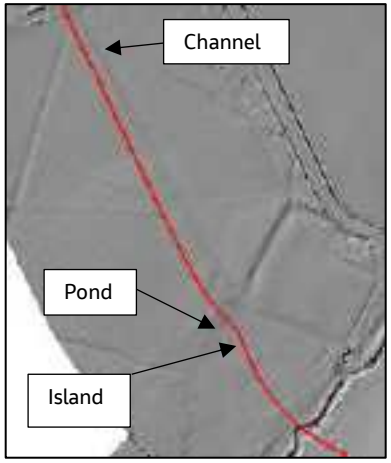
Unique Reference Number	Easting / Northing	Townland	Site Type	Summary Description	Constraint Reference Number (if applicable)	Confidence Rating	Figure
LI_042	693832 / 745230	Barstown	Building	- A positive rectangular feature measuring c. 15m x 6m, adjacent to the R156. With negative linear features to the north and west, forming an enclosure. - Corresponds with a building depicted on historic Ordnance Survey mapping, perpendicular to the road, with associated boundary features. - Building footings visible on aerial imagery. - Interpreted as the site of a post-medieval roadside building.	-	High	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.
LI_043	693636 / 745131	Kilclone	Field System	- A number of intersecting linear features. - Correspond with field boundaries on historic Ordnance Survey mapping (6" to 1 mile, 1837 – 1842). - Interpreted as a post-medieval field system.	-	High	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.

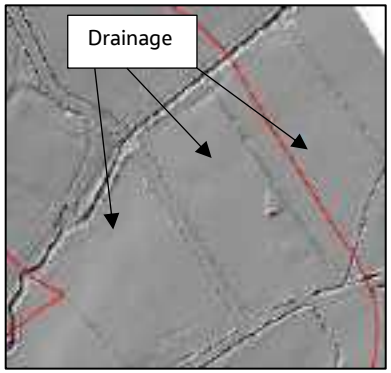
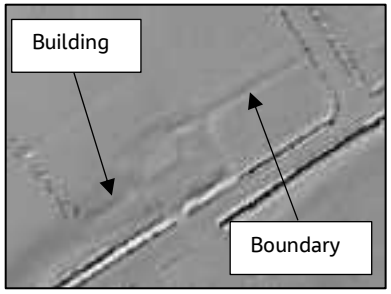
Unique Reference Number	Easting / Northing	Townland	Site Type	Summary Description	Constraint Reference Number (if applicable)	Confidence Rating	Figure
LI_044	689847 / 745035	Phepotstown	Ditch	- A negative linear feature measuring c. 75m in length, orientated north-south. - Visible on aerial photographs. Parallel to R125. - No corresponding features on historic Ordnance Survey mapping. - No corresponding modern utilities. - Interpreted as a possible ditch on unknown date.	-	Medium	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.
LI_045	689582 / 744738	Phepotstown	Road	- An irregular negative feature adjacent to the R125 measuring c.16m x c.9m. - Corresponds with a roadside recess depicted on historic Ordnance Survey mapping (25" to 1 mile, 1888-1913) adjacent to a road bridge. - Visible on aerial imagery as a tree covered area. - Interpreted as a possible post-medieval roadside refuge point or recess adjacent to the road.	-	High	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.

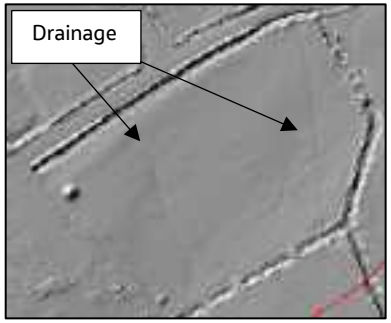
Unique Reference Number	Easting / Northing	Townland	Site Type	Summary Description	Constraint Reference Number (if applicable)	Confidence Rating	Figure
LI_046	689358 / 744456	Phepotstown	Ditch	- Sinuous negative feature, measuring c.182m in length, orientated approximately north-south. - Within DL_03, adjacent to a path depicted on historic Ordnance Survey mapping. No corresponding features depicted on mapping. - Visible on aerial imagery (2005 Ortho). - No modern utilities noted. - Interpreted as a possible ditch of unknown date.	DL_03	Medium	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.
LI_047	689282 / 744230	Phepotstown	Ditch	- Ephemeral sinuous negative linear features, cutting cultivation patterns. Orientated north-south measuring c.103m and east-west measuring c.50m. Located within DL_04. No corresponding features on historic Ordnance Survey mapping. - N corresponding features on aerial imagery. - Interpreted as possible drainage ditches of unknown date.	DL_04	Medium	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.

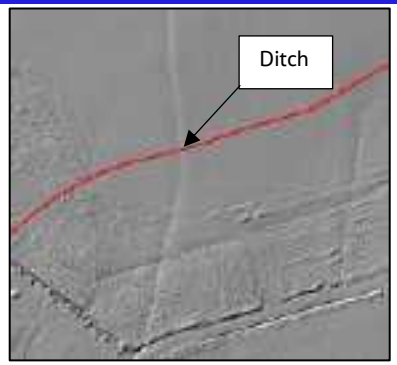
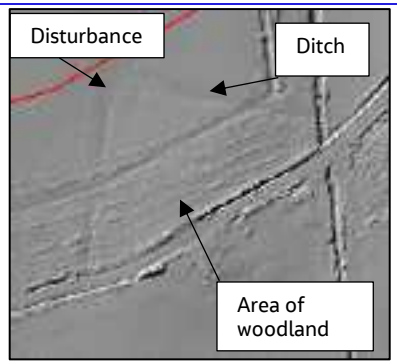
Unique Reference Number	Easting / Northing	Townland	Site Type	Summary Description	Constraint Reference Number (if applicable)	Confidence Rating	Figure
LI_048	689248 / 744113	Phepotstown	Designed Landscape Feature	- A linear feature c. >169m comprising positive and negative features. - Within DL_04. Corresponds with demesne features depicted on historic Ordnance Survey mapping. - Interpreted as a haha associated with DL_04.	DL_04	High	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.
LI_049	689322 / 744060	Phepotstown	Ring Ditch	- An ephemeral circular feature, c. 5m in diameter. - Located on the edge of a slightly raised area in an otherwise flat pasture field. - No corresponding features on historic Ordnance Survey mapping, although located within the Larch Hill House demesne (DL_04). - Possible modern animal feeder (unclear from aerial imagery). - Tentatively interpreted as a possible ring ditch of unknown origin; however, equally could be the location of a modern animal feeder.	DL_04	Low	 Simple Local Relief Model (40% transparency) over Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.

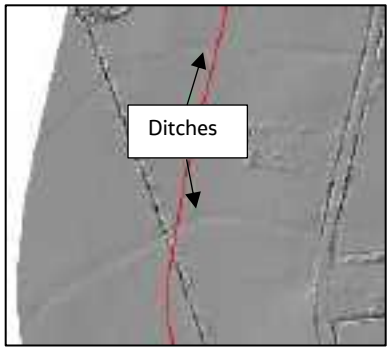
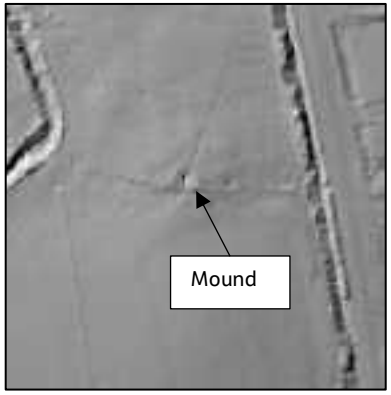
Unique Reference Number	Easting / Northing	Townland	Site Type	Summary Description	Constraint Reference Number (if applicable)	Confidence Rating	Figure
LI_050	689374 / 743914	Phespotstown	Ditch	- Three ephemeral linear features running roughly north-east to south-west, between the R125 and 'Larch Hill Lake', measuring between c.145m and c.190m in length. - Visible on aerial imagery. - Located within DL_04; however, no corresponding features on historic Ordnance Survey mapping. - One coincides with an existing field entrance and trackway. Other cultivation patterns noted (DTM). - Interpreted as ditches of unknown date.	DL_04	Medium	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.
LI_051	689450 / 743662	Phepotstown	Building	- Three rectangular features, measuring c.14m x 9m. - Within an area of trees in DL_04 (DSM). - No corresponding features on historic Ordnance Survey mapping. - Not visible on aerial imagery (inc. 1995 / 2000 with trees absent). - Interpreted as buildings of uncertain date.	DL_04	Medium	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.

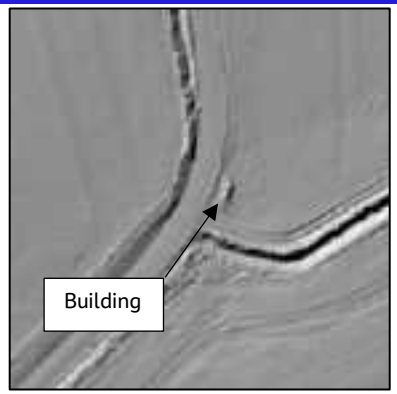
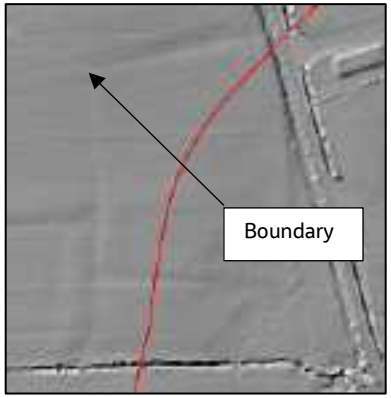
Unique Reference Number	Easting / Northing	Townland	Site Type	Summary Description	Constraint Reference Number (if applicable)	Confidence Rating	Figure
LI_052	689536 / 743522	Phepotstown	Field System	- A network of negative linear features. - Located within DL_04. Some corresponding field boundaries depicted on historic Ordnance Survey mapping. - Visible on aerial imagery (inc. Ortho 2000 & 2005). - Interpreted as a possible field system of unknown date.	DL_04	Medium	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.
LI_053	689573 / 743468	Phepotstown	Designed Landscape Feature	- An ephemeral linear feature orientated approximately north-south, measuring c. 230m in length, with an irregular negative feature to the south. A faint sub-circular feature is also perceptible. - Corresponds with a water feature with small circular island associated with Larch Hill House (DL_04) depicted on historic Ordnance Survey mapping (6" to 1 mile, 1837 – 1842), south of 'Larch Hill Lake'. Not depicted on later mapping. - Not visible on aerial imagery. - Interpreted as a post-medieval water feature	DL_04	High	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.

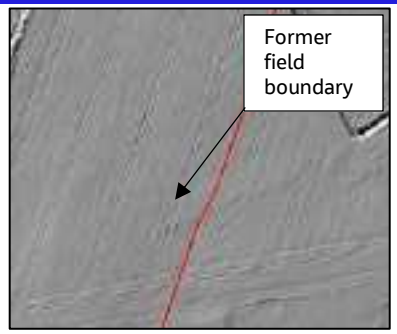
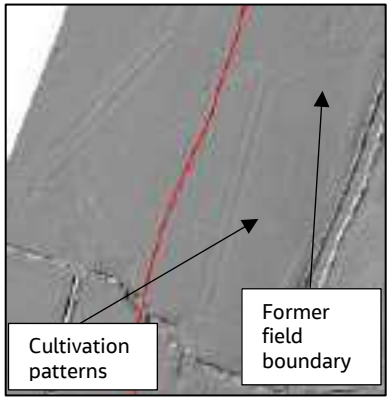
Unique Reference Number	Easting / Northing	Townland	Site Type	Summary Description	Constraint Reference Number (if applicable)	Confidence Rating	Figure
				associated with the designed landscape of Larch Hill House.			
LI_054	689790 / 743440	Martinstown	Drainage	- Ephemeral negative linear features, straight and parallel, in a herringbone-type pattern. - While there are no corresponding features depicted on historic Ordnance Survey mapping, these features are located within fields depicted on historic Ordnance Survey mapping (6" to 1 mile, 1837 – 1842, and 25" to 1 mile, 1888-1913). - Vaguely perceptible on aerial imagery. - Minor watercourse noted to north and west of the area. - Interpreted as post-medieval or modern field drainage.	-	High	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.
LI_055	689769 / 743327	Martinstown	Building	- Negative linear feature orientated approximately east-west, measuring approximately 54m, with two perpendicular linears, measuring approximately 22m and 12m, respectively, forming the boundary to a rectangular enclosure on a bend in the R125. In addition, an ephemeral rectangular feature is perceptible in the western corner of the enclosure, measuring c. 18m x 8m. - These features correspond with a plot depicted on historic	-	High	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.

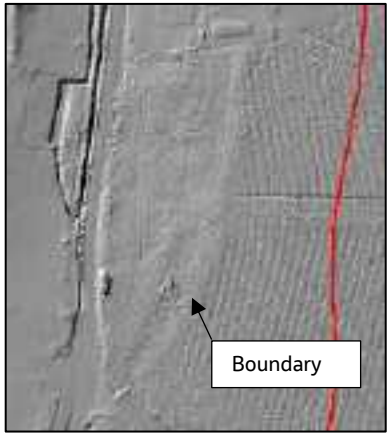
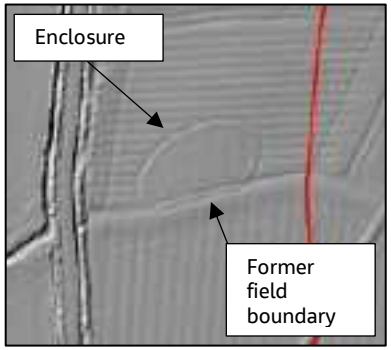
Unique Reference Number	Easting / Northing	Townland	Site Type	Summary Description	Constraint Reference Number (if applicable)	Confidence Rating	Figure
				Ordnance Survey mapping (6" to 1 mile, 1837 – 1842), with only the rectangular feature depicted on later Ordnance Survey mapping (25" to 1 mile, 1888-1913). - Interpreted as the site of a post-medieval building and enclosure.			
LI_056	689838 / 743298	Kemmins Hill	Drainage	- Ephemeral negative linear features. - While there are no corresponding features depicted on historic Ordnance Survey mapping, these features are located within fields depicted on historic Ordnance Survey mapping (6" to 1 mile, 1837 – 1842, and 25" to 1 mile, 1888-1913). - Not visible on aerial imagery. - Minor watercourse noted to east of the area. - Interpreted as drainage of post-medieval or modern date .	-	Medium	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.

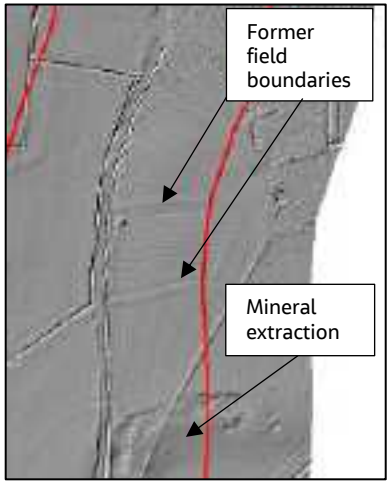
Unique Reference Number	Easting / Northing	Townland	Site Type	Summary Description	Constraint Reference Number (if applicable)	Confidence Rating	Figure
LI_057	689382 / 743191	Phepotstown	Ditch	- Ephemeral linear feature, orientated north-south, measuring c. >98m in length (extends beyond the 100m Study Area). - Located within DL_04. No corresponding features on historic Ordnance Survey mapping. - Visible on aerial imagery. - Interpreted as a ditch of unknown date.	DL_04	Medium	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.
LI_058	689526 / 743166	Phepotstown	Enclosure	- Two negative linear features measuring c.100m and c.108m in length respectively forming two sides and a corner (obscured) of a square ditched enclosure, within DL_04. Cultivation marks / woodland overlies these features. Possible continuation on the opposite side of the road. - No corresponding features on historic Ordnance Survey mapping, although boundary / tree line still perceptible cutting the feature. Minor watercourse to east. - Visible on aerial imagery. - Tentatively interpreted as a possible square enclosure, although positioning near a	-	Low	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.

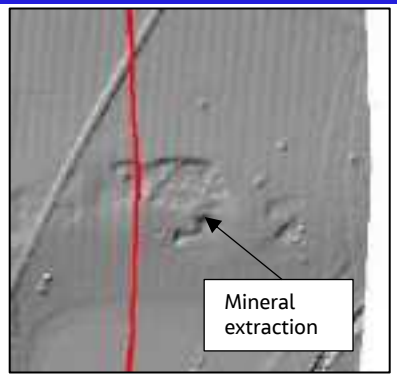
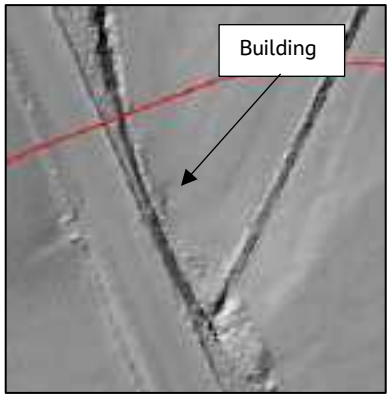
Unique Reference Number	Easting / Northing	Townland	Site Type	Summary Description	Constraint Reference Number (if applicable)	Confidence Rating	Figure
				watercourse may indicate this is a drainage feature.			
LI_059	689131 / 742772	Calgath	Ditch	- Two large parallel negative curvilinear features, that curve to their eastern extents. Measuring >c.230m in length (extend beyond the 100m Study Area). Bisected by a ditch. - Visible on aerial imagery. - No modern utilities noted. - Minor watercourse in ditch bisects these features, running from Brides Well (to the south). - Interpreted as ditches of unknown date and function.	-	Medium	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.
LI_060	689224 / 742511	Calgath	Mound	- An ephemeral positive circular features, measuring approximately 8m in diameter, with linear extending to the north-east. - Corresponds with 'Brides Well' and mound on historic Ordnance Survey mapping (6" to 1 mile, 1837 – 1842, and 25" to 1 mile, 1888-1913). - Tree / shrub boundary to well and trackway noted. - Interpreted as the mound associated with Bride's Well. - Recorded Monument ME049-014001	AY_02; ME049-014001	High	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.

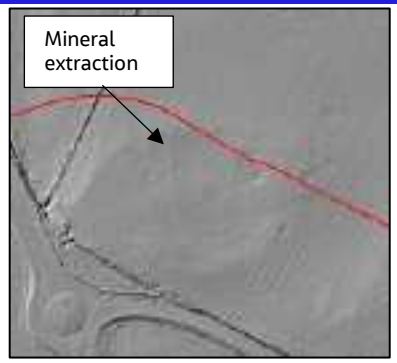
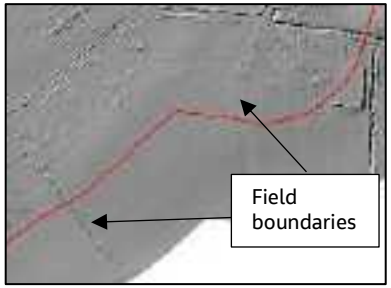
Unique Reference Number	Easting / Northing	Townland	Site Type	Summary Description	Constraint Reference Number (if applicable)	Confidence Rating	Figure
LI_061	689287 / 742336	Calgath	Building	- A rectangular feature measuring c. 9m x c.3m. -Corresponds with a roadside building depicted on historic Ordnance Survey mapping (6" to 1 mile, 1837 – 1842). - Not visible on aerial imagery. - Interpreted as the site of a post-medieval building.	-	High	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.
LI_062	689103 / 742268	Calgath	Boundary	- Diffuse negative linear features forming an irregular enclosure, bounded by a local road to the east and watercourse/ditch to the south. Linear features also noted within enclosure. - Corresponds with a building plot on historic Ordnance Survey mapping (6" to 1 mile, 1837 – 1842). - Interpreted as the boundary of a post-medieval farmstead.	-	High	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.

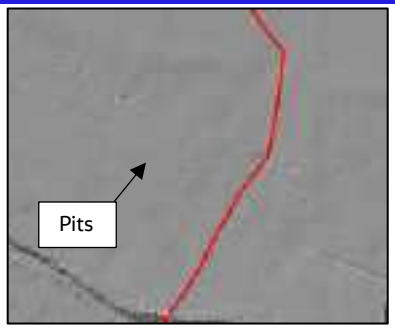
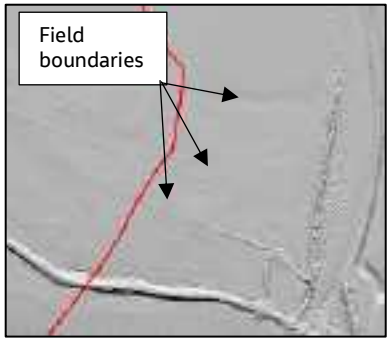
Unique Reference Number	Easting / Northing	Townland	Site Type	Summary Description	Constraint Reference Number (if applicable)	Confidence Rating	Figure
LI_063	689272 / 741852	Calgath	Field System	- A negative 'L'-shaped feature measuring c.92m orientated roughly east-west and c. 30m north-south. Modern cultivation patterns noted. - Corresponds with a field boundary on historic Ordnance Survey mapping (6" to 1 mile, 1837 – 1842). - Extent of field system (ME049-018) visible on aerial imagery (Digital Globe). - Interpreted as part of a field system (ME049-018).	AY_03; ME049-018	High	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.
LI_064	689035 / 741810	Calgath	Field System	- Area of negative linear features, including two parallel linears orientated north-south measuring c. 155m in length, overlying cultivation patterns. - Exterior feature corresponds with field boundaries on historic Ordnance Survey mapping (6" to 1 mile, 1837 – 1842). - Visible on aerial imagery. - No corresponding modern utilities. - Archaeological testing noted a raised field system in this area; however, no archaeological material was recovered during excavation (Licence Number: 04E0764; http://excavations.ie/report/2004/Meath/0012315/). - Interpreted as a post-	-	High	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.

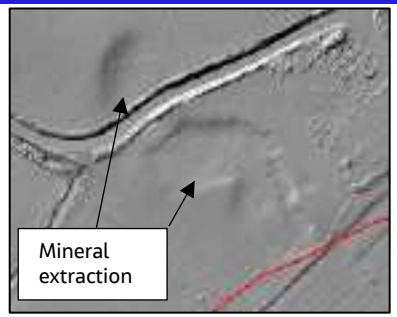
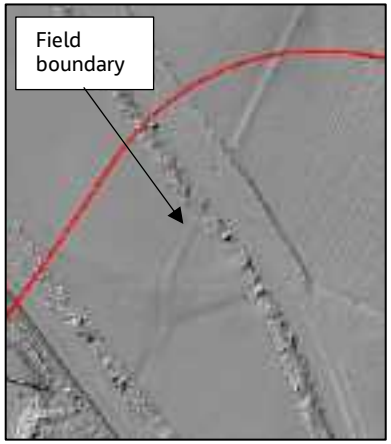
Unique Reference Number	Easting / Northing	Townland	Site Type	Summary Description	Constraint Reference Number (if applicable)	Confidence Rating	Figure
				medieval field system, including possible trackway and drainage of unknown date.			
LI_065	689114 / 741549	Calgath	Mill - Corn	- An irregular area of disturbance measuring c.150m x c.50m. - Corresponds with the location of 'Calgath Corn Mill' depicted on historic Ordnance Survey mapping (6" to 1 mile, 1837 – 1842). - The 'Mill Dam' has been redeveloped; however, boundaries still vaguely perceptible on aerial imagery. - Interpreted as the site of a post-medieval corn mill.	-	High	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.
LI_066	689074 / 741218	Calgath	Enclosure	- A sub-circular negative feature, c.58mx33m, with ephemeral linear features extending to the north and east. Appears to be cut by a later track or former boundary to the south, with cultivation patterns abutting/cut by this feature (none within the enclosure). - No corresponding features are depicted on historic Ordnance Survey mapping (or modern mapping); however, located within Brides Stream	DL_07	Low	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.

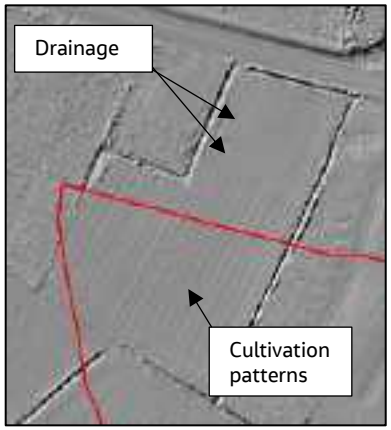
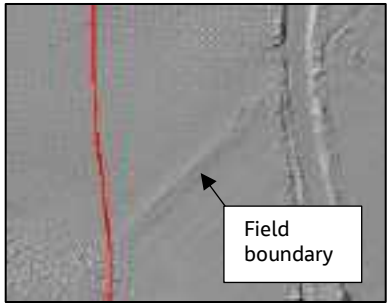
Unique Reference Number	Easting / Northing	Townland	Site Type	Summary Description	Constraint Reference Number (if applicable)	Confidence Rating	Figure
				House demesne (DL_07). - Visible on aerial imagery. Livestock noted within the field. - Tentatively interpreted as a possible enclosure of unknown date and function; however, while it feature is not shown on modern Ordnance Survey mapping, it could equally be a modern animal run / outdoor arena.			
LI_067	689120 / 741213	Calgath	Field System	- A network of negative linear features, including cultivation patterns. Irregular area of disturbance to the south. - Located within DL_07. Features do not correspond with field boundaries on historic Ordnance Survey mapping (6" to 1 mile, 1837 – 1842, and 25" to 1 mile, 1888-1913) - depicted as an area of parkland, bisected by driveway to Bridestream House. 'Sand Pits' depicted to the south. - Vaguely perceptible on aerial imagery. - Interpreted as a field system of unknown date, with disturbance from a post-medieval gravel Pit/Quarry.	DL_07	Medium	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.

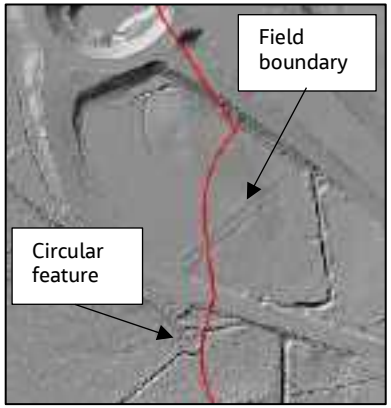
Unique Reference Number	Easting / Northing	Townland	Site Type	Summary Description	Constraint Reference Number (if applicable)	Confidence Rating	Figure
LI_068	689163 / 741075	Calgath	Gravel pit / Quarry	- An irregular negative area measuring c. 93m across. Cuts cultivation patterns. - located within DL_07; however, no corresponding features on historic Ordnance Survey mapping. A 'Gravel Pit' / 'Sand Pit' is located to the south-east on historic Ordnance Survey mapping. - Visible on aerial imagery. Possible extends south and west (large pond). - Interpreted as a possible quarry / area of extraction.	DL_07	High	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.
LI_069	687999 / 740999	Balfeaghan	Building	- A rectangular feature measuring c.7m x c.4m. - Corresponds with a building depicted on historic Ordnance Survey mapping (25" to 1 mile, 1888-1913). - Not visible on aerial imagery. - Interpreted as a post-medieval building.	-	High	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.

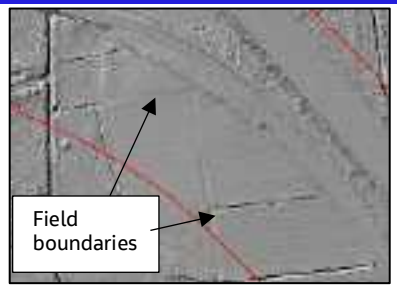
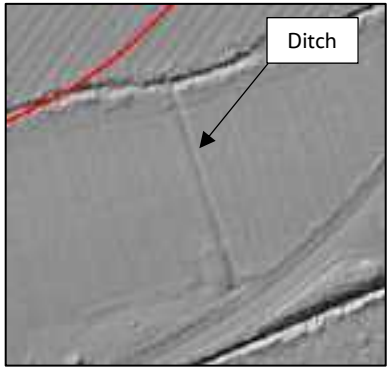
Unique Reference Number	Easting / Northing	Townland	Site Type	Summary Description	Constraint Reference Number (if applicable)	Confidence Rating	Figure
LI_070	688109 / 740973	Balfeaghan	Gravel pit / Quarry	- A large irregular area measuring c.166m across. - Corresponds with a 'Gravel Pit' depicted on historic Ordnance Survey mapping (6" to 1 mile, 1837 – 1842). - Interpreted as a post-medieval gravel pit.	-	High	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.
LI_071	Number not used						
LI_072	688937 / 740811	Dolanstown	Field System	- Negative linear features. - Correspond with field boundaries on historic Ordnance Survey mapping (6" to 1 mile, 1837 – 1842). - Interpreted as a post-medieval field system.	-	High	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.

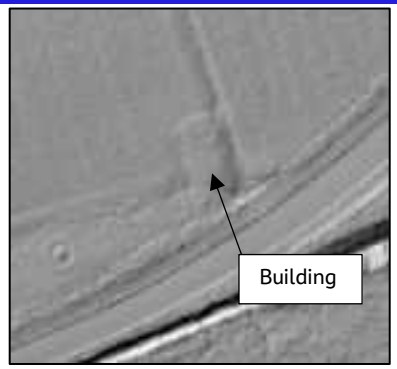
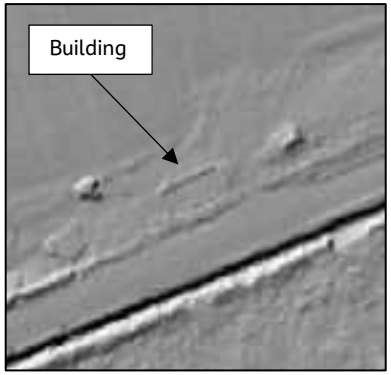
Unique Reference Number	Easting / Northing	Townland	Site Type	Summary Description	Constraint Reference Number (if applicable)	Confidence Rating	Figure
LI_073	687901 / 740754	Balfeaghan	Pits	- A number of negative circular features measuring c.3m in diameter. - No corresponding features on historic Ordnance Survey mapping. - Visible on aerial imagery in pasture field (Digital Globe shows the field as silage). - Tentatively interpreted as pits of unknown date and function; however, could relate to agriculture (former field boundaries and modern cultivation in this area) or be natural.	-	Low	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.
LI_074	687953 / 740751	Balfeaghan	Field Boundary	- Three negative linear features orientated east-west, running from the R158, measuring c.250m in length. - Correspond with field boundaries on historic Ordnance Survey mapping (6" to 1 mile, 1837 – 1842, and 25" to 1 mile, 1888-1913). - Interpreted as post-medieval field boundaries.	-	High	 Single Direction Hillshade Model: DTM azimuth 180° and altitude 45°.

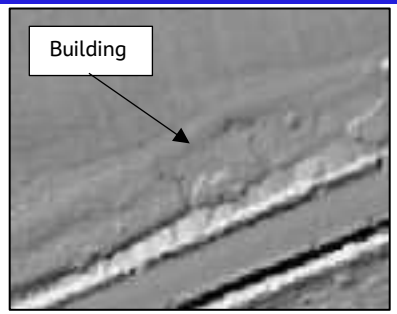
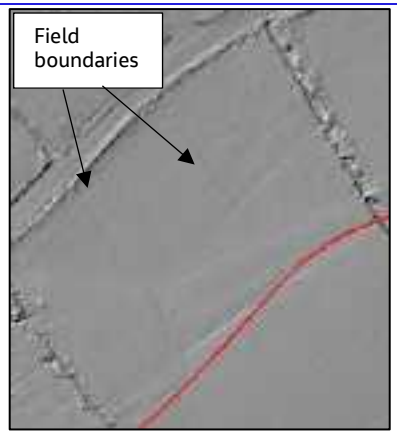
Unique Reference Number	Easting / Northing	Townland	Site Type	Summary Description	Constraint Reference Number (if applicable)	Confidence Rating	Figure
LI_075	688538 / 740707	Dolanstown; Balfeaghan	Gravel pit / Quarry	- A large irregular area measuring c.150m across. Bisected by the R125. - 'Gravel Pit' and 'Sand Pits' depicted on historic Ordnance Survey mapping (6" to 1 mile, 1837 – 1842, and 25" to 1 mile, 1888-1913) to the north-west and south-east. - Vaguely perceptible on aerial imagery. - Archaeological testing in this area identified features relating to quarrying (Licence Number: 11E239; 11R87; http://excavations.ie/report/2011/Meath/0022718/). - Interpreted as post-medieval gravel pit.	-	High	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.
LI_076	687679 / 740540	Boycetown	Field Boundary	- Negative linear feature orientated roughly north-south, measuring c.282m in length. Between the Rye Water in the north to the Midland Great Western Railway in the south. Bisected by the Royal Canal. - Corresponds with a field boundary on historic Ordnance Survey mapping (6" to 1 mile, 1837 – 1842). - Interpreted as a post-medieval field boundary.	-	High	

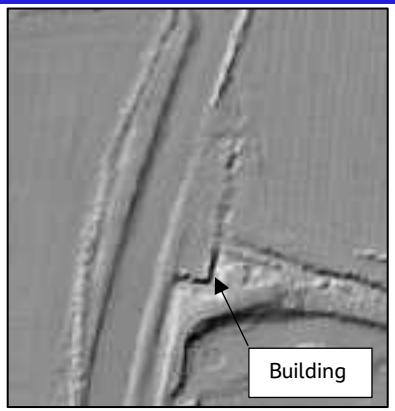
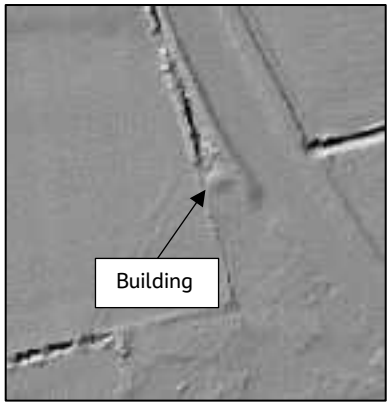
Unique Reference Number	Easting / Northing	Townland	Site Type	Summary Description	Constraint Reference Number (if applicable)	Confidence Rating	Figure
							Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.
LI_077	687490 / 740249	Boycetown	Drainage	- A network of very ephemeral linear features perpendicular to cultivation patterns. - No corresponding features on historic Ordnance Survey mapping (overall field shape reflects historic Ordnance Survey mapping (25" to 1 mile, 1888-1913). - No corresponding modern utilities, although minor watercourses noted to east and south. - Interpreted as field drainage of unknown date.	-	Medium	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.
LI_078	687226 / 740193	Boycetown	Field Boundary	- Negative linear feature orientated roughly north-east to south-west, measuring c.109m in length. - Corresponds with a field boundary on historic Ordnance Survey mapping (6" to 1 mile, 1837 – 1842, and 25" to 1 mile, 1888-1913). - Visible on aerial imagery. - Archaeological testing in this area identified cultivation ridges; however, these were interpreted as modern agricultural activity (Licence Number: 02E0144;	-	High	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.

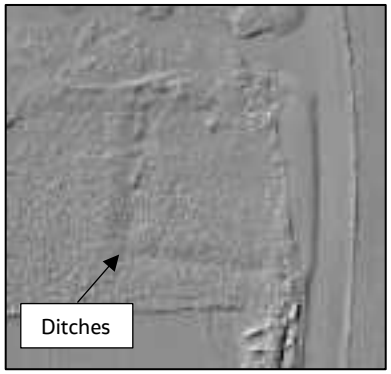
Unique Reference Number	Easting / Northing	Townland	Site Type	Summary Description	Constraint Reference Number (if applicable)	Confidence Rating	Figure
				http://excavations.ie/report/2002/Kildare/0008192/). - Interpreted as a post-medieval field boundary.			
LI_079	687190 / 739685	Pitchfordstown	Field system	- A network of intersecting linear features and cultivation patterns. A circular feature (measuring c.20m in diameter) is located to the south incorporated into field boundaries (outwith study area). - Some of which correspond to field boundaries on historic Ordnance Survey mapping (6" to 1 mile, 1837 – 1842). - Archaeological testing in this area failed to reveal any associated archaeological remains; however, cultivation activity was interpreted as more recent in date (Licence Number: 02E0147; http://excavations.ie/report/2002/Kildare/0008297/ & https://repository.dri.ie/catalog/td96zh281). - Interpreted as a field system of unknown date.	-	Medium	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.

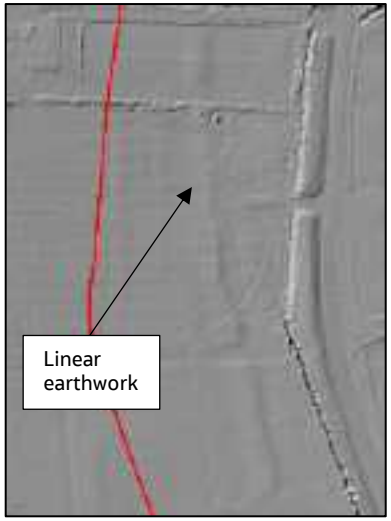
Unique Reference Number	Easting / Northing	Townland	Site Type	Summary Description	Constraint Reference Number (if applicable)	Confidence Rating	Figure
LI_080	687392 / 739418	Kilcock	Field system	- A number of intersecting negative linear features and cultivation patterns. - Correspond to field boundaries on historic Ordnance Survey mapping (6" to 1 mile, 1837 – 1842). - Archaeological testing in this area failed to reveal any archaeological remains and cultivation was interpreted as the remains of relatively recent farming (Licence Number: 02E0148; http://excavations.ie/report/2002/Kildare/0008226/). - Interpreted as a post-medieval field system.	-	High	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.
LI_081	687439 / 738928	Duncreevan	Ditch	- A linear feature measuring c. 82m in length and orientated roughly north-south adjacent to a possible roadside building (LI_082). - No corresponding features on historic Ordnance Survey mapping. - Visible on aerial imagery. - No modern utilities noted. - Interpreted as a ditch of unknown date.	-	Medium	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.

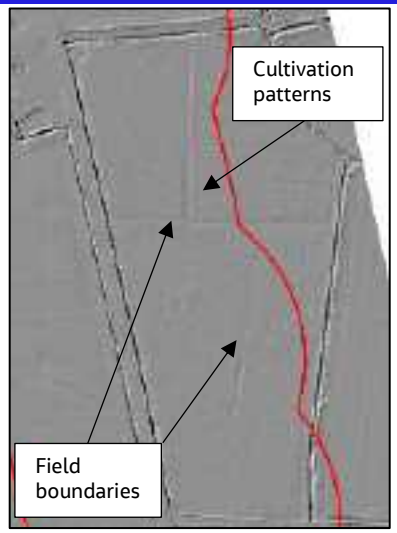
Unique Reference Number	Easting / Northing	Townland	Site Type	Summary Description	Constraint Reference Number (if applicable)	Confidence Rating	Figure
LI_082	687444 / 738892	Duncreevan	Building	- A rectangular feature measuring c.17m x c.12, positioned perpendicular to the R407. - Corresponds with a group of buildings depicted on historic Ordnance Survey mapping (6" to 1 mile, 1837 – 1842) and a single building on later Ordnance Survey mapping (25" to 1 mile, 1888-1913). - Interpreted as site of a post-medieval roadside building.	-	High	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.
LI_083	687372 / 738848	Duncreevan	Building	- A positive rectangular feature measuring approximately 13m x 6m, parallel to the R407. - Corresponds with one of a small group of buildings on historic Ordnance Survey mapping (6" to 1 mile, 1837 – 1842). - An extant building is visible on aerial imagery (Ortho 1995). - Interpreted as the site of a roadside building of unknown date and function.	-	Medium	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.

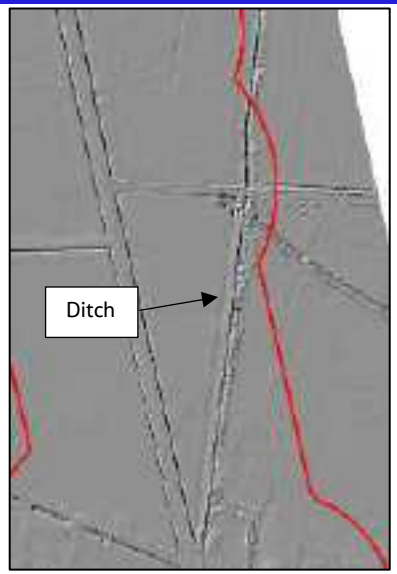
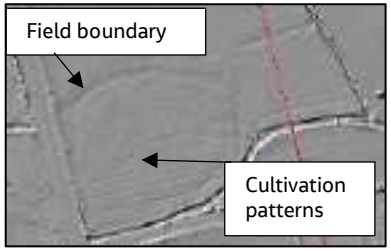
Unique Reference Number	Easting / Northing	Townland	Site Type	Summary Description	Constraint Reference Number (if applicable)	Confidence Rating	Figure
LI_084	687321 / 738831	Duncreevan	Building	- A rectangular feature measuring c.17m by c.11m adjacent to the R407. - No corresponding feature on historic Ordnance Survey mapping (although a group of roadside buildings are depicted on historic Ordnance Survey mapping nearby; 6" to 1 mile, 1837 – 1842). - Interpreted as the site of a possible roadside building or enclosure.	-	Medium	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.
LI_085	686826 / 738521	Duncreevan	Field system	- A series of negative linear features c.90m in length, orientated roughly north-south, south of the R407. - Corresponding to field boundaries on the historic Ordnance Survey mapping (6" to 1 mile, 1837 – 1842). - Interpreted as a post-medieval field system.	-	High	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.

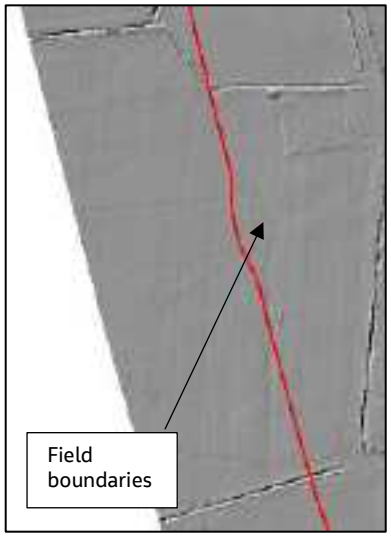
Unique Reference Number	Easting / Northing	Townland	Site Type	Summary Description	Constraint Reference Number (if applicable)	Confidence Rating	Figure
LI_086	686102 / 737822	Portgloriam	Building	- A rectangular feature measuring c.39m x c.10m adjacent to the existing road (R407). - Corresponds with a roadside house within an enclosed plot depicted on historic Ordnance Survey mapping. - Not visible on aerial imagery (obscured by trees). - Archaeological monitoring identified the foundations of a trapezoidal building and associated ash pit (Licence Number: 10E0445; http://excavations.ie/report/2010/Kildare/0021615/). - Interpreted as the plot associated with a post-medieval roadside house.	-	High	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.
LI_087	686115 / 737483	Portgloriam	Building	- A rectangular feature measuring c.6m x 5m. - Corresponds with a roadside building on historic Ordnance Survey mapping (6" to 1 mile, 1837 – 1842). - Not visible on aerial imagery. - Interpreted as a post-medieval roadside building.	-	High	

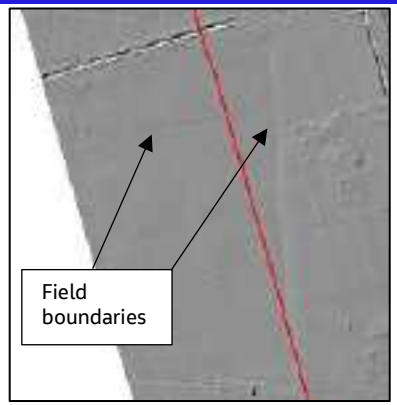
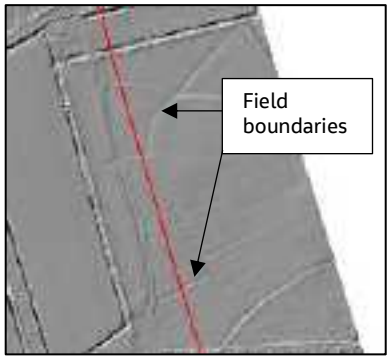
Unique Reference Number	Easting / Northing	Townland	Site Type	Summary Description	Constraint Reference Number (if applicable)	Confidence Rating	Figure
							Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.
LI_088	686094 / 737465	Portgloriam	Ditch	- An ephemeral negative linear feature, orientated north-east to south-west, measuring c. 53m between two extant boundaries. - No corresponding features on historic Ordnance Survey mapping. - Not visible on aerial imagery. - No modern utilities noted. - Interpreted as a ditch of unknown date.	-	Medium	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.
LI_089	Number not used						
LI_090	686297 / 737037	Ballybrack	Enclosure	- Ephemeral negative linear features. Appear to form two sides and a corner of a possible square ditched enclosure, measuring c. 60m in width. Possibly truncated by the R407. - No corresponding feature on historic Ordnance Survey mapping. - Not visible on aerial imagery. - Located north of linear earthwork (KD010-001001), identified as 'The Pale' on historic Ordnance Survey mapping (25" to 1 mile, 1888-	-	Low	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.

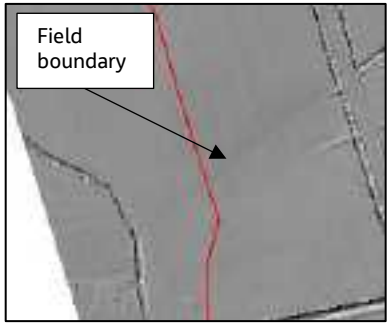
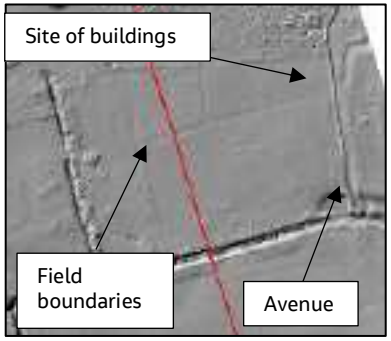
Unique Reference Number	Easting / Northing	Townland	Site Type	Summary Description	Constraint Reference Number (if applicable)	Confidence Rating	Figure
				1913). - Interpreted as a possible square enclosure; however, could equally be a drainage feature.			
LI_091	686264 / 736716	Ballybrack	Linear Earthwork	- An ephemeral positive linear earthwork orientated north-south, measuring c. 250m in length. Parallel to the R407. - No corresponding features depicted on historic Ordnance Survey mapping. - Vaguely perceptible on Digital Globe. Truncated by former field boundaries. - No corresponding modern utilities. - Approximately 800m to the north of linear earthwork (KD010-001001), identified as 'The Pale' on historic Ordnance Survey mapping (25" to 1 mile, 1888-1913). - Interpreted as an earthwork, possibly a defensive or territorial boundary of possible Anglo-Norman date.	-	Low	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.

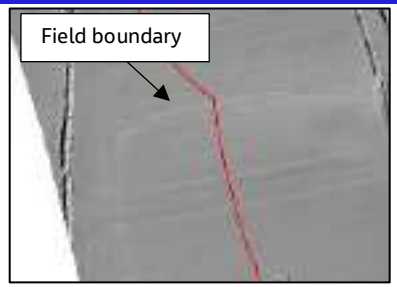
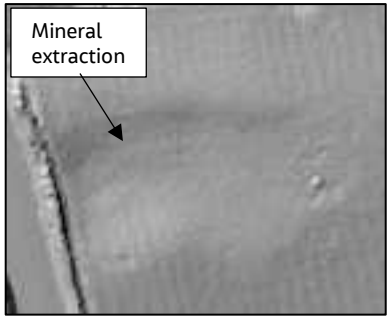
Unique Reference Number	Easting / Northing	Townland	Site Type	Summary Description	Constraint Reference Number (if applicable)	Confidence Rating	Figure
LI_092	686653 / 736010	Ballyloughan	Field system	- A network of ephemeral linear features including cultivation patterns. - Located within a field depicted on historic Ordnance Survey mapping (6" to 1 mile, 1837 – 1842), including field boundaries and 'Loughan River'. - Visible on aerial imagery (https://www.cambridgeairphotos.com/location/bdu041/) in proximity to a rath (KD010-002) and linear earthwork (KD010-001001). - Interpreted as a post-medieval field system.	-	High	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.

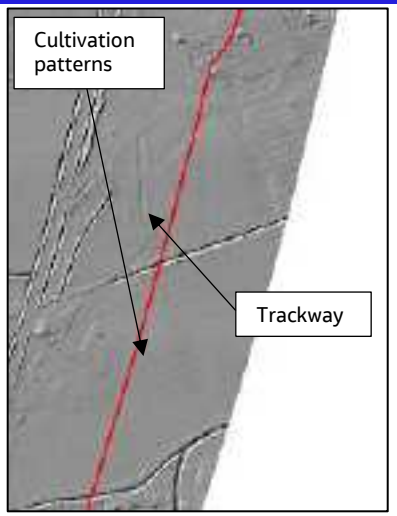
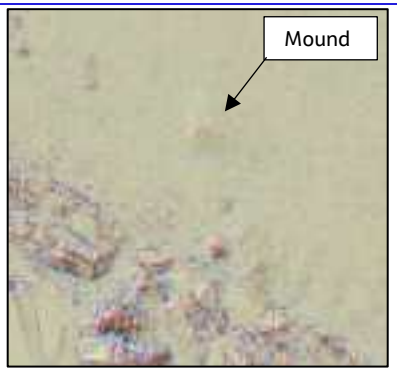
Unique Reference Number	Easting / Northing	Townland	Site Type	Summary Description	Constraint Reference Number (if applicable)	Confidence Rating	Figure
LI_093	686702 / 735652	Ballyloughan	Linear Earthwork	- A linear feature orientated approximately north-south measuring c.565m in length (extends beyond 100m Study Area). Runs parallel to an extant field boundary / ditch. - On the townland boundary between Clonduff, Graiguepottle and Ballyloughan. - Corresponds with linear earthwork (KD010-001001), a Recorded Monument. - Depicted on historic Ordnance Survey mapping. Identified as 'The Pale' on later Ordnance Survey mapping (25" to 1 mile, 1888-1913). Bisected by 'Loughan River'. - Interpreted as a linear earthwork of possible Anglo-Norman date.	AY_13; KD010-001001	High	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.
LI_094	686938 / 734800	Baltracey	Field system	- A negative curvilinear feature with cultivation patterns, as well as a linear feature extending to the east. - Corresponds with field boundary on historic Ordnance Survey mapping (6" to 1 mile, 1837 – 1842) and drainage ditches on later Ordnance Survey mapping (25" to 1 mile, 1888-1913). Associated with a farmstead to the east. - Visible on aerial imagery.	-	High	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.

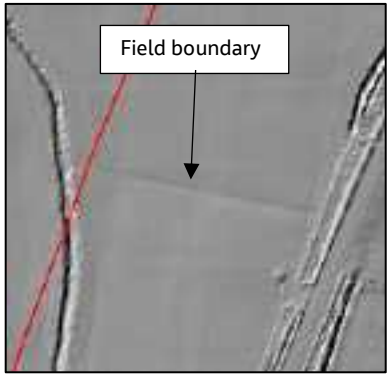
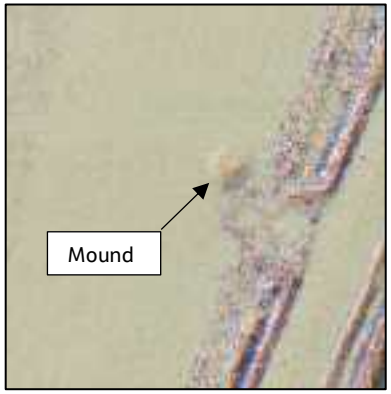
Unique Reference Number	Easting / Northing	Townland	Site Type	Summary Description	Constraint Reference Number (if applicable)	Confidence Rating	Figure
				- Interpreted as a post-medieval field system.			
LI_095	686770 / 734677	Baltracey	Field system	- A network of ephemeral linear features including cultivation patterns and possible field drainage. - Correspond with field boundaries depicted on historic Ordnance Survey mapping (6" to 1 mile, 1837 – 1842, and 25" to 1 mile, 1888-1913). - Interpreted as a post-medieval field system.	-	High	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.

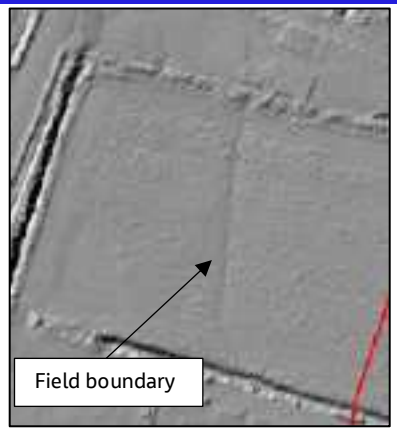
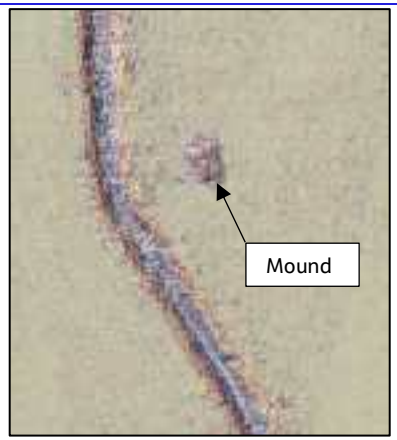
Unique Reference Number	Easting / Northing	Townland	Site Type	Summary Description	Constraint Reference Number (if applicable)	Confidence Rating	Figure
LI_096	686846 / 734434	Baltracey	Field system	- A network of ephemeral linear features. - Correspond with field boundaries depicted on historic Ordnance Survey mapping (6" to 1 mile, 1837 – 1842, and 25" to 1 mile, 1888-1913). - Visible on aerial imagery. - Interpreted as a post-medieval field system.	-	High	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.
LI_097	687185 / 734210	Baltracey	Field System	- A network of negative linear features, including a pair of parallel linears orientated approximately north-south with perpendicular features running off and forming small irregular enclosures. Cultivation patterns noted within these small enclosures. - No corresponding features on historic Ordnance Survey mapping (6" to 1 mile, 1837 – 1842, and 25" to 1 mile, 1888-1913). - Visible on aerial imagery. - Nearest known constraint is the 18th/19th century house (KD010-011) and associated grounds (LI_099) to the south. - Interpreted as possible field	-	Medium	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.

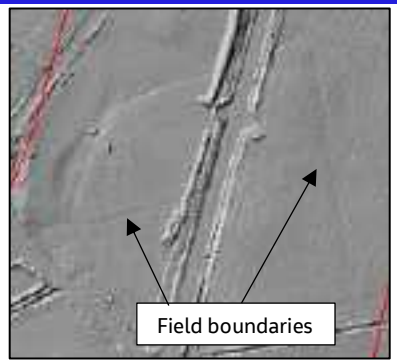
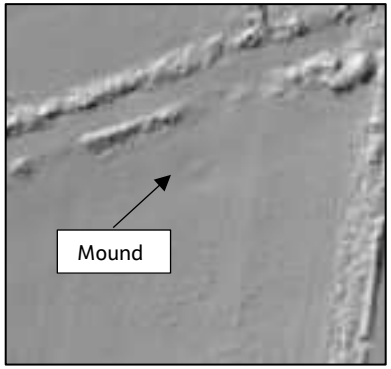
Unique Reference Number	Easting / Northing	Townland	Site Type	Summary Description	Constraint Reference Number (if applicable)	Confidence Rating	Figure
				boundaries and trackways forming a field system of unknown date.			
LI_098	687013 / 734033	Baltracey	Field boundary	- A negative linear feature measuring c. 160m. - Corresponds with a field boundary on historic Ordnance Survey mapping (6" to 1 mile, 1837 – 1842). - Interpreted as a post-medieval field boundary.	-	High	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.
LI_099	687229 / 734025	Baltracey	Designed Landscape Feature	- A series of negative linears including cultivation patterns. - Correspond with features on historic Ordnance Survey mapping (6" to 1 mile, 1837 – 1842). - Visible on aerial imagery (https://www.cambridgeairphotos.com/location/avo087/). - Corresponds with an 18th/19th century house (KD010-011). - Interpreted as the grounds surrounding a post-medieval house.	KD010-011	High	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.

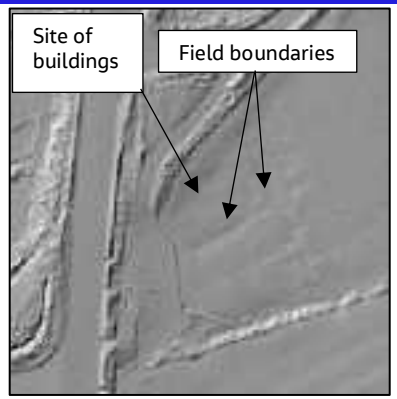
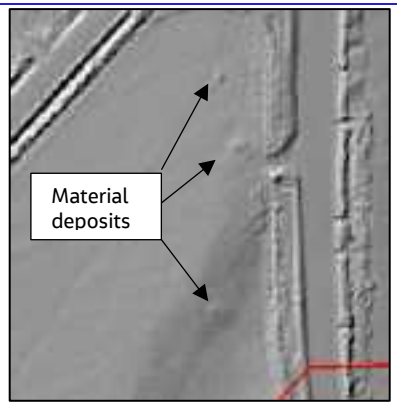
Unique Reference Number	Easting / Northing	Townland	Site Type	Summary Description	Constraint Reference Number (if applicable)	Confidence Rating	Figure
LI_100	687033 / 733814	Baltracey	Field boundary	- A sinuous linear feature measuring c. 240m in length. - Corresponds with a field boundary depicted on historic Ordnance Survey mapping (6" to 1 mile, 1837 – 1842, and 25" to 1 mile, 1888-1913). - Interpreted as a post-medieval field boundary.	-	High	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.
LI_101	687208 / 733803	Baltracey	Gravel pit / Quarry	- A large irregular depression c.63m across, cultivation patterns overlay the feature. - No corresponding features on historic Ordnance Survey mapping; however, possible extraction site (none noted nearby on historic Ordnance Survey mapping). - Not visible on aerial imagery. - Interpreted as a possible Gravel pit /Quarry of unknown date or possible natural feature.	-	Medium	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.

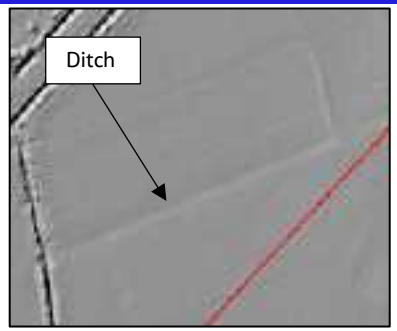
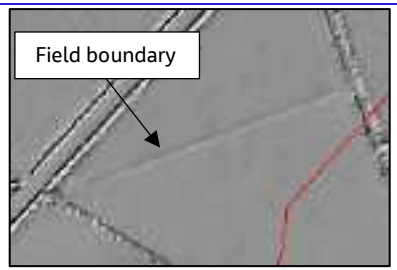
Unique Reference Number	Easting / Northing	Townland	Site Type	Summary Description	Constraint Reference Number (if applicable)	Confidence Rating	Figure
LI_102	687308 / 732586	Painestown	Field system	- A network of negative linear features including cultivation patterns and possible trackway. - Located within DL_10. No corresponding features on historic Ordnance Survey mapping. Depicted on historic Ordnance Survey mapping (6" to 1 mile, 1837 – 1842) as an area of parkland. - Visible on aerial imagery. - Interpreted as a field system, including possible trackway, of unknown date.	DL_10	Medium	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.
LI_103	687002 / 732300	Painestown	Mound	- A circular positive feature measuring c.5m in diameter. - No corresponding features on historic Ordnance Survey mapping. - Visible on aerial imagery (1995 & 2000 orthos). - Interpreted as a possible mound, or modern agricultural feature.	-	Medium	

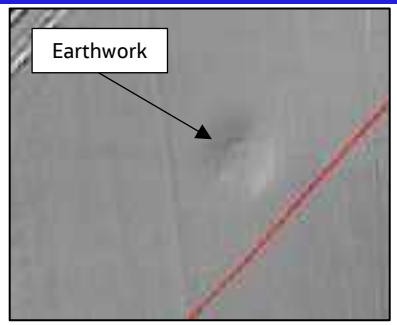
Unique Reference Number	Easting / Northing	Townland	Site Type	Summary Description	Constraint Reference Number (if applicable)	Confidence Rating	Figure
							Simple Local Relief Model (40% transparency) over Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.
LI_104	686870 / 32045	Painestown	Field boundary	- A negative linear feature measuring c. 111m orientated east-west between the road and townland boundary. - Corresponds with a field boundary on historic Ordnance Survey mapping. - Interpreted as a post-medieval field boundary.	-	High	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.
LI_105	686909 / 732008	Painestown	Mound	- A positive circular feature measuring c.6m in diameter. - No corresponding features on historic Ordnance Survey mapping. - Visible on aerial imagery (2000 orthos). - Interpreted as a possible mound, or modern agricultural feature.	-	Medium	 Simple Local Relief Model (40% transparency) over Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.

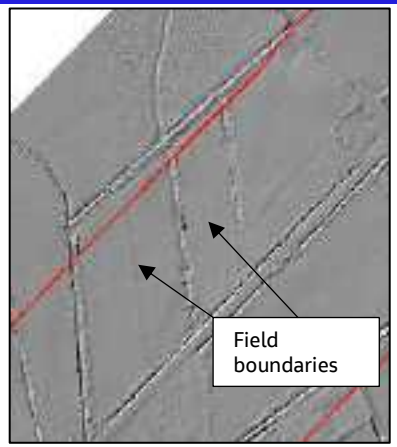
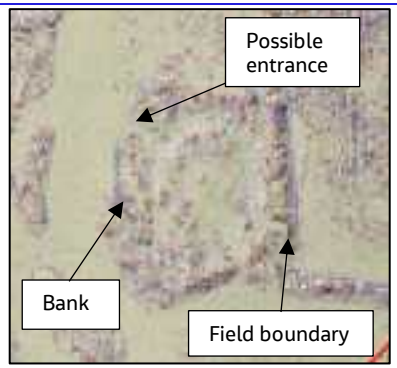
Unique Reference Number	Easting / Northing	Townland	Site Type	Summary Description	Constraint Reference Number (if applicable)	Confidence Rating	Figure
LI_106	686982 / 731960	Painestown	Field boundary	- A sinuous negative linear feature measuring c. 74m in length. Orientated north-south. - Corresponds with a field boundary / townland boundary between Moortown and Painestown on historic Ordnance Survey mapping. - Interpreted as a field boundary used as a townland boundary.	-	High	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.
LI_107	686831 / 731924	Painestown	Mound	- An irregular positive feature measuring c. 8m in width. - No corresponding features on historic Ordnance Survey mapping. - Visible on aerial imagery (1995 orthos / 2005 orthos). - Interpreted as a possible mound, or modern agricultural feature.	-	Medium	 Simple Local Relief Model (40% transparency) over Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.

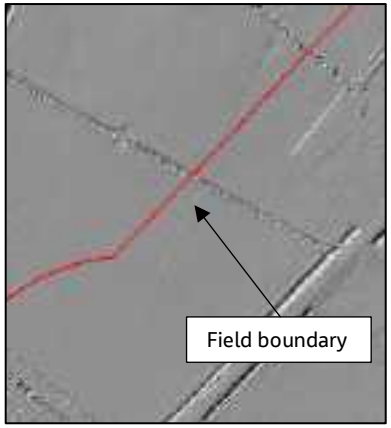
Unique Reference Number	Easting / Northing	Townland	Site Type	Summary Description	Constraint Reference Number (if applicable)	Confidence Rating	Figure
LI_108	686775 / 731565	Boherhole	Field system	- A network of negative linear features. - Some of which correspond with field boundaries on historic Ordnance Survey mapping, with some forming subdivisions. - Interpreted as a possible post-medieval field system.	-	High	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.
LI_109	686675 / 731240	Boherhole	Mound	- A small ephemeral circular feature measuring c. 6m in diameter. - No corresponding features on historic Ordnance Survey mapping. - Not visible on aerial imagery. - Interpreted as a possible mound with a ditch around the circumference; however, could equally be the site of amodern animal feeder.	-	Low	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.

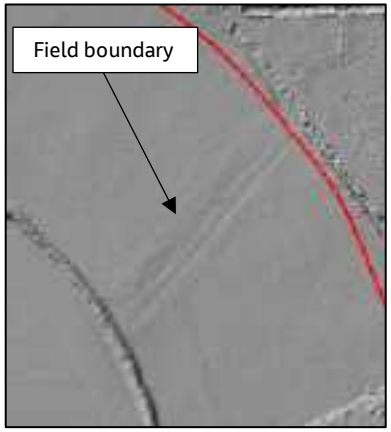
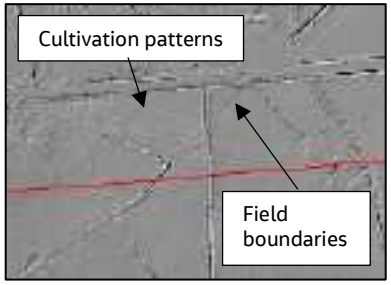
Unique Reference Number	Easting / Northing	Townland	Site Type	Summary Description	Constraint Reference Number (if applicable)	Confidence Rating	Figure
LI_110	686743 / 731069	Boherhole	Field system	- A network of ephemeral negative linears. - Correspond with buildings and field boundaries depicted on historic Ordnance Survey mapping. - Interpreted as a post-medieval field system and associated buildings.	-	High	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.
LI_111	686664 / 730948	Boherhole	Gravel pit / Quarry	- Three positive sub-circular features measuring c. 4 - 7m in diameter. - No corresponding features on historic Ordnance Survey mapping; however, possibly associated with a 'Gravel Pit' on historic Ordnance Survey mapping (25" to 1 mile, 1888-1913), or modern dumped material. - Also in proximity to an enclosure (KD010-037), c. 100m to the south-east (other side of the R407). - Interpreted as possible material associated with a gravel pit, or modern deposited material.	-	Medium	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.

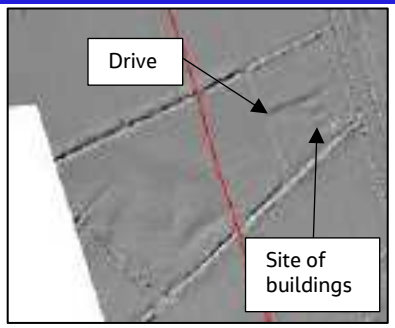
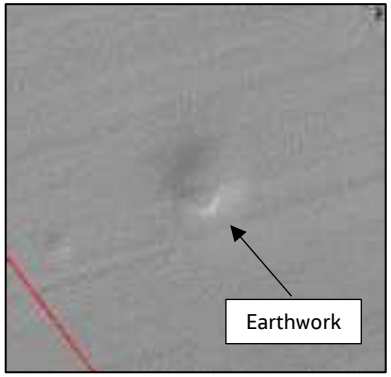
Unique Reference Number	Easting / Northing	Townland	Site Type	Summary Description	Constraint Reference Number (if applicable)	Confidence Rating	Figure
LI_112	686503 / 730761	Boherhole	Ditch	- An ephemeral negative linear feature measuring c. 121m. - No corresponding features on historic Ordnance Survey mapping. - Not visible on aerial imagery. - No corresponding modern utilities. - Interpreted as a possible ditch of unknown date.	-	Medium	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.
LI_113	686177 / 730424	Ballynaboley	Field boundary	- A linear feature measuring c. 168m orientated roughly north-east to south-west. - Corresponds with a field boundary on historic Ordnance Survey mapping (6" to 1 mile, 1837 – 1842). - Visible on aerial imagery. - Interpreted as a post-medieval field boundary.	-	High	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.

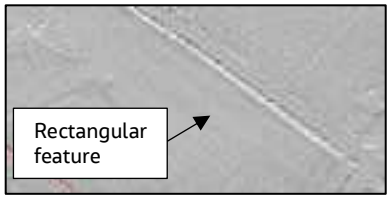
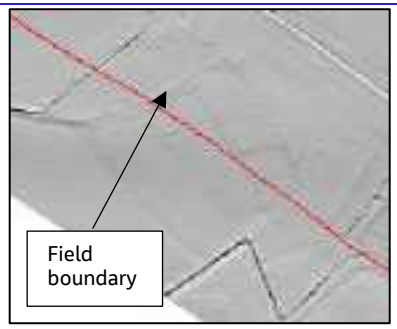
Unique Reference Number	Easting / Northing	Townland	Site Type	Summary Description	Constraint Reference Number (if applicable)	Confidence Rating	Figure
LI_114	685948 / 730125	Ballynabolley	Earthwork (site of)	- Negative circular feature measuring c.28m in diameter. Similar feature in field opposite; however, slightly less circular. - No corresponding features on historic Ordnance Survey mapping (other feature depicted on historic Ordnance Survey mapping as an irregular depression; 25" to 1 mile, 1888-1913). - Visible on aerial imagery as an area of un-cut grass. - Barrow (KD014-067) and enclosures (KD014-066 and KD014-065) noted approximately 500m to the south. - This feature could be the site of an enclosure or mound that has been levelled; therefore, it has been tentatively interpreted as the site of an earthwork of unknown date.	-	Low	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.

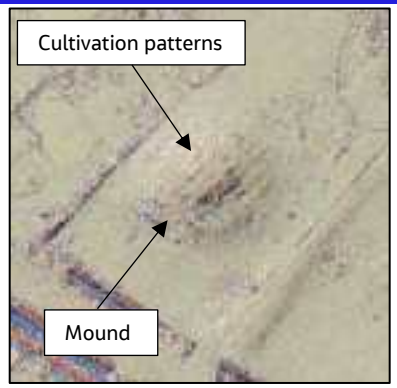
Unique Reference Number	Easting / Northing	Townland	Site Type	Summary Description	Constraint Reference Number (if applicable)	Confidence Rating	Figure
LI_115	685235 / 729580	Betaghstown	Field system	- A network of negative linear features. - Some of which correspond with field boundaries on historic Ordnance Survey mapping (6" to 1 mile, 1837 – 1842, and 25" to 1 mile, 1888-1913). - Interpreted as a post-medieval field system.	-	High	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.
LI_116	684902 / 729054	Ballynagappagh	Rath - ringfort	- Sections of a sub-circular feature, possibly forming a sub-circular bank (c.30m in length), abutted by a field boundary. Possible entrance through bank to north-west. Area approximately 37mx24m. - Depicted on historic Ordnance Survey mapping (6" to 1 mile, 1837 – 1842), possible bank corresponds with an 'L'-shaped section of earthwork depicted on later Ordnance Survey mapping (25" to 1 mile, 1888-1913). - Tree covered and located within a private garden (DSM). - Corresponds with a known	AY_24; KD014-001	High	 Simple Local Relief Model (40% transparency) over Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.

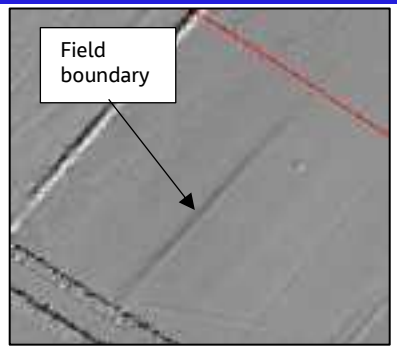
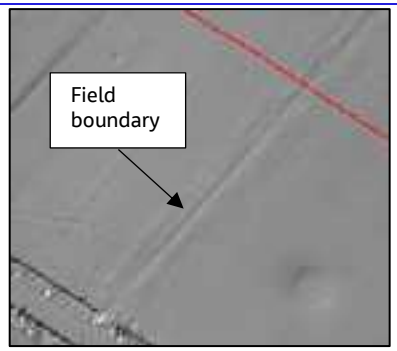
Unique Reference Number	Easting / Northing	Townland	Site Type	Summary Description	Constraint Reference Number (if applicable)	Confidence Rating	Figure
				Rath - ringfort (KD014-001; a Recorded Monument). - Interpreted as a rath - ringfort dating to the early medieval period (AD 500 – 1169).			
LI_117	684255 / 728607	Cott	Field boundary	- A negative linear feature measuring c. 266m, orientated roughly north-south. - Corresponds with a field boundary on historic Ordnance Survey mapping. - Interpreted as a post-medieval field boundary.	-	High	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.

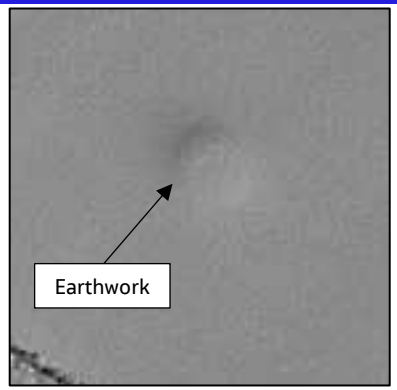
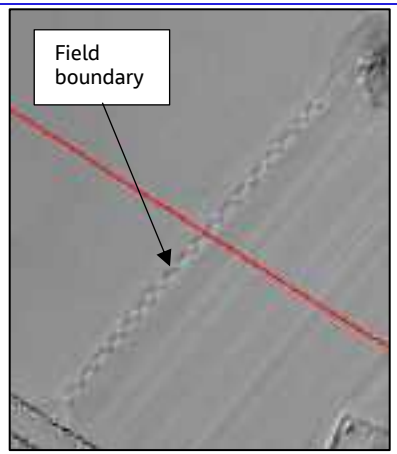
Unique Reference Number	Easting / Northing	Townland	Site Type	Summary Description	Constraint Reference Number (if applicable)	Confidence Rating	Figure
LI_118	684443 / 727450	Longtown North	Field boundary	- A broad linear feature measuring c. 107m orientated roughly north-east to south-west. - Corresponds with a field boundary on historic Ordnance Survey mapping. - Interpreted as a post-medieval field boundary.	-	High	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.
LI_119	684651 / 727206	Longtown North	Field system	- An area of negative linear features and cultivation patterns. - Some of the linear features correspond with field boundaries on historic Ordnance Survey mapping. - Interpreted as a field system of unknown date.	-	Medium	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.

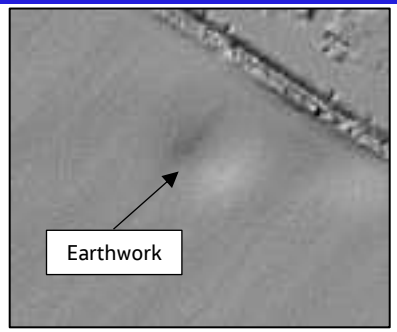
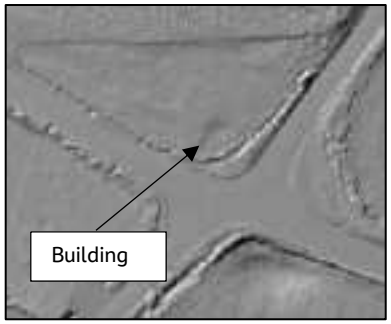
Unique Reference Number	Easting / Northing	Townland	Site Type	Summary Description	Constraint Reference Number (if applicable)	Confidence Rating	Figure
LI_120	685588 / 727084	Firmount West	Building	- An area of disturbance with a north-south linear to the west. Negative linear features and cultivation patterns also noted. - Corresponds with a cluster of buildings on historic Ordnance Survey mapping (6" to 1 mile, 1837 – 1842). Negative linear features correspond with field boundaries and a drive. - Not perceptible on aerial imagery. - Interpreted as the site of a post-medieval house and grounds.	-	High	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.
LI_121	685808 / 726714	Firmount Demesne	Earthwork (site of)	- Ephemeral negative circular feature measuring c.18m in diameter (with a further ephemeral feature to the west). - Vaguely perceptible on aerial imagery. Modern animal feeding station marks noted nearby. Bisected by a modern fence. Appears to be a circular depression with a tree growing within it (Google StreetView; May 2019). - No corresponding features on historic Ordnance Survey mapping; however, a rath (KD014-025) is located c. 180m to the north-east. - This feature could be the site of an enclosure or mound that has been levelled; therefore, it has been tentatively	-	Low	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.

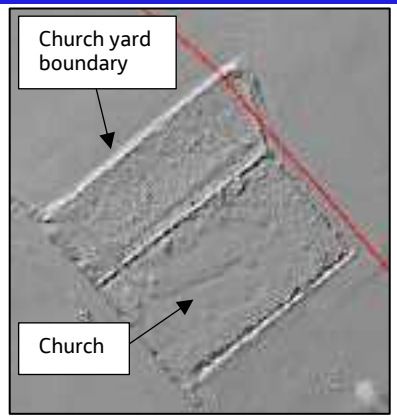
Unique Reference Number	Easting / Northing	Townland	Site Type	Summary Description	Constraint Reference Number (if applicable)	Confidence Rating	Figure
				interpreted as the site of an earthwork of unknown date.			
LI_122	686034 / 726597	Firmount Demesne	Designed Landscape Feature	- An ephemeral rectangular feature measuring c.140m in length. Parallel to the road. - Corresponds with a rectangular feature depicted on historic Ordnance Survey mapping (25" to 1 mile, 1888-1913). Possibly associated with DL_14. - Tentatively interpreted as a possible post-medieval landscape feature.	DL_14	Medium	 Single Direction Hillshade Model: DTM azimuth 180° and altitude 45°.
LI_123	685963 / 726537	Firmount Demesne	Field system	- A network of negative linear features and ephemeral cultivation patterns. - Corresponds with field boundaries depicted on historic Ordnance Survey mapping (6" to 1 mile, 1837 – 1842). - Interpreted as a post-medieval field system.	-	High	 Single Direction Hillshade Model: DTM azimuth 180° and altitude 45°.

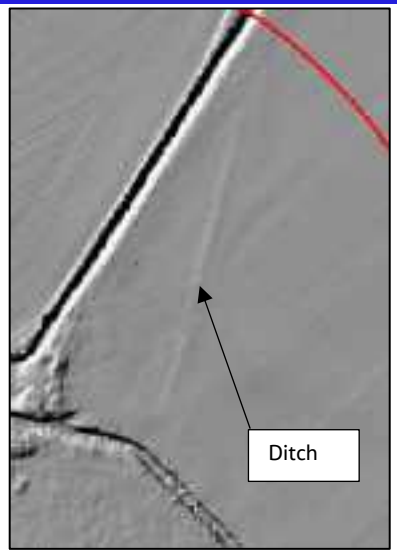
Unique Reference Number	Easting / Northing	Townland	Site Type	Summary Description	Constraint Reference Number (if applicable)	Confidence Rating	Figure
LI_124	686334 / 726465	Firmount East	Mound	- A positive circular feature, measuring approximately 28m in diameter. Appears to have cultivation ridges across the top; however, no other associated features were identified. - Partially covered in trees (DSM). - Corresponds with an earthwork depicted on historic Ordnance Survey mapping (6" to 1 mile, 1837 – 1842) and identified on later Ordnance Survey mapping as a 'Moat' (25" to 1 mile, 1888-1913). Located within the Moatfield House demesne (DL_15). - Corresponds with a known Mound (KD014-032; a Recorded Monument) and Tumulus (B14-07; a Protected Structure). - Interpreted as a mound of possible Anglo-Norman date.	AY_26; KD014-032; B14-07	High	 Simple Local Relief Model (40% transparency) over Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.

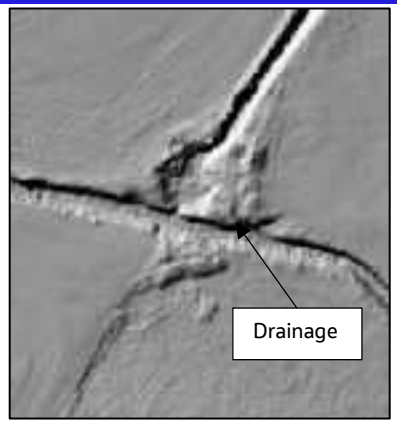
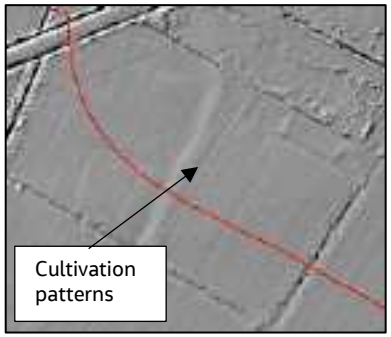
Unique Reference Number	Easting / Northing	Townland	Site Type	Summary Description	Constraint Reference Number (if applicable)	Confidence Rating	Figure
LI_125	686597 / 726329	Firmount East	Field boundary	- A negative linear feature, orientated roughly north-east to south-west, measuring c. 115m in length. - Corresponds with a field boundary on historic Ordnance Survey mapping. Forms part of a field associated with 'Moatfield House' within DL_15. - Interpreted as a post-medieval field boundary.	DL_15	High	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.
LI_126	686650 / 726290	Firmount East	Field boundary	- A linear feature measuring c. >93m orientated roughly north-east to south-west. - Corresponds with a field boundary on historic Ordnance Survey mapping. Border of DL_15. - Interpreted as a post-medieval field boundary.	DL_15	High	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.

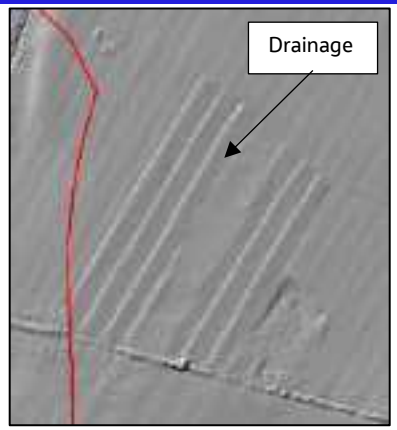
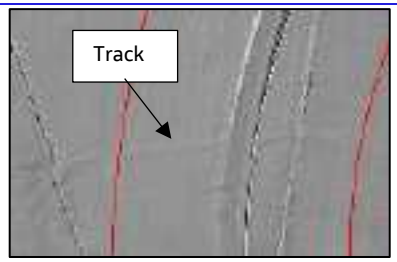
Unique Reference Number	Easting / Northing	Townland	Site Type	Summary Description	Constraint Reference Number (if applicable)	Confidence Rating	Figure
LI_127	686686 / 726259	Firmount East	Earthwork (site of)	- A negative circular feature measuring c.12m in diameter. - Located to the south of DL_15. No corresponding features on historic Ordnance Survey mapping. - A feature is visible in this location on aerial imagery (Digital Globe) as a parchmark in a pasture field. Could also be natural. - This feature could be the site of an enclosure or mound that has been levelled; therefore, it has been tentatively interpreted as the site of an earthwork of unknown date.	DL_15	Medium	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.
LI_128	686791 / 726244	Firmount East	Field boundary	- A linear feature measuring c. 181m orientated roughly north-east to south-west with undulations within the feature. - Corresponds with a field boundary on historic Ordnance Survey mapping. - Visible on aerial imagery. - Interpreted as a post-medieval field boundary.	-	High	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.

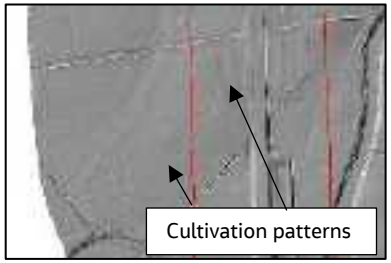
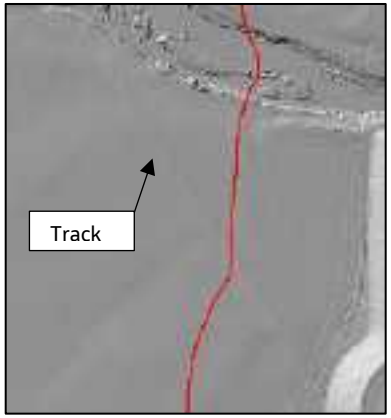
Unique Reference Number	Easting / Northing	Townland	Site Type	Summary Description	Constraint Reference Number (if applicable)	Confidence Rating	Figure
LI_129	686807 / 726081	Firmount Demesne	Earthwork (site of)	- Ephemeral negative circular feature measuring c.18m in diameter. - Visible on aerial imagery. - No corresponding features on historic Ordnance Survey mapping. - Appears to be a circular depression; possible relating to a modern animal feeding station as livestock noted in the field and area appears trampled (Google StreetView March 2011). - This feature could be the site of an enclosure or mound that has been levelled; therefore, it has been tentatively interpreted as the site of an earthwork of unknown date.	-	Low	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.
LI_130	686950 / 726049	Clane	Building	- A rectangular feature measuring c. 10m by c.8m, appears truncated to south-east by crossroads. - Corresponds with a building depicted on historic Ordnance Survey mapping on 'Millicent Cross Roads'. - Not visible on aerial imagery. - Interpreted as the site of a post-medieval roadside building.	-	High	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.

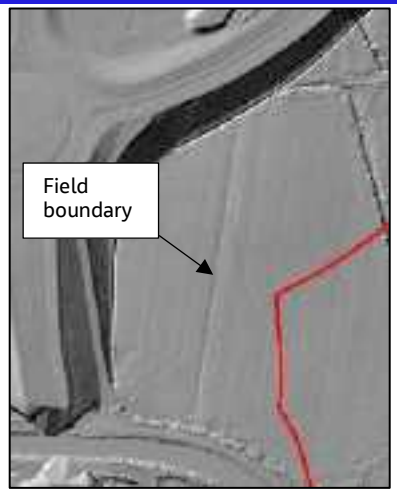
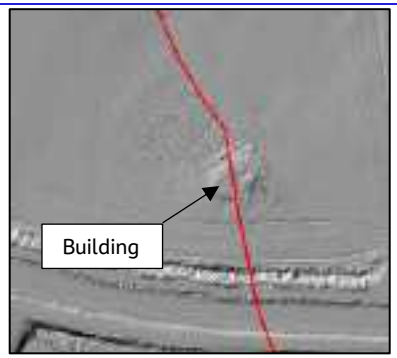
Unique Reference Number	Easting / Northing	Townland	Site Type	Summary Description	Constraint Reference Number (if applicable)	Confidence Rating	Figure
LI_131	687351 / 725866	Millicent Demesne	Church / church yard	- A sub-rectangular enclosure, measuring c.98m by c.95m, defined by a bank / ditch surrounding a 19th century church and associated memorials. Linear features bisects the area, running north-east to south-west, to meet the road (L2002). A drive is also present from the western corner running towards the church building (cruciform in plan with square apse and projecting porch). Lych gate and footpath also visible. - Obscured on aerial imagery (largely tree-covered; DSM). - Church, graveyard and path with lych gate depicted on later historic Ordnance Survey mapping (25" to 1 mile, 1888-1913). Area to the north depicted as an area of woodland. - Interpreted as church grounds and the 19th century church.	B14-12; DL_17	High	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.
LI_132	Number not used.						

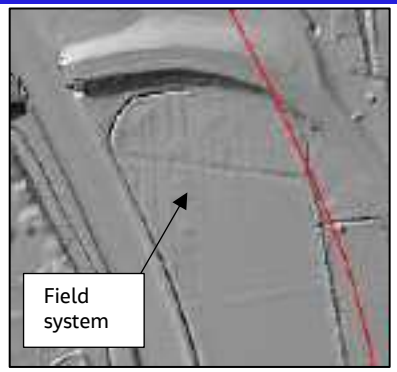
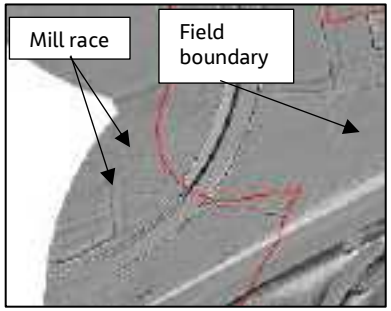
Unique Reference Number	Easting / Northing	Townland	Site Type	Summary Description	Constraint Reference Number (if applicable)	Confidence Rating	Figure
LI_133	687663 / 725071	Millicent Demesne	Ditch	- A negative linear feature orientated north-south, measuring c. 89m. - No corresponding features on historic Ordnance Survey mapping. - Not visible on aerial imagery. - No corresponding modern utilities, although adjacent to a minor watercourse. - Interpreted as a possible ditch of unknown date.	-	High	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.

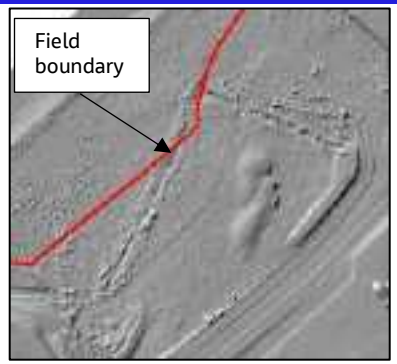
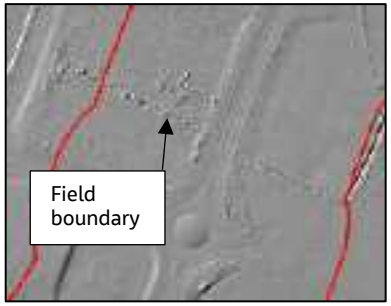
Unique Reference Number	Easting / Northing	Townland	Site Type	Summary Description	Constraint Reference Number (if applicable)	Confidence Rating	Figure
LI_134	687613 / 725042	Millicent Demesne	Designed Landscape Feature	- An irregular negative feature measuring c.20m across. - Corresponds with a drainage feature on historic Ordnance Survey mapping (25" to 1 mile, 1888-1913). Located within DL_17. - Interpreted as a post-medieval drainage feature associated with DL_17.	DL_17	High	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.
LI_135	687520 / 724883	Millicent South	Field system	- A network of linears including cultivation patterns. - Some correspond with field boundaries depicted on historic Ordnance Survey mapping, associated with a roadside building. - Not visible on aerial imagery. - Interpreted as a post-medieval field system.	-	High	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.

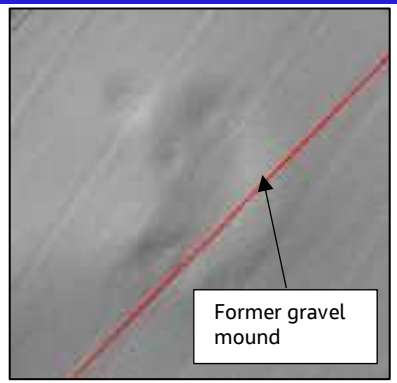
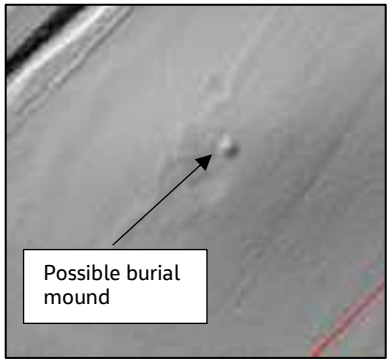
Unique Reference Number	Easting / Northing	Townland	Site Type	Summary Description	Constraint Reference Number (if applicable)	Confidence Rating	Figure
LI_136	687847 / 724517	Millicent South	Drainage	- A series of regular parallel linear features measuring c.105m in length. Orientated roughly north-south. - No corresponding features on historic Ordnance Survey mapping. - Visible on aerial imagery (2000 ortho). Located c.50m to the west of the River Liffey. - No corresponding modern utilities. - Interpreted as drainage.	-	Low	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.
LI_137	687983 / 723640	Barrettstown	Track	- A negative linear feature orientated west-east, measuring c. 236m. - Corresponds with a track on historic Ordnance Survey mapping (6" to 1 mile, 1837 – 1842) running from a house in the west to a 'Brick Field' adjacent to the river. - Visible on aerial imagery. - Interpreted as a post-medieval track.	-	High	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.

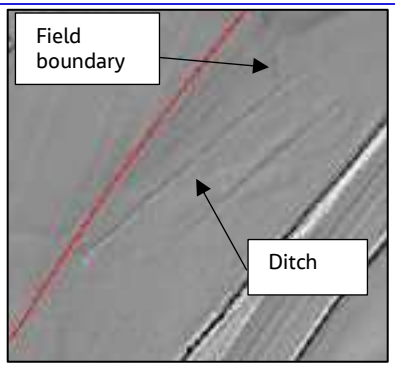
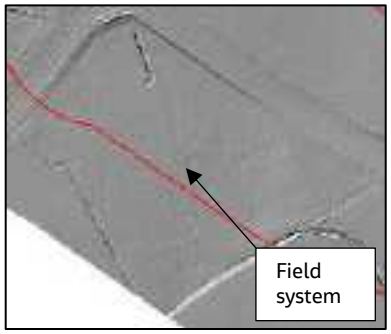
Unique Reference Number	Easting / Northing	Townland	Site Type	Summary Description	Constraint Reference Number (if applicable)	Confidence Rating	Figure
LI_138	687916 / 723347	Waterstown	Field system	- A network of linear features and cultivation patterns. Bisected by the Sallins Bypass. - Some linears correspond with field boundaries on historic Ordnance Survey mapping. - Visible on aerial imagery. - An isolated find (1990:136 Head Of Bronze Enamelled Hand Pin) was recovered in this location. - Interpreted as a post-medieval field system.	-	High	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.
LI_139	687896 / 722959	Osberstown	Track	- A linear feature measuring c.296m running south-east from the river and truncated by the bypass roundabout. - Corresponds with a track depicted on historic Ordnance Survey mapping running from a brick field (north of the river, via a ford) to the road. - Visible on aerial imagery. Truncated by Sallins Bypass roundabout. - Interpreted as a post-medieval track.	-	High	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.

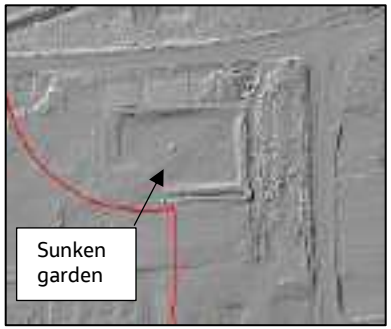
Unique Reference Number	Easting / Northing	Townland	Site Type	Summary Description	Constraint Reference Number (if applicable)	Confidence Rating	Figure
LI_140	688162 / 722732	Osberstown	Field boundary	- A negative linear feature measuring c.177m running from the river and truncated by the Sallins Bypass roundabout. - Corresponds with a field boundary depicted on historic Ordnance Survey mapping. - Archaeological testing recovered modern pottery sherds and fragments of clay-pipe stem from this area, as well as a fragmented flint arrowhead or knife (Licence Number: 09E0147; http://excavations.ie/report/2009/Kildare/0020828/). - Interpreted as a post-medieval field boundary.	-	High	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.
LI_141	687919 / 722694	Osberstown	Building	- An irregular area of disturbance measuring c. 45m x c. 58m. - Corresponds with the location of a number of buildings on historic Ordnance Survey mapping. - Interpreted as the site of a group of post-medieval buildings.	-	High	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.

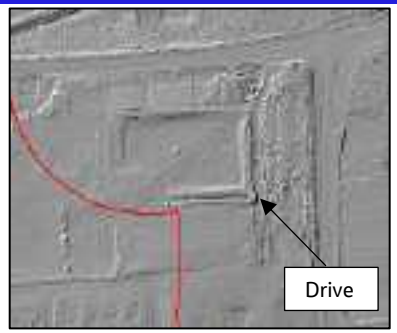
Unique Reference Number	Easting / Northing	Townland	Site Type	Summary Description	Constraint Reference Number (if applicable)	Confidence Rating	Figure
LI_142	688391 / 722096	Osberstown	Field system	- A network of negative linear features with three rectangular features (c. 11m x 7m). Two parallel linear features demarcate the south, running east-west. - No corresponding features on historic Ordnance Survey mapping. - Not visible on aerial imagery. - To the west of the river. No features visible on Google StreetView (Sept 2021). - Tentatively interpreted as a possible field system and buildings of unknown date. Could equally be modern drainage associated with the road.	-	Low	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.
LI_143	688314 / 721737	Osberstown	Field system	- A network of negative linear features, including cultivation patterns. - Some correspond with field boundaries and a mill race associated with 'Osberstown House' / 'Leinster Flour Mills' depicted on historic Ordnance Survey mapping. - Some linear features visible on aerial imagery. Bisected by Sallins Bypass and the M7. - Interpreted as a post-medieval field system, associated with Osberstown House and mill.	B19-14	High	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.

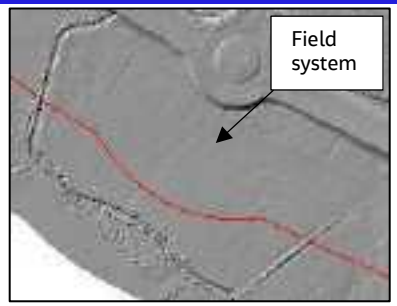
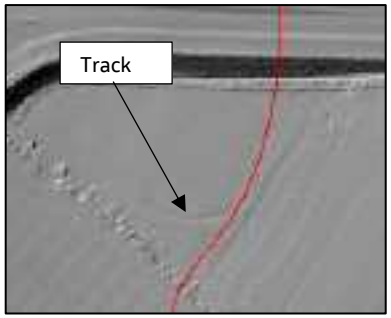
Unique Reference Number	Easting / Northing	Townland	Site Type	Summary Description	Constraint Reference Number (if applicable)	Confidence Rating	Figure
LI_144	688154 / 721189	Osberstown	Field boundary	- An 'L'-shaped negative linear feature measuring c. 104m x c.145m. - Corresponds with a field boundary on historic Ordnance Survey mapping. - Visible on aerial imagery. Truncated by Osberstown Millenium Park road. - Interpreted as a post-medieval field boundary.	-	High	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.
LI_145	687750 / 720637	Osberstown	Field boundary	- A negative linear feature, measuring c. 270m in length orientated roughly north-west to south-east. - Corresponds with a field boundary on historic Ordnance Survey mapping. - Bisected by the Osberstown Millenium Park road. - Interpreted as a post-medieval field boundary.	-	High	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.

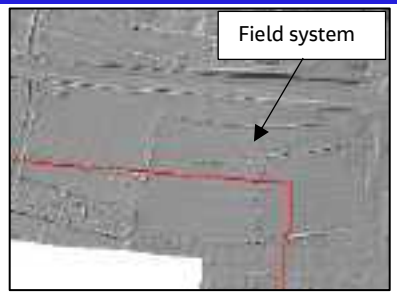
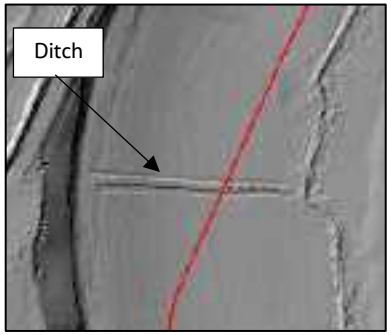
Unique Reference Number	Easting / Northing	Townland	Site Type	Summary Description	Constraint Reference Number (if applicable)	Confidence Rating	Figure
LI_146	687641 / 720239	Ploopluck	Mound	- A negative area measuring c. 70m across comprising a cluster of five circular features. - No corresponding features on historic Ordnance Survey mapping. - Visible on aerial imagery. - Finds recovered in this area during gravel extraction included skeletons and food vessels (1935:544-8 R.I.A Burial Finds Including; Burial I, Food Vessel; Burial II, Food Vessel and Skeleton; Burial III, Food Vessel; Burial IV, Skeleton). - Prehistoric pit burials (KD019-017; NS19-093) are recorded in this location on the RMP. - Interpreted as part of KD019-017/NS19-093 (prehistoric pit burials).	KD019-016	High	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.
LI_147	687548 / 720191	Ploopluck	Mound	- A sub-circular feature measuring c. 6m in diameter with an area of disturbance to the south-west. - No corresponding features on historic Ordnance Survey mapping. - In proximity to prehistoric pit burials (KD019-017; NS19-093). - Sewer noted to south. - Finds recovered in this area included skeletons and food	KD019-016	High	

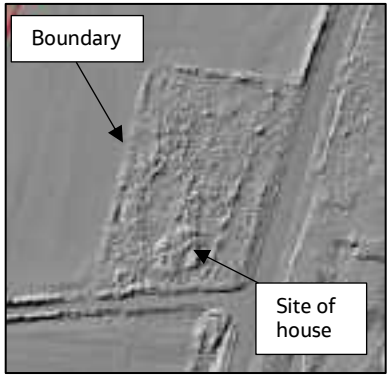
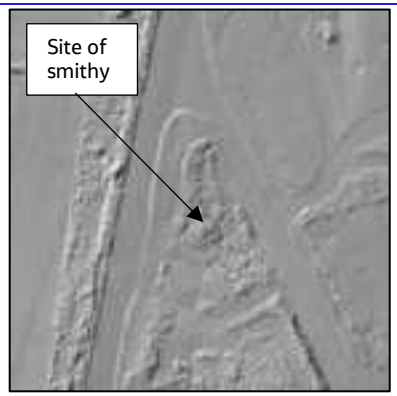
Unique Reference Number	Easting / Northing	Townland	Site Type	Summary Description	Constraint Reference Number (if applicable)	Confidence Rating	Figure
				vessels (1935:544-8 R.I.A Burial Finds Including; Burial I, Food Vessel; Burial II, Food Vessel and Skeleton; Burial III, Food Vessel; Burial IV, Skeleton). - Interpreted as part of KD019-017 (prehistoric pit burials).			Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.
LI_148	687145 / 719942	Osberstown	Ditch	- A series of parallel negative linear features orientated roughly north-east to south-west measuring c. 144m in length. - Corresponds with field boundary and ditch on historic Ordnance Survey mapping. - Visible on aerial imagery. - Interpreted as a ditch of post-medieval date.	-	High	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.
LI_149	687172 / 719586	Jigginstown	Field system	- A network of negative linears and cultivation patterns. - Some of linears correspond with field boundaries depicted on historic Ordnance Survey mapping. - Vaguely perceptible on aerial imagery. - Interpreted as a post-medieval field system.	-	High	

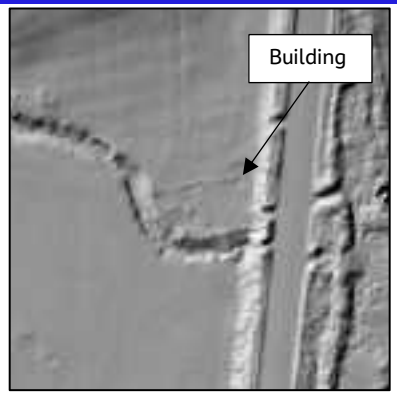
Unique Reference Number	Easting / Northing	Townland	Site Type	Summary Description	Constraint Reference Number (if applicable)	Confidence Rating	Figure
							Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.
LI_150	687996 / 718932	Jigginstown	Designed Landscape Feature	- A negative rectangular area measuring c. 84m x c. 55m. - Corresponds with a rectangular tree-lines area depicted on historic Ordnance Survey mapping (6" to 1 mile, 1837 – 1842) associated with Jigginstown House, to the south of the 17th century house. Later Ordnance Survey mapping (25" to 1 mile, 1888-1913) depicted this as a sunken area with scattered trees. - Obscured on aerial imagery by established trees (https://www.cambridgeairphotos.com/location/asw018/). - Archaeological testing nearby recovered red brick and mortar fragments, and sherds roof tile of 17th–18th-century date (Licence Number: C000238; E3600; http://excavations.ie/report/2007/Kildare/0017795/). - Isolated finds recovered from this area comprise Medieval Glazed Potsherd (1979:13). - Interpreted as the sunken garden (KD019-033003) associated with Jigginstown Castle.	AY_43; KD019-033003	High	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.

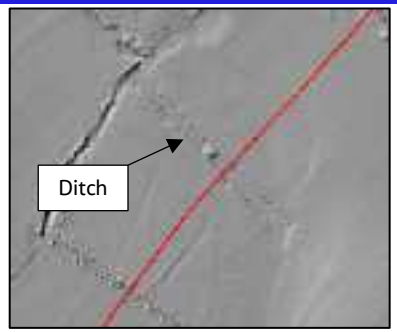
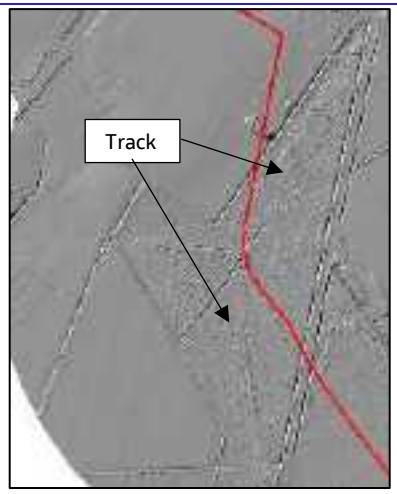
Unique Reference Number	Easting / Northing	Townland	Site Type	Summary Description	Constraint Reference Number (if applicable)	Confidence Rating	Figure
LI_151	688048 / 718919	Jigginstown	Designed Landscape Feature	- A negative linear feature orientated north-south, measuring c. 144m in length. - Corresponds with the drive associated with Jigginstown Castle on historic Ordnance Survey mapping (located to the east of the 17th century house). - Visible on aerial imagery. Runs south from the R445 (https://www.cambridgeairphotos.com/location/asw018/). - Archaeological testing nearby recovered red brick and mortar fragments, and sherds roof tile of 17th–18th-century date (Licence Number: C000238; E3600; http://excavations.ie/report/2007/Kildare/0017795/). - Isolated finds recovered from this area comprise Medieval Glazed Potsherd (1979:13). - Interpreted as the drive to east of Jigginstown Castle.	AY_39; KD019-033001	High	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.

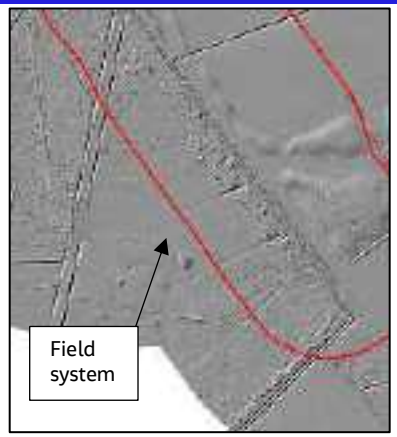
Unique Reference Number	Easting / Northing	Townland	Site Type	Summary Description	Constraint Reference Number (if applicable)	Confidence Rating	Figure
LI_152	688308 / 718366	Naas West	Field system	- An area of very ephemeral linear features and possible cultivation patterns. - No corresponding features on historic Ordnance Survey mapping. Abut townland boundary. - Possible features visible on aerial imagery (1995 Ortho). - Interpreted as a possible field system of unknown date.	-	Medium	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.
LI_153	689197 / 718258	Naas East	Track	- A sinuous curvilinear feature, measuring c. 97m in length. - No corresponding features on historic Ordnance Survey mapping. - to south-east of Killcullen Road roundabout. - Vaguely perceptible on aerial imagery. - Possible trackway or modern disturbance associated with construction of the road.	-	Medium	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.

Unique Reference Number	Easting / Northing	Townland	Site Type	Summary Description	Constraint Reference Number (if applicable)	Confidence Rating	Figure
LI_154	688852 / 718227	Naas West	Field system	- An area of negative linear features and cultivation patterns. - Correspond with field boundaries on historic Ordnance Survey mapping. - Visible on aerial imagery as partially extant field boundaries (hedgerows). - An isolated find of a Bronze Pin (1969:75) was recovered from this area. - Interpreted as a post-medieval field system.	-	High	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.
LI_155	689060 / 717728	Naas East	Ditch	- A negative feature measuring c. 97m, orientated east-west. - Does not appear to correspond with any features on historic Ordnance Survey mapping. A disused 'Gravel Pit' is depicted to the south-west (25" to 1 mile, 1888-1913). - No modern utilities noted. - Not visible on aerial imagery. Located to the west of a minor watercourse. - Archaeological testing nearby identified drains and recent agricultural activity; however, an early medieval ecclesiastical enclosure was also identified near an existing church IKD024-003) (Licence Number: 04E0355 ext.; http://excavations.ie/report/2006/Kildare/0015709/).	-	Medium	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.

Unique Reference Number	Easting / Northing	Townland	Site Type	Summary Description	Constraint Reference Number (if applicable)	Confidence Rating	Figure
				- Interpreted as a ditch of unknown date, possibly drainage.			
LI_156	688050 / 716174	Rathasker	Building	- A rectangular area of disturbance measuring c. 82m x c.59m. - Located on the junction between Kilcullen Road and a local access. - Corresponds with a building and associated boundary depicted on later historic Ordnance Survey mapping (25" to 1 mile, 1888-1913). - Area overgrown. -Interpreted as the site of a post-medieval roadside house and boundary.	-	High	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.
LI_157	688058 / 715980	Killashee	Smithy	- A wedge-shaped area of disturbance between Kilcullen Road and a local road. - Corresponds with a 'Pound' on historic Ordnance Survey mapping (6" to 1 mile, 1837 – 1842) and on later Ordnance Survey mapping as a 'Smithy' and 'Pump' (25" to 1 mile, 1888-1913). - Some buildings appear to remain extant on aerial imagery. - Interpreted as the site of a post-medieval smithy.	-	High	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.

Unique Reference Number	Easting / Northing	Townland	Site Type	Summary Description	Constraint Reference Number (if applicable)	Confidence Rating	Figure
LI_158	687991 / 715782	Killashee	Building	- An area of ephemeral features west of Kilcullen Road. - Corresponds with a building and boundarie depicted on historic Ordnance Survey mapping (6" to 1 mile, 1837 – 1842). - Located north of a minor watercourse, modern linear feature visible on aerial imagery. - Interpreted as the site of a post-medieval building.	-	High	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.
LI_159	687752 / 714028	Mylerstown	Gravel pit / Quarry	- A wedge-shaped area of disturbance adjacent to the R448 and a field boundary. - Corresponding with an area of quarrying / extraction with associated buildings depicted on historic Ordnance Survey mapping (6" to 1 mile, 1837 – 1842). - Visible on aerial imagery as an area of scrub / rough ground. - Interpreted as the location of a post-medieval quarry.	-	High	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.

Unique Reference Number	Easting / Northing	Townland	Site Type	Summary Description	Constraint Reference Number (if applicable)	Confidence Rating	Figure
LI_160	687105 / 713342	Stephenstown South	Ditch	A negative linear feature measuring c.96m in length. Orientated roughly north-west to south-east. - Corresponds with a ditch associated with a 'Spring' depicted on historic Ordnance Survey mapping (25" to 1 mile, 1888-1913). - Visible on aerial imagery. - Interpreted as a ditch associated with a spring.	-	High	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.
LI_161	687204 / 712701	Dunnstown	Track	- A network of linears within an area of woodland, including a north-south orientated linear feature with sinuous perpendicular linears branching off. - Area of mixed woodland on historic Ordnance Survey mapping (6" to 1 mile, 1837 – 1842). One linear feature corresponds with a track through the trees depicted on later Ordnance Survey mapping (25" to 1 mile, 1888-1913). - Interpreted as plantation / cultivation patterns and associated track.	-	High	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.

Unique Reference Number	Easting / Northing	Townland	Site Type	Summary Description	Constraint Reference Number (if applicable)	Confidence Rating	Figure
LI_162	687376 / 712444	Dunnstown	Field system	- A network of negative linear features. - Correspond with field boundaries and ditches on historic Ordnance Survey mapping (6" to 1 mile, 1837 – 1842, and 25" to 1 mile, 1888-1913). Later mapping shows the areas as wooded. - Vaguely perceptible on aerial imagery. - Interpreted as a post-medieval field system.	-	High	 Single Direction Hillshade Model: DTM azimuth 315° and altitude 35°.

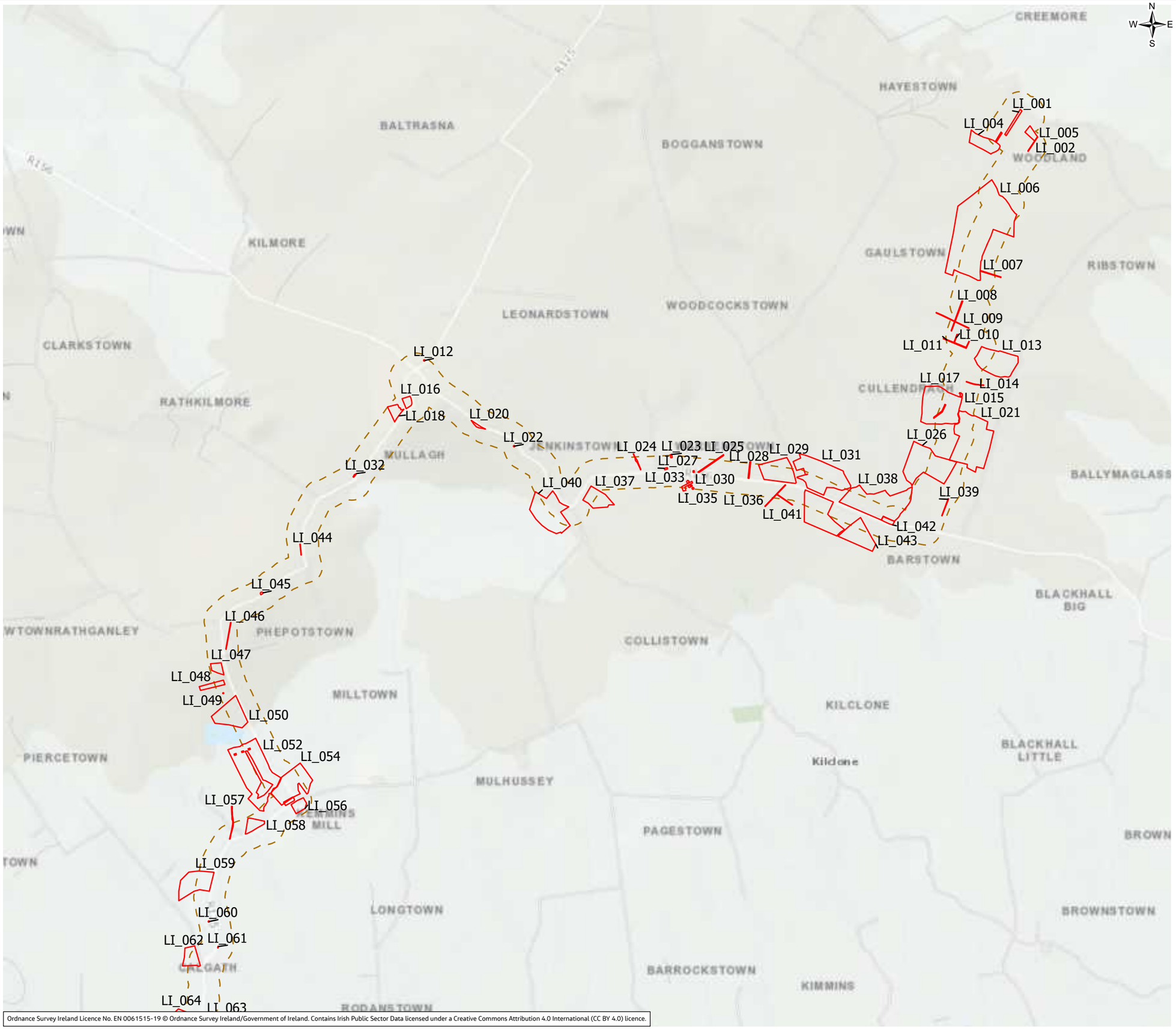


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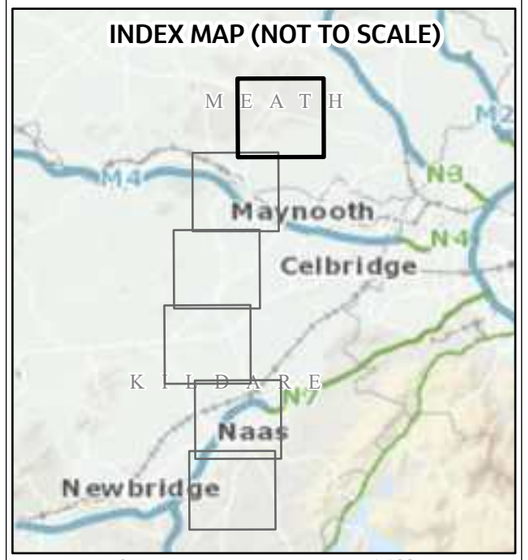
Figure 1a

Legend

- Potential archaeological features
- 100m Study Area

INDEX MAP (NOT TO SCALE)



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Rev.	Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
1	Aug 2022	For information	MP	AC	JD	FL

Jacobs

Merrion House, Merrion Road, Dublin, D04 R2C5, Ireland.
Tel: +353 1269 5666 Fax: +353 1269 5497
www.jacobs.com

Client: EIRGRID

Project: EirGrid Kildare-Meath Grid Upgrade

Drawing Title: Locations of potential archaeological features identified from LiDAR data (Sheet 1 of 6)

Drawing Status: FINAL

Scale @ A3	1:25,000	DO NOT SCALE
Jacobs No.	321084AH	
Client No.		
Drawing No.	1a	

Figure 1b

Legend

- Potential archaeological features
- 100m Study Area

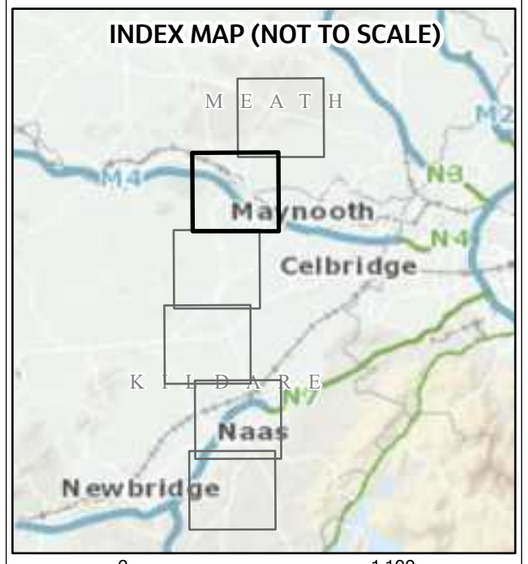
LI_059 LI_060 LI_062 LI_061 LI_064 LI_063 LI_065 LI_067 LI_068 LI_069 LI_070 LI_072 LI_073 LI_074 LI_075 LI_076 LI_077 LI_078 LI_079 LI_080 LI_081 LI_082 LI_083 LI_084 LI_085 LI_086 LI_087 LI_088 LI_090 LI_091 LI_092 LI_093

FERRANS LONGTOWN KILGLIN NICHOLASTOWN BALFEAGHAN RODANSTOWN BALLYMAC DOLANSTOWN BRYANSTOWN BOYCETOWN KILLICKAWEENY PITCHFORDSTOWN NEWTOWNMOYAGHY MOYC Kilcock KILCOCK BALLYCAGHAN TIMARD DUNCREEVAN BRANGANSTOWN MAWS HODGESTOWN COURTOWN GREAT COURTOWN LITTLE GRAGADDER LARAGHBRYAN WEST PORTGLORIAM BALLYCANON CLONSAST LARAGH ROESTOWN TREADSTOWN ILMAGORROGE CLONDUFF LARAGH DEMESNE CRINSTOWN BELGARD BALLYLOUGHAN CLONFERT NORTH CORMICKSTOWN

M4 M4 M4 R158 R125 R148

N W E S

INDEX MAP (NOT TO SCALE)



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Merrion House, Merrion Road, Dublin, D04 R2C5, Ireland.
Tel: +353 1269 5666 Fax:+353 1269 5497
www.jacobs.com

Client: EirGrid

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Drawing Title: Locations of potential archaeological features identified from LiDAR data (Sheet 2 of 6)

Drawing Status	FINAL	
Scale @ A3	1:25,000	DO NOT SCALE
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Client No.		
Drawing No.	1b	

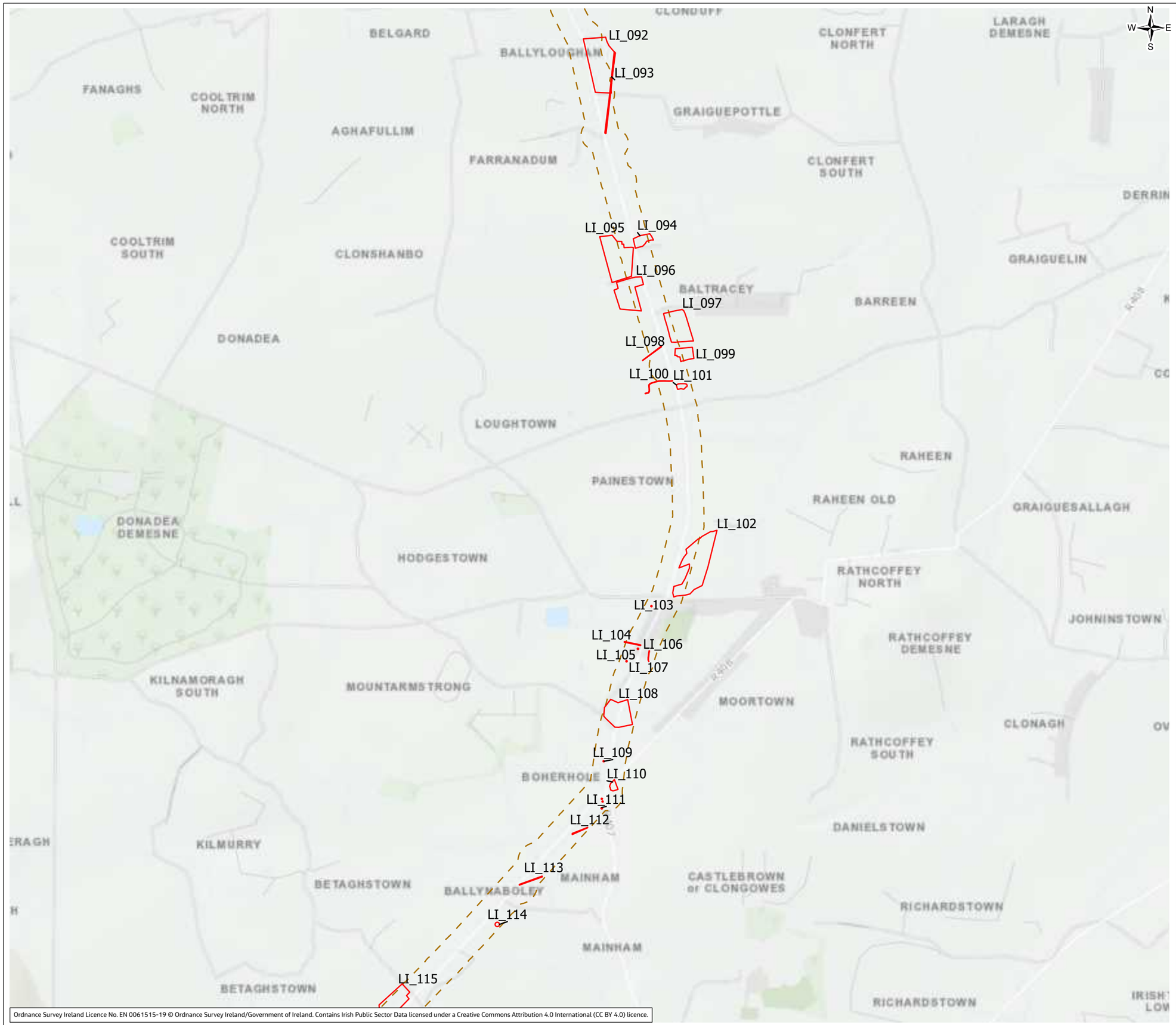
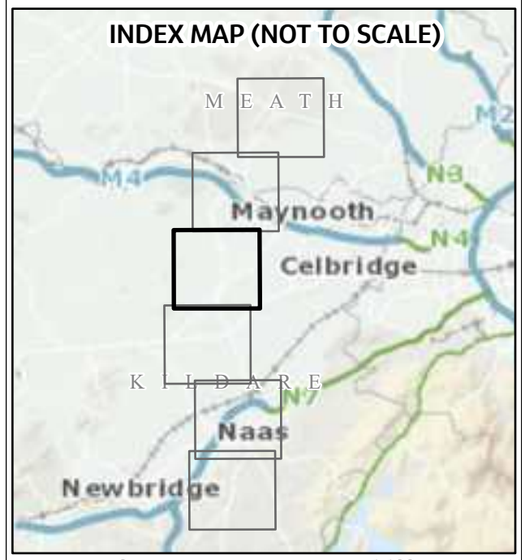


Figure 1c

Legend

- Potential archaeological features
- 100m Study Area

INDEX MAP (NOT TO SCALE)



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Rev.	Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
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Jacobs
Merrion House, Merrion Road, Dublin, D04 R2C5, Ireland.
Tel: +353 1269 5666 Fax:+353 1269 5497
www.jacobs.com

Client: EirGrid

Project: EirGrid Kildare-Meath Grid Upgrade

Drawing Title: Locations of potential archaeological features identified from LiDAR data (Sheet 3 of 6)

Drawing Status: FINAL

Scale @ A3	1:25,000	DO NOT SCALE
Jacobs No.	321084AH	
Client No.		
Drawing No.	1c	

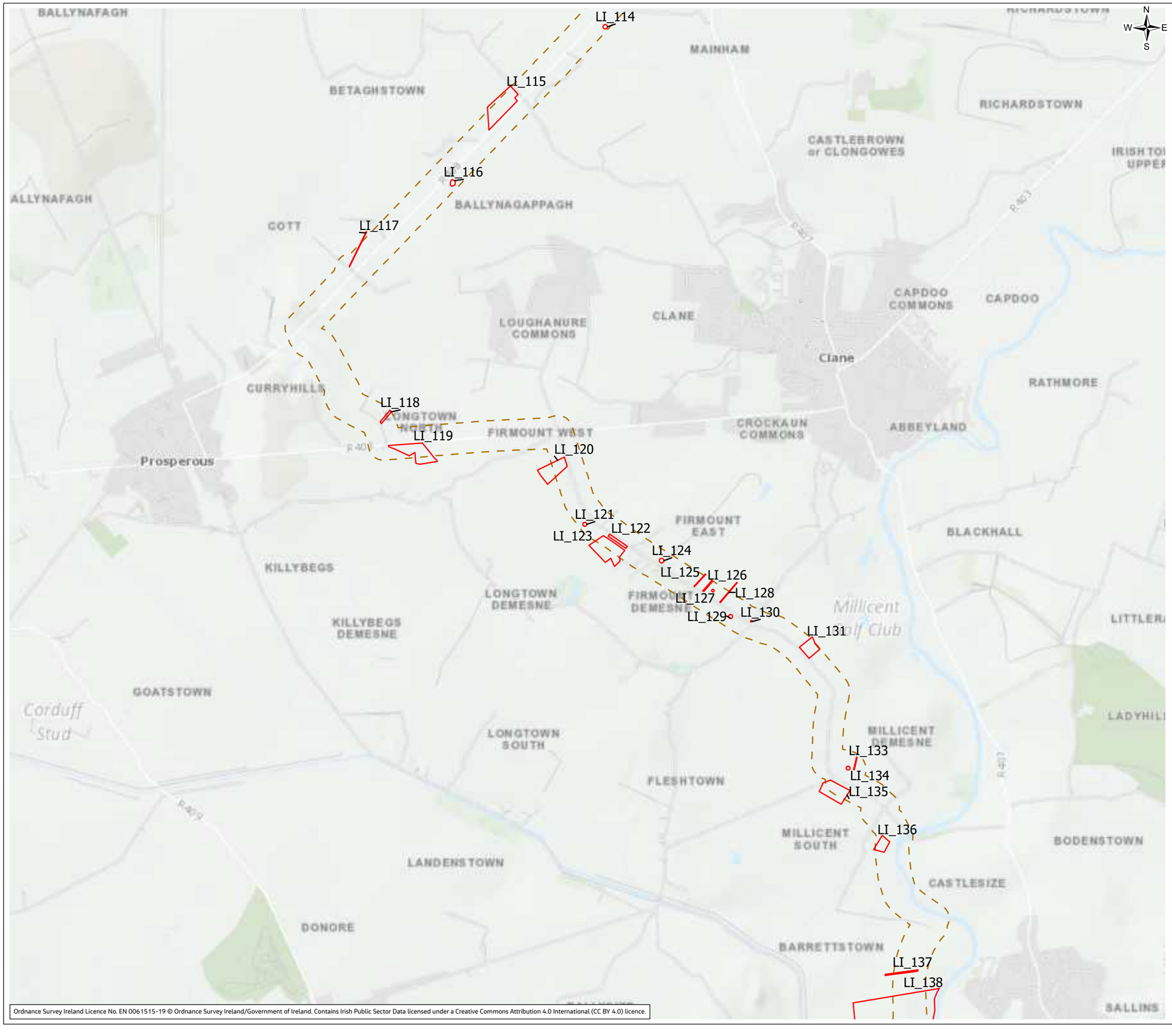
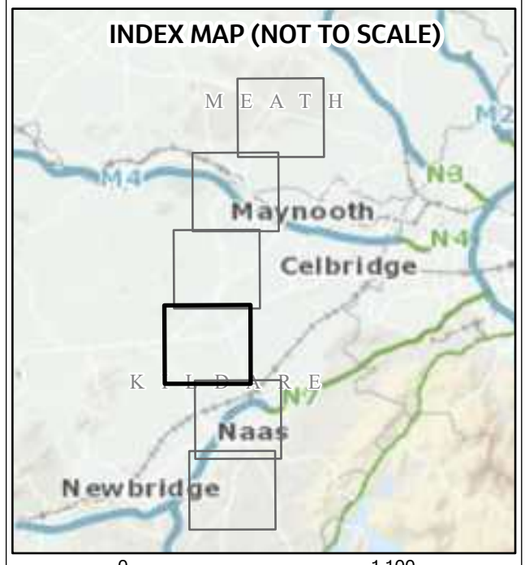


Figure 1d

Legend

- Potential archaeological features
- 100m Study Area

INDEX MAP (NOT TO SCALE)



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Rev.	Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
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Jacobs
Merrion House, Merrion Road, Dublin, D04 R2C5, Ireland.
Tel: +353 1269 5666 Fax:+353 1269 5497
www.jacobs.com

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Drawing Title: Locations of potential archaeological features identified from LiDAR data (Sheet 4 of 6)

Drawing Status	FINAL	
Scale @ A3	1:25,000	DO NOT SCALE
Jacobs No.	321084AH	
Client No.		
Drawing No.	1d	

Figure 1e

Legend

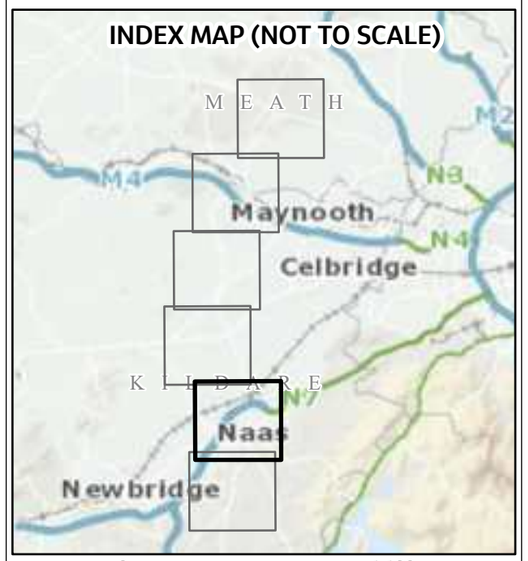
- Potential archaeological features
- 100m Study Area

LI_137
LI_138
LI_139
LI_140
LI_141
LI_142
LI_143
LI_144
LI_145
LI_146
LI_147
LI_148
LI_149
LI_150
LI_151
LI_152
LI_153
LI_154
LI_155

BARRETTSTOWN
BALLYSIZE
SALLINS
Sallins
PALMERSTOWN DEMESNE
WATERSTOWN
KERDIFFSTOWN
OSBERSTOWN
CARRAGH
CASTLEKEELY
Carragh
MONREAD NORTH
M7
N7
Johnstown
GINGERSTOWN
MONREAD SOUTH
MAUDLINGS
JOHNSTOWN
OLDTOWN DEMESNE
OLDTOWN
HALVERSTOWN
YEOMANSTOWN
KINGSFURZE
Naas Racecourse
PLOOPLUCK
Naas
NEWHALL
NAAS WEST
NAAS EAST
TIPPER NORTH
TIPPER WEST
TIPPER SOUTH
JIGGINSTOWN
Naas South
LADYTOWN
BLUEBELL
CRADOCKSTOWN DEMESNE
CRADOCKSTOWN EAST
BROADFIELD
R445
R407

N
W
E
S

INDEX MAP (NOT TO SCALE)



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Merrion House, Merrion Road, Dublin, D04 R2C5, Ireland.
Tel: +353 1269 5666 Fax:+353 1269 5497
www.jacobs.com

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Project: EirGrid Kildare-Meath Grid Upgrade

Drawing Title: Locations of potential archaeological features identified from LiDAR data (Sheet 5 of 6)

Drawing Status: FINAL

Scale @ A3	1:25,000	DO NOT SCALE
Jacobs No.	321084AH	
Client No.		
Drawing No.	1e	

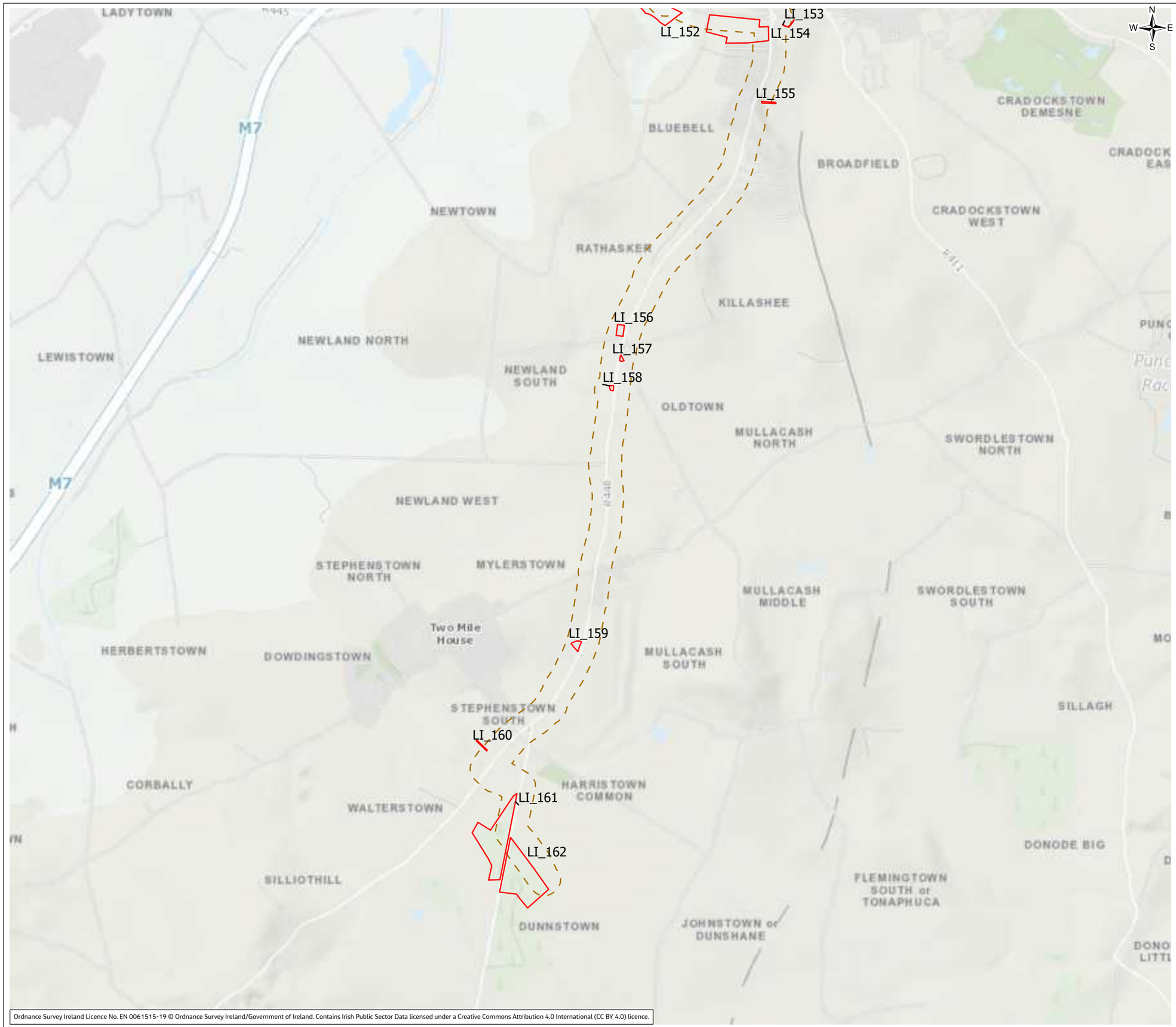

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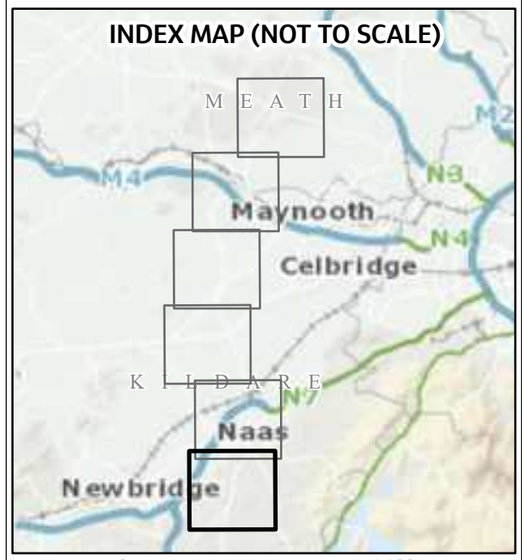
Figure 1f

Legend

- Potential archaeological features
- 100m Study Area

INDEX MAP (NOT TO SCALE)



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Rev.	Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
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Jacobs

Merrion House, Merrion Road, Dublin, D04 R2C5, Ireland.
Tel: +353 1269 5666 Fax: +353 1269 5497
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Client: EIRGRID

Project: EirGrid Kildare-Meath Grid Upgrade

Drawing Title: Locations of potential archaeological features identified from LiDAR data (Sheet 6 of 6)

Drawing Status: FINAL

Scale @ A3	1:25,000	DO NOT SCALE
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Client No.		
Drawing No.	1f	

Appendix 15.1 Assessment of Individual Land Parcel Effects

Ref Number	Chainage	Description of land parcel	Area of land parcel	Description of effects	Temporary works area (ha) (%)	Permanent Easement and land-take area (ha) (%)	Residual Impact
1279*	16250	Grassland plot grazed by beef cattle. Medium sensitivity.	9.7	UGC located on private land requires a permanent easement. Impact at the edge of the farm as a result of temporary access required during construction period. The area of temporary land-take = 0.3 ha and the area of the permanent easement is 0.1 ha representing 2.6 % and 1 % of the total area respectively.	0.3 (2.6 %)	0.1 (1 %)	Not significant
1271*	500	Grassland plot grazed by beef cattle. Medium sensitivity.	29.6	Impact at the edge of the farm as a result of construction of joint bay No 1 / communication chamber / link box and a passing bay. Installation of access track to site of construction works. UGC and joint bay located on private land requires a permanent easement and land-take. The area of temporary land-take = 1 ha and the area of permanent easement and land-take = 0.5 ha representing 3.5 % and 2 % of the total area respectively.	1 (3.5 %)	0.5 (2 %)	Not significant
1269*	400	Grassland plot grazed by sheep and cattle. Medium sensitivity.	61.8	Impact at the edge of the farm as a result of UGC located on private land requires a permanent easement. The area of temporary land-take = 1.3 ha and the area of permanent easement = 0.6 ha representing 2.2 % and 1 % of the total area respectively.	1.3 (2.2 %)	0.6 (1 %)	Not significant

Ref Number	Chainage	Description of land parcel	Area of land parcel	Description of effects	Temporary works area (ha) (%)	Permanent Easement and land-take area (ha) (%)	Residual Impact
1261*	1250	Grassland plot grazed by sheep and cattle. Medium sensitivity.	66.3	Impact at the edge of the farm as a result of construction of joint bay No 2 / communication chamber / link box and a passing bay. Installation of access track to site of construction works. UGC and joint bay located on private land requires a permanent easement and land-take. The area of temporary land-take = 3.4 ha and the area of permanent easement and land-take = 1.7 ha representing 5.3 % and 2.6 % of the total area respectively.	3.4 (5.3 %)	1.7 (2.6 %)	Slight adverse
1223 & 1227*	7300	Small grassland plot. Low sensitivity.	2.1	Impact as a result of construction of joint bay No 10 / communication chamber / link box and a passing bay. UGC and joint bay located on private land requires a permanent easement and land-take. Installation of access track to site of construction works. The area of temporary land-take = 0.9 ha and the area of permanent easement and land-take = 0.2 ha representing 42 % and 10 % of the total area respectively.	0.9 (42 %)	0.2 (10 %)	Slight adverse (sensitivity low due to small size)

Ref Number	Chainage	Description of land parcel	Area of land parcel	Description of effects	Temporary works area (ha) (%)	Permanent Easement and land-take area (ha) (%)	Residual Impact
1200*+	2750	Grassland plot grazed by sheep and cattle. Medium sensitivity.	74.6	Impact at the edge of the farm as a result of construction of joint bays No 3 & 4 / communication chambers / link boxes and a passing bays. Construction compound. Installation of access track to site of construction works. UGC and joint bays located on private land requires a permanent easement and land-take. The area of temporary land-take = 6.6 ha and the area of permanent easement and land-take = 3 ha representing 9 % and 4 % of the total area respectively.	6.6 (4.9 %)	3 (4 %)	Slight adverse
10000*	3400	Grassland plot grazed by beef cattle. Medium sensitivity.	26.9	Impact at the edge of the farm as a result of Construction works at watercourse crossing. UGC located on private land requires a permanent easement. The area of temporary land-take = 0.17 ha and the area of the permanent easement is 0.02 ha representing 1 % and 0.1 % of the total area respectively.	0.17 (0.1 %)	0.02 (0.1 %)	Not significant
1194	7750	Grassland plot grazed by beef cattle. Medium sensitivity.	21.6	Impact at the edge of the farm as a result of construction of joint bay No 11 / communication chamber / link box and a passing bay. The area of temporary land-take = 0.23 ha representing 1.1 % of the total area.	0.23 (1.1 %)	(0 %)	Not significant

Ref Number	Chainage	Description of land parcel	Area of land parcel	Description of effects	Temporary works area (ha) (%)	Permanent Easement and land-take area (ha) (%)	Residual Impact
1180	5250	Small grassland plot grazed by horses. Medium sensitivity.	1	Impact at the edge of the farm as a result of construction of joint bay No 7 / communication chamber / link box and a passing bay. The area of temporary land-take = 0.1 ha representing 15 % of the total area.	0.1 (15 %)	(0 %)	Not significant
1177	6750	Grassland plot grazed by beef cattle. Medium sensitivity.	13.7	Impact at the edge of the farm as a result of construction of joint bay No 9 / communication chamber / link box and a passing bay. The area of temporary land-take = 0.15 ha representing 1.1 % of the total area.	0.15 (1.1 %)	(0 %)	Not significant
1148*	3750	Grassland plot grazed by beef cattle. Medium sensitivity.	16.3	Impact at the edge of the farm as a result of construction of joint bay No 5 / communication chamber / link box and a passing bay. Construction works at watercourse crossing. UGC located on private land requires a permanent easement. The area of temporary land-take = 0.35 ha and the area of the permanent easement = 0.02 ha representing 2 % and 0.1 % of the total area respectively.	0.35 (2 %)	0.02 (0.1 %)	Not significant

Ref Number	Chainage	Description of land parcel	Area of land parcel	Description of effects	Temporary works area (ha) (%)	Permanent Easement and land-take area (ha) (%)	Residual Impact
1147*	8000	Grassland plot grazed by dairy cows. High sensitivity.	36.7	Impact at the edge of the farm as a result of construction of joint bay No 12 / communication chamber / link box and a passing bay. Construction works at watercourse crossing. Installation of access track to site of construction works. UGC located on private land requires a permanent easement. The area of temporary land-take = 0.6 ha and the area of the permanent easement is 0.04ha representing 1.6 % and 0.1 % of the total area respectively.	0.6 (1.6 %)	0.04 (0.1 %)	Not significant
1145*	5750	Grassland plot grazed by cattle and horses. Medium sensitivity.	8.8	Impact at the edge of the farm as a result of construction of joint bay No 8 / communication chamber / link box and a passing bay. Construction works at watercourse crossing. Installation of access track to site of construction works. UGC and joint bay located on private land requires a permanent easement and land-take. The area of temporary land-take = 0.2 and the area of permanent easement = 0.04 ha representing 2 % and 0.5 % of the total area respectively.	0.2 (2 %)	0.04 (0.5 %)	Not significant

Ref Number	Chainage	Description of land parcel	Area of land parcel	Description of effects	Temporary works area (ha) (%)	Permanent Easement and land-take area (ha) (%)	Residual Impact
1140*	6250	Grassland plot grazed by beef cattle. Medium sensitivity.	8.8	Impact at the edge of the farm as a result of construction works at watercourse crossing. UGC located on private land requires a permanent easement. The area of temporary land-take = 0.12ha and the area of permanent easement = 0.02 ha representing 1.5 % and 0.3% of the total area respectively.	0.12 (1.5 %)	0.02 (0.3 %)	Not significant
1139 & 1082+	4500 & 10900	Grassland plot. Medium sensitivity.	57	Impact at the edge of the farm as a result of construction of joint bay No 6 / communication chamber / link box and a passing bay. Construction compound at ch 10900. The area of temporary land-take = 0.91 ha representing 1.6 % of the total area.	0.91 (1.6 %)	(0 %)	Not significant
1133	5250	Grassland plot grazed by beef cattle. Medium sensitivity.	22.1	Impact at the edge of the farm as a result of A passing area is required for traffic flow. The area of temporary land-take = 0.04 ha representing 0.2 % of the total area.	0.04 (0.2 %)	(0 %)	Not significant
1120*	6000	Grassland plot. Medium sensitivity.	2.5	Impact at the edge of the farm as a result of construction works at watercourse crossing. UGC located on private land requires a permanent easement (0.02ha). The area of temporary land-take = 0.14 ha representing 6 % of the total area.	0.14 (6 %)	0.02 (1 %)	Not significant

Ref Number	Chainage	Description of land parcel	Area of land parcel	Description of effects	Temporary works area (ha) (%)	Permanent Easement and land-take area (ha) (%)	Residual Impact
1094	9100	Grassland plot. Medium sensitivity.	5.1	Impact at the edge of the farm as a result of construction of joint bay No 13 / communication chamber / link box and a passing bay. The area of temporary land-take = 0.15 ha representing 3 % of the total area.	0.15 (3 %)	(0 %)	Not significant
1090	10000	Grassland plot grazed by horses and cattle. High sensitivity.	18.5	Impact at the edge of the farm as a result of construction of joint bay No 14 / communication chamber / link box and a passing bay. The area of temporary land-take = 0.15 ha representing 0.8 % of the total area.	0.15 (0.8 %)	(0 %)	Not significant
1086*	10300	Tillage plot. Medium sensitivity.	19.6	Impact at the edge of the farm as a result of construction works at watercourse crossing. UGC located on private land requires a permanent easement. The area of temporary land-take = 0.2 ha and the area of the permanent easement = 0.02ha representing 1 % and 0.1% of the total area respectively.	0.2 (1 %)	0.02 (0.1 %)	Not significant

Ref Number	Chainage	Description of land parcel	Area of land parcel	Description of effects	Temporary works area (ha) (%)	Permanent Easement and land-take area (ha) (%)	Residual Impact
1084*	10800	Grassland plot grazed by beef cattle. Medium sensitivity.	4	Impact at the edge of the farm as a result of construction of joint bay No 15 / communication chamber / link box and a passing bay. Construction works at watercourse crossing. Installation of access track to site of construction works. UGC and joint bay located on private land requires a permanent easement and land-take. The area of temporary land-take = 0.2 ha and the area of permanent easement and land-take = 0.04 ha representing 4.5 % and 1 % of the total area respectively.	0.2 (4.54 %)	0.04 (1 %)	Not significant
1079*	11250	Grassland plot. Medium sensitivity.	8.5	Impact at the edge of the farm as a result of construction works at watercourse crossing. UGC located on private land requires a permanent easement. The area of temporary land-take = 0.5 ha and the area of the permanent easement = 0.04 ha representing 6 % and 0.5% of the total area respectively.	0.5 (6 %)	0.04 (0.5 %)	Not significant
1076	11600	Grassland plot grazed by beef cattle. Medium sensitivity.	8.4	Impact at the edge of the farm as a result of construction of joint bay No 16 / communication chamber / link box and a passing bay. Construction works at watercourse crossing. Installation of access track to site of construction works. The area of temporary land-take = 0.07 ha representing 1 % of the total area.	0.07 (1 %)	(0 %)	Not significant

Ref Number	Chainage	Description of land parcel	Area of land parcel	Description of effects	Temporary works area (ha) (%)	Permanent Easement and land-take area (ha) (%)	Residual Impact
1053*	12300 & 13750	Mixed tillage and grassland. Medium sensitivity.	52.8	Impact at the edge of the farm as a result of construction of joint bay No 17 / communication chamber / link box and a passing bay. Construction works at watercourse crossing. Installation of access track to site of construction works. UGC located on private land requires a permanent easement. The area of temporary land-take = 0.4 ha and the area of permanent easement = 0.15 ha representing 0.8 % and 0.3 % of the total area respectively.	0.4 (0.8 %)	0.15 (0.3 %)	Not significant
1052*	14250	Grassland plot grazed by beef cattle. Medium sensitivity.	178.7	Impact at the edge of the farm as a result of construction of joint bay No 19 / communication chamber / link box and a passing bay. Construction works at watercourse crossing. UGC and joint bay located on private land requires a permanent easement and land-take. The area of temporary land-take = 0.24 ha and the area of permanent easement = 0.1 ha representing 0.1 % and 0.06% of the total area respectively.	0.24 (0.1 %)	0.1 (0.06 %)	Not significant
1048	13000	Grassland plot. Medium sensitivity.	4.6	Impact at the edge of the farm as a result of construction of joint bay No 18 / communication chamber / link box and a passing bay. The area of temporary land-take = 0.14 ha representing 3.1 % of the total area.	0.14 (3.1 %)	(0 %)	Not significant

Ref Number	Chainage	Description of land parcel	Area of land parcel	Description of effects	Temporary works area (ha) (%)	Permanent Easement and land-take area (ha) (%)	Residual Impact
1042*	14750	Grassland plot. Medium sensitivity.	28.6	Impact at the edge of the farm as a result of Construction compound at watercourse crossing. UGC located on private land requires a permanent easement. The area of temporary land-take = 0.015 ha and the area of permanent easement = 0.015 ha representing 0.1 % and 0.1 % of the total area respectively.	0.015 (0.1 %)	0.015 (0.1 %)	Not significant (cumulative gas pipeline effect is not significant)
1035*	15250	Grassland plot grazed by beef cattle. Medium sensitivity.	17.5	Impact at the edge of the farm as a result of construction of joint bay No 21 / communication chamber / link box and a passing bay. Installation of access track to site of construction works. Construction activity at watercourse crossing. Construction compound at crossing. UGC and joint bay located on private land requires a permanent easement and land-take. The area of temporary land-take = 1.5 ha and the area of permanent easement and land-take = 0.3 ha representing 9 % and 2 % of the total area respectively.	1.5 (9 %)	0.3 (2 %)	Not significant (cumulative gas pipeline effect is not significant)
1021*	15450	Grassland plot. Medium sensitivity.	6.1	Impact as a result of UGC located on private land requires a permanent easement. The area of temporary land-take = 0.2 ha and the area of permanent easement = 0.05 ha representing 4.3 % and 1 % of the total area respectively.	0.2 (4.3 %)	0.05 (1 %)	Not significant

Ref Number	Chainage	Description of land parcel	Area of land parcel	Description of effects	Temporary works area (ha) (%)	Permanent Easement and land-take area (ha) (%)	Residual Impact
994*	16600	Grassland plot. Low - medium sensitivity.	5.6	Impact at the edge of the farm as a result of UGC located on private land requires a permanent easement. Construction area at HDD site. The area of temporary land-take = 0.7 ha and the area of permanent easement = 0.03 ha representing 13 % and 0.4 % of the total area respectively.	0.7 (13 %)	0.03 (0.4 %)	Not significant (the proposed Project will not add significantly to the cumulative effect of M4)
10006*	16800	Grassland plot. Medium sensitivity.	9.5	Impact as a result of UGC located on private land requires a permanent easement. HDD compound at motorway crossing. The area of temporary land-take = 0.4 ha and the area of permanent easement = 0.4 ha representing 4.2 % and 4.2 % of the total area respectively.	0.4 (4.2 %)	0.4 (4.2 %)	Not significant (the proposed Project will not add significantly to the cumulative effect of M4)
10005*	17750	Grassland plot. Medium sensitivity.	12.1	Impact at the edge of the farm as a result of construction of joint bay No 24 / communication chamber / link box and a passing bay. UGC and joint bay located on private land requires a permanent easement and land-take. The area of temporary land-take = 0.2 ha and the area of permanent easement and land-take = 0.04 ha representing 2 % and 0.5 % of the total area respectively.	0.2 (2 %)	0.04 (0.5 %)	Not significant

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955	18250	Grassland plot grazed by beef cattle. Medium sensitivity.	16.9	Impact at the edge of the farm as a result of construction of joint bay No 25 / communication chamber / link box and a passing bay. The area of temporary land-take = 0.15 ha representing 0.9 % of the total area.	0.15 (0.9 %)	(0 %)	Not significant
910	19250	Small grassland plot grazed by horses. Medium sensitivity.	3.1	Impact at the edge of the farm as a result of construction of joint bay No 26 / communication chamber / link box and a passing bay. The area of temporary land-take = 0.04 ha representing 1.3 % of the total area.	0.04 (1.3 %)	(0 %)	Not significant
875	20000	Small grassland plot grazed by horses. Medium sensitivity.	2.6	Impact at the edge of the farm as a result of construction of joint bay No 27 / communication chamber / link box and a passing bay. The area of temporary land-take = 0.15 ha representing 6 % of the total area.	0.15 (6 %)	(0 %)	Not significant
854*+	20500	Tillage plot. Medium sensitivity.	106.6	Impact at the edge of the farm as a result of construction of joint bay No 28 / communication chamber / link box and a passing bay. Construction works at watercourse crossing. Construction compound. . UGC located on private land requires a permanent easement. The area of temporary land-take = 1.3 ha and the area of the permanent easement = 0.02 ha representing 1.2 % and 0.02 % of the total area respectively.	1.3 (1.2 %)	0.02 (0.02 %)	Not significant

Ref Number	Chainage	Description of land parcel	Area of land parcel	Description of effects	Temporary works area (ha) (%)	Permanent Easement and land-take area (ha) (%)	Residual Impact
820*	21250	Grassland plot grazed by sheep and cattle. Medium sensitivity.	63.8	Impact at the edge of the farm as a result of construction of joint bay No 29 / communication chamber / link box. Construction works at watercourse crossing. Installation of access track to site of construction works. Construction works at a watercourse crossing. HDD compound at crossing. UGC located on private land requires a permanent easement. The area of temporary land-take = 0.9 ha and the area of permanent easement = 0.05 ha representing 1.5 % and 0.1 % of the total area respectively.	0.61 (1.5 %)	0.05 (0.1 %)	Not significant
801*	22250	Grassland plot grazed by sheep. Medium sensitivity.	17.8	Impact at the edge of the farm as a result of construction of joint bay No 30 / communication chamber / link box and a passing bay. Construction works and HDD works area at road crossing. UGC and joint bay located on private land requires a permanent easement and land-take. The area of temporary land-take = 0.5 ha and the area of permanent easement and land-take = 0.04 ha representing 3 % and 0.2 % of the total area respectively.	0.5 (3 %)	0.04 (0.2 %)	Not significant

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788*	23000	Grassland plot grazed by beef cattle. Medium sensitivity.	24.7	Impact at the edge of the farm as a result of construction of joint bay No 31 / communication chamber / link box and a passing bay. Installation of access track to site of construction works. UGC and joint bay located on private land requires a permanent easement and land-take. The area of temporary land-take = 0.16 ha and the area of permanent easement and land-take = 0.02 ha representing 1 % and 0.1 % of the total area respectively.	0.16 (1 %)	0.02 (0.1 %)	Not significant
774*	23500	Grassland plot grazed by sheep and cattle. Medium sensitivity.	25.8	Impact at the edge of the farm as a result of construction of joint bay No 32 / communication chamber / link box and a passing bay and works at watercourse crossing. UGC located on private land requires a permanent easement. The area of temporary land-take = 0.3 ha and the area of the permanent easement = 0.02 ha representing 1.2 % and 0.1% of the total area respectively.	0.3 (1.2 %)	0.02 (0.1 %)	Not significant
754 & 766	24500	Stud Farm. Very high sensitivity.	25	Impact at the edge of the farm as a result of construction of joint bay No 33 / communication chamber / link box and a passing bay. The area of temporary land-take = 0.17 ha representing 0.7 % of the total area.	0.17 (0.7 %)	(0 %)	Not significant

Ref Number	Chainage	Description of land parcel	Area of land parcel	Description of effects	Temporary works area (ha) (%)	Permanent Easement and land-take area (ha) (%)	Residual Impact
745*	25500	Grassland plot grazed by sheep. Medium sensitivity.	18.6	Impact at the edge of the farm as a result of construction of joint bay No 34 / communication chamber / link box and a passing bay. UGC and joint bay located on private land requires a permanent easement and land-take. The area of temporary land-take = 0.15 ha and the area of permanent easement and land-take = 0.05 ha representing 1 % and 0.3 % of the total area respectively.	0.15 (1 %)	0.05 (0.3 %)	Not significant
722	26000	Grassland plot. Medium sensitivity.	3.1	Impact at the edge of the farm as a result of construction of joint bay No 35 / communication chamber / link box and a passing bay. The area of temporary land-take = 0.1 ha representing 3.2 % of the total area.	0.1 (3.2 %)	(0 %)	Not significant
700*	27100	Grassland plot grazed by beef cattle. Medium sensitivity.	45.3	Impact at the edge of the farm as a result of construction works at watercourse crossing. UGC located on private land requires a permanent easement. The area of temporary land-take = 0.15 ha and the area of permanent easement = 0.02 ha representing 0.3 % and 0.05 % of the total area respectively.	0.15 (0.3 %)	0.02 (0.05 %)	Not significant

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694*	27500	Grassland plot grazed by beef cattle. Medium sensitivity.	3.8	Impact at the edge of the farm as a result of construction of joint bay No 37 / communication chamber / link box and a passing bay. Construction works at watercourse crossing. UGC located on private land requires a permanent easement. The area of temporary land-take = 0.3 ha and the area of permanent easement = 0.02 ha representing 8 % and 0.5 % of the total area respectively.	0.3 (8 %)	0.02 (0.5 %)	Not significant
681 & 689*	27750	Grassland plot grazed by beef cattle. Medium sensitivity.	75.2	Impact at the edge of the farm as a result of construction works at watercourse crossing. UGC located on private land requires a permanent easement. The area of temporary land-take = 0.36 ha and the area of the permanent easement = 0.02 ha representing 0.5 % and 0.02 % of the total area respectively.	0.36 (0.5 %)	0.02 (0.02 %)	Not significant
664 & 669	28500	Tillage plot. Medium sensitivity.	19.7	Impact at the edge of the farm as a result of construction of joint bays No 38 & 39 / communication chamber / link box and a passing bay. The area of temporary land-take = 0.3 ha representing 1.6 % of the total area.	0.3 (1.6 %)	(0 %)	Not significant
634	30000	Tillage plot. Medium sensitivity.	33.3	Impact at the edge of the farm as a result of construction of joint bay No 40 / communication chamber / link box and a passing bay. The area of temporary land-take = 0.08 ha representing 0.2 % of the total area.	0.08 (0.2 %)	(0 %)	Not significant

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623*	30250	Grassland plot grazed by beef cattle. Medium sensitivity.	29.1	Impact at the edge of the farm as a result of construction works at watercourse crossing. UGC located on private land requires a permanent easement. The area of temporary land-take = 0.4 ha and the area of permanent easement = 0.02ha representing 1.3 % and 0.1 % of the total area respectively.	0.4 (1.3 %)	0.02 (0.1 %)	Not significant
608*+	30750	Tillage plot. Medium sensitivity.	61.1	Impact at the edge of the farm as a result of construction of joint bay No 41 / communication chamber / link box and a passing bay. Construction compound. Installation of access track to site of construction works. UGC located on private land requires a permanent easement. The area of temporary land-take = 2.3 ha and the area of permanent easement = 0.3 ha representing 3.7 % and 0.5 % of the total area respectively.	2.3 (3.7 %)	0.3 (0.5 %)	Slight adverse

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580*	31250	Tillage plot. Medium sensitivity.	24.6	Impact across the middle of the farm as a result of construction of joint bay No 42 / communication chamber / link box and a passing bay. Installation of access track to site of construction works. UGC and joint bay located on private land requires a permanent easement and land-take. The area of temporary land-take = 2.7 ha and the area of permanent easement = 1.1 ha representing 11 % and 4.6 % of the total area respectively.	2.7 (11 %)	1.1 (4.6 %)	Slight adverse
510 & 577	32000	Grassland plot grazed by beef cattle. Medium sensitivity.	29.7	Impact at the edge of the farm as a result of construction of joint bay No 43 / communication chamber / link box and a passing bay. The area of temporary land-take = 0.13 ha representing 0.5 % of the total area.	0.13 (0.5 %)	(0 %)	Not significant
509	31900	Grassland plot grazed by beef cattle. Medium sensitivity.	11.9	Impact at the edge of the farm as a result of construction of joint bay No 43 / communication chamber / link box and a passing bay. The area of temporary land-take = 0.02 ha representing 0.2 % of the total area.	0.02 (0.2 %)	(0 %)	Not significant
484	33750	Grassland plot grazed by beef cattle. Medium sensitivity.	23.7	Impact at the edge of the farm as a result of construction of joint bay No 45 / communication chamber / link box and a passing bay. The area of temporary land-take = 0.16 ha representing 0.7 % of the total area.	0.16 (0.7 %)	(0 %)	Not significant

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10004	34500	Grassland plot grazed by sheep. Medium sensitivity.	31.2	Impact at the edge of the farm as a result of construction of joint bay No 46 / communication chamber / link box and a passing bay. The area of temporary land-take = 0.1 ha representing 0.3 % of the total area.	0.1 (0.3 %)	(0 %)	Not significant
465*+	35750	Tillage plot. Medium sensitivity.	27.4	Impact at the edge of the farm as a result of construction of joint bay No 47 & 48 / communication chambers / link boxes and passing bays. Construction works at watercourse crossing. Construction compound. UGC located on private land requires a permanent easement. The area of temporary land-take = 1.93 ha and the area of permanent easement = 0.5 ha representing 7 % and 1.8 % of the total area respectively.	1.9 (7 %)	0.5 (1.8 %)	Not significant (compound located mainly in existing yard)
464	34500	Grassland plot. Medium sensitivity.	73	Impact at the edge of the farm as a result of construction of joint bay No 46 / communication chamber / link box and a passing bay. The area of temporary land-take = 0.1 ha representing 0.2 % of the total area.	0.1 (0.2 %)	(0 %)	Not significant
443*	36500	Stud Farm. Very high sensitivity.	56.1	Impact at the edge of the farm as a result of UGC located on private land requires a permanent easement. The area of temporary land-take = 0.3 ha and the area of permanent easement = 0.1 ha representing 0.5 % and 0.2 % of the total area respectively.	0.3 (0.5 %)	0.1 (0.2 %)	Not significant

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413*	37000	Grassland plot grazed by sheep. Medium sensitivity.	5	Impact as a result of UGC located on private land requires a permanent easement. HDD compound at river crossing. The area of temporary land-take = 1 ha and the area of permanent easement = 0.46 ha representing 20 % and 9.2 % of the total area respectively.	1 (20 %)	0.46 (9.2 %)	Slight adverse
412*	36750	Grassland plot. Medium sensitivity.	5.6	Impact at the edge of the farm as a result of construction of joint bay No 49 / communication chamber / link box. UGC located on private land requires a permanent easement. The area of temporary land-take = 0.1 ha and the area of permanent easement = 0.07 ha representing 3.4 % and 0.1 % of the total area respectively.	0.1 (3 %)	0.07 (0.1 %)	Not significant
396*	37250	Tillage plot. Medium sensitivity.	49	Impactacross the farm as a result of construction of joint bay No 50 / communication chamber / link box and a passing bay. Construction works at river crossing. Installation of access track to site of construction works. UGC and joint bay located on private land requires a permanent easement and land-take. The area of temporary land-take = 3 ha and the area of permanent easement and land-take = 0.5 ha representing 6 % and 1 % of the total area respectively.	3 (6 %)	0.5 (1 %)	Slight adverse

Ref Number	Chainage	Description of land parcel	Area of land parcel	Description of effects	Temporary works area (ha) (%)	Permanent Easement and land-take area (ha) (%)	Residual Impact
145 & 151	46600	Grassland plot. Medium sensitivity.	10.5	Impact at the edge of the farm as a result of construction of joint bay No 63 / communication chamber / link box and a passing bay. The area of temporary land-take = 0.15 ha representing 1.4 % of the total area.	0.15 (1.4 %)	(0 %)	Not significant
81	48500	Grassland plot. Low - medium sensitivity.	8.2	Impact at the edge of the farm as a result of construction of joint bay No 65 / communication chamber / link box and a passing bay. The area of temporary land-take = 0.15 ha representing 2 % of the total area.	0.15 (2 %)	(0 %)	Not significant
76*	48750	Grassland plot grazed by sheep and cattle. Medium sensitivity.	9.9	Impact at the edge of the farm as a result of construction works at watercourse crossing. UGC located on private land requires a permanent easement. The area of temporary land-take = 0.18 ha and the area of the permanent easement = 0.04 ha representing 0.2 % and 0.4 % of the total area respectively.	0.18 (2 %)	0.04 (0.4 %)	Not significant
72*	49250	Grassland plot grazed by horses and cattle. High sensitivity.	37.1	Impact at the edge of the farm as a result of construction of joint bay No 66 / communication chamber / link box and a passing bay. Construction works at watercourse crossing. UGC located on private land requires a permanent easement. The area of temporary land-take = 0.3 ha and the area of permanent easement = 0.04 ha representing 1 % and 0.1 % of the total area respectively.	0.3 (1 %)	0.04 (0.1 %)	Not significant

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51	50100	Stud Farm. Very high sensitivity.	35.4	Impact at the edge of the farm as a result of construction of joint bay No 67 / communication chamber / link box and a passing bay. The area of temporary land-take = 0.15 ha representing 0.4 % of the total area.	0.15 (0.4 %)	(0 %)	Not significant
39	50600	Grassland plot grazed by horses and cattle. High sensitivity.	29.1	Impact at the edge of the farm as a result of construction of joint bay No 68 / communication chamber / link box and a passing bay. The area of temporary land-take = 0.15 ha representing 0.5 % of the total area.	0.15 (0.5 %)	(0 %)	Not significant
20*	5200	Grassland plot grazed by beef cattle. Medium sensitivity.	6.2	Impact as a result of construction of joint bay No 70 / communication chamber / link box; Installation of access track to site of construction works; UGC and joint bay located on private land and permanent easement and land-take required. The area of temporary land-take = 1.4 ha and the area of permanent easement and land-take = 0.2 ha representing 22.5 % and 4 % of the total area respectively.	1.4 (22.5 %)	0.2 (4 %)	Slight Adverse