MetroLink 110kV Underground Cables

Volume 2: Environmental Impact Assessment Report

June 2023

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Volume 2: Environmental Impact Assessment Report

June 2023

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Abbreviations

Abbreviation	Full Title
AA	Appropriate Assessment
AADT	Annual Average Daily Traffic
AAP	Area of Archaeological Potential
AAWT	Annual Average Weekday Traffic
ABP	An Bord Pleanála
ACA	Architectural Conservation Area
AEP	Annual Exceedance Probability
AIRO	All-Island Research Observatory
AOD	Above Ordnance Datum
AQS	Air Quality Standards
BCT	British Conservation Trust
bgl	Below Ground Level
BoCCI	Birds of Conservation Concern Ireland
BNL	Basic Noise Level
BPM	Best Practicable Means
BS	British Standard
BSI	British Standard Institute
C&D	Construction and Demolition
CARO	Climate Action Regional Offices
CBAM	Carbon Border Adjustment Mechanism
CBD	Convention on Biological Diversity
CCKP	Climate Change Knowledge Portal
CCTV	Close Circuit Television
CDP	County Development Plan
CEMP	Construction Environmental Management Plan
CFRAM	Catchment-based Flood Risk Assessment and Management
Ch	Chainage
CIEEM	Chartered Institute of Ecology and Environmental Management
CIRIA	Construction Industry Research and Information Association
CRR	Commission for Railway Regulation
CRU	Commission for Regulation of Utilities
CRWMP	Construction Resource Waste Management Plan
CS	Core Strategy
CSO	Central Statistics Office
CTMP	Construction Traffic Management Plan
D&B	Design and Build
DAA	Dublin Airport Authority
DAFM	Department of Agriculture, Food and the Marine
DAHGI	Department of Arts, Heritage, Gaeltacht and the Islands
dBA	Decibels
DCC	Dublin City Council

Abbreviation	Full Title
DECC	Department of Communications, Climate Action & Environment
DETE	Department of the Enterprise, Trade and Employment
DHLGH	Department of Housing, Local Government and Heritage
DHPLG	Department of Housing, Planning, and Local Government
DMRB	Design Manual for Roads and Bridges
DMA	Dublin Metropolitan Area
DRCD	Department of Rural and Community Development
DTTAS	Department of Transport, Tourism and Sport (now Department of Transport)
EC	European Commission
EcIA	Ecological Impact Assessment
ECoW	Ecological Clerk of Works
ED	Electoral Division
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
EnCoW	Environmental Clerk of Works
ENR	Environmental Noise Regulations
EPA	Environmental Protection Agency
EPUK	Environmental Protection UK
ESB	Electricity Supply Board
ETS	Emissions Trading Scheme
EU	European Union
EURRF	European Union Recovery and Resilience Facility
EV	Electric Vehicle
eVDV	Estimated Vibration Dose Value
EWC	European Waste Code
FAQ	Frequently Asked Questions
FCC	Fingal County Council
FLTIF	Future Land Transport Investment Framework
FRA	Flood Risk Assessment
GAA	Gaelic Athletic Association
GDD	Greater Dublin Drainage
GDP	Gross Domestic Product
GDTA	Grow Dublin Tourism Alliance and Action Plan
GFC	Gaelic Football Club
GHG	Greenhouse Gas
GI	Ground Investigation
GIS	Gas Insulated Switchgear
GNI	Gross National Income
GPS	Global Positioning System
GSI	Geological Survey Ireland
GWDTE	Groundwater Dependent Terrestrial Ecosystems
HDD	Horizontal Directional Drilling
HDV	Heavy Duty Vehicles
HEFS	High End Future Scenario

Abbreviation	Full Title
HGV	Heavy Good Vehicles
HSA	Health and Safety Authority
HSE	Health Service Executive
HV	High Voltage
IAA	Irish Aviation Authority
IAQM	Institute of Air Quality Management
IDA	Industrial Development Agency
IE	Iarnród Éireann
IEMA	Institute of Environmental Management and Assessment
IFI	Inland Fisheries Ireland
IGBC	Irish Green Building Council
IGI	Institute of Geologists Ireland
ICNIRP	International Commission on Non-Ionizing Radiation Protection
ISO	International Organization for Standardization
KER	Key Ecological Receptors
kV	Kilo Volt
LAP	Local Area Plan
LCA	Landscape Character Area
LCT	Landscape Character Types
LDV	Light Duty Vehicles
LEV	Low Emission Vehicle
LIA	Landscape Impact Assessment
MASP	Metropolitan Area Strategic Plan
MD	Municipal District
MMI	Mott MacDonald Ireland Limited
MRFS	Mid-Range Future Scenario
NAF	National Adaptation Framework
NBDC	National Biodiversity Data Centre
NDP	National Development Plan
NHA	Natural Heritage Area
NIAH	National Inventory of Architectural Heritage
NIFM	National Indicative Fluvial Mapping
NIFTI	National Investment Framework for Transport in Ireland
NIS	Natura Impact Statement
NPF	National Planning Framework
NPWS	National Parks & Wildlife Service
NRA	National Roads Authority (now TII)
NRRP	National Recovery and Resilience Plan
NSL	Noise Sensitive Locations
NSO	National Strategic Outcomes
NTA	National Transport Authority
OD	Ordnance Datum
OPW	Office of Public Works
OSI	Ordnance Survey Ireland
OSM	Open Street Mapping

Abbreviation	Full Title
PAS	Publicly Available Specification
PIC	Personal Injury Collisions
pNHA	Proposed Natural Heritage Area
PPV	peak particle velocity
PSCS	Project Supervisor for the Construction Stage
PSDP	Project Supervisor Design Process
PUP	Pandemic Unemployment Payment
QI	Qualifying Interest
RBSP	River Basin Specific Pollutants
RCP	Representative Concentration Pathway
RMP	Record of Monuments and Places
RO	Railway Order
RPO	Regional Policy Objectives
RSA	Road Safety Authority
RSES	Regional Spatial and Economic Strategy
SAC	Special Areas of Conservation
SAR	Strategic Assessment Report
SCI	Site of Community Importance
SDG	Sustainable Development Goals
SHD	Strategic Housing Development
SMR	Sites and Monuments Record
SPA	Special Protection Areas
Tii	Transport Infrastructure Ireland
TTA	Traffic and Transport Assessment
UGC	Under Ground Cable
UN	United Nations
UNECE	United Nations Economic Commission for Europe
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNFCCC	United Nations Framework Convention on Climate Change
VIA	Visual Impact Assessment
VP	View Point
VPH	Vehicles Per Hour
VRPs	Viewshed Reference Points
WFD	Water Framework Directive
WHO	World Health Organization
WSA	Waste Storage Area
ZoI	Zone of Influence

1 Introduction

1.1 Overview of Project

The MetroLink project (the project) is a proposed high-capacity, high-frequency, modern and efficient metro railway between north of Swords via Dublin Airport to Charlemont Station which lies south of Dublin City Centre. The proposed project will be approximately 18.8km in length. The Railway Order (RO) application for MetroLink was submitted to An Bord Pleanála on 30 September 2022, case reference: NA29N.314724. The National Roads Authority (operating as Transport Infrastructure Ireland) made the application under Section 37 of the Transport (Railway Infrastructure) Act 2021, (as amended and substituted). This case was due to be decided by 22 May 2023.

The RO application (NA29N.314724) for the MetroLink project included the following principal elements:

- Tunnels
- Cut Sections
- Tunnel Portals
- Stations
- Intervention shaft
- Intervention tunnels
- Park and Ride facility
- Broadmeadow and Ward River Viaduct
- Proposed Grid Connections
- Dardistown Depot
- Operations Control Centre
- M50 Viaduct

The RO application has assessed the proposed grid connections and substations as part of the RO EIAR and this Section 182A EIAR assesses the proposed grid connections cumulatively with the main MetroLink rail project.

1.2 Proposed Development

This Environmental Impact Assessment Report (EIAR) has been prepared to accompany an application for statutory approval to An Bord Pleanála (ABP) for the high voltage (HV) electricity connections (the proposed development) that are required for the overall MetroLink project.

The proposed development, the subject of this EIAR, case reference: VC06F.312348, is for the construction of three new 110kV underground cables to provide power to Metrolink. These three new circuits are

- Newbury-Ballystruan 110kV;
- Ballystruan-Forest Little 110kV; and
- Forest Little-Belcamp 110kV/220kV.

The main elements of the proposed development comprise:

- A 110 kV underground cable (UGC) between Newbury and Ballystruan substations, approximately 5km in length passing through the townlands of Ballymun, Coultry, Ballystruan, Turnapin, Great Dardistown, Turnapin Little, Clonshaugh (E.D. Coolock), Santry (E.D. Coolock) and Shrubs.

- A 110 kV (UGC between Ballystruan and Forest Little substations, approximately 10km in length passing through the townlands of Cloghran, Forest Little, Forest Great, Pickardstown, Barberstown, Kingstown, Millhead, Sandyhill, Saint Margaret's, Shanganhill and Ballymun.
- A 110 kV / 220 kV UGC between Forest Little and Belcamp substations
  - Option 1 is approximately 9km in length, via Baskin Lane/Malahide Road, through the townlands of Cloughran, Stockhole, Baskin, Ballymacartle, Kinsaley, Bohammer, Saintdoolaghs, Burgage, Balgriffin, Clonshaugh (E.D. Coolock) and Belcamp, and
  - Option 2 via Stockhole Lane approximately 4km in length, through the townlands of Cloghran, Stockhole, Clonshaugh (E.D. Coolock) and Belcamp.
- Excavation of cable trenches:
  - for standard 110kV circuits of up to 0.6m wide and 1.4m deep;
  - for standard double circuit trefoil formation 110kV/220kV circuit 1.5m wide and 1.4m depth;
  - for double circuit 110kV/220kV where utility congestion exists, a flat formation up to 2.9m wide is proposed.
  - Utilisation of existing ducts where available.
- Associated joint bays and crossings (using existing bridge decks, open cut trenching or trenchless method i.e. Horizontal Directional Drilling, HDD).

The proposed development also includes ancillary works such as, clearance of laydown areas, use of temporary compounds, the exact location of these is to be determined by the appointed Construction Contractor at the time of development. A detailed description of the proposed development is provided in Chapter 6 of this EIAR.

This application relates only to the electricity connections between the substations of Newbury, Ballystruan, Forest Little and Belcamp only.

The MetroLink RO application included for permission for the proposed Forest Little and Ballystruan substations as part of the MetroLink project. Belcamp and Newbury are existing substations.

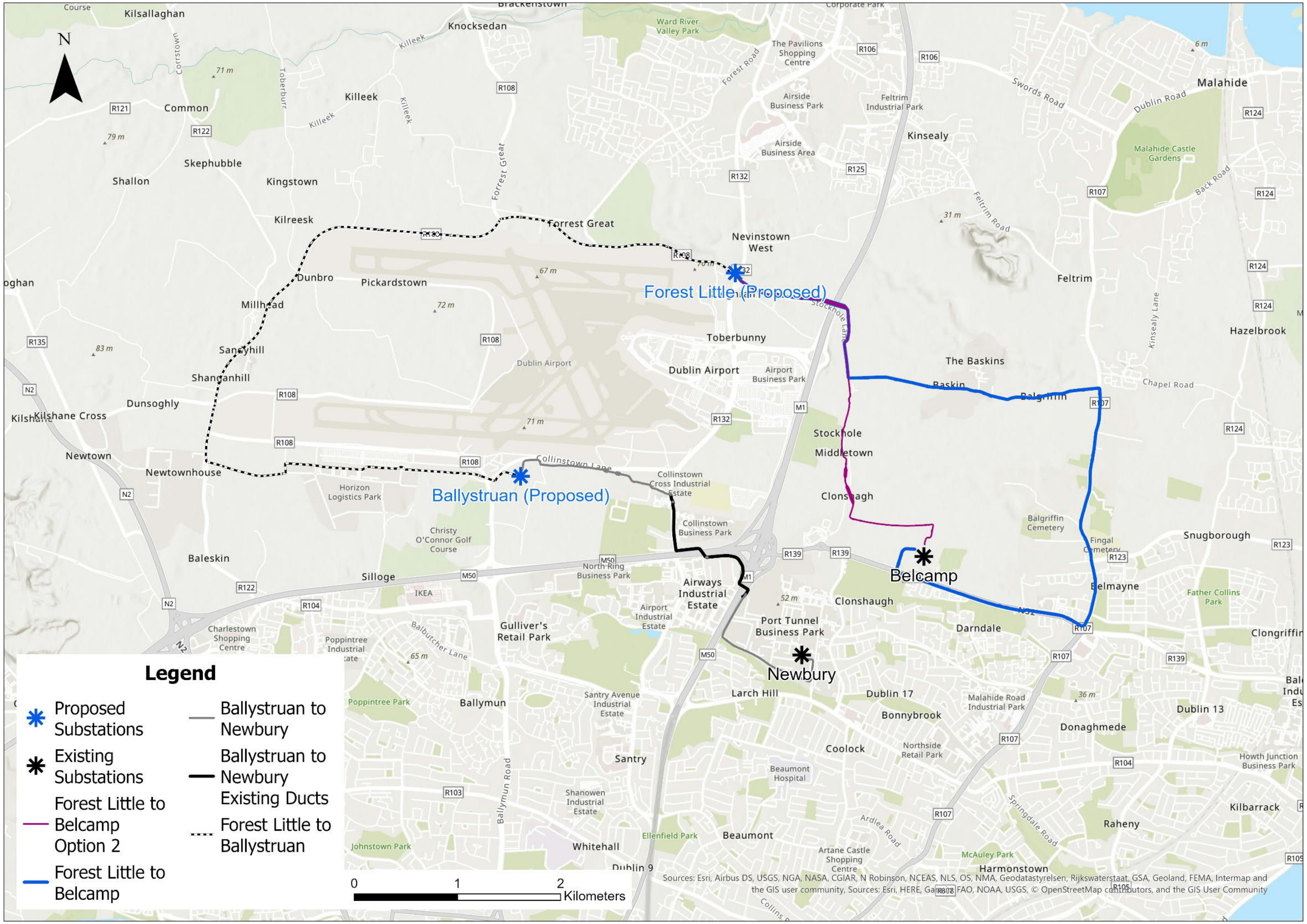
The proposed development has been designated by ABP as Strategic Infrastructure Development (SID) following pre-application consultation between ESB and the SID Division of ABP undertaken in accordance with the provisions of Section 182E of the Planning and Development Act 2000, as amended (ABP Ref. 312348).

The application for the proposed development (Case reference: VC06F.312348) will be made to An Bord Pleanála (ABP) by ESB under Section 182A of the Planning and Development Act, 2000 (as amended).

Further information is included with Chapter 5 Consultation and Appendix C.

Figure 1.1 presents the three proposed UGC, the subject of this EIAR. Mapping is also provided in Volume 3 Appendix B of this EIAR.

Figure 1.1: Proposed Underground Cable Routes



Source: Mott MacDonald

1.3 Electricity Supply Board

The Applicant for the proposed development is ESB.

ESB are responsible for seeking consent and for the detailed design and the appointment of the construction contractor of the MetroLink UGC electricity connections.

ESB are also responsible for the construction of the electricity circuits required for the proposed development, the MetroLink UGC electricity connections and the operation and maintenance of the circuits.

1.4 Requirement for an EIAR

Screening 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. An EIAR was however required for the main MetroLink rail project. As that project (NA29N.314724) and the proposed development are reliant and interdependent on each other, an EIAR has been prepared which includes an assessment of the intra-project elements.

1.5 Structure of this EIAR

This EIAR is contained within 3 volumes:

- Volume 1: Non-Technical Summary
- Volume 2: Main EIAR
- Volume 3: Appendices

The structure of this EIAR (Volume 2) is presented in Table 1.1 Structure of EIAR below.

Table 1.1: Structure of EIAR

Chapter Number	Section
1	Introduction
2	Methodology
3	Need for the Proposed Development
4	Alternatives
5	Stakeholder Engagement
6	Description of the Proposed Development

Chapter Number	Section
7	Population and Human Health
8	Land, Soils and Hydrogeology
9	Surface Water and Flooding
10	Biodiversity
11	Air
12	Climate
13	Noise and Vibration
14	The Landscape
15	Archaeology, Architectural and Cultural Heritage
16	Material Assets
17	Roads and Traffic
18	Major Incidents and / or Disasters
19	Interactions of the Forgoing
20	Summary of Mitigation and Monitoring

1.6 Competency of the Project Team

Mott MacDonald is a multidisciplinary consultancy with over 30 years' experience of undertaking complex and challenging impact assessment reports in accordance with the requirements of the EIA Directive for a wide range of projects. These include some of the world's largest infrastructure, engineering and development projects.

Mott MacDonald is a corporate member of the Institute of Environmental Management and Assessment and hold its EIA Quality Mark. The Quality Mark Scheme allows organisations that lead the co-ordination of statutory EIAs in the UK and Ireland to make a commitment to excellence in their EIA activities and have this commitment independently reviewed. The EIA Quality Mark is a voluntary scheme, with organisations free to choose whether they are ready to operate to its seven EIA Commitments.

This EIAR was prepared by Mott MacDonald with expert technical contributions provided by a number of specialists. ESB personnel contributed to the technical aspects of EIAR as they relate to the electrical circuits, Alternatives and the Description of the Proposed Development. In addition, subconsultants were engaged to undertake specialist technical assessments to inform this EIAR.

Details of the competencies of the respective EIAR contributors are provided in Volume 3 - Appendix A - EIAR Competencies.

Metrolink 110kV Underground Cables

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2 EIAR Methodology

2.1 Introduction

The Environmental Impact Assessment (EIA) Directive on the assessment of the effects of certain public and private projects on the environment (2014/52/EU) ensures a high level of protection to the environment and human health, through the use of minimum requirements for undertaking an EIA. The 2014/52/EU directive defines EIA as a process that consists of:

- The preparation of an environmental impact assessment report by the developer;
- The carrying out of consultations;
- The examination by the competent authority of the information presented in the environmental impact assessment report and any supplementary information provided, where necessary, by the developer, and any relevant information received through the consultations;
- The reasoned conclusion by the competent authority on the significant effects of the project on the environment, taking into account the results of the examination and, where appropriate, its own supplementary examination; and
- The integration of the competent authority's reasoned conclusion into any of the decisions.

This definition provides for a clear distinction between the process of EIA to be carried out by the competent authority and the preparation by the developer of an EIAR.
This chapter sets out the approach to this EIAR. For each assessment, a precautionary approach has been applied whereby maximum design parameters based on realistic worst-case dimensions, orientations and components have been assessed. This approach ensures that the assessment will consider the greatest environmental impact (i.e. largest footprint, longest exposure, or highest dimensions depending on the topic). This approach is a resilient method where it may not be possible to identify the exact design parameters at this stage within the final design, thereby accommodating flexibility in design and construction whilst ensuring maximum extents and ranges are assessed in this EIAR.

The technical chapters of this EIAR provide further topic specific details of the methodologies applied in the preparation of this EIAR.

2.2 EIA Directive

The amended EIA Directive requires that the EIAR provides: “A description of the relevant aspects of the current state of the environment (baseline scenario) and an outline of the likely evolution thereof without implementation of the project as far as natural changes from the baseline scenario can be assessed with reasonable effort on the basis of the availability of environmental information and scientific knowledge”.

Article 3(1) states that the EIA shall:

“Identify, describe and assess in an appropriate manner, in the light of each individual case, the direct and indirect significant effects of the project on the following factors:

a. Population and human health;
b. Biodiversity, with particular attention to species and habitats protected under Directive 92/43/EEC and Directive 2009/147/EC;
c. Land, soil, water and climate;
d. Material assets, cultural heritage and landscape; and

e. The interaction between the factors referred to in points (a) to (d)".

Article 5 states that an EIAR shall include at least:

1. "A description of the project comprising information of the site, design, size and other relevant features of the project;
2. A description of the likely significant effects of the project on the environment;
3. A description of the features of the project and/or measures envisaged in order to avoid, prevent or reduce, and if possible, offset likely significant adverse effects on the environment;
4. A description of the reasonable alternatives studied by the developer which are relevant to the project and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the project on the environment;
5. A non-technical summary of the information referred to in (a) to (d); and
6. Any additional information specified in annex iv relevant to the specific characteristics of a particular project or type of project and to the environmental features likely to be affected".

Annex IV requires;

"The description of the likely significant effects on the factors specified in Article 3(1) should cover the direct effects and any indirect, secondary, cumulative, transboundary, short term, medium term and long term permanent and temporary, positive and negative effects of the project. The description should take into account the environmental protection objectives established at Union or member State level which are relevant to the project".

In addition, Annex IV requires:

"A description of the forecasting methods or evidence, used to identify and assess the significant effects on the environment, including details of difficulties (for example technical deficiencies or lack of knowledge) encountered compiling the required information and the main uncertainties involved".

2.3 EIAR Methodology

The methodology used in preparing an EIAR is comprised of the following steps in accordance with EIA Directive 2011/92/EU on the assessment of the effect of certain public and private projects on the environment (codification), as amended by EIA Directive 2014/52/EU (the EIA Directive) and the EPA's Guidelines on the Information to be contained in Environmental Impact Assessment Reports (2022), hereafter referred to as the 'EIAR Guidelines'.

The EIAR also has regard to EPA Advice Notes on Current Practice in the Preparation of Environmental Impact Statement (EPA, 2015) and European Commission, Environmental Impact Assessment of Impacts, Guidance on the preparation of the Environmental Impact Assessment Report, (European Commission 2017).

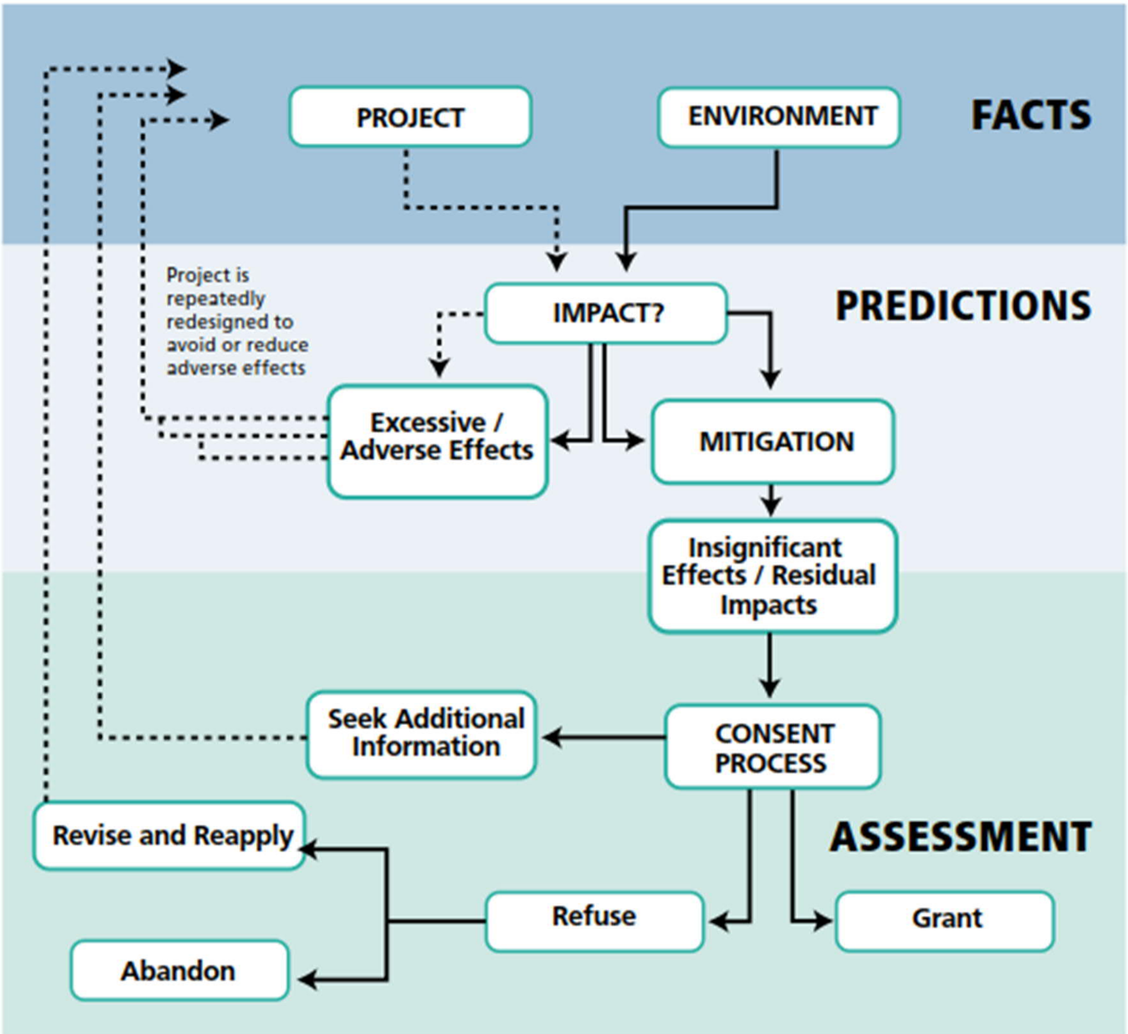
This EIAR includes the following:

- A description of the project comprising information on the site, design, size and other relevant features of the project;
- A description of the likely significant effects of the project on the environment;
- A description of the features of the project and/or measures envisaged in order to avoid, prevent or reduce and, if possible, offset likely significant adverse effects on the environment;

- Any additional information relevant to the specific characteristics of a particular project or type of project and to the environmental features likely to be affected;
- A description of the reasonable alternatives which are relevant to the project and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the project on the environment;
- A non-technical summary of the information referred to above.
- Any additional information specified in Annex IV relevant to the specific characteristics of a particular project or type of project and to the environmental features likely to be affected.

Figure 2.1 illustrates the stages of EIAR preparation.

Figure 2.1: Stages of EIAR Preparation



Source: EPA's Guidelines on the Information to be contained in Environmental Impact Assessment Reports (2022)

2.3.1 Receiving Environment

The baseline environment describes the current state of environmental characteristics, detailing the condition, sensitivity and significance of relevant environmental factors which are likely to be significantly affected by the proposals.

The amended EIA Directive also requires consideration of the likely future receiving environment in the absence of the project:

"A description of the relevant aspects of the current state of the environment (baseline scenario) and an outline of the likely evolution thereof without implementation of the project as far as natural changes from the baseline scenario can be assessed with reasonable effort on the basis of the availability of environmental information and scientific knowledge".

2.3.2 Temporal and Spatial Scope

The duration of effects will be described for each technical chapter of this EIAR. Spatial (or geographical) scope refers to the area over which the EIAR considers effects. The environmental sensitivity of the surrounding geographical areas and the establishment of source-pathway-receptor linkages (i.e. the zones of influence) will determine the extent of the area to be assessed as part of the EIAR. This is defined in each of the technical chapters of the EIAR.

2.3.3 Identification of Potential Receptors

A receptor is defined in the EIAR Guidelines as 'any element in the environment which is subject to impacts'. The environmental effect will depend on the spatial relationship between the source and the receptor with some receptors being more sensitive than others to particular environmental effects. Topic specific receptors will be identified in each technical chapter.

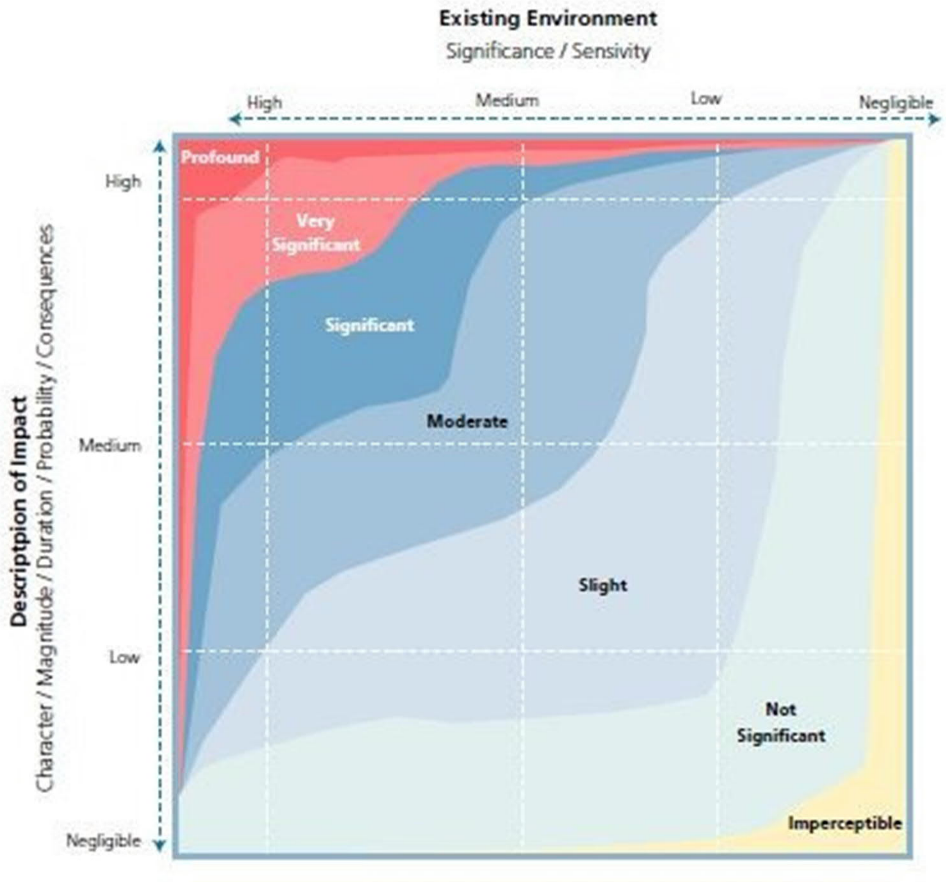
2.3.4 Determining Significance of Effects

The significance of a potential impact is defined by the sensitivity of the receiving environment and the description (i.e. magnitude/probability/duration) of the predicted impact. Table 2.1 details how effects are described and the matrix that is used in this EIAR for evaluating the significance of environmental effects is set out in Figure 2.2. In some cases, magnitude or significance cannot be quantified with certainty, and in these cases professional judgement remains the most effective way to identify the significance of an effect. Where this is necessary, it will be highlighted within the text. Where significant adverse effects are likely, mitigation to reduce those impacts is required.

Table 2.1: Description of Effects

Quality of Effects	**Positive Effects -** A change which improves the quality of the environment, by increasing species diversity; or the improving reproductive capacity of an ecosystem; or be removing nuisances or improving amenities
	Neutral Effects – No effects, or effects that are imperceptible, within normal bounds of variation or within the margin of forecasting error
	Negative/Adverse Effects – A change which reduces the quality of the environment (for example, lessening species diversity or diminishing the reproductive capacity of an ecosystem; or damaging health or property or by causing nuisance)
Significance of Effects	**Imperceptible –** an effect capable of measurement but without significant consequences
	Not significant – an effect which causes noticeable changes in the character of the environment but without significant consequences
	Slight – an effect which causes noticeable changes in the character of the environment without affecting its sensitivities
	Moderate – an effect that alters the character of the environment in a manner that is consistent with existing and emerging baseline trends
	Significant – an effect which, by its character, magnitude, duration or intensity alters a sensitive aspect of the environment
	Very significant – an effect which, by its character, magnitude, duration or intensity significantly alters most of a sensitive aspect of the environment
	Profound – an effect which obliterates sensitive characteristics
Extent and Context of Effects	**Extent –** describe the size of the area, the number of sites and the proportion of a population affected by an effect
	Context – Describe whether the extend, duration, or frequency will conform or contrast with established (baseline) conditions (is it the biggest, longest effect ever?)
Probability of Effects	**Likely effects –** the effects that can reasonably be expected to occur because of the planned project if all mitigation measures are properly implemented
	Unlikely effects – the effects that can reasonably be expected not to occur because of the planned project if all mitigation measures are properly implemented
Duration and Frequency of Effects	**Momentary effects –** effects lasting from seconds to minutes
	Brief effects – effects lasting less than a day
	Temporary effects – effects lasting less than a year
	Short-term effects – effects lasting one to seven years
	Medium-term effects – effects lasting seven to fifteen years
	Long-term effects – effects lasting fifteen to sixty years
	Permanent effects – effects lasting over sixty years
	Reversible effects – effects that can be undone, for example through remediation or restoration
	Frequency of effects – describe how often the effect will occur, (once, rarely, occasionally, frequently, constantly – or hourly, daily, weekly, monthly, annually)

Figure 2.2: Determining the Significance of Impact



Source: EPA's Guidelines on the Information to be contained in Environmental Impact Assessment Reports (2022)

2.3.5 Mitigation and Monitoring Measures

There are four established strategies for the mitigation of effects - avoidance, prevention, reduction and offsetting. The efficacy of each is related to the stage in the design process at which environmental considerations are taken into account.

Mitigation measures that have been defined for each environmental topic are set out in the technical chapters comprising this EIAR. These mitigation measures relate to the construction, operational and decommissioning phases of the project. Mitigations, as proposed, are representative of best practice guidance in the respective specialist technical fields.

The mitigation measures and where appropriate proposed monitoring will be implemented by means of targeted management plans by ESB and any Contractors appointed by ESB during the various project phases. Notwithstanding, responsibility for all commitments specified in this EIAR will be the responsibility of ESB ultimately.

Monitoring provides assurance that proposed systems are operating as intended. This allows adjustments of operations to be made to ensure continued compliance with consent conditions such as emission limit values, conditions of operation, performance criteria/ indicators and detection of unexpected mitigation failures. Post consent monitoring may include, for example, update of the live Construction Environmental Management Plan (CEMP) and the Construction

Traffic Management Plan (CTMP). All agreed mitigation measures will be incorporated into these management plans. The content of these documents will be agreed with Fingal County Council and Dublin City Council and will be regularly reviewed and updated.

2.3.6 Residual Impacts

Any likely significant impacts that continue to exist when the mitigation and monitoring measures have been put in place are assessed for each individual environmental topic. These residual impacts are identified in reach chapter.

2.3.7 Decommissioning

It is not intended to decommission the proposed electricity infrastructure, however, over time elements of the proposed development, for example, cables, may need to be replaced. Decommissioning effects are assessed in each technical chapter.

2.3.8 Do Nothing Effects

As outlined in the EIAR Guidelines, the description of Do-Nothing effects relates to *'the environment as it would be in the future should the subject project not be carried out'*.

The Do nothing scenario is considered in each technical chapter of this EIAR.

2.3.9 Cumulative Effects

Cumulative effects take account of the addition of many minor or significant effects to create larger, more significant effects.

As outlined in the EIAR Guidelines, while a single activity may itself result in a minor impact, it may, when combined with other impacts (minor or significant), result in a cumulative impact that is collectively significant. A single effect which may, on its own, have a significant effect, may also have a reduced and insignificant impact when combined with other effects.

In the case of the proposed development, there is potential for intra-project effects with the main MetroLink project and there are also 'other developments' which may act cumulatively. Both intra-project and 'other developments' are considered in each technical assessment.

For each technical topic, the nature and scale of the other development has been evaluated and the potential for temporal overlap within the topic-specific zone of influence (ZoI) has been assessed, having regard to the potential for significant cumulative effects. A planning search for applications was conducted in May 2023 (including An Bord Pleanála, Fingal County Council and Dublin City Council websites). Table 2.2 presents certain planned developments, from the past five years, along the proposed UGC routes, focusing on developments not associated with extensions, demolition and construction of dwellings and farm buildings, installation of solar panels on roofs etc.as these projects would not have the potential for significant environmental effects.

The environmental assessments presented in this report have had regard to these planned developments in the context of potential for cumulative effects. In relation to the potential for cumulative effects, prior to commencement of construction and during the construction phase, engagement with the local communities along the proposed route will continue. Where there is potential for works to be carried out at the same time appropriate mitigation measures have been described and will be implemented within the parameters assessed in this EIAR. This includes the scheduling of works and regular liaison meetings to ensure that plans are coordinated and effects are minimised.

Table 2.2: Planning Search

Application Ref (LA or ABP)	Grant of Approval date (decision date if not granted)	Development Description	Development Address	Link to application
Section 34 Applications to Local Authority				
LA: F20A/0550 ABP: PL06F.312476	Planning Appeal - Contribution Appeal Decided: 06/03/23	For full planning permission to extend the North Apron in the Airfield at Dublin Airport, Co Dublin to facilitate the provision of twelve aircraft stands and a ground servicing equipment area on a site of 19.2ha.	Airfield in the townlands of, Cloghran, Corballis, Forrest Great, Forrest Little, Collinstown & Rock, Dublin Airport, Co Dublin	https://www.pleanala.ie/en-ie/case/312476
LA : F20A/0668 ABP: PL06F.314485	Planning Appeal TBD: 05/01/2023	A proposed development comprising the taking of a ‘relevant action’ only within the meaning of Section 34C of the Planning and Development Act 2000, as amended, which relates to the night-time use of the runway system at Dublin Airport	Dublin Airport, Co. Dublin.	https://www.pleanala.ie/en-ie/case/314485
LA: F20A/0295	06/11/2020	Permission for a single-storey free standing c.5m tall substation (approximately 18m x 21m), within which will be enclosed; a medium voltage ring main unit room; a medium voltage switch gear distribution room; a communications room; a transformer room; a generator change over panel room; a generator room; a main distribution room; and an entrance lobby.	Airfield, Dublin Airport, Townland of Collinstown, Co Dublin	Planning Portal (agileapplications.ie)

Application Ref (LA or ABP)	Grant of Approval date (decision date if not granted)	Development Description	Development Address	Link to application
F22A/0460 / PL06F.316138	Due appeal decision on 27/07/2023	The proposed development will consist of the construction of a subterranean Underpass of Runway 16/34, a critical airfield operational safety project, which will comprise: sites at the Airfield in the townlands of Collinstown, Coultry, and Huntstown, Co. Dublin, 1no. of which incorporates part of Pier 3 and surrounding aircraft stands, aircraft stands to the south of Pier 2, Apron Taxiway 4, Taxiway F-2, Runway 16/34 (the crosswind runway), Taxiway W1 and W2, West Apron; and 1no. of which incorporates an existing airside site compound, south of the West Apron; 1no. area of land to the west of the existing Western Compound, south of the R108, north-west of the Airport, in the townland of Pickardstown, Co. Dublin, also to be known as the Western Compound; and 1no. an area of existing hardstanding to the south-west of the Airport, north of the R108, to be known as the Southern Compound, in the townland of Portmellick, Co. Dublin.	sites at the Airfield in the townlands of Collinstown, Coultry, and Huntstown, Co. Dublin	https://planning.agileapplications.ie/fingal/application-details/93131 https://www.pleanala.ie/en-ie/case/316138
LA: FW21A/0151 ABP: PL06F.313583	Planning appeal to be decided by 19/09/2022 - no decision yet (rechecked 10.05.23, no decision)	Demolition of 2 no. existing residential dwellings and construction of 2 no. data hall buildings. EIAR submitted with application	Lands adjacent to Huntstown Power Station, North Road, Finglas, Dublin 11 (FW21A/0151)	Planning Portal (agileapplications.ie)
FCC: F21A/0681 DCC: 3041/22	FCC Final Grant - 18.10.22 DCC Final Grant - 11.10.22	Mayne Stability Limited intends to apply for permission for a period of 10 years for the development of access to the Synchronous Compensator Development (Grid Stabilisation Facility) at lands south of Belcamp 220KV substation	Belcamp, Dublin 17.	https://planning.agileapplications.ie/fingal/application-details/91287 https://planning.agileapplications.ie/dublincity/application-details/147963
FCC: FW21A/0144	Granted 05.10.20	Installation of electrical infrastructure between Finglas substation and Huntstown Power Station to facilitate the retirement of existing Electricity Supply Board overhead powerlines and facilitate site clearance for the future development of a data centre and substation	Huntstown , Co. Dublin	
FCC: FW22A/0079	Grant (final) dated 17.11.22	Construction of three light industrial / warehouse (including wholesale use) / logistics buildings and all associated development.	Harristown, Silloge, and Ballymun, St. Margaret's, Swords, Co. Dublin	https://planning.agileapplications.ie/fingal/application-details/92167
FCC: F22A/0514	AI requested - 3 month extension approved to respond	The development will consist of 1. Juvenile grass playing pitch with 2Nr 4.57m x 6.7m high goalpost , 2Nr 15m x 10m high ball stop nets & posts to rear of goals; 2. 100m x 10m high ball stop netting with 7Nr. 10m high timber posts along Eastern Boundary (shared	Starlights G.F.C, Hillfarm, Turnapin Grove, Santry, Dublin 17	Planning Portal (agileapplications.ie)

Application Ref (LA or ABP)	Grant of Approval date (decision date if not granted)	Development Description	Development Address	Link to application
		with M1); 3. Detached changing room unit. 4. Detached accessible toilet unit; 5. Widening of existing vehicular entrance from Turnapin Grove; 6. Parking for 33Nr. cars and associated site works.		
FCC: F19A/0023 / ABP PL06F.305298	Granted: 18/03/2020	Amend the North Parallel Runway (North Runway)(permitted under FCC Reg. Ref. F04A/1755; An Bord Pleanála Ref: PL06F.217429)	Dublin Airport	https://www.pleanala.ie/en-ie/case/305298
DCC: 3058/23	This application was valid on 18 May 2023	The development will consist of: (i) removal of existing vehicular entrance/access roadway and provision of 2no. new vehicular entrance gates and 1 no. pedestrian entrance gate off the Clonshaugh Business and Technology Park campus roadway; (ii) construction of 1 no. single-storey warehouse, with ancillary office accommodation, building (3,955sq.m) with solar/pv panels at roof level...	Lands (to the immediate south of Eircode No. D17 V303) at Clonshaugh Business & Technology Park, Dublin 17	Citizen Portal Planning (agileapplications.ie)
DCC: 3803/20	Final grant - 20/08/2021	ALREADY UNDER CONSTRUCTION - NO PHYSICAL OVERLAP WITH EITHER PROJECT 2 no. 2 storey data centre buildings (each 16,576 sqm), which are 16m in height at the main parapet level. Each building to include: Office administration area, data halls, associated electrical and mechanical plant rooms, a loading bay, maintenance and storage spaces, screened plant and solar panel array at roof level, with rainwater harvesting system to support industrial water requirements. 16 no. emergency generators with emission stacks along with a single emergency house supply generator, all contained in a fenced compound adjacent to each building. Diesel storage tank, fuel filling area and associated plant.	Woodlands & Former Diamond Innovations Site, Clonshaugh Business & Technology Park, Dublin 17	Citizen Portal Planning (agileapplications.ie)
FCC: F21/041	Planning Appeal TBD: 11/04/2022	Residential development on lands at Belcamp Hall (a Protected Structure). construction of 78 residential units.	Lands at Belcamp Hall, Malahide Road, Dublin 17	312060 | An Bord Pleanála (pleanala.ie)
DCC: 3641/21	Final Grant: 24/08/2022	Construction of two data centre buildings (Data Centre A and Data Centre B), with a gross floor area (GFA) of c. 12,875 sq.m and c. 1,455 sq.m respectively, each over two storeys (with Data Centre A also including two mezzanine levels), with plant at roof level	he site is located to the north of the Santry River and the R104 Oscar Traynor Road, to the west of Clonshaugh Road, and to the south and east of existing estate roads	Citizen Portal Planning (agileapplications.ie)
F22A/0422	Planning Appeal TBD 07/08/2023	To consist of the following; (a) demolition of storage warehouse and construction of a replacement storage warehouse at the same site location; (b) the extension and upgrading of cladding on storage shed and removal of towers and silos; (c) minor internal	McComish, Fosterstown South, Cloghran, Swords, Co. Dublin	316184 | An Bord Pleanála (pleanala.ie)

Application Ref (LA or ABP)	Grant of Approval date (decision date if not granted)	Development Description	Development Address	Link to application
		changes to the trade counter building and provision of parking, building signage and all associated site and development works.		
State Development				
ABP-314777-22	EIAR Not required - Permitted to proceed	Construction of temporary emergency electricity generation power plant	Huntstown Power Station, Johnstown, Co. Dublin	https://www.pleanala.ie/en-ie/case/314777
ABP: SC06F.313117	Lodged	Construction of temporary emergency electricity generation	Huntstown Power Station, Johnstown, Co. Dublin	https://www.pleanala.ie/en-ie/case/313117
Strategic Infrastructure Development				
ABP SID Application GDD: PA0055 & PA06F.312131	Granted by ABP with conditions 11/11/2019. Board's Decision quashed by Order of the High Court (Perfected on 16th July 2021), New Case Number ABP-312131-21.	Greater Dublin Drainage - new WWTP, sludge hub centre, orbital sewer, outfall pipeline and regional biosolids storage facility	Newton, Dublin 11	Planning Documents | Greater Dublin Drainage Project (water.ie)
ABP SID Application (RBSF): PA0054 and PA29S.301798		10 yr. permission for Ringsend Regional Biosolid Storage Facility (RBSF) & Ringsend WwTP upgrade		
ABP:302651	03/05/2019	Permanent continuation of use of the existing long-term car park known as Quickpark, including construction of new entrance building with associated revised entrance layout resulting in 6,122 long-term car parking spaces, and all associated ancillary infrastructure and works.	Lands at Quickpark Car Park, Turnapin Great, Swords Road (Old Airport Road), Santry, Co. Dublin	302651 | An Bord Pleanála (pleanala.ie)

Application Ref (LA or ABP)	Grant of Approval date (decision date if not granted)	Development Description	Development Address	Link to application
ABP: PA06F.301458	08/10/2018	Permanent continuance of use of the 8,840 space long-term car park known as Holiday Blue on a site at Harristown, Silloge and Ballymun Townlands, South Parallel Road, Dublin Airport, Co. Dublin, that is currently used for the same purpose under and in accordance with temporary planning permission reg. ref PL06F.PA0022, and the 2,040 space long-term car park known as Express Red Zones Y and Z (Express Red) on a site at Stockdale, Cloghran, and Toberbunny Townlands, Dublin Airport, Co. Dublin that is currently used for the same purpose under and in accordance with temporary planning permission reg. ref: PL06F.PA0030.	Harristown, Silloge and Ballymun Townlands, South Parallel Road, Dublin Airport Co. Dublin and Stockhole, Cloghran, and Toberbunny Townlands, Dublin Airport, Co. Dublin.	301458 | An Bord Pleanála (pleanala.ie)
ABP: 311528	Case is due to be decided by 08/04/2022 - not yet decided	Construction of a 2 storey 220kV GIS substation known as ‘Mooretown’, 4 underground transmission cables and all associated and ancillary site development and construction works (Fingal Co.Co. Ref. SID/03/21 – the application was made concurrent with the proposed data hall development proposal – Ref. FW21A/0151	Huntstown, North Road, Finglas, Dublin 11	https://www.pleanala.ie/en-ie/case/311528
Strategic Housing Development				
ABP: TA06F.311059	Lodged 09/08/21 Grant Perm. w Conditions 10/11/2022	1,365 no. units (346 no. houses, 1,019 no. apartments), creche and associated site works. (www.corballiseastshd.ie)	Corballis East, Donabate, Co. Dublin	311059 | An Bord Pleanála (pleanala.ie)
ABP 312855	Case is due to be decided by 28/06/2022 - not yet determined (rechecked 11.05.23)	Construction of 87 residential dwellings and 3 ground floor retail units	Lands located west of Malahide Road and north of Baskin Lane, Malahide Road, Kinsealy (also Kinsaley), Dublin 17	https://www.pleanala.ie/en-ie/case/312855
ABP 307887	Granted 01/12/2020	191 no. apartments and associated site works.	Site 2, Mayne River Avenue, Northern Cross, Malahide Road, Dublin 17. (www.ncblock2shd.ie)	307887 | An Bord Pleanála (pleanala.ie)
ABP: TC06F.307248	Granted: 16/09/2021	590 no. apartments, creche and associated site works.	Charlestown Place, St. Margaret's Road, Charlestown, Co. Dublin.	307248 | An Bord Pleanála (pleanala.ie)

Application Ref (LA or ABP)	Grant of Approval date (decision date if not granted)	Development Description	Development Address	Link to application
ABP: TA29N.310077	Granted: 17/08/2021	260 no. apartments and associated site works.	Site at Belmayne P4. The corner of Churchwell Road and Churchwell Crescent, Belmayne, Dublin 13.	310077 | An Bord Pleanála (pleanala.ie)
Part 8 Development				
N/A				
EirGrid Projects /Electricity Development (Section 182A)				
EirGrid (not in planning system, at Step 4)	East Meath - North Dublin Grid Upgrade	The East Meath-North Dublin Grid Upgrade will add a high-capacity 400 kV (kilovolt) underground cable electricity connection from Woodland substation near Batterstown in County Meath to Belcamp substation near Clonshaugh in north Dublin		https://www.eirgridgroup.com/the-grid/projects/cp1021/the-project/
Other EirGrid projects	• Shellybanks to Belcamp 220kV cable • Finglas to Belcamp 220kV cable • Belcamp 220kV substation extension	Completed		
ABP-303687	08/08/2019 - Approve with Conditions	Provision of a double circuit 110kV underground transmission line between the Belcamp 220kV and 110kV substation and the Darndale 110kV substation covering a distance of approximately two kilometres.		303687 | An Bord Pleanála (pleanala.ie)
FW22A/0021	Granted: 12 Dec 2022	Site bounded by Harristown Lane (3151), St Margaret's Road (R122), and South Parallel Road (R108), Shanganhill Td, Finglas ED, Dublin Planning permission for a new solar photovoltaic solar farm at site bounded by Harristown Lane (L3151), St Margaret's Road (R122), and South Parallel Road (R108) in the townland of Shanganhill Td, Finglas ED, Co. Dublin. The development will consist of the installation of a ground mounted solar photovoltaic (PV) array with associated development and ancillary works including inverters, modules and transformers; site cabling; 2 no. substation building; a storage container on a concrete base; an internal access road and attendant surface water drainage; the formation of a new site		Planning Portal (agileapplications.ie)

Application Ref (LA or ABP)	Grant of Approval date (decision date if not granted)	Development Description	Development Address	Link to application
		entrance onto South Parallel Road (R108); security boundary fencing and landscaping; and a security controlled entry gate and lighting.		

2.3.10 Transboundary Effects

Certain environmental effects of a proposed development have the potential to cross state boundaries and have a 'transboundary effect'.

The need to consider transboundary impacts has been enshrined in the United Nations Economic Commission for Europe (UNECE) Convention on Environmental Impact Assessment in a Transboundary Context, adopted in 1991 (the Espoo Convention). The Espoo Convention has been ratified by the European Union, Ireland and the United Kingdom of Great Britain and Northern Ireland. Under the amended EIA Directive, the likely significant transboundary effects of a proposed Project must be described.

All activities associated with the construction, operation and decommissioning of the proposed development are wholly within Ireland and there is no potential for transboundary effects and as such are not considered further in this EIAR.

2.3.11 Interactions between Environmental Factors

Interactions between effects may arise from the reaction between effects of the proposed development on different aspects of the environment which may exacerbate the magnitude of those effects. These are presented in Chapter 19.

MetroLink 110kV Underground Cables

Volume 2: Environmental Impact Assessment Report
Chapter 3 - Need for the Proposed Development

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3 Need for the Development

3.1 Introduction

The MetroLink is a proposed high-capacity, high-frequency rail line running from Swords to Charlemont, linking various transportation hubs, such as Dublin Airport, Irish Rail, DART, Dublin Bus and Luas services, thus creating fully integrated public transport in the Greater Dublin Area. MetroLink will connect various key destinations including Ballymun, the Mater Hospital, the Rotunda Hospital, Dublin City University and Trinity College Dublin, with much of the 19-kilometre route will run underground.

The MetroLink 110kV power supply will be provided by the Electricity Supply Board (ESB) through the construction of new electricity circuits, which are the subject of this application.

3.2 Project Need

The proposed MetroLink creates integration and connectivity between other transport hubs, such as Dublin Airport, Iarnród Éireann and DART. The proposed development will provide a suitable and sufficient power source to facilitate the MetroLink project.

The proposed development, the subject of this EIAR, will see the construction of three new 110kV circuits. One of which, Forest Little – Belcamp will initially operate at 110 kV but is to be built to 220 kV standards for future operation. The proposed new circuits are:

- 110 kV Newbury to Ballystruan;
- 110 kV Ballystruan to Forest Little;
- 110 kV / 220 kV Forest Little to Belcamp (Option 1 and 2).

Metrolink 110kV Underground Cables

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4 Alternatives

4.1 Introduction

EIA legislation and the EPA Guidelines (2022) and best practice require that EIA Reports consider 'alternatives' for projects with regard to their environmental effects. Please refer to Appendix

4.2 Do Nothing

In the do-nothing scenario, there would be no change in terms of environmental effects. However, this is not a feasible alternative given that a power supply is required for MetroLink.

4.3 Route Selection Criteria

4.3.1 Criteria when Selecting a Cable Route

The process of project development has been an iterative process but was guided by the following design principles.

- Routes were selected within the public domain e.g. roadways, public parks etc. and avoid private property where possible. Route corridors are required to maintain required clearances from existing structures.
- Route corridors endeavoured to avoid unnecessary crossings of major roads, railways and water ways.
- The routes selected in order to minimise traffic disruption during construction where possible.
- The proposed route corridors attempted to minimise sudden changes in direction, both in horizontal and vertical.
- The proposed cable route corridors were required to provide suitable locations for joint chambers.

4.3.1.1 Constructability of the cable route corridor.

- The cable route corridors were selected to avoid lakes and water features, where possible.
- Cable routes were selected in order to minimise the overall length in order to reduce costs.
- The cable route corridors were selected to minimise conflict with future development.
- Minimum design clearances between existing underground high voltage cables and transmission gas pipelines must be maintained.
- The cable routes identified avoided areas of significant planting or forestry where possible..
- Environmental constraints including designated areas such as NHAs, pNHAs, SACs, SPAs and areas of archaeological importance were avoided wherever possible.
- Crossing points under SACs (Special Areas of Conservation) were avoided or minimised where no other viable alternative exists.
- Access for future maintenance was critical identifying the cable route corridor.

4.4 Constraints within the study area

The following is a desktop study overview of potential constraints within the study area, which were avoided in terms of route options in so far as was practical.

4.4.1 R132/Swords Rd

- A high-pressure gas main is located running north – south from just south of the Airport. Clarification of location and conditions around construction works in this area to be agreed with GNI
- DAA Aviation fuel line crosses the road to the north of the ALSAA complex
- There are 2no. existing 110 kV HV circuits located within this road, consideration will have to be given to cable ratings if installing other circuits in this area.
- The T50 runs along the southern end of this road and is believed to contained up to 18no. comms ducts.
- High traffic volumes and bus routes on this road
- This road crosses the main access road to Dublin Airport and may be subject to strict rules on working hours and limitations to lane & road closures
- The proposed GDD project will cross the road adjacent to Dardistown Cemetery;
- It is proposed to use existing ducts along the Swords Road, subject to testing.

4.4.2 Stockhole Lane

- The southern section of this road is heavily congested with underground services, including 2no. water mains (600mm & 100mm), foul sewer line, gas main, aviation fuel line, ESB, Eir & Virgin Media networks.
- Potential future crossings of the GDD and 220 kV Belcamp-Shellybanks circuit
- Trinity Care AnovoCare Nursing Home located towards the northern end will likely require 24hr access which should be considered when planning for future traffic management and construction works.
- Options for M1 crossing location and method to be clarified.
- Potential Statkraft North Irish Sea Array Project cable route to Belcamp;
- An area of Japanese Knotweed is noted on Stockhole Lane adjacent to the nursing home;
- Crossing of an underground stream is required on this route.

4.4.3 Baskin Lane & R107/Malahide Rd

- These areas are largely residential and likely to have multiple service connections for water, sewer & gas. Additional consideration should be given to sewer connections as they can be difficult to divert as they are dependent on invert levels.
- There are two schools located in Kinsealy, St Nicholas of Myra National School & Malahide/Portmarnock Educate Together NS, on the R107, consideration should be given to avoid construction works during the school calendar where possible. Indeed, this may well be a condition of any road opening licence required.
- The southern section of the R107 is heavily congested with services including multiple ESB and Eir ducts, Virgin Media, Aurora Fibre Optic, Water & Foul Sewer;
- Baskin Lane is constrained as is 5m wide. Lane closure will be required;
- Crossing of Cuckoo Stream required on Malahide Road;
- Mayne River Crossing
- Potential Statkraft North Irish Sea Array Project cable route to Belcamp

4.4.4 R139

- There are multiple existing services in this road including 600mm & 300mm water mains, aviation fuel line and 3no. existing HV circuits running along the western end of the R139 (2no. 110 kV & 1no. 220 kV)

- This is a highly trafficked route and may be subject to restrictions on working hours and potential lane closure;
- Cable route will cross the road where there is an aviation fuel line running.

4.4.5 Clonshaugh Business Park

- This area is extremely congested with existing services and detailed utility surveys in conjunction with slit trenching is recommended to determine if there is sufficient space within the road corridor, along potential cable routes, for the installation of the proposed circuit and joint bays
- Further investigation required for the existing ducts at M1 and M50 crossings;
- Entry into existing joint bay on Amazon Property at the M1 will need to be agreed.

4.4.6 R108/R122/L3132/Naul Road

- The R108 section to the south of the airport is very heavily congested with services including the T50, gas, water and existing 110 kV. It is likely large sections of this route are not suitable to be constructed within the existing roadway and will likely have to consider adjacent lands. Potential development of future pitch flood lighting at Starlights GAA and Na Fianna GAA grounds should also be taken into consideration as it may limit space for potential route options through private property.
- Cable route moved off road on the R108;
- The Finglas Dardistown 110 kV project & Belcamp Shellybanks 220 kV project will see the construction of a new 110 kV circuit and upgrade of the existing 110 kV to a 220 kV circuit along this route to the south of the airport.
- While this potential route is a considerably longer option it has a low number of existing underground utilities along the northern airport boundary section.

4.4.7 Dublin Airport

- Dublin Airport occupies a large portion of land within the study area, and as such are a key stakeholder on the project. Route options may be available within Airport lands and roadways and should be discussed with the DAA.
- Construction activities on or adjacent to airport lands are subject to agreement with the DAA and may be subject to additional restrictions, in particular where works are in close proximity to key access points, flight paths and emergency access roads.

4.4.8 Private Lands

It is likely that some cable routes will need to pass through private lands to avoid certain obstacles, each instance will be considered on a case by case basis and will be subject to agreement with the property owner. A full legal easement will be required on all 3rd party lands as well as the standard ESB Wayleave.

Temporary access to private lands may also be required to facilitate construction activities. These may require a working wayleave to be agreed with the relevant landowner.

4.5 Proposed Cabling Routes

The three new HV Cables routes proposed, are as follows:

- 110 kV Newbury – Ballystruan;
- 110 kV Ballystruan – Forest Little;
- 110 kV / 220 kV Forest Little – Belcamp;

ESBN prepared a Preferred HV Cable Route Selection Report (refer to Appendix K), a summary of this report is presented in the following sections for each of the three underground cable routes. For each cable route options were developed. These were then assessed against the criteria presented in Table 4.1. Each option was evaluated with regard to each criteria and scored between 1 and 7, with 1 being the most constrained and 7 being the least constrained. These scores were then added together and compared against each route options.

Table 4.1: HV Cable Route Selection Matrix Example

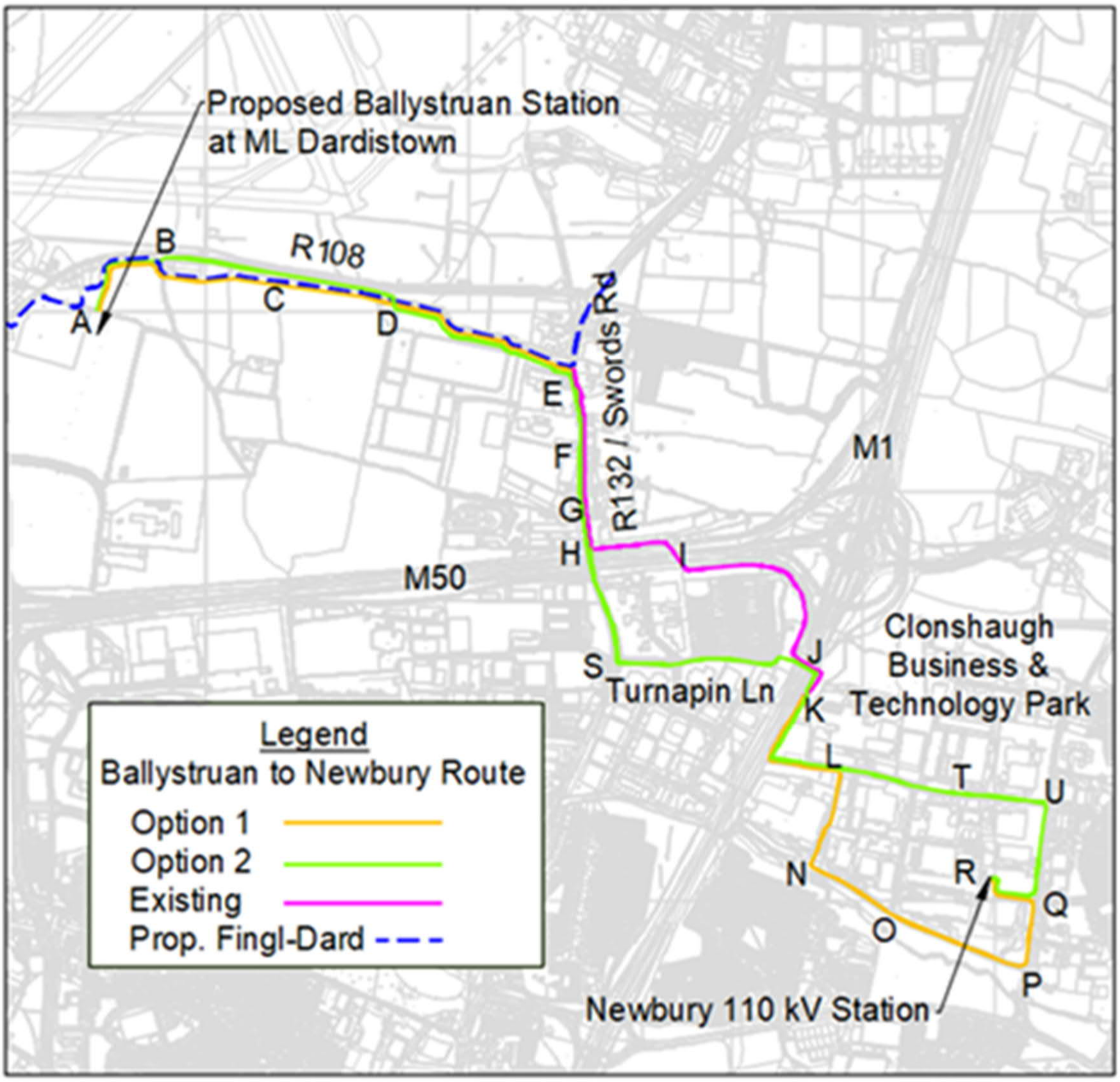
	HV Cable Route Options		
Evaluation Criteria	**Option 1**	**Option 2**	**Option 3**
HV Cable Route Availability	1	2	3
HV Cable Route Constructability	1	2	3
HV Cable Route Length	1	2	3
HV Cable Maint. Wayleave/Easement Requirements	1	2	3
Other HV Cables in Road Reserve	1	2	3
Utility Services in road Reserve	1	2	3
Impact on Local Residents	1	2	3
Impact on Traffic Flow	1	2	3
Horizontal Directional Drilling for Road Crossings	1	2	3
Number of Water Crossings	1	2	3
Flooding History/Potential	1	2	3
Contaminated Land	1	2	3
Cultural Heritage Sites	1	2	3
Biodiversity (Flora & Fauna)	1	2	3
Landscaping Requirements	1	2	3
Sum of Ranking	**15**	**30**	**45**
Overall Ranking - Least Constrained Route Option	**3**	**2**	**1**

7	6	5	4	3	2	1
Least Constrained						Most Constrained

4.5.1 110 kV Newbury – Ballystruan

The Newbury to Ballystruan route will consist of a single 110 kV circuit. The route will run from the existing Newbury Station in Clonshaugh Business Park to the proposed Ballystruan Substation at Metrolink Dardistown.

Figure 4.1: Newbury to Ballystruan – Options



Source: ESB PE424-F1159-R00-004-000 HV Cables – Route Selection Report

4.5.1.1 Newbury - Ballystruan Route Option 1

Route option 1 is approx. 5.1 km long as shown in Figure 4.1. Starting at the proposed Ballystruan Station, the route initially runs through private property south of the R108 adjacent to the GAA pitches and parallel to the proposed Finglas - Dardistown 110 kV circuit (construction 2022), before entering agricultural land and then into the Quickpark carpark. The route joins the public road at the R132/Swords Road before heading south in the existing spare ducts* parallel to the existing Dardistown Kilmore 110 kV circuit. At the M50 it turns east, running along the north side of the motorway before crossing to the southside adjacent to the Turnapin Green/Turnapin Cottages area and then follows the slip road alignment to the south along the M1 before crossing the motorway into Clonshaugh Business Park. The route runs south, adjacent to the M1 before turning east and then south again adjacent to Kilmore Station, turning east along the road just north of the Santry River. At the main entrance road to Clonshaugh Business Park the circuit turns north before entering Newbury Station to the west. *The existing ducts between locations E-K are subject to clarification on site regarding their size, number and quality before their use can be approved for this project. Clarification is also required on section K-L about the possible reuse of the existing Kilmore - Baskin ducts.

Environmental Considerations

An open drain/stream crossing is identified at location A, there is no current bridge in this location. Confirmation of the planned construction works in the area as part of Metrolink Dardistown should be confirmed before a possible crossing method can be assessed. This route crosses the Mayne River at Turnapin Bridge on the Swords Rd and a stream at location E approx. 150 m to the north. If the existing ducts are found to be suitable for the new circuit, there should be no disruptive works required at this bridge. Option 1 is approximately 5.5km west of Baldoyle Bay SAC and Baldoyle Bay SPA and approximately 5.5km west of North Dublin Bay SAC and North Bull Island SPA.

4.5.1.2 Newbury – Ballystruan Route Option 2

Route option 2 is approx. 4.8 km long as shown in Figure 4.1. Starting at the proposed Ballystruan Station, the route runs to north from the station, turning east across the northern boundary of Starlights GAA and entering the verge running to the south of the R108. The circuit then enters the north west corner of Quickpark carpark and runs parallel to the proposed Finglas - Dardistown 110 kV circuit. At the R132/Swords Rd, the circuit turns south crossing the M50 via the existing underpass road. At Turnapin Lane the circuit turns east and crosses the M50 via a HDD following the Finglas– Kilmore 110 kV circuit into Clonshaugh Business Park, the route continues to the east to the main Business Park access road, turning south and eventually entering Newbury Station from the east.

Environmental Considerations

This route crosses the Mayne River at Turnapin Bridge on the Swords Rd and a stream at location E approx. 150 m to the north. The existing Dardistown - Kilmore 110 kV circuit passes parallel to this proposed route so it is assumed there is sufficient depth in the road to accommodate the new circuit, detailed site investigation will be required for clarification. An open drain/stream crossing is identified at location A, there is no current bridge in this location and confirmation of planned construction works in the area as part of Metrolink Dardistown should be confirmed before a possible crossing method can be assessed.

<u>Clay Berm Removal</u>

This route proposal requires the removal of the large clay berm to the south of the Old Airport Road / R108. A suitable alternative reinstatement should be agreed with the landowner as it will not be possible to replace the berm once the circuit is installed. Further investigations are required to determine if there would be any negative environmental impact to the flora and fauna or watercourses in this area by the removal of this berm.

Option 1 is approximately 5.5km west of Baldoyle Bay SAC and Baldoyle Bay SPA and approximately 5.5km west of North Dublin Bay SAC and North Bull Island SPA.

4.5.1.3 110 kV Newbury – Ballystraun Preferred Option

Following assessment, Table 4.2 HV Cable Route Selection Matrix - Newbury to Ballystruan, the preferred HV cable route is initial Option 1, which is approx. 5.1 km long as illustrated in Figure 4.2.

Table 4.2: HV Cable Route Selection Matrix - Newbury to Ballystruan

	HV Cable Route Options		
Evaluation Criteria	**Option 1**	**Option 2**	**Option 3**
HV Cable Route Availability	4	4	-
HV Cable Route Constructability	5	3	-
HV Cable Route Length	4	4	-
HV Cable Maint. Wayleave/Easement Requirements	5	3	-
Other HV Cables in Road Reserve	5	3	-
Utility Services in road Reserve	5	3	-
Impact on Local Residents	5	3	-
Impact on Traffic Flow	5	3	-
Horizontal Directional Drilling for Road Crossings	7	2	-
Number of Water Crossings	4	4	-
Flooding History/Potential	4	4	-
Contaminated Land	4	4	-
Cultural Heritage Sites	4	4	-
Biodiversity (Flora & Fauna)	4	4	-
Landscaping Requirements	4	4	-
Sum of Ranking	**69**	**52**	**N/A**
Overall Ranking - Least Constrained Route Option	**1**	**2**	

7	6	5	4	3	2	1
Least Constrained					Most Constrained	

The preferred Option 1 - Newbury – Ballystruan HV cable route is generally along existing roads. Site investigation is yet to be undertaken to confirm the route to confirm the presence of contamination and there is potentially some horizontal directional drilling across M50. Flooding is not anticipated along the route and there are unlikely to be significant effects to cultural heritage sites. Biodiversity (flora and fauna) and/or landscaping requirements are unlikely to have significant effects.

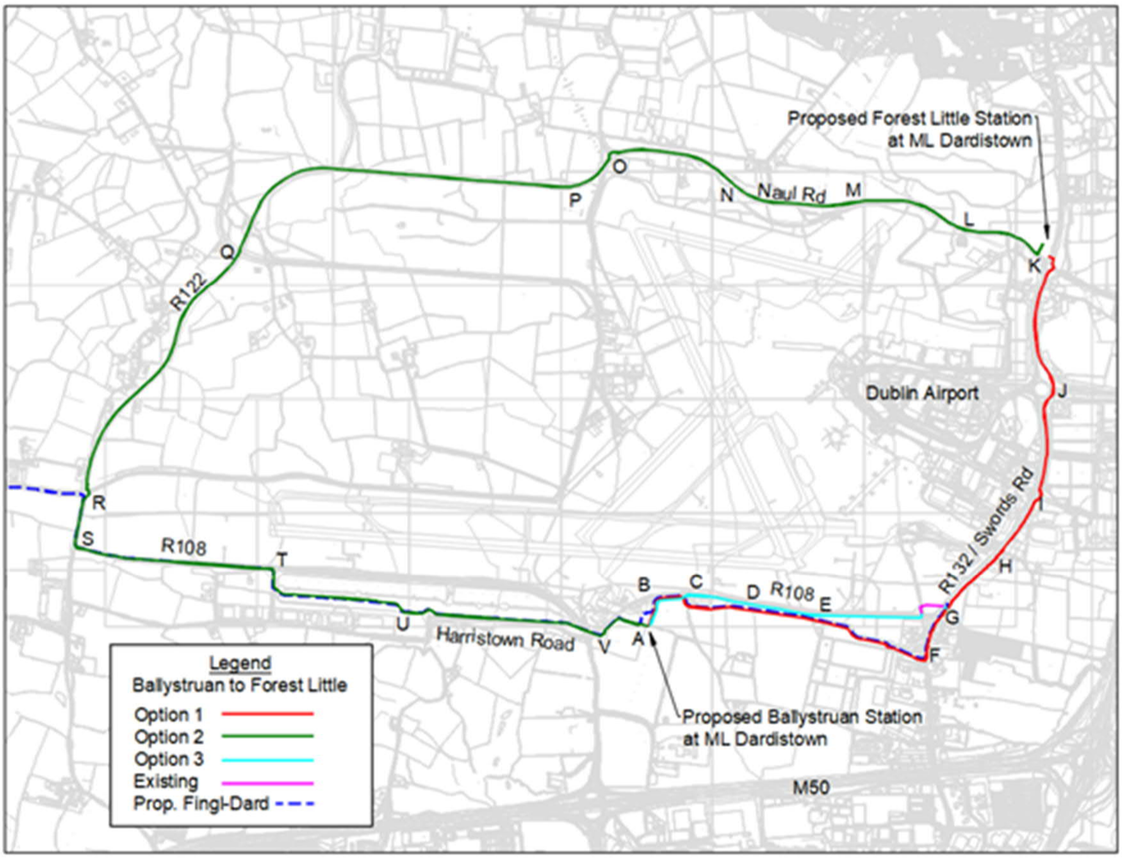
Figure 4.2: The Proposed Metrolink Development Newbury to Ballystruan

Source: Mott MacDonald

4.5.2 110 kV Ballystruan – Forest Little

The Ballystruan to Forest Little cable route will consist of a single 110 kV circuit. The route will run from the proposed Ballystruan Substation at Metrolink Dardistown to the proposed Forest Little Substation at Metrolink North Portal.

Figure 4.3: Ballystruan to Forest Little



Source: ESB PE424-F1159-R00-004-000 HV Cables – Route Selection Report

4.5.2.1 Ballystruan – Forest Little Option 1

Route option 1 is approx. 4 km long as shown in Figure 4.3. Starting at the proposed Ballystruan Station, the route initially runs through private property south of the R108 adjacent to the GAA pitches and parallel to the proposed Finglas - Dardistown 110 kV circuit (construction 2022), before entering agricultural land and then into the Quickpark carpark. The route joins the public road at the R132/Swords Road turning north and continuing past the airport roundabout and entering the proposed Forest Little Substation at the Cloghran roundabout.

Environmental Considerations

The proposed route crosses the Cuckoo Stream at location H. There is an existing circuit crossing above the Cuckoo Stream within the roadway and site investigations should be utilised to confirm that the new cable route can also cross within the road carriageway. An open drain/stream crossing is identified at location A, there is no current bridge in this location and confirmation of planned construction works in the area as part of Metrolink Dardistown should be confirmed before a possible crossing method can be assessed. The northern section of the route is approximately 4km from Malahide Estuary SAC and Broadmeadow/Swords Estuary SPA.

4.5.2.2 Ballystruan – Forest Little Option 2

Route option 2 is approx. 9.8 km long as shown in Figure 4.3. Starting at the proposed Ballystruan Station the circuit heads east through Ballymun Kickhams GAA onto the Harristown Road before crossing into the DAA Blue Carpark and through to the R108, continuing east before turning north onto the R122. The circuit follows the R122 north and eventually east around the perimeter of the airport. It continues east to join up with the Naul Road and into the proposed Forest Little Station adjacent the Cloghran roundabout.

Environmental Considerations

There are approx. 8 watercourse crossings located to the north west of the airport between locations Q-P. Confirmation of culvert depths and size is required prior to detailed design of the route in this area. The Naul Road passes through the Zone of Notification of a Ringfort adjacent to the Halting Site at location L. The construction of a cable route within this area requires advance notification to the National Monuments Service. An archaeological assessment will be required prior to any excavation works in this area. The easterly section of the route is approximately 4km from Malahide Estuary SAC and Broadmeadow/Swords Estuary SPA.

4.5.2.3 Ballystruan – Forest Little Option 3 (BS-FL_3)

Route option 3 is approx. 3.9 km long as shown in Figure 4.3. Section A-E is as described in A-D of option 2 and section G-K as described in option 1. E-G would run parallel to the R108 and adjacent to Irish Water GDD alignment, before turning north to connect to the existing ducts which would allow the route to bypass the Old Airport Road/Swords Road junction. This potential route option is dependent on suitable space being available adjacent to the Irish Water GDD wayleave, the proposed finished reinstatement plan in this area, agreement with the relevant landowners and further site investigations. Consultation should take place with Irish Water to clarify their proposed plans for this area, and with the relevant landowners. The existing ducts at the Old Airport Road/Swords Rd will become available following the decommissioning of the existing Finglas - Dardistown 110 kV circuit, planned for 2022.

Environmental Considerations

The eastern section of the Option 3 is approximately 6km to the south of Malahide Estuary SAC and Broadmeadow/Swords Estuary SPA and approximately 6km to the north of South Dublin Bay and River Tolka Estuary SPA.

4.5.2.4 110 kV Ballystruan to Forest Little Preferred Option

Following assessment, Table 4.3 HV Cable Route Selection Matrix - 110 kV Ballystruan to Forest Little, the preferred HV cable route, initial option 2 is approximately 9.8 km long as shown in Figure 4.4.

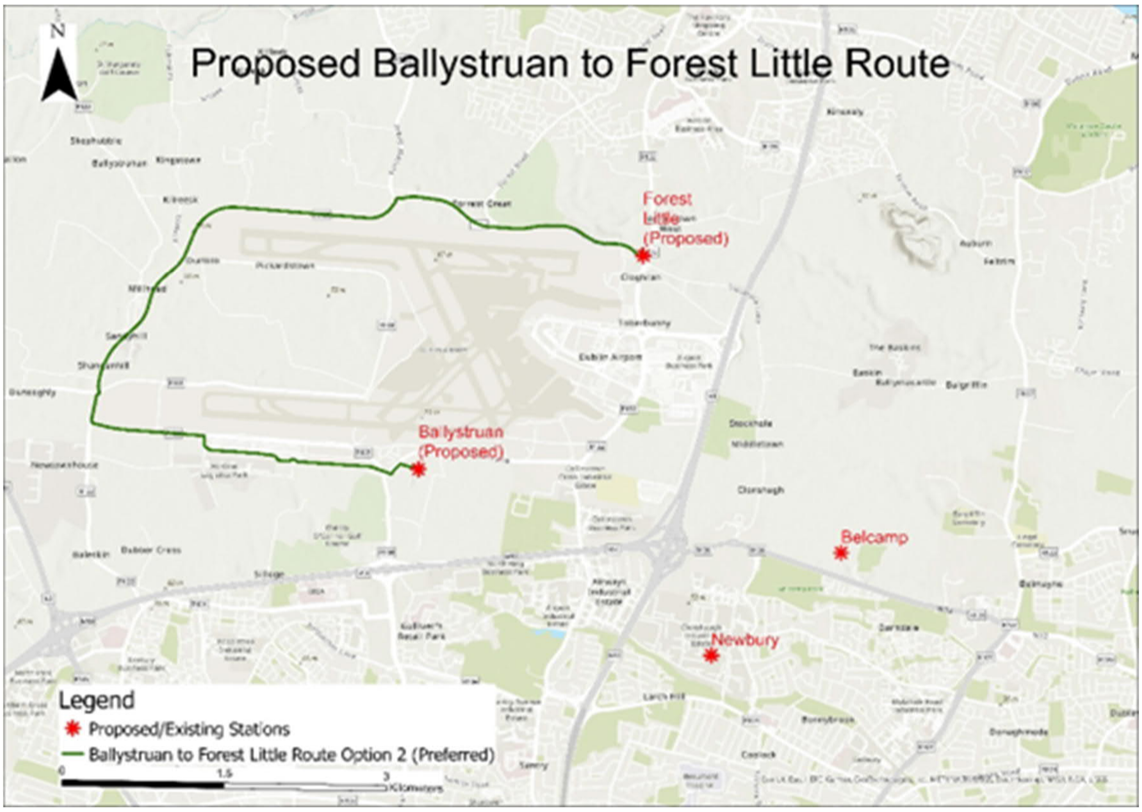
Table 4.3: HV Cable Route Selection Matrix - 110 kV Ballystruan to Forest Little

	HV Cable Route Options		
Evaluation Criteria	**Option 1**	**Option 2**	**Option 3**
HV Cable Route Availability	4	4	4
HV Cable Route Constructability	5	4	5
HV Cable Route Length	4	2	4
HV Cable Maint. Wayleave/Easement Requirements	3	4	3
Other HV Cables in Road Reserve	3	4	3
Utility Services in road Reserve	2	5	1
Impact on Local Residents	3	5	3
Impact on Traffic Flow	2	6	2
Horizontal Directional Drilling for Road Crossings	2	6	2
Number of Water Crossings	4	4	4
Flooding History/Potential	4	4	4
Contaminated Land	4	4	4
Cultural Heritage Sites	4	4	4
Biodiversity (Flora & Fauna)	4	4	4
Landscaping Requirements	4	4	4
Sum of Ranking	**52**	**64**	**51**
Overall Ranking - Least Constrained Route Option	**2**	**1**	**3**

7	6	5	4	3	2	1
Least Constrained						Most Constrained

The preferred Option 2 will potentially require more construction effort due, due to the length in comparison to the other options. It is unlikely to require any horizontal directional drilling. It is considered that there will be water crossings required along the cable routes. It is thought that there will not be any flooding along the route and pending site investigation to confirm the presence of any contaminated land. Cultural heritage sites, biodiversity and landscaping requirements are not anticipated to present any significant effects.

Figure 4.4: 110 kV Ballystruan to Forest Little

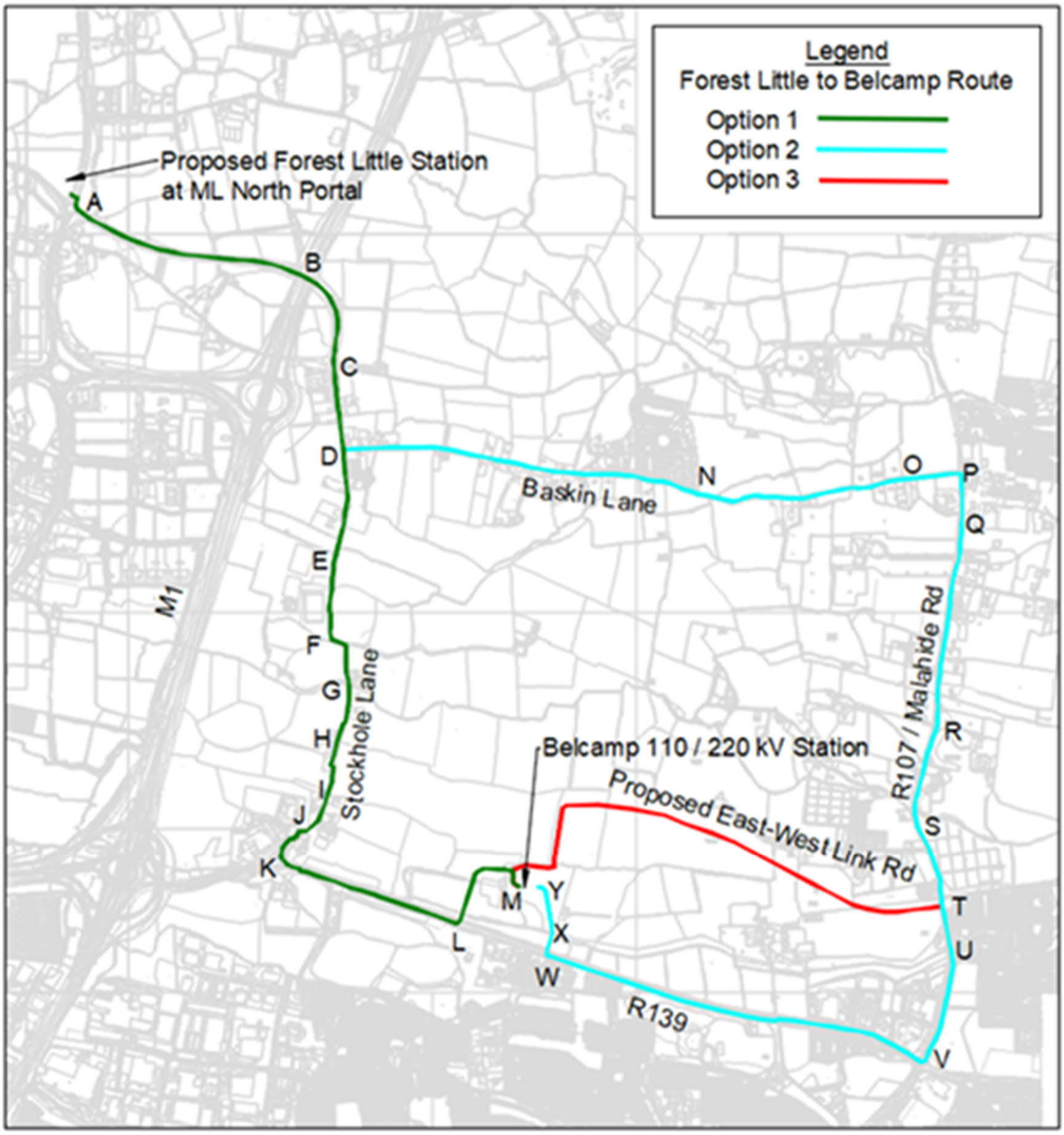


Source: Mott MacDonald

4.5.3 110 kV Forest Little – Belcamp

The Forest Little to Belcamp route will consist of the construction of two trenching and ducting installations. The first installation shall be constructed to 220 kV standards with a 110 kV cable circuit installed within the ducts. This cable circuit will be initially operated at 110 kV but will be designed and constructed to 220 kV for future operation. The second trenching and ducting installation shall be constructed to 110 kV standards and will initially be kept empty as a spare 110 kV ducting installation.

Figure 4.5: Forest Little to Belcamp – Options



Source: ESB PE424-F1159-R00-004-000 HV Cables – Route Selection Report

4.5.3.1 Forest Little – Belcamp Route initial Option 1

Route option 1 is approx. 4.7 km long as shown in Figure 4.5. Starting at the proposed Forest Little Station at Metrolink North Portal, the route crosses the R132 at the Cloghran Roundabout onto Stockhole Lane heading eastwards, crosses the M1 and continues along Stockhole Lane to the south before turning east onto the R139 and entering into Belcamp Station.

Environmental Considerations

There were six watercourse crossings identified along this route, 2no. stream/drains at location C, a drain/stream at location E, the Cuckoo Stream crossing location at G, the Mayne River crossing at Location L and the stream/drain close to location M. These crossings should be assessed on a case-by-case basis and where possible the circuit(s) should remain in the bridge or roadway above the culvert to avoid crossing through the stream itself.

Signage indicating Japanese Knotweed was found in the verge at location C, while it is not anticipated that the route will be constructed in the verge in this area, care should be taken to avoid disturbance of these plants during construction activities. Option 1 is approximately 4km west of Baldoyle Bay SAC and Baldoyle Bay SPA.

4.5.3.2 Forest Little – Belcamp Route initial Option 2

Route option 2 is approx. 8.5 km long as shown in Figure 4.5. Starting at the proposed Forest Little Station at Metrolink North Portal, the route crosses the R132 at the Cloghran Roundabout onto Stockhole Lane heading eastwards, crosses the M1 and continues along Stockhole before turning east onto Baskin Lane. At Kinsealy the route turns south onto the R107/Malahide Rd towards the Clarehall Junction before turning west on the R139 and then enters Belcamp Station.

Environmental Considerations

There were 6no. watercourse crossings identified along this route, 2no. stream/drains at location C, a drain/stream at location N, the Cuckoo Stream crossing at location S and 2no. Mayne River crossings at Location U & X. These crossings should be assessed on a case-by-case basis and where possible the circuit should remain in the bridge or roadway above the culvert to avoid crossing through the stream itself.

Signage indicating Japanese Knotweed was found in the verge at location C, while it is not anticipated that the route will be constructed in the verge in this area, care should be taken to avoid disturbance of these plants during construction activities. Option 2 is approximately 2km west of Baldoyle Bay SAC and Baldoyle Bay SPA.

4.5.3.3 Forest Little – Belcamp Route initial Option 3

Route option 3 when combined with section Option 1 & 2 is approx. 8 km long as shown in Figure 4.5. The northern route sections are as described in Option 1 & 2, and from location T, the route turns west along the proposed East-West Link Road, shown in Figure 4.3. A timeline for potential construction of this road is unknown and discussion should be undertaken with Fingal County Council for any plans to progress this project. This alternative route would bypass the very busy Clarehall junction and remove two crossings of the Mayne River. Installation of the circuit(s) should be aligned with the construction of the proposed road which would greatly reduce any impact on traffic and existing utilities.

Environmental Considerations

This alternative route would bypass the very busy Clarehall junction and remove two crossings of the Mayne River. Installation of the circuit(s) should be aligned with the construction of the proposed road which would greatly reduce any impact on traffic and existing utilities. Option 3 is approximately 2km west of Baldoyle Bay SAC and Baldoyle Bay SPA.

4.5.3.4 110 kV Forest Little – Belcamp;

Following assessment, Table 4.4 HV Cable Route Selection Matrix - Forest Little to Belcamp, the preferred HV cable route (which is a combination of initial options 1 and 2) is approx. 8.5 km long as illustrated in Figure 4.6.

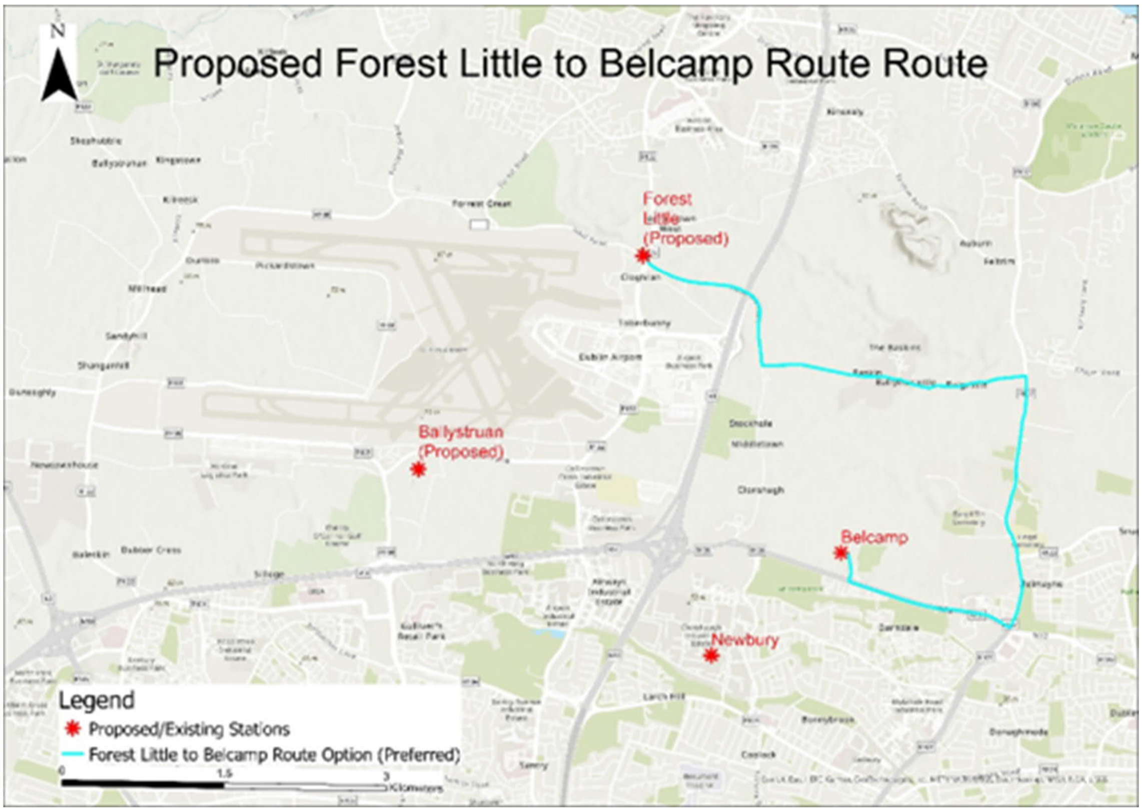
Table 4.4: HV Cable Route Selection Matrix - Forest Little to Belcamp

	HV Cable Route Options		
Evaluation Criteria	**Initial Option 1**	**Initial Option 2**	**Initial Option 3**
HV Cable Route Availability	4	4	n/a
HV Cable Route Constructability	2	6	-
HV Cable Route Length	4	2	-
HV Cable Maint. Wayleave/Easement Requirements	4	4	-
Other HV Cables in Road Reserve	2	4	-
Utility Services in road Reserve	1	5	-
Impact on Local Residents	4	4	-
Impact on Traffic Flow	4	4	-
Horizontal Directional Drilling for Road Crossings	4	4	-
Number of Water Crossings	4	4	-
Flooding History/Potential	4	4	-
Contaminated Land	4	4	-
Cultural Heritage Sites	4	3	-
Biodiversity (Flora & Fauna)	4	4	-
Landscaping Requirements	4	4	-
Sum of Ranking	**53**	**60**	**N/A**
Overall Ranking - Least Constrained Route Option	**2**	**1**	**N/A**

7	6	5	4	3	2	1
Least Constrained						Most Constrained

Detailed design will confirm any horizontal directional drilling requirements at road junctions. No flooding is anticipated along the preferred route. Site investigation is still to be undertaken for the preferred option which will identify if there is contaminated ground present. It is anticipated that Cultural heritage sites should not be affected by the HV cabling works in the Malahide Road/R107, or its verge. From initial investigation, biodiversity/landscaping requirements, significant effects are not likely.

Figure 4.6: The Proposed Metrolink Development Forest Little to Belcamp – Option 1



Source: Mott MacDonald

4.6 Further Design Development

During the outline design period, optimisation of the proposed routes took place. Some variations were incorporated within the design and are as follows:

- Forest Little – Belcamp – Option 1
  - The route was moved off road at the M1 crossing. The crossing of the M1 will be via HDD which will minimise disruption effects.
  - Twin ducting for 110kV and 220kV cable is now included along the route, which will future-proof the route.
- Forest Little – Belcamp – Option 2
  - An alternative route for this option is proposed to continue down Stockhole Lane (instead of easterly turn along Baskin Lane), including HDD under the bridge and tracking eastwardly along open ground to Belcamp. The main reason for this alternative option is the possibility of installing the cable ducting within new road infrastructure associated with the Greater Dublin Drainage Scheme (GDDS) which is currently being considered by ABP. If the GDDS were to be approved, ESB will pursue this option which would potentially become available subject to timing, etc.
  - An off Road section has been added at Baskin Park to facilitate a joint bay before re-joining the road.
  - The route continues due south along Stockhole Lane/Clonshaugh Road, before going off road at the AUL Sports Complex with a HDD crossing under the Cuckoo Stream and an additional HDD crossing under Clonshaugh Road, due to roadway constraints.

  - The ducting along this route will contain ducting for 110kV and 220kV cables and will be sized accordingly.
- Newbury – Ballystruan
  - The route was adjusted to follow the road along Clonshaugh Business & Technology Park which minimises the works required.
  - Crossing M1 through existing ducting adjacent to Turnapin Lane which minimises the works required.
  - Crossing of M50 at existing joint bay which minimises the works required.
- Ballystruan – Forest Little
  - R108 moved off road to the south within agricultural lands due to limited clearance in the road corridor. This route was subsequently moved to travel further south along the R122 before turning in an easterly direction along Harristown Lane, avoiding the DAA lands and the proposed Solar Farm, before travelling to the north of Horizons Logistics Park.
  - Moved from Airport long stay car park to lands adjacent to avoid disruption.

These changes have been incorporated into the design and form the routes of the proposed underground cables, as illustrated in Figure 4.7 to Figure 4.10 and included with in EIAR Volume 2 – Appendices - Appendix B.

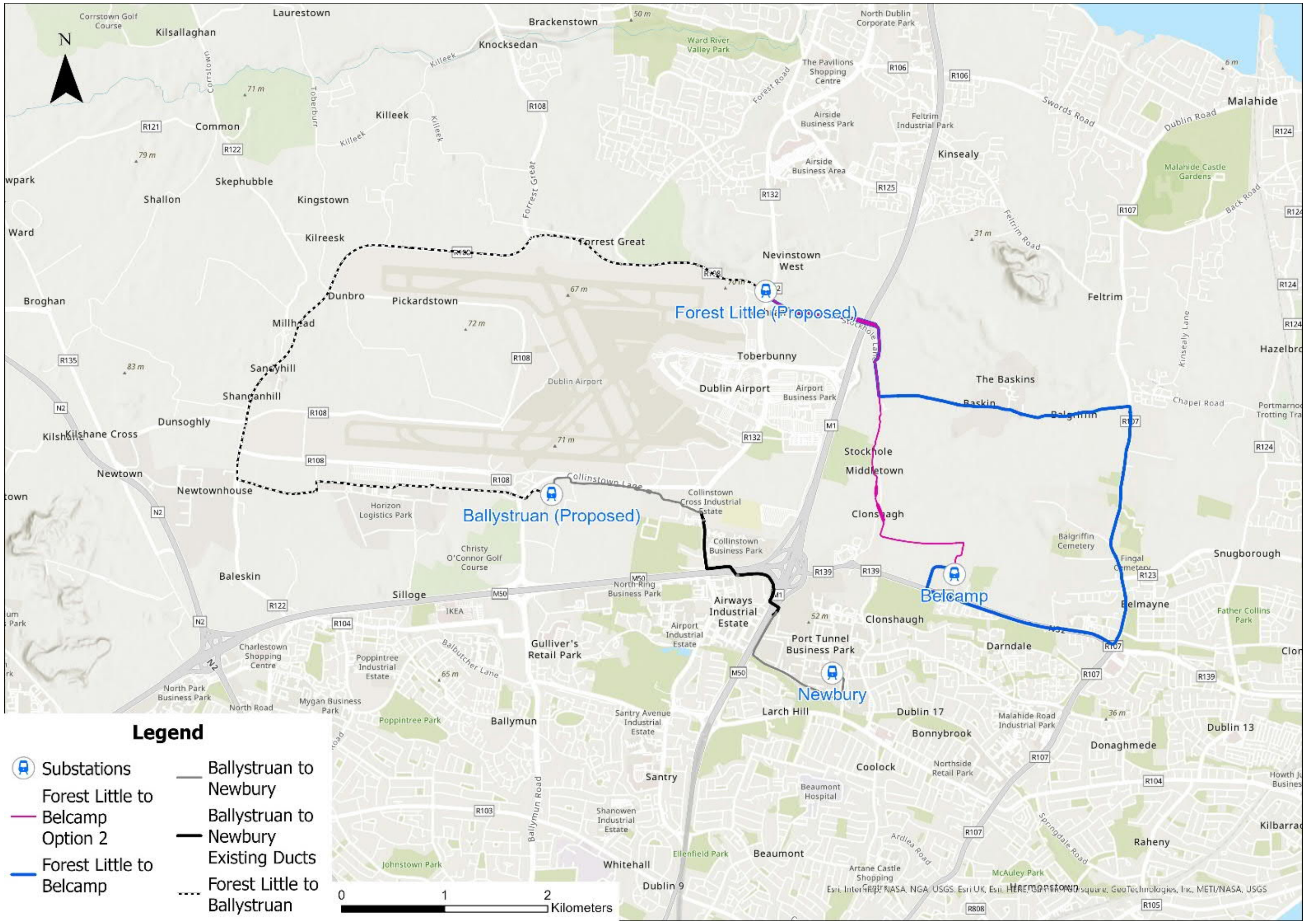
4.7 Conclusions

Following the HV cable route selection process, the three HV cable routes emerged as the preferred routes for the MetroLink project are:

- Newbury – Ballystruan (Initial Option 1);
- Ballystruan – Forest Little (Initial Option 2); and
- Forest Little – Belcamp (Initial Option 2).

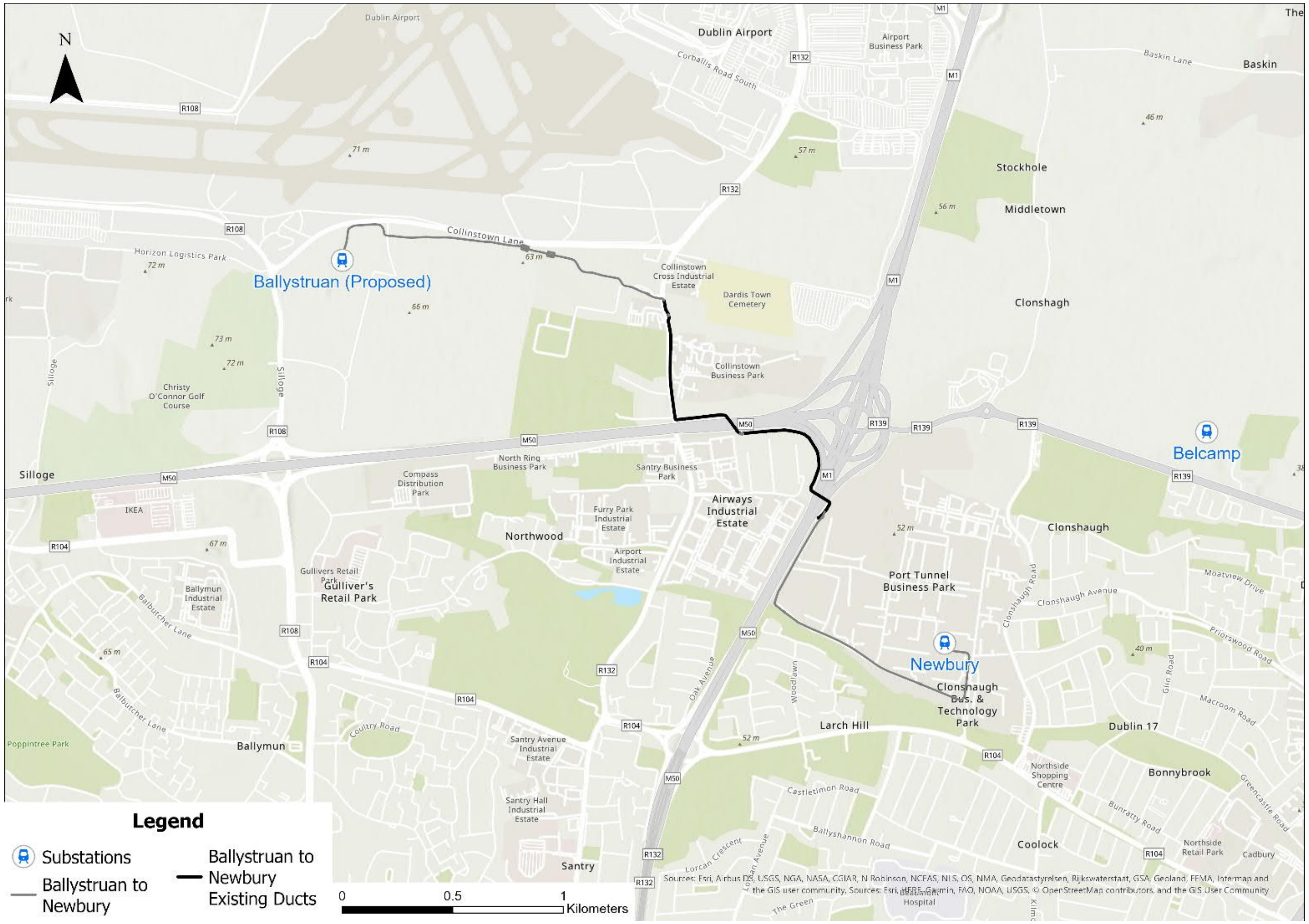
During design optimisation, an alternative option for the Forest Little – Belcamp route was designed which continues down Stockhole lane (avoiding Baskin lane) and then eastwards to Belcamp. This is a shorter route (ca. 4.5km) than the original option above and is partly on greenfield lands with HDD under the Cuckoo Stream (Mayne_10) and Clonshaugh Road. Both the initial Option 2 during route selection (now current Option 1) above and this alternative route, Option 2, are assessed within this EIAR.

Figure 4.7: MetroLink Underground Cabling - Overview



Source: Mott MacDonald

Figure 4.8: MetroLink Underground Cabling – Newbury to Ballystruan

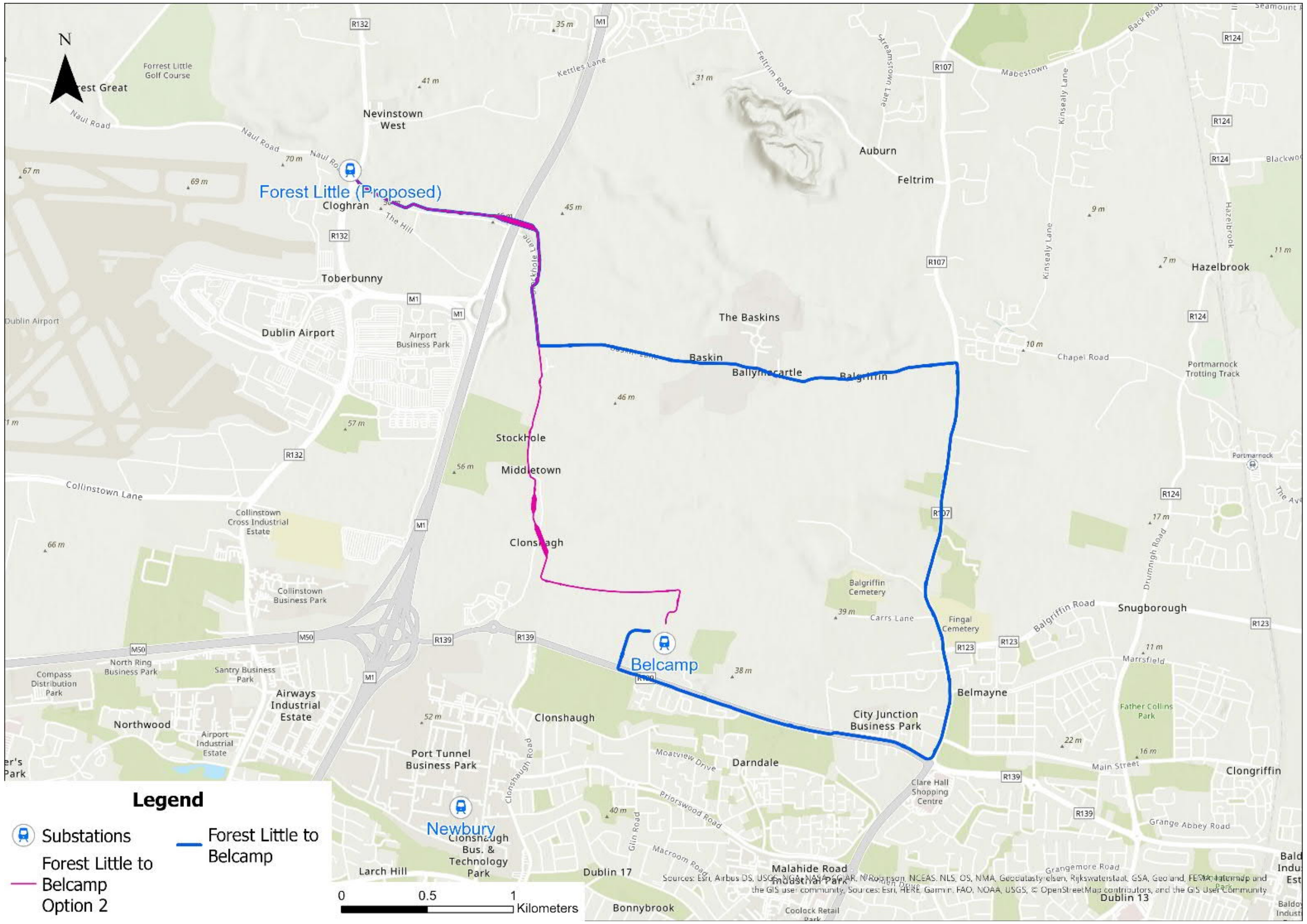


Source: Mott MacDonald

Figure 4.9: MetroLink Underground Cabling – Ballystruan to Forest Little

Source: Mott MacDonald

Figure 4.10: MetroLink Underground Cabling – Forest Little to Belcamp – Option 1 & Option 2



Source: Mott MacDonald

MetroLink 110kV Underground Cables

Volume 2: Environmental Impact Assessment Report
Chapter 5 - Stakeholder Engagement

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5 Stakeholder Engagement

5.1 EIAR Consultation

Consultation has been carried out in preparation for this EIAR to inform consultees of the Proposed Development and provide them with the opportunity to offer feedback. Both statutory and non-statutory bodies, were involved in this process. A summary of the main issues is presented below.

5.1.1 Stakeholders

Table 5.1 below identifies statutory and non-statutory bodies who were consulted via email on 26 May 2022.

The stakeholder consultation letter (an example of which is contained within Appendix C) consisted of information on the underground cable routes, the characteristics of the site and the surrounding area and a request for information to be considered as part of the EIA process.

Table 5.1: Record of Statutory Consultees Stakeholder Consultation

No.	Stakeholder Name	Date of response	Summary of Key Issues
1	An Taisce - The National Trust for Ireland	26 May 2022	Acknowledgement email received
2	Birdwatch Ireland	26 May 2022	Acknowledgement email received
3	Dublin City Council	27 May 2022 16 December 2022	The project team met (Teams online) with Dublin City Council on 16th November 2022 to discuss the potential traffic issues that may arise with the Proposed Development. The following was discussed: • ESB major cabling renewal 2024 onwards which may affect proposed Metrolink cable routing. • Irish Water works also planned in the area. • There is an abnormal loads route on R139 to R107 Mallahide Road (11pm to 7am) - no open trenches would be permitted during this period and a 3m road width would not be adequate width for abnormal loads, at least 4.2m of road width would be required. Concerns raised include: • R139 is currently very busy and with planned new developments it is likely to get busier - DCC preference for not using R139. • Some concern that cables on major road arteries will disrupt traffic movements and detail will require consideration closer to the time - this will be made clear in framework CTMP. • Temporary reinstatement is not ideal - permanent reinstatement required as soon as is practical - this will be made clear in the CTMP. DCC would like to have a rough indication of how long impact would be on DCC roads – This matter will be reviewed (Mott MacDonald and ESB) and an update was provided to DCC on 21 November, 2023.
4	Fingal County Council	26 May 2022 10 November 2022 12 December 2022	Acknowledgement 'The Planning & Strategic Infrastructure Department acknowledges receipt of your email. It will be sent to the relevant Planning Section for their attention. If your message is not Planning & Strategic Infrastructure Department related, you are advised that it will be referred to the relevant Fingal County Council Department for their attention." The project team met (Teams online) with Fingal County Council on 10 November 2022 and 12 December 2022 to discuss the

No.	Stakeholder Name	Date of response	Summary of Key Issues
			potential traffic issues that may arise with the Proposed Development. The following is a summary of the discussions held: • The purpose of this consultation meeting was to draw on and take due account of the knowledge (and any related concerns) of Fingal County Council as managers for sections of the local road network proposed to be utilised by the Metrolink project. • The EIAR Roads and Traffic Chapter considers: • Traffic generated by the project during the construction phase; including construction personnel, plant and material movements, though it is envisaged that these will not be significant. • Effects of construction worksites and spatial impact upon on the receiving environment, looking at potential delay to drivers (due to lane closures etc.), any potential detriment to road safety and community effects which might arise - particularly considering if specific consideration is needed for to sensitive locations such as schools. • The reduction in road space and potential impacts on bus services and the movement of people and goods, even if assessed to be minor, is a key focus and accordingly Mott MacDonald will be developing a Construction Traffic Management Plan (CTMP) • The Forrest Little to Belcamp (Options 1 & 2) cable route options were discussed and Mott MacDonald shared a General Arrangement plan and indicative cross sections showing joint bay and cabling construction assumptions; these were working draft versions. • The Forrest Little to Belcamp cable route is programmed to be constructed between Q3 2027 and Q1 2029. • Stockhole Lane • It is understood that there are no major projects planned on Stockhole Lane • If Stockhole Lane is required to be closed this is unlikely to be a significant issue. Stockhole Lane was closed for c. 6 weeks in 2022 and there were no reported issues. • R107 / Malahide Road • New school proposed close to the Malahide Rd / Baskin Lane junction. Proposal includes parking and new playing fields. • New school proposal includes new/improved footway on Malahide Road. • Proposals also include new roads and cycle routes through adjacent fields. • New school is programmed to open in 2024. • Significant (housing) development proposed in Balgriffin area which would likely use existing R107 Malahide Road / R123 Balgriffin Road signalised junction. (See Planning Portal or Local Plan for further information). • Dublin City Council (DCC) control the traffic signals at R107 Malahide Road / R123 Balgrifin Road junction. • R107 Malahide Road / R123 Balgrifin Road junction already at/close to capacity in peak hours and any planned works would likely require to be undertaken off-peak/at night or could significantly affect the junction's operation.
5	Commission for Railway Regulation		No response received at the time writing of this EIAR
6	Commission for Regulation of Utilities		No response received at the time writing of this EIAR
7	Dublin Airport Authority	27 May 2022	Response received from David Shannon (DAA) 29 July 2022.

No.	Stakeholder Name	Date of response	Summary of Key Issues
		8 December 2022 25 January 2023	Meetings (Teams online 8 December 2022, 25 January 2023) were held between the EIAR Team and Dublin Airport Authority to discuss potential traffic issues associated with the proposed development. The following was discussed: • Road ownership • Consultation required post planning with respect to crainage requirements for the installation of Joint Bays and HDD etc. when working in close proximity to the airport. • Night working may be a requirement for works within the DAA Flight Path zone. • DAA stated that a 3m buffer is required between the airport perimeter fence encroachment zone and any works. • Working hours restrictions will be imposed for working near airport lights. • DAA suggested that the proposed route south of the airport currently shown within the new solar farm be rerouted to the southern end of this land and onto Harristown Lane to avoid any conflict with the MV cable / solar farm structures. DAA stated that the roads along the Forrest Little to Ballystruan route are currently in the ownership of DAA and that any road opening license requests would need to be made directly with the DAA and the reinstatement required would be to the DAA's specification.
8	Department of Agriculture, Food and the Marine		No response received at the time writing of this EIAR
9	Development Applications Unit	29 May 2022	Acknowledgement email & would contact if any issues identified. No response received at the time writing of this EIAR
10	Department of Communications, Climate Action & Environment		No response received at the time writing of this EIAR
11	Department of Justice and Equality	26 May 2022	Acknowledgement email received
12	Department of Transport	26 May 2022	Acknowledgement email received, forwarded to IDA
13	Department of the Enterprise, Trade and Employment	26 May 2022	Acknowledgement email received, forwarded to IDA
14	Department of Housing, Planning, and Local Government	26 May 2022	Acknowledgement email received.
15	Department of Rural and Community Development		No response received at the time writing of this EIAR
16	Fáilte Ireland	14 May 2022	Copy of Fáilte Ireland's Guidelines for the Treatment of Tourism in an EIA, issued to MM 14/06/22
17	Gas Networks Ireland	26 May 2022	Acknowledgement email received
18	Geological Survey of Ireland		No response received at the time writing of this EIAR
19	The Heritage Council		No response received at the time writing of this EIAR
20	Health and Safety Authority	26 May 2022	Please be advised we can only provide technical advice on Proposed Developments if the application is referred by a Local Authority or An Bord Pleanála.
21	Regional Health Forum, Dublin Mid Leinster		No response received
22	Inland Fisheries Ireland	23 June 2022	Following email consultation with IFI, a meeting (Teams online) was undertaken to discuss proposed development, on the 23 June, 2022. Attended by IFI, ESB and Mott MacDonald, the cabling route was discussed along with the proposed water crossings and the construction methodology involved in the crossings. At the time of discussion, ESB expressed their preference to cross rivers along existing road/bridges but as the design develops, open trench/HDD would be looked at dependent on the location of the crossing and results from any site

No.	Stakeholder Name	Date of response	Summary of Key Issues
			investigations. ESB/IFI will agree method statements and designs for any water crossings. Barberstown stream (in Ward system) limited fisheries value, the Ward system supports a small population of Atlantic salmon in its lower reaches and a resident Brown trout population. The Sluice system supports a resident population of Brown trout. The Cuckoo and Mayne Rivers are a non-salmonid system, however IFI stated at the meeting (23/06/22) that they are currently assessing the viability of a salmonid reintroduction programme. The Mayne system does contain populations of European Eel and other fish species. The Santry River is non-salmonid in the upper reaches because of the presence of a number of impassable features to fish located toward the lower end of the system. Brown Trout have been recorded in the lower reaches. It should be highlighted that Dublin City Council has secured funding to develop an ambitious river restoration and greenway project along a 4,500m stretch of the River. The specific details of any works directly affecting watercourses or riparian habitats in the area, in particular plans for stream crossings must first be submitted to IFI for assessment. Further contact will be made post application by ESBN.
23	Irish Aviation Authority	26 May 2022	Acknowledgement email received
24	Irish Water	27 January 2023	A meeting was held on the 27 January 2022 between ESB and Irish Water in relation to the Greater Dublin Drainage (GDD), project, where the MetroLink and GDD route were discussed, along with the depth of the excavations required. Continued consultation between the teams on the development of both projects was agreed.
25	Office of Public Works	26 May 2022	Acknowledgement email received
26	Eastern Midlands Regional Assembly	26 May 2022	Acknowledgement email received
27	Teagasc		No response received at the time writing of this EIAR
28	An Comhairle Ealaion (The Arts Council)	26 May 2022	Acknowledgement email received
29	Birdwatch Ireland	26 May 2022	Acknowledgement email received

5.1.1.1 Landowner Consultation

ESBN have undertaken landowner consultation and will continue to liaise with landowners directly affected by the proposed works.

MetroLink 110kV Underground Cables

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Chapter 6 - Description of the Proposed Development

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6 Description of the Proposed Development

6.1 The Project

The MetroLink project (the Project) is a proposed high-capacity, high-frequency, modern and efficient metro railway between Estuary Station and the Park and Ride Facility, north of Swords via Dublin Airport to Charlemont Station which lies south of Dublin City Centre. The proposed Project will be approximately 18.8km in length. The Railway Order (RO) application for MetroLink was submitted to An Bord Pleanála on 30 September 2022, case reference: NA29N.314724[1]. The National Roads Authority (operating as Transport Infrastructure Ireland) made the application under Section 37 of the Transport (Railway Infrastructure) Act 2021, (as amended and substituted).

The RO application for the MetroLink project included the following principal elements:

- Tunnels
- Cut Sections
- Tunnel Portals
- Stations
- Intervention shaft
- Intervention tunnels
- Park and Ride facility
- Broadmeadow and Ward River Viaduct
- Proposed Grid Connections
- Dardistown Depot
- Operations Control Centre
- M50 Viaduct

The RO application has assessed the proposed grid connections and substations as part of the RO EIAR and this Section 182A EIAR assesses the proposed grid connections cumulatively with the main MetroLink rail project.

6.2 The Proposed Development

The proposed development comprises electricity transmission infrastructure to facilitate the MetroLink project and consists of the following principal elements:

- A 110 kV underground cable (UGC) between Newbury and Ballystruan substations, approximately 5km in length passing through the townlands of Ballymun, Coultry, Ballystruan, Turnapin, Great Dardistown, Turnapin Little, Clonshaugh (E.D. Coolock), Santry (E.D. Coolock) and Shrubs.
- A 110 kV (UGC between Ballystruan and Forest Little substations, approximately 10km in length passing through the townlands of Cloghran, Forest Little, Forest Great, Pickardstown, Barberstown, Kingstown, Millhead, Sandyhill, Saint Margaret's, Shanganhill and Ballymun.

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[1] Home - MetroLinkWeb (metrolinkro.ie)

- A 110 kV / 220 kV UGC between Forest Little and Belcamp substations
  - Option 1 is approximately 9km in length, via Baskin Lane/Malahide Road, through the townlands of Cloughran, Stockhole, Baskin, Ballymacartle, Kinsaley, Bohammer, Saintdoolaghs, Burgage, Balgriffin, Clonshaugh (E.D. Coolock) and Belcamp, and
  - Option 2 via Stockhole Lane approximately 4km in length, through the townlands of Cloghran, Stockhole, Clonshaugh (E.D. Coolock) and Belcamp.
- Excavation of cable trenches:
  - for standard 110kV circuits of up to 0.6m wide and 1.4m deep;
  - for standard double circuit trefoil formation 110kV/220kV circuit 1.5m wide and 1.4m depth;
  - for double circuit 110kV/220kV where utility congestion exists, a flat formation up to 2.9m wide is proposed.
  - Utilisation of existing ducts where available.
- Associated joint bays and crossings (using existing bridge decks, open cut trenching or trenchless method i.e. Horizontal Directional Drilling, HDD).

The proposed development also includes ancillary works such as, clearance of laydown areas, use of temporary compounds, the exact location of these is to be determined by the appointed Construction Contractor at the time of development. The proposed cable routes will incorporate the following:

- Joint bays (to accommodate both 220kV and 110kV cables), communication chambers and link boxes
- Temporary passing bays
- Water and utility crossings, including Horizontal Directional Drilling (HDD)
- Temporary construction compounds including associated site works and ancillary staff facilities and parking.
- All associated and ancillary above and below ground site development works, including works comprising or relating to permanent and temporary construction and roadworks and excavation including HDD and vegetation clearance.

The UGC will be installed within a trench and the majority of the proposed UGC will be installed within the existing public road network. Off-road (cross-country) routes are proposed at particular locations when on-road solutions have been investigated and are not considered feasible.

The UGC will be installed in either a trefoil or a flat formation when crossing existing services. For the avoidance of doubt, the assessments included in this EIAR and in the NIS are based on a flat formation which has a wider trench width. The widths assessed includes for either trefoil for 110kV UGC is ca. 0.6m to 1.5m wide and for trefoil/flat formation 110kV/220kV UGCs and is ca. 1.5m to 2.9m wide. However, the standard is a trefoil formation.

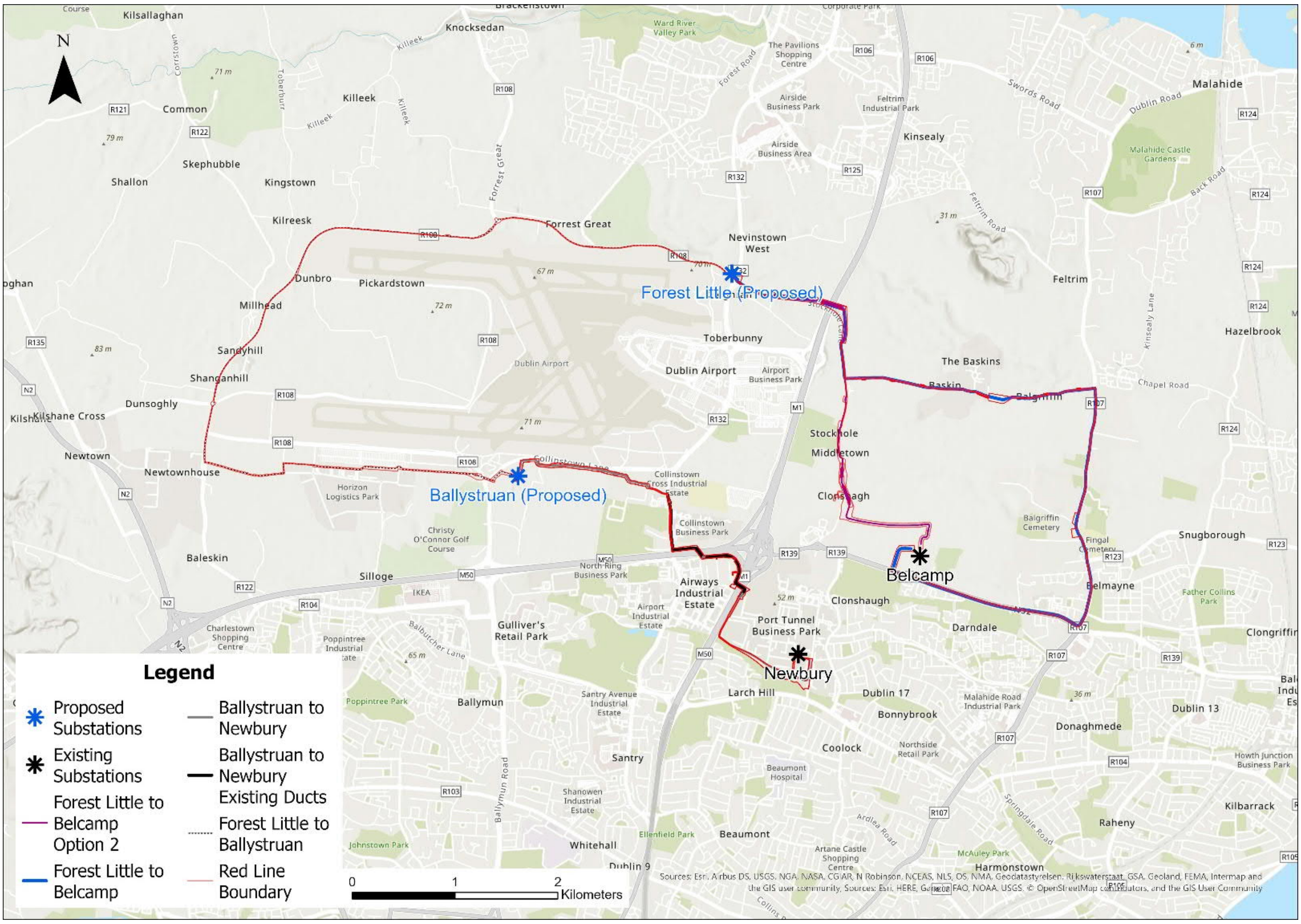
Figure 6.1 presents an overview of the Proposed Development.

The proposed UGC between the proposed substation at Ballystruan and the existing Newbury substation is presented in Figure 6.2.

The proposed UGC between the proposed substation at Ballystruan and the proposed substation at Forest Little is presented in Figure 6.3.

Figure 6.4 presents the two options for the proposed UGC between the proposed substation at Forest Little and the existing substation at Belcamp.

Figure 6.1: The Proposed Development

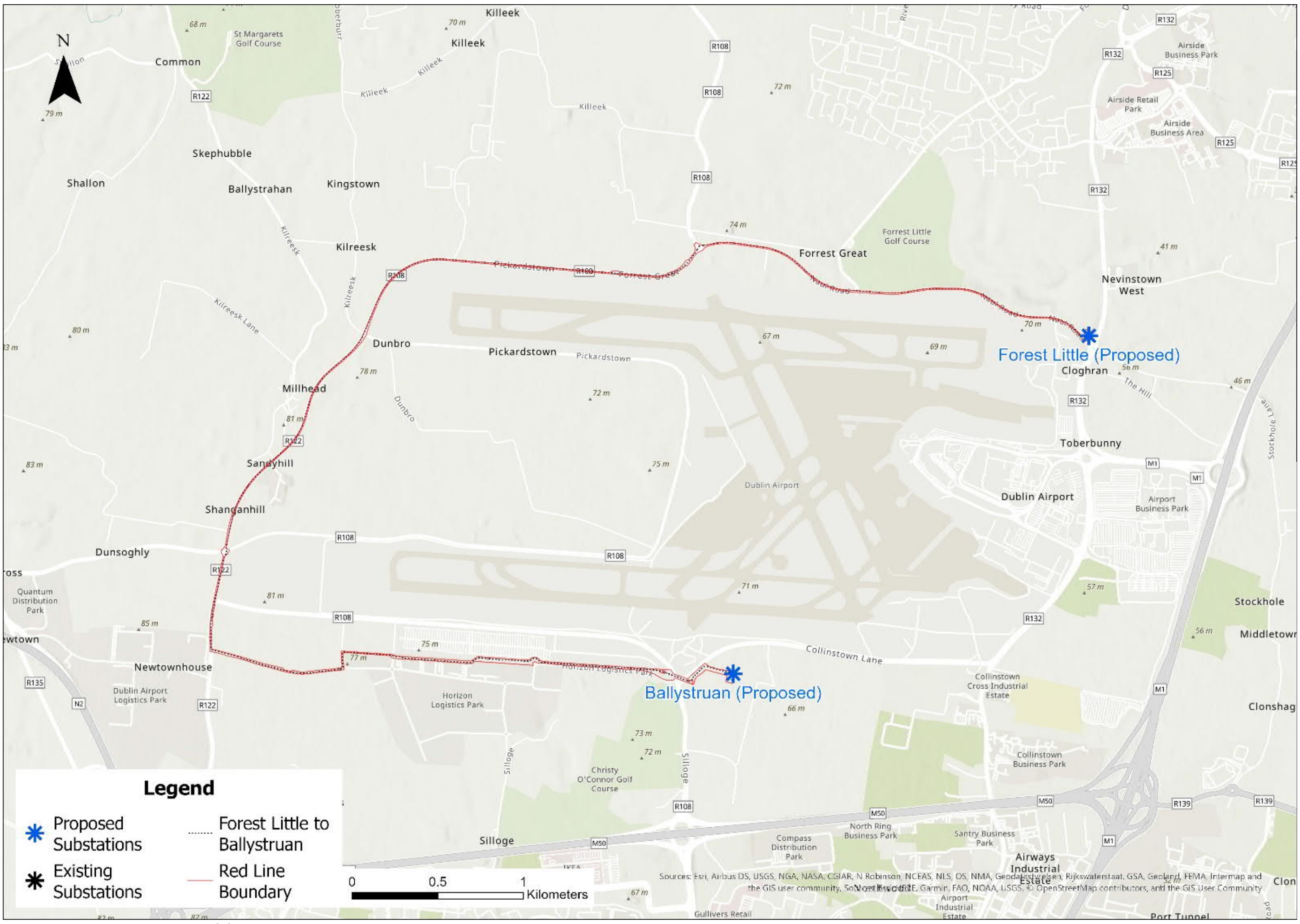


Source: Mott MacDonald

Figure 6.2: Newbury to Ballystruan 110kV UCG Route

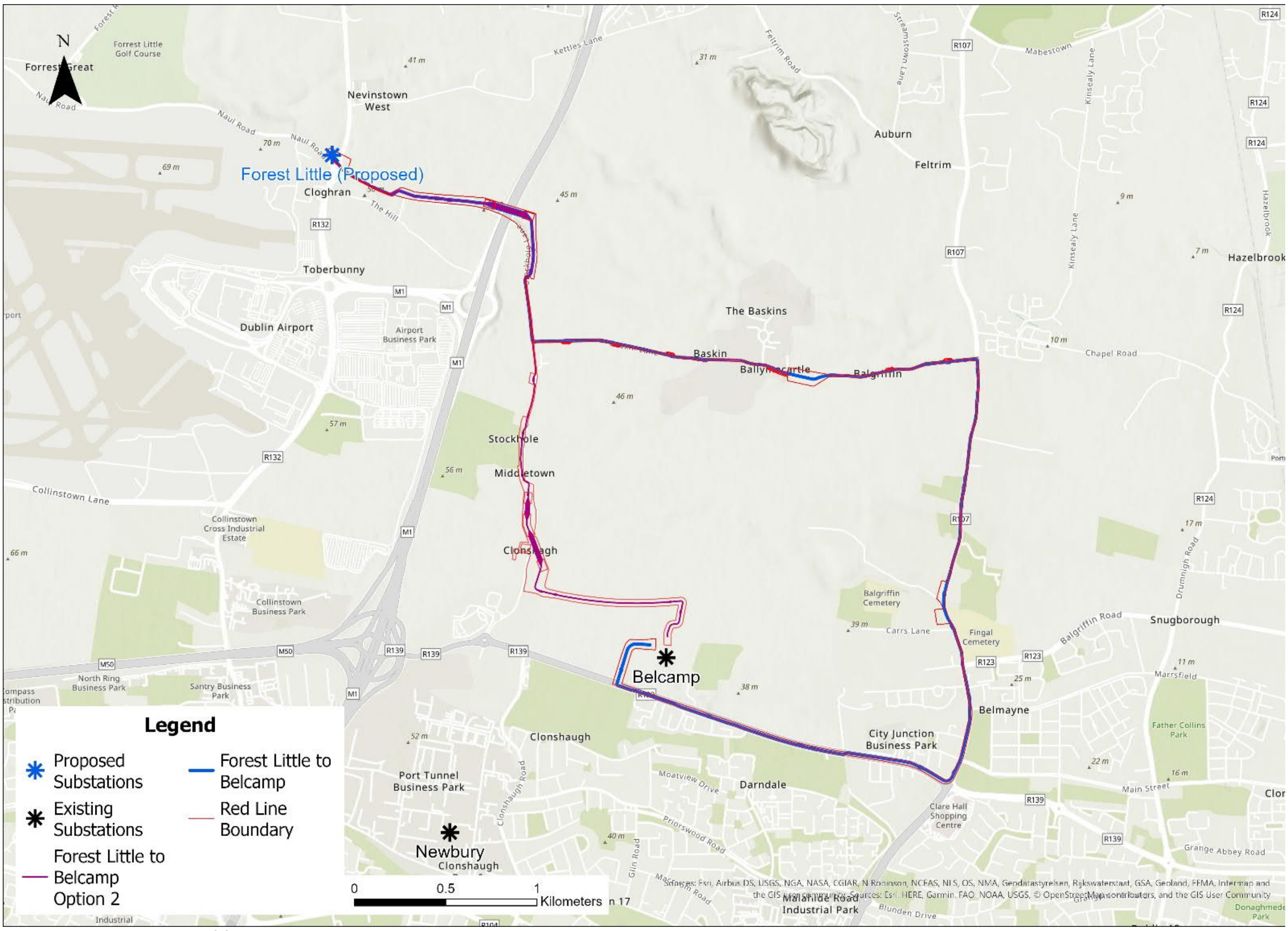
Source: Mott MacDonald

Figure 6.3: Ballystruan to Forest Little 110kV UCG Route



Source: Mott MacDonald

Figure 6.4: Forest Little to Belcamp UCG Route



Source: Mott MacDonald

6.3 Overview of the Receiving Environment

The proposed development is located primarily within the existing road network within the functional areas of Dublin City Council and Fingal County Council. Summaries of the proposed routes are provided in the sections below.

6.3.1 Proposed Newbury to Ballystruan 110kV UGC Route

The proposed Newbury to Ballystruan 110kV UGC route initially runs through private property south of the Old Airport Road, through the north perimeter of two GAA pitches, before entering and area of agricultural land, and the DAA Quickpark carpark, parallel to the Old Airport Road/Collinstown Lane.

The cable route subsequently joins the R132/Swords Road before heading south using existing ducting where viable. At the M50 motorway the cable route turns east, running along the north side of the motorway before crossing to the southside adjacent to the Turnapin Green/Turnapin Cottages area. The cable route then follows the slip road alignment to the south along the M1 motorway before crossing the motorway into the Clonshaugh Business and Technology Park.

The route then runs south, adjacent to the M1 motorway before turning east along the road ca. 20m-50m north of the Santry River at Clonshaugh Business and Technology Park. At the main entrance road to Clonshaugh Business and Technology Park the circuit turns north, before entering Newbury 110 kV substation to the west.

6.3.2 Proposed Ballystruan to Forest Little 110kV UGC Route

The Proposed Ballystruan to Forest Little 110kV UGC route heads west from Ballystruan substation through Ballymun Kickhams GAA grounds onto the Harristown Road, between the DAA Blue Carpark and the Harristown Bus Station.

Running to the north of Horizons Logistics Park before joining and continuing along Harristown Lane before turning north onto the R122. The UGC route follows the R122 north and then turns in an easterly direction around the perimeter of the airport, at Pickardstown on Barberstown Road. It continues east to join up with the Naul Road and into the proposed Forest Little substation adjacent to Cloghran roundabout.

6.3.3 Proposed Forest Little to Belcamp 110kV/220kV UGC Route

6.3.3.1 Option 1

Starting at the proposed Forest Little substation, Option 1 crosses the R132 at the Cloghran roundabout onto Cloghran, travelling off road and crossing the M1 by trenchless method. The UGC route continues adjacent to Stockhole Lane, prior to re-joining Stockhole Lane. Option 1 then turns east onto Baskin Lane. At Kinsealy the route turns south onto the R107/Malahide Rd towards the Clarehall junction before turning west on the R139 and entering the existing 220kV Belcamp Station.

6.3.3.2 Option 2

Starting at the proposed Forest Little substation, Option 1 crosses the R132 at the Cloghran roundabout onto Cloghran, travelling off road and crossing the M1 by trenchless method. The UGC route continues adjacent to Stockhole Lane, prior to re-joining Stockhole Lane. Option 2 continues due south along Stockhole Lane and Clonshaugh Road, before going off road just after Baskin Park. A HDD crossing under the Cuckoo Stream and under Clonshaugh Road is proposed, prior to turning in an easterly direction along agricultural lands prior to turning south on the approach to the existing 220kV Belcamp Station.

6.4 Description of the Construction Phase (Underground Cable)

The following sections describe the proposed construction phase activities associated with the installation of the new UGC.

Following the consenting of the proposed development, should this be the case by ABP, there will be a process of pre-construction detailed design and micro-siting of the grid infrastructure. This will occur within the parameters and assessments of the Approved development; any micro-siting which extends outside such parameters, for example outside the red line application area, will be subject to post-consent modification in accordance with the provisions of statutory legislation, as required. Throughout the design and assessment process, all reasonable and practically achievable measures have been taken to minimise and avoid impacts.

6.4.1 Trenching and Ducting

The standard trench dimensions for a 110kV cable (Figure 6.5) are approximately 0.6m wide x 1.35m deep. These dimensions are based on a standard arrangement within the public roadway (assessments are based on a width of 0.6m to 1.5m to allow for standard trefoil formation. This will be the predominant type of trenching required as the majority of the routes are within public roadways.

The trench dimension are 1.5m wide and 1.4m depth for standard double circuit trefoil formation (Figure 6.6). For standard 110kV/220kV circuit and where utility congestion exists, a flat formation 110kV/220kV up to 2.9m wide is required (Figure 6.7). Existing ducts will be used where available. For off-road routes, additional space may be required for route alignment to avoid underground objects such as tree roots or other obstructions that cannot be removed.

Following excavation of the trench, bedding material, Cement Bound Granular Material (CBGM) will then be laid, the ducts put in place, protection strips laid on top and the trench will be backfilled. Following duct installation, the road above the trench will be reinstated to the standard required by the relevant authority at that location, in this case Fingal County Council, Dublin City Council and Dublin Airport Authority.

The duct installation will progress sequentially starting at one joint bay and moving towards the next joint bay along the route. The construction area will move in tandem with the progress of the duct installation, with only the relevant portion of the section cordoned off while under construction.

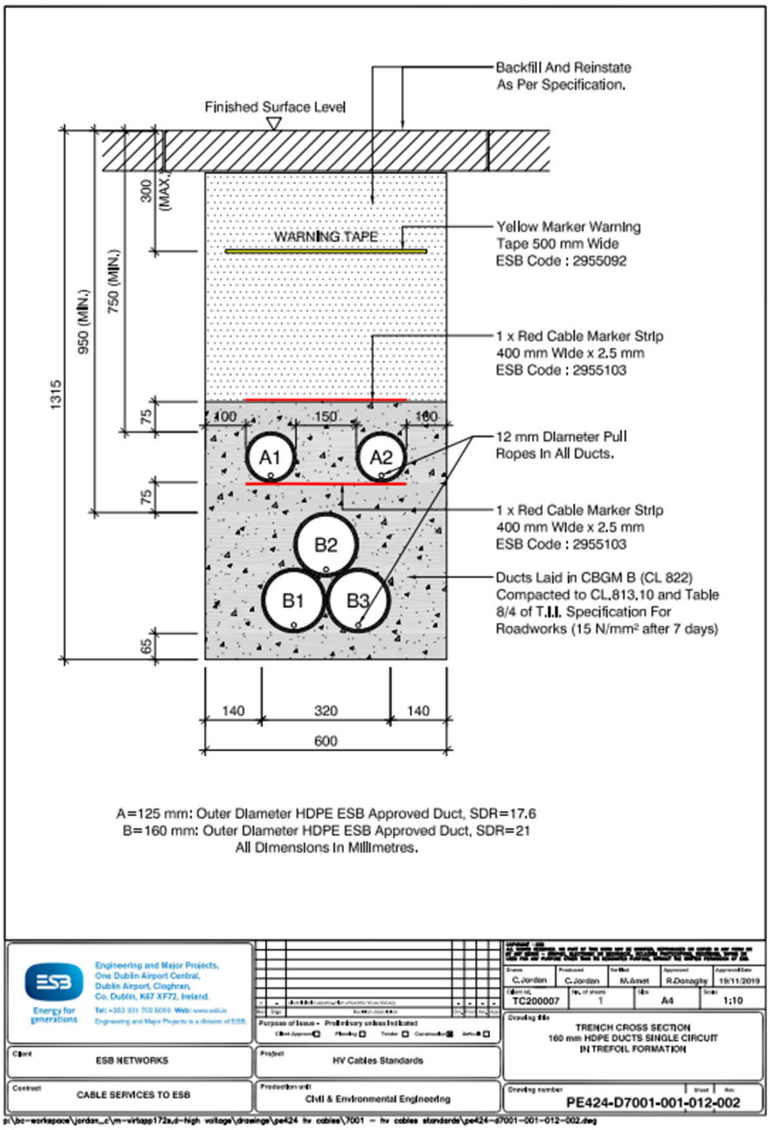
Excavation where utilities are congested will require numerous crossings and parallel runs of trenching and ducting with existing utilities. This will also require agreement on the method of crossing the utilities prior to excavation and may require supervision by a member of the utility provider. Hand digging and use of smaller excavators may also be required. Traffic management will be required for on-road construction.

For off-road or cross-country sections, a temporary working strip of approximately 30m in width is proposed. While the cable trench is approximately 0.6 to 1.5m (110kV to 110/220kV) in width, the approximately 30m working strip is required for the following reasons;

- To facilitate the storage of topsoil which must be removed from;
  - The footprint of the temporary construction access track (typically up to 5m in width).
  - The footprint of the cable trench.
  - A buffer strip between the temporary access track and the trench (for safety).
  - Subsoil storage area.
  - Materials storage areas.
- To facilitate the laying of the temporary construction access track alongside the cable trench to allow for the movement of construction equipment and materials along the section of the route on the farmland.
- To facilitate the excavation of the cable trench and the installation of the cable ducting.
- To facilitate the storage of distinct layers of subsoils excavated from the cable trench in segregated piles for later reinstatement to the original soil profile.

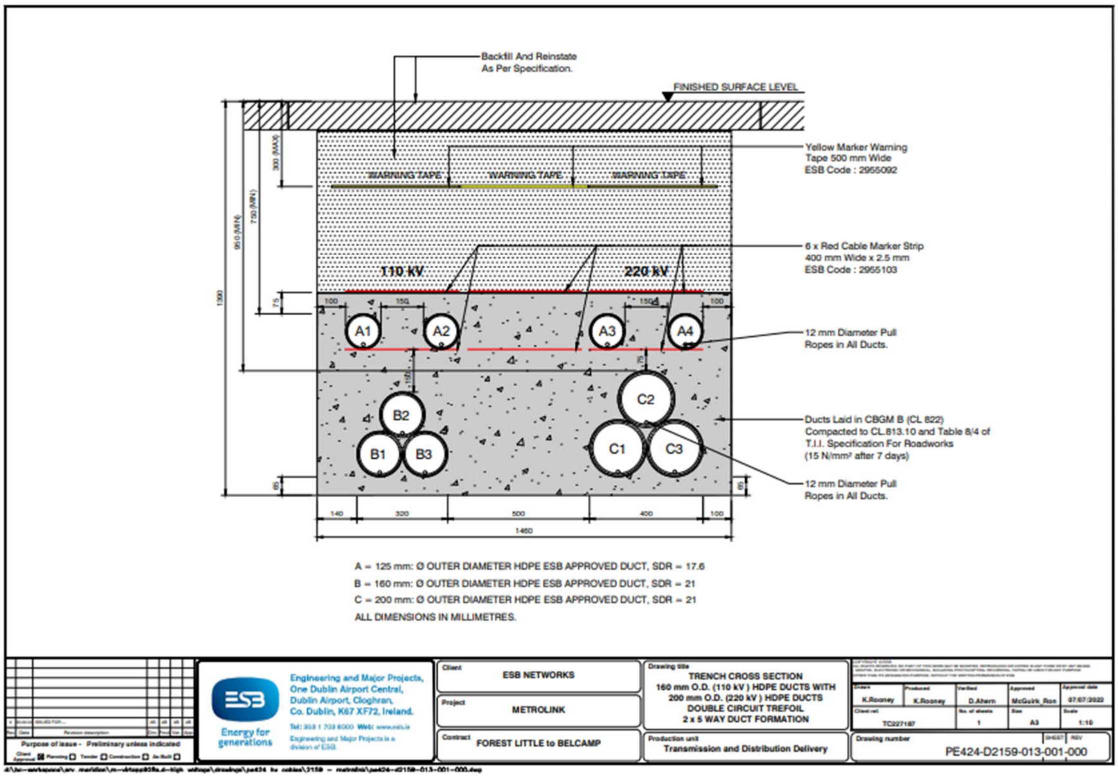
Approximately 30-50 m of trenching and ducting is completed in a day, dependent on conditions. Figure 6.8 illustrates a trench for a high voltage cable and Figure 6.9 illustrates reinstatement of the road.

Figure 6.5: 110kV Detail Circuit Trefoil Formation



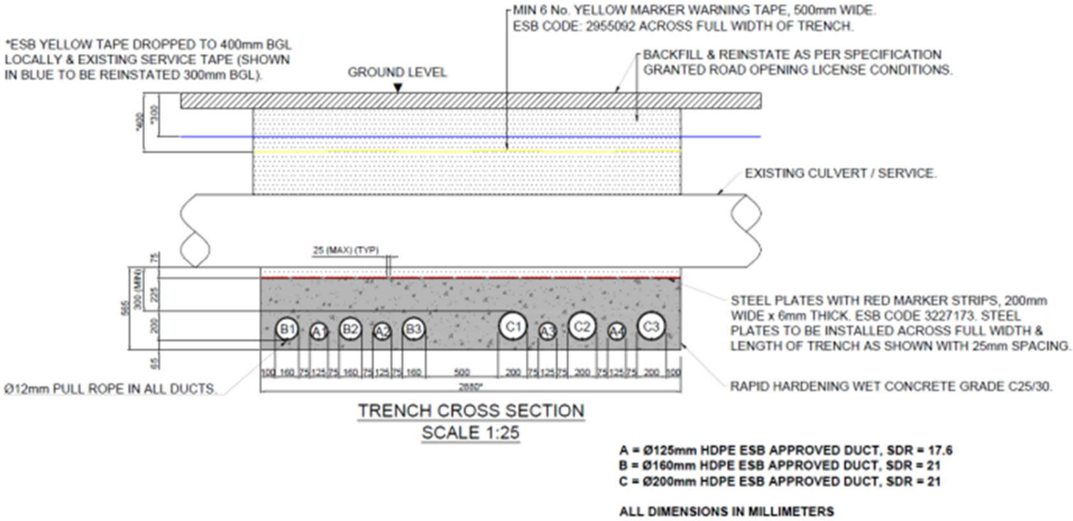
Source: ESB

Figure 6.6: 110kV/220kV Double Circuit Trefoil Formation Detail



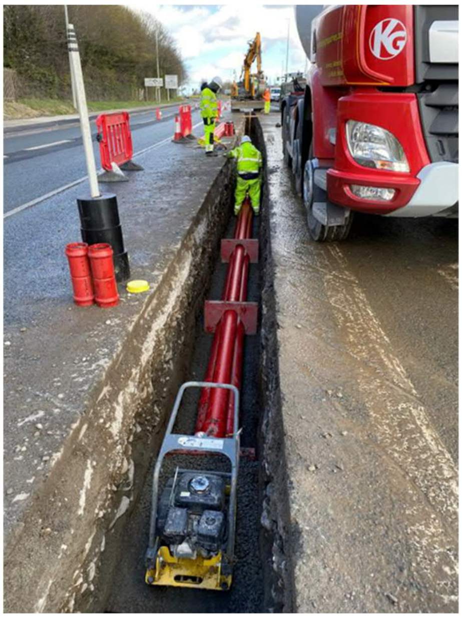
Source: ESB

Figure 6.7: 110kV/220kV Double Circuit Flat Formation Typical Detail



Source: ESB

Figure 6.8: Typical HV Trench Cross Section



Source: ESB

Figure 6.9: Reinstatement of Road Surface Over Trench

Source: ESB

6.4.2 Cable Installation and Jointing

The cables will be brought to site on cable drums which will then be placed into position. Once the drum is set up, a winch system at the remote joint bay location(s), including pulling cable, will be attached to the nose of the cable and rollers will be used to guide the cable end towards the duct. The cables will then be pulled into the duct with lubrication being applied to the cable and duct throughout the process in order to control pulling tensions.

A bend radius of typically 20m or greater is used to navigate changes in direction for the cable route. The bend radius can be reduced to 6m to navigate very tight corners however as this introduces increased pulling tensions when installing the cable, it is used sparingly and only where required.

As detailed previously, joint bays will be required to be installed along the cable route to join consecutive lengths of cable and to facilitate cable pulling.

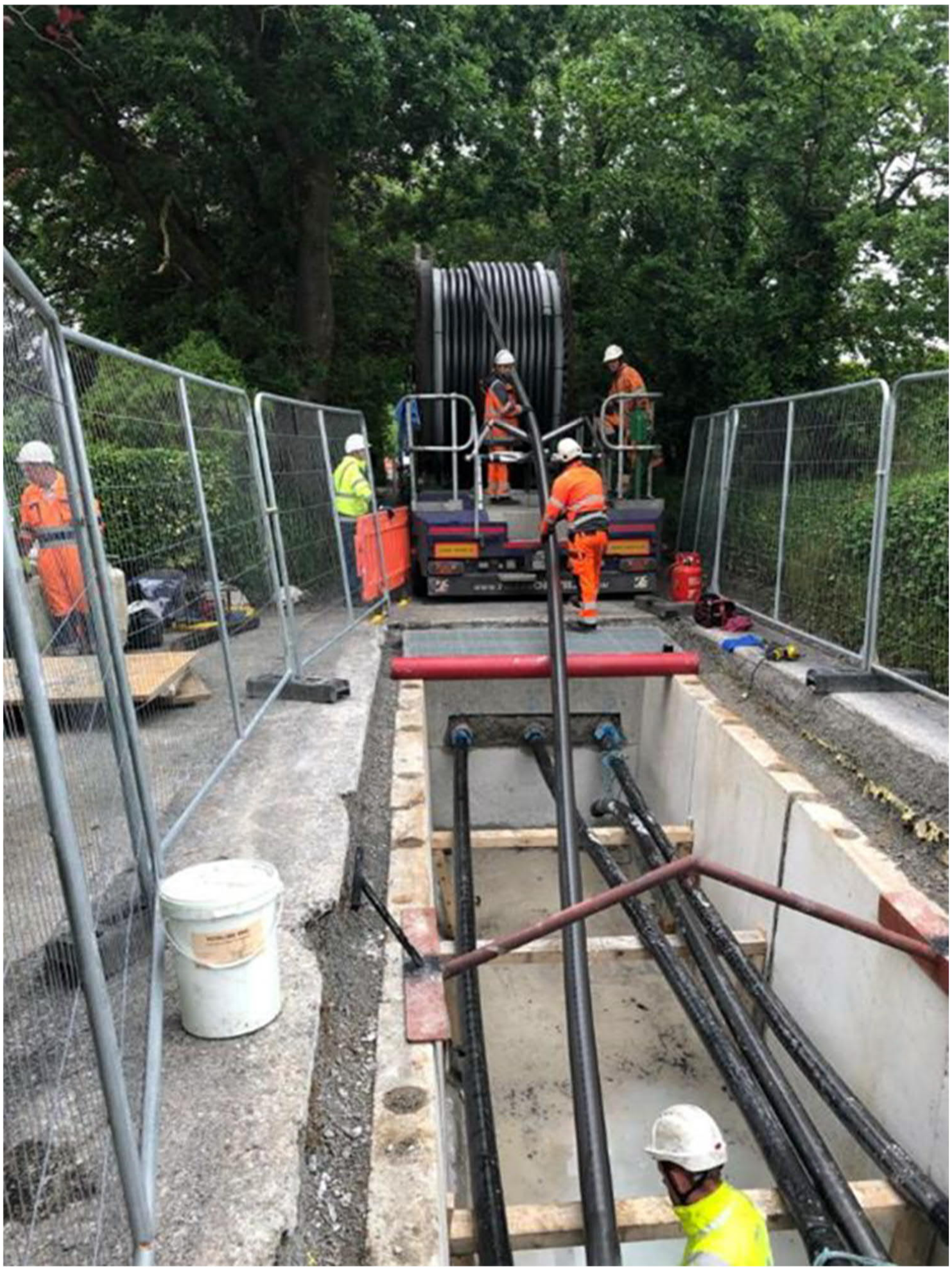
The width of the joint bays and the nature of the road network in the area means that road closures and diversions will be required in some areas along the route during construction and operation. However, all reasonable and practically achievable measures, such as moving of equipment and placing temporary covers over the trenches to allow essential access for vehicles, will be implemented to facilitate local access requirements for emergency services, residential and commercial purposes. Specific traffic management requirements and localised arrangements will be developed by the appointed contractor(s) and will be agreed in advance of implementation with the appropriate local authority.

Joint bays generally consist of precast concrete walls and base located below ground with typical approximate dimensions of 8m length x 2.5m width x 2.3m depth for 220kV joint bays and 6m length x 2.5m width x 2.3m depth for 110kV joint bays. Sand or lean mix concrete will be used as required as a blinding layer to the underside of the chamber. The ducts will be installed to each end of the chamber, then proven, cleaned and sealed. Figure 6.10 illustrates a joint bay and Figure 6.11 illustrates the cable pulling.

Figure 6.10: Completed Joint Bay prior to Cable Installation (pre-cast)

Source: ESB

Figure 6.11: Typical Set-Up of HV Cable Pulling Procedure



Source: ESB

6.4.3 Cable Crossings (Water, Utility, Airport Lights etc)

A number of crossings will be required along the cable routes. These crossings will be facilitated by either open cut trenching or HDD and will be confirmed following the site investigation. For the purposes of the EIAR, the worst case has been assessed. HDD works have been confirmed at Stockhole Lane (Forest Little – Belcamp Option 2) and for the crossing of the M1 (Forest Little – Belcamp Option 1 and Option 2.

A description of open cut trenching and HDD methods is provided in section 6.4.3.1 and section 6.4.3.2. All works will be preceded by detailed confirmatory utilities / services location assessments, and where existing utilities / services are identified, the works will be diverted around the service / utility depending on the level of complexity arising.

The identification of crossings along the proposed cable routes has been based on consultations with utility providers, site walkovers, field studies and reviews of publicly available datasets such as Environmental Protection Agency (EPA) datasets and mapping. All crossings will be confirmed at construction stage and the mitigation detailed and proposed as part of this EIAR will be implemented when dealing with any such features.

6.4.3.1 Open Cut Trenches at Water Crossings

Open cut water crossings have the potential to generate silt and suspended solids. In order to reduce the risk of discharging sediment it is proposed to carry out all of 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. Techniques 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 to discharge back to the watercourse. 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 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 stabilization, 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 5-day weather forecast via its website (www.met.ie) and works will not take place at least during yellow, orange and red weather warnings. The Contractor's Environmental Clerk of Works (EnCOW) will monitor this daily and will provide reports for audit.

Unless otherwise agreed with IFI, any element of the works requiring instream works will be restricted to the fisheries open season (i.e. restricted to July to September inclusive). Where trenching (instream) works are proposed, electrofishing may be required to remove fish under licence from IFI. Method statements will be developed in agreement with IFI for the works.

6.4.3.2 Horizontal Directional Drilling

HDD technology has been widely used in the oil and gas industries for several decades. It has become more commonplace in recent times in municipal engineering projects, such as for the installation of electrical cables, optical cables and potable water pipes. Competent specialist contractors will be appointed to undertake the work.

The HDD Contractor will conduct the drilling works in a safe and controlled manner with due regard for site constraints including environmental issues. The Contractor will be required to ensure that their proposed works do not adversely affect, existing services / utilities, groundwater / aquifers.

The HDD compounds consist of launch and reception pits as the drilling rig requires 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, guided by tri-axial magnetometers and accelerometers that provide real time directional information to the surveyor at the driller's console, will be used to navigate the bores.

The drilled cuttings will then be flushed back by the drill fluid flowing via nozzles in the drill bit, up the annulus 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.

Constant monitoring by the specialist drilling team of fluid volume pressure, pH, weight and viscosity 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 mud returns will be pumped to the circulation system trailer by means of 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 reamed in a number of passes to reach the required bore size to enable the cable ducts to be pulled through. To ensure that the prevailing geological conditions have suitable cohesion that can maintain the bore during the drilling and reaming process, close attention will be paid by the specialist drilling team to modelled drag forces during pullback with constant monitoring of load stress undertaken 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 assist with the identification of any voids or changes in strata.

On completion of the works, the stone and geotextile will be carefully removed using a back-hoe or 360^0 excavator and removed off-site to an appropriately permitted waste facility. The site will then be reinstated to its original condition.

There are limitations in entry angle and radius of curvature for drilling and often accommodating these to match favoured ground conditions can be challenging. The advantage with this method is that a number of standalone cable ducts can be provided as required with suitable separation to meet the preferred requirement. Unlike other installation techniques, a key advantage of HDD is that shafts are not required, but only entry / exit transition pits.

The Contractor will monitor river / stream flows upstream and downstream of any directional drilling of watercourse crossings. The flow monitoring will be undertaken on a daily basis for five working days prior to the directional drilling, during the directional drilling and for five working days following completion of the directional drilling. The Contractor will record the results of such monitoring, and provide these to ESB and the local authority and as required by any conditions. If a measurable increase in losses from the watercourse to ground is observed in the reach where the directional drilling took place, bed lining will be undertaken if required by IFI.

6.4.4 Temporary Construction Compounds

The installation of underground ducting and cables will require temporary construction compounds to accommodate temporary storage, contractor offices, etc. These compounds are typically, but not always, located in close proximity to the works area. Generally, these compounds are selected by the appointed contractors for the project based on a variety of factors, including operational requirements. Contractors are not appointed until planning permission has been secured and contracts have been signed for a particular project.

In the case of this project, given the passage of time between when preparation of this application for planning approval and when construction would commence, which will be a number of years, specific temporary construction compound locations cannot be identified in the planning application drawings, nor can specific locations be considered in this EIAR.

However, it is recognised that where a project is the subject of EIA, temporary compounds must be assessed and planning approval sought where required. It can sometimes be the case that construction compounds may already exist and are approved so it is not always necessary to seek further approval.

While this EIAR does not assess the impact of temporary construction compounds at specific identified locations, the contractor will ensure that the following environmental parameters will be complied with. The temporary compounds will form part of separate planning application(s). Area of existing hardstanding will be used where possible. The parameters which the temporary compound will comply with are:

- Compounds will not be located within 100m of proposed Natural Heritage Areas (pNHAs), Natural Heritage Areas (NHAs), Special Areas of Conservation (SACs) or Special Protection Areas (SPAs)
- Compounds will not be located in areas of semi natural habitats of significant local biodiversity value or in locations that will disturb protected fauna breeding sites, determined following ecological surveys
- Compounds will not be located in or within the zone of notification of archaeological sites or sites of architectural heritage including National Monuments, Sites with Preservation Orders, listed in the Record of Monuments and Places (RMPs), Areas of Archaeological Potential, RPSs, Architectural Conservation Areas, NIAH structures
- There will be a requirement for a programme of monitoring of any greenfield or off-road groundworks including those associated with temporary construction compounds, which will be agreed with the planning authority
- Compounds will not be located within a flood zone and will be located a minimum of 50m from watercourses
- Where there is linkage between a compound location and drains leading to rivers, bunding and silt fencing must be installed to prevent run off from entering downstream watercourses
- Where bedrock is likely to be encountered and excavated, compounds should not be located in vicinity of karst features. Sanitary facilities will not be in proximity to karst voids, and vehicle activity near karst voids is to be avoided in case of collapse
- Compound exits and entrances will not compromise road safety and there must be sufficient capacity on the road network
- The location of compounds will be removed from residential areas where possible to ensure noise and lighting do not significantly affect residents or other sensitive receptors
- The location of compounds will be away from air sensitive receptors as far as practicable to avoid adverse construction air quality impacts to sensitive receptors.
- The storage of dusty material in the compounds will be covered by impervious sheeting or water suppression will be applied to avoid wind erosion to air sensitive receptors.

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. Any discharges from temporary welfare facilities will be connected to a sealed holding tank to be emptied and disposed of off-site by a licenced contractor to an approved licenced facility, located in the wider area.

Where an access 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.

All construction workers will be required to use the designated access / egress routes only.

Storage of fuel and refuelling will be undertaken within bunded areas. Water will be brought to site via tankers as required.

Security lighting will be directional and cowled. The Contractor will regularly review security lighting in this regard, to inform adaptive management if necessary and report the monitoring findings regularly to ESB and the local authority.

6.4.5 Passing Bays

During the construction phase of the proposed development, where a joint bay is required within the road, the provision of a passing bay at the location of the joint bay will facilitate the through movement of traffic along the road, as required. This will be by means of single traffic signalled lane or stop/go system at the joint bay, during the construction /installation phase.

The installation of the passing bay entails the removal of the top layer of ground to the side of the carriageway and temporarily storing it locally to the side for reinstatement following the works (to include hedgerow re-instatement). The passing bays will then be constructed to a standard agreeable to Fingal County Council/Dublin City Council.

Where the road width is still not sufficient, a road closure may be required to undertake the work. Further detail on proposed road closures and diversions is provided in the construction phase Traffic Management Plan provided in Appendix D, as an appendix to the Construction Environmental Management Plan.

6.4.6 Construction Traffic

The total number of construction staff on-site will vary during the construction phase of the works but is expected to peak at approximately fifteen (15) persons. Four per trenching and ducting crew, two traffic management personnel per crew, one surveyor, one junior engineer and one senior engineer / project manager.

The estimated traffic movements associated with installation of the cable are presented in Table 6.1. The ultimate approach will be determined by the appointed Contractor, within the parameters assessed in this EIAR. No abnormal loads are anticipated to be required for the installation of the UGC.

The estimated average daily HGV traffic generation by number of vehicles and movements (one movement = one inbound journey + one return journey) per HV cable section are detailed in Table 6.1.

Table 6.1: Average Daily HGV Movements

	Civil		Electrical	
HV Cable Route	**No. of HGVs**	**HGV Movements**	**No. of HGVs**	**HGV Movements**
110 kV Newbury – Ballystruan	26	52	3	6
110 kV Ballystruan – Forest Little	26	52	3	6

	Civil		Electrical	
HV Cable Route	**No. of HGVs**	**HGV Movements**	**No. of HGVs**	**HGV Movements**
110 kV / 220 kV Forest Little – Belcamp Option 1	42	84	7	14
110 kV / 220 kV Forest Little – Belcamp Option 2	29	58	0*	0*

Source: Mott MacDonald

*The joint bays are off road, resulting in a 0 daily average

In general, it is anticipated that construction will occur during normal working hours i.e. Monday to Friday 07:00 to 19:00 hours and 08.00 to 17.00 on Saturday. However, the working hours may be dictated by either the planning conditions or conditions contained within the road opening licenses, if granted. Night working may also be a requirement in highly congested areas and these works will be completed in full compliance with the local authorities' requirements. There may be instances where extended hours / days are required however should working outside these hours / days be required they will only be undertaken with prior agreement with all relevant statutory authorities.

6.4.7 Construction Programme

The power supply for the MetroLink project is anticipated to be required in the 2030s, consequently, it is proposed that the associated cabling works associated will be undertaken in two stages/phases, namely a civil phase, and an electrical phase.

The civil phase will be undertaken at the earliest opportunity, while the electrical phase will be undertaken at later date when the MetroLink infrastructure requires it.

The following are indicative timelines for construction of the underground cables:

- Newbury to Ballystruan - Subject to the grant of statutory approval, it is anticipated that the construction phase will commence in Q2 of 2030 and the construction works (civil) will be complete in Q1 of 2031.
- Ballystruan to Forest Little - Subject to the grant of statutory approval, it is anticipated that the construction phase (civil works only) will commence in Q3 of 2026 and the construction works (civil) will be complete in Q4 of 2027.
- Forest Little to Belcamp - Subject to the grant of statutory approval, it is anticipated that the construction phase (civil works only) will commence in Q3 of 2027 and the construction works (civil) will be complete in Q1 of 2029.

Table 6.2: Indicative Programme

	Newbury – Ballystruan	Ballystruan – Forest Little	Forest Little – Belcamp (option 1)	Forest Little – Belcamp (option 2)
Civil Works				
Pre-construction	6 weeks	6 weeks	6 weeks	6 weeks
Trenching and ducting works and temporary reinstatement (based on two crews)	16 weeks	40 weeks	48 weeks	24 weeks

	Newbury – Ballystruan	Ballystruan – Forest Little	Forest Little – Belcamp (option 1)	Forest Little – Belcamp (option 2)
Joint Bay Installation & temporary reinstatement	7 weeks	9 weeks	18 weeks	9 weeks
Permanent Reinstatement of trench	3 weeks	8 weeks	7 weeks	4 weeks
Total	32 weeks	63 weeks	79 weeks	43 weeks
Electrical Works				
Pre-construction works	3 weeks	3 weeks	3 weeks	3 weeks
HV cable joint bay re-excavation (min 3 max 5 at time)	7 weeks (jointing works in parallel after initial 5 JBs open)	7 weeks (jointing works in parallel after initial 5 JBs open)	10 weeks (jointing works in parallel after initial 5 JBs open)	5 weeks (jointing works in parallel after initial 5 JBs open)
Proving of ducting / HV cable installation	7 weeks	8 weeks	14 weeks	7 weeks
HV cable jointing	6 weeks	9 weeks	17 weeks	8 weeks
HV cable commissioning (sheath test, cross bonding and HV/AC testing)	3 weeks	3 weeks	3 weeks	3 weeks
Permanent Reinstatement of Joint Bays (Civil Contractor)	6 weeks	6 weeks	11 weeks	5 weeks
Total	32 weeks	36 weeks	58 weeks	31 weeks

6.4.8 Construction Environmental Management Plan

A CEMP is included as Appendix D to this EIAR and will be implemented during the construction phase in consultation with Fingal County Council and Dublin City Council. The CEMP will remain a ‘live’ document which will be reviewed regularly and revised as necessary in consultation and agreement with the two Local Authorities to ensure that the measures implemented are effective. The CEMP will be subject to ongoing review throughout the construction phase of the proposed development. This will confirm the efficacy and implementation of all relevant mitigation measures and commitments identified in the application documentation.

The primary objective of the CEMP is to safeguard the environment, site personnel and nearby sensitive receptors from site activity which may cause harm or nuisance. As such, the CEMP sets out a project framework to ensure that key mitigation measures and conditions set out as part of the planning consent process are translated into measurable actions and are appropriately implemented during the construction phase of the proposed development. As part of this framework, transparent and effective monitoring of the receiving environment during construction will be used to inform and manage on-going activities on site and to demonstrate effectiveness of the measures outlined therein.

ESB will monitor the contractor(s) performance on a regular basis and will undertake various compliance checks throughout the duration of the construction period including:

- Review contractor documents against the requirements of the CEMP;

- Undertake regular audits;
- Continuously check records;
- Set up a contractor reporting structure; and
- Conduct regular meetings (at least fortnightly) where Environmental Health and Safety is an agenda item.

6.4.8.1 Traffic Management Plan

The appointed Contractor will further develop the Traffic Management Plan (TMP) based on the information provided within Appendix D (CEMP) of this EIAR in ongoing consultation with Fingal County Council and Dublin City Council. The TMP is considered a 'live' document and as such, may be subject to iterative updates in consultation and agreement with the two Local Authorities, as part of ongoing review (throughout the construction phase of the proposed development). This will confirm the efficacy and implementation of all relevant mitigation measures and commitments identified in the application documentation. The implementation of the TMP will mitigate potential construction traffic impacts on the public road network. All construction activities, including construction traffic, will be managed through the CEMP.

6.4.8.2 Construction Resource Waste Management Plan

Prior to commencement of the development, the appointed Contractor will implement the Construction Resource Waste Management Plan (included as part of the CEMP comprising Appendix D) which will ensure that optimum levels of waste prevention, reduction, re-use, recycling, and recovery are achieved throughout the duration of the proposed development. As with the CEMP and TMP, the CRWMP may be subject to iterative updates in consultation and agreement with the two Local Authorities, as part of ongoing review (throughout the construction phase of the proposed development). This will confirm the efficacy and implementation of all relevant mitigation measures and commitments identified in the application documentation.

The plan has been prepared in accordance with waste management guidance and principles as outlined in Best practice guidelines for the preparation of resource & waste management plans for construction & demolition projects (EPA, 2021) and Design Out Waste: A design team guide to waste reduction in construction and demolition projects (EPA, 2015).

All operations at the site will be managed and programmed in such a manner as to prevent / minimise waste production and maximise upper tier waste management (i.e. re-use, recycle, and recovery) in line with the Waste Hierarchy where technically and economically feasible.

The requirement to develop, maintain and operate the CRWMP will form part of the contract documents for the proposed development and will be updated by the appointed Contractor in advance of the commencement of construction activities on site. Waste sent off site for recovery or disposal will only be conveyed by an authorised waste contractor and transported from the proposed development site to an authorised site of recovery/disposal in a manner which will not adversely affect the environment. All employees will be required to comply with the obligations under this CRWMP.

6.4.9 Environmental Clerk of Works

The Contractor's 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 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 Employers Representative. The EnCoW will be delegated sufficient powers under the construction contract so that they will be able to instruct the Contractor 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 NPWS and IFI. The EnCoW will be responsible for carrying out regular monitoring of the Contractor's CEMP and will report monitoring findings in writing to ESB on a regular basis (at least weekly, but immediately in the case of incidents or accidents).

6.5 Description of the Construction Phase (Substation Interface)

The proposed underground cables will connect into two existing substations (Newbury 110kV substation and Belcamp 220kV substation) and two proposed substations (Forest Little 110kV substation and Ballystruan 110kV substation) which form part of the MetroLink RO application. The ducting will be brought to the wall of the Gas Insulated Switchgear (GIS) substation buildings and pass through ducts into the cable pit and then connect into the GIS switchgear on the first floor of the GIS building. The ducts will then be sealed.

6.6 Operation and Maintenance Phase (Underground Cables)

It will be the responsibility of Electricity Supply Board Networks (ESBN), the asset owner, to ensure that all work is carried out in accordance with the EIAR and planning conditions. ESBN will be responsible for maintaining the asset.

The 110 kV cable route will not require specific or routine maintenance activities along the cable trench or joint bay locations. Access may be required on a rare occasion to facilitate cable replacement if a failure occurs.

Access will be required to link boxes and communications chambers for inspection and maintenance, estimated at a frequency of once per annum for scheduled maintenance.

6.7 Operation and Maintenance Phase (Substation Interface)

Newbury 110kV substation is a Distribution System Operator (DSO) substation and operated by ESBN. Belcamp 220kV substation is a Transmission System Operator (TSO) substation and operated by EirGrid and maintained by ESBN. The proposed substations at Forest Little and Ballystruan (the subject of RO application NA29N.314724) will be operated by ESBN.

Maintenance activities will consist of regular inspections and periodic testing in line with existing procedures.

6.8 Decommissioning Phase (Underground Cables)

It is not intended to decommission the proposed electricity infrastructure. Equipment will be replaced but decommissioning is not intended. In the highly unlikely event that decommissioning is required, the effects would be similar but less than those assessed during construction of the underground cables.

6.9 Decommissioning Phase (Substations)

It is not intended to decommission the substations; however, it is likely that equipment will be replaced in the future.

6.10 Health and Safety in Design

6.10.1 PSDP

At the start of the detailed design of the project, a Project Supervisor for the Design Process (PSDP) will be appointed. By law, the PSDP is required to coordinate the activities of designers involved in the project to ensure that the design works that can be constructed, used, maintained and demolished safely. Designers involved in the project will design out risks where possible in their designs. Designers will record the decisions they make to mitigate risks in their design. These risk assessments identify those risks that could not be mitigated so that the people responsible for constructing, using, maintaining and demolishing the works can be informed of those risks.

Each PSDP will prepare a Preliminary Safety and Health Plan for the respective Contractor which will include in the background information issued to the Tenderers when the construction project goes to tender. This is to inform the tendering Contractors of the risks present on the site which are associated with the construction of the works.

On completion of the works, the PSDP will compile the Safety File. The Safety File will be a comprehensive record of the completed scheme and will serve as a reference point for the future operation and maintenance of the works and any future upgrading works.

The following is an example of the contents of a typical safety file:

- Construction (As-built) Drawings and photographs;
- Design Criteria;
- Specifications and Method Statements;
- Demolition Restrictions;
- Details of Equipment;
- Details of Maintenance Facilities;
- Operating & Maintenance Manuals;
- Certificates from suppliers, manufacturers, specialist subcontractors, Material Safety Data Sheets, etc.;
- Details of location and nature of utilities and services encountered and diverted; and
- Details of residual risks in the use and maintenance of the works.

6.10.2 PSCS

The PSCS will be responsible for developing the construction stage Safety and Health Plan, coordinating the work of Contractors and providing the PSDP with information required in the Safety File. The PSDP ensures coordination of the work of designers throughout the project. This is to ensure effectiveness in addressing and coordinating safety and health matters from the very early stages of the project.

The requirements of the Safety, Health and Welfare at Work (Construction) Regulations, 2006, as amended will be implemented and complied with in full during the construction phase of the development. However, as with any construction project, there is still potential for adverse impacts associated with the natural environment and nuisance (such as noise and dust emissions). Construction will be undertaken by a competent contractor. The potential for these effects is discussed separately within the respective Chapters.

MOTT MACDONALD

Metrolink 110kV Underground Cables

Volume 2: Environmental Impact Assessment Report
Chapter 7 - Population and Human Health

June 2023

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7 Population and Human Health

7.1 Introduction

This chapter presents an assessment of the likely significant impacts arising from the proposed development on Population and Human Health and is based on the information contained in Chapter 6, Description of the Proposed Development. This chapter describes the assessment methodology and receiving environment and provides an assessment of the construction and operation and maintenance phases and prescribes mitigation and monitoring measures, where required.

The assessment considers demographics, land use, economic activity, tourism and recreation, community and amenities and human health.

Mitigation and monitoring measures, residual impacts and cumulative impacts are also discussed where appropriate.

7.2 Methodology and Limitations

The Guidelines of the information to be contained in Environmental Impact Assessment Reports, hereafter referred to as the EPA Guidelines 2022 state that:

"'In an EIAR, the assessment of impacts on population & human health should refer to the assessments of those factors under which human health effects might occur, as addressed elsewhere in the EIAR e.g. under the environmental factors of air, water, soil etc..'

This assessment considers:

- Population Centres;
- Demographic and Economic Profile;
- Housing and Land Use;
- Road Users
- Tourism, Recreation and Amenities; and
- Human Health.

Aspects of relevance to this assessment include amenity and, business, tourism and employment opportunities. This assessment also has regard to likely significant impacts associated with relevant environmental disciplines addressed elsewhere in this EIAR including:

- Chapter 9 – Surface Water and Flooding
- Chapter 11 – Air;
- Chapter 12 – Climate
- Chapter 13 – Noise and Vibration;
- Chapter 14 – Landscape and Visual;
- Chapter 15 – Archaeology, Architecture and Cultural Heritage;
- Chapter 16 – Material Assets;
- Chapter 17 – Roads and Traffic; and
- Chapter 18 – Major Accidents and / or Disasters.

7.2.1 Guidelines

This chapter was prepared in line with the methodology detailed in Chapter 2 of this EIAR.

Publications and other data sources that guided the preparation of this Chapter are listed hereunder:

- EIAR Guidelines for the Consideration of Tourism and Tourism Related Projects (Fáilte Ireland. 2019);
- EirGrid Evidence Based Environmental Study 9 Settlement and Landuse (EirGrid 2016);
- EirGrid-Evidence-Based-Environmental-Study-1-EMF (EirGrid, 2014);
- The Institute of Public Health (IPH), Health Impact Assessment Guidance, Standalone HIA and health in environmental assessment (2021) (Pyper et al., 2021);
- International Association for Impact Assessment (IAIA) and European Public Health Association (EUPHA), Human health: Ensuring a high level of protection. A reference paper on addressing Human Health in Environmental Impact Assessment (2020) (Cave et al., 2020); and
- IEMA, Health in Environmental Impact Assessment: A Primer for a Proportionate Approach outlined in Cave et al., 2017).

7.2.2 Study Area

A study area was developed for the assessment of population and human health. This study area comprises an area of 250m from each side of the UGC route (a 500m corridor), a distance sufficient to incorporate receptors likely to be most affected by the proposed development. Electoral divisions (EDs) and settlements within the wider environs of the proposed development have also been included for the purpose of this appraisal. It is considered that, in combination, this receiving environment includes the most significant and densest populations of sensitive social receptors.

The study area is located in County Dublin within the local authority areas of Fingal County Council and Dublin City Council and includes fourteen (14) electoral divisions (EDs) including Airport, Balgriffin, Dubber, Grange A, Grange B, Kilmore A, Kilmore B, Kinsaley, Priorswood A, Priorswood B, Priorswood C, Priorswood E, Swords-Forrest and Ternapin.

The majority of the study area comprises the area north of the M50 to the northern boundary road of Dublin Airport, the R109/Naul Road. The westerly boundary is located just west of the R122 at the western end of Dublin Airport and the R107/Malahide Road to the East. The study area also includes the area immediately south of the M50/M1 interchange including Clonshaugh Business Park.

The functional value of the study area is determined with reference to the importance and sensitivity of the area. Tourist facilities and sites are important because they define and add value to the character of an area. Recreational land uses are also important and include areas zoned as open space and/or recreational amenity areas. Community facilities such as schools, hospitals, and churches contribute to the community, educational, health and social quality of life. The quality and safety of the residential environment is perhaps the most important determinant of people’s overall quality of life. Business and commercial activities are also important aspects of the local economy as they provide goods, services, and jobs to the local population.

7.2.3 Data Sources

A desk-based assessment of the study area has been undertaken using the sources listed hereunder.

- Darndale Belcamp Village Centre Company Limited by Guarantee (CLG) Strategic Plan 2018-2021;
- Dublin City Development Plan 2016-2022;
- Dublin City Development Plan 2022-2028;
- Dublin Airport Local Area Plan January 2020;
- Dublin Strategic Planning Area (SPA) Socio-Economic Evidence Baseline Report 2017;
- Eastern and Midlands Regional Assembly (EMRA) www.emra.ie ;
- ESB, EMF and You: Information about Electric and Magnetic Fields and the Electricity Network in Ireland. April 2017;
- ICNIRP Guidelines (1998) Guidelines for Limiting Exposure to Time-Varying Electric, Magnetic and Electromagnetic Fields (up to 300GHz);
- Fingal Development Plan 2017-2023;
- Fingal Development Plan 2023-2029;
- Project Ireland 2040 (PI 2040);
- National Aviation Policy for Ireland: Second Progress Report 2019;
- National Development Plan (NDP) 2018-2027;
- National Development Plan 2021-2030;
- National Planning Framework (NPF) 2040;
- Regional Spatial and Economic Strategy for the Eastern and Midland Regional Assembly (RSES) 2019-2031;
- Census 2022 Preliminary Results (Central Statistics Office www.cso.ie
- Census 2016, Central Statistics Office www.cso.ie ;
- Census 2011, Central Statistics Office www.cso.ie;
- Geodirectory Ireland, 2022 www.Geodirectory.ie ;
- Ordnance Survey Ireland (OSI) Mapping and aerial photography;
- Corine Land Cover data www.epa.ie ;
- Central Statistics Office (CSO) www.cso.ie;
- Open Street Mapping www.openstreetmap.org;
- Google Street Mapping;
- Health Services Executive (HSE) www.hse.ie; and
- Fáilte Ireland www.failteireland.ie

7.2.4 Desktop Study

A baseline was established by completing a desktop study involving a review of national guidance documents, publicly available datasets and resources as listed in Section 7.2 of this EIAR. The demographic and employment characteristics of the population was established by reviewing publicly available datasets from the 2011 and 2016 Census and the preliminary 2022 results and from the latest CSO Labour Force Survey. Data included information on population, number of persons in employment and a profile of persons unemployed, tourism, amenities, housing, land-use and health.

7.2.5 Limitations of this EIAR

There were no limitations encountered in compiling the information required to carry out this assessment of likely significant impacts on population and human health as a result of the proposed development.

7.3 Receiving Environment

The EPA Guidelines 2022 identify 'sensitive receptors' as neighbouring landowners, local communities and other parties which are likely to be directly affected by the proposed development. Homes, hospitals, hotels and holiday accommodation, schools and commercial premises are included as receptors. This assessment also includes transient populations including drivers, tourists, walkers, and cyclists.

For the purpose of this population and human health chapter, the receiving environment is considered at a regional and local level.

7.3.1 Population Centres

Swords is identified as a 'Key Town' in the Fingal CDP 2023 - 2029. Swords currently provides a significant employment base, reflecting its location proximate to the M1, M50 and Dublin Airport.

Balgriffin is situated in Fingal County, on the southern side of Baskin Lane along the proposed route of the proposed development. Balgriffin was until recently a small rural settlement. It has now become part of a growing population spreading from Baldoyle in the east to the as yet undeveloped area around Belcamp House to the west.

Coolock, situated to the south of the proposed UGC routes (Ballystruan to Newbury), is a large suburban area, centred on a village. Coolock is crossed by the Santry River, a feature in the middle of the district, with a linear park and ponds. Lands in the north of Coolock were developed to form the districts of Darndale and Priorswood.

Kinsaley electoral division is situated in Fingal County on the northern side of Baskin Lane along the proposed Forest Little to Belcamp UGC route. Kinsaley is identified as a 'Rural Village' in the Fingal CDP 2023 - 2029.

The town of Kinsealy-Drinan is situated on the northern border of Kinsaley Electoral Division. This town should not be confused with Kinsaley Village, 'Old Kinsealy' on the R107 Malahide Road. Kinsealy-Drinan is a suburb of Swords is situated north of the proposed development, along the eastern side of the M1 motorway.

Darndale Belcamp Village is a complex of buildings and open/public spaces in the Darndale neighbourhood of north Dublin. It is situated south of the Belcamp Substation.

Malahide is located just over 3km from the Baskin Lane and R107/Malahide Road crossroads.

The coastal town of Portmarnock, known for its stunning beaches and the world-class Portmarnock Golf Club, is ideal for a variety of activities ranging from kitesurfing to trail-walking. The Velvet Strand is a sandy beach about 5km long and known for its blue flag status. Portmarnock is located less than 3km from the crossroads of Baskin Lane and R107/Malahide Road and offers convenient transportation links to Dublin and farther afield, DART, rail, and bus services.

Santry is a district on Dublin's north side, it's situated south of Dublin Airport and lies on the border between Fingal County Council and Dublin City Council. It is less than 5km south of the proposed Ballystruan to Newbury route.

7.3.2 Demographic/Economic Profile

Demographics are used to study the characteristics of a population at a specific point in time. In this assessment, demographics such as population and housing were examined. CSO census 2022 (preliminary data), 2016 and 2011 data has been used to collate the most recent statistics. While these Census statistics are now some six years old, having regard to the nature, extent and general pattern of development in the receiving environment, these figures remain representative of population and settlement in the identified area.

7.3.2.1 Population

According to Census 2016, population growth in Ireland increased by 3.7% from 4,588,252 in 2011 to 4,761,865 in 2016. Preliminary Census 2022 results published by the Central Statistics Office indicate that the population growth in Ireland increased from 4,761,865 in 2016 to 5,123,536 (an increase of 361,671).

The population of Dublin County in 2016 was 1,347,359. This compares to a total population of 1,273,069 in 2011 indicating an increase of 5.8%, slightly higher than the national county average growth of 5.3%. The population increased further in the Preliminary 2022 Census data to 1,450,701, an increase of 7.7%.

The population of Dublin City in 2016 was 554,554 of which 272,270 were male and 282,284 were females. This compares to a total population of 527,612 in 2011 indicating an increase of 5.1%. The population of Fingal in 2016 was 296,020 of which 145,240 were males and 150,780 were females. This compares to a total population of 273,991 in 2011 indicating an increase of 8%.

Table 7.1 indicates the population increase from census data in 2011 to 2016 to 2022 (where available) on a national, regional, county, and local level.

Table 7.1: Demographic Profile

Area	Population 2011	Population 2016	Preliminary Population 2022	Approximate % Change 2016-2022
Ireland	4,588,252	4,761,865	5,123,536	7.6%
Eastern & Midland Region	N/A	2,328,517	N/A	N/A
County Dublin	1,273,069	1,347,359	1,450,701	7.7 %
Dublin City	527,612	554,554	N/A	N/A
Fingal	273,991	296,020	329,218	11.2%
Study Area	67,574	75,379	N/A	N/A

Source: www.cso.ie

Table 7.2 indicates the population increase of the study area by electoral division from 2011 to 2016 and the Preliminary 2022 results.

It is evident from this data that there was an overall significant increase in population of the study area over the 2011 and 2016 and subsequent 2022 census periods.

Population in the Airport ED increased by over 50% between 2011 and 2022, while the population in Balgriffin almost tripled between 2011 to 2022. There were significant population increases between 2016 to 2022 in Grange A (30%) Grange B (40%), Dubber (20%), Kinsaley (20%), Swords-Forest (4%), and Priorswood B (4%).

Some areas showed a decrease in population; Kilmore B (6%), Priorswood B (4%), Priorswood E (3%), Priorswood A (2%), Priorswood C and Ternapin (1%).

Table 7.2: Demographic profile of study area by electoral division

Electoral Division	Population 2011	Population 2016	Preliminary Population 2022	Approximate % Change (2016 to 2022)
Airport	4032	5018	6139	22
Balgriffin	1966	3113	5536	78
Dubber	6359	7372	8812	20
Grange A	8948	9696	12552	30
Grange B	4565	5326	7441	40
Kilmore A	3505	3660	3624	-0.1
Kilmore B	2600	2681	2513	-6
Kinsaley	8475	9621	11542	20
Priorswood A	1562	1618	1587	-2
Priorswood B	2673	2728	2612	-42
Priorswood C	4491	4854	4784	-12
Priorswood E	2821	2839	2746	-32
Swords-Forrest	13,894	15,153	15790	42
Ternapin	1683	1700	1683	-12
Total	**67,574**	**75,379**	**87361**	16

Source: www.cso.ie

7.3.2.2 Economic Profile

The Dublin City Region is a major driver of growth for the Irish Economy and in recent years has become a node of global economic development. It plays a vital role in fostering economic growth and jobs. The Dublin City Region is home to approximately 1.35m people (a figure expected to rise to approximately 1.55-1.60m by 2031) and 28.5% of the national population of approximately 4.75m. This region is responsible for over 40% of national Gross Domestic Product (GDP) and has the highest household income in the Country.

The Dublin City region generates a substantially higher Gross Value Added (GVA) [1]per head of population than any other part of the Country owing to the heavy concentration of high tech (IT/digital media, pharmaceuticals), advanced producer services (financial and professional) and nationally important public services (Government, utilities and tertiary education). It is also home to the headquarters of several prominent Irish companies and many of the multi-national companies that have invested in Ireland.

The Dublin City Region remains the focus of the substantial national visitor economy. The latest CSO statistics also point to the value of the goods and services produced in Dublin City Region having increased to approximately €85 billion in 2016, a 50% rise compared to the approximately €55 billion figure recorded in 2005. As Ireland's only city of international scale, Dublin has recently been ranked as more influential than other major European cities such as Milan, Barcelona and Madrid by GaWC (the Global and World Cities Network).

[1] Gross Value Added - CSO - Central Statistics Office; GVA is defined as the value that producers have added to the goods and services they have bought. When they sell their wares, producers' income should be more than their costs, and the difference between the two is the value they have added.

The unemployment rate and Debt to GDP and Gross National Income (GNI) Ratios have tracked this improvement, from ESRI's Spring 2023 report[2].

Annual GDP has fluctuated since the highs of 2015 and according to the Central Statistics Office Ireland sits at just over 6% in Quarter 1 2023.

Life sciences, international services (financial and e-commerce), ICT and software development, and E-learning and digital media are predicted to be the fastest-growing industries in Dublin and Fingal in the future. Many of these sectors, as well as more conventional regional strengths like the tourism economy, rely on high levels of connectivity and proximity to airports.

The importance of managed growth at Dublin Airport to the state's economic well-being is explicitly stated in national policy documents. It is also proved that the success of the Dublin Region is inextricably related to the Airport's accessibility. In addition, the airport generates a large amount of revenue and employment. Finally, the Airport is Fingal's major employer, and the Country's economic standing is improved by the Airport's great accessibility, as well as the benefits accrued in the form of employment, housing demand, and wage distribution, all of which result in higher economic activity.

7.3.2.3 Employment

According to Census 2016, there were 2,006,641 people in employment in Ireland. The number of people employed in Dublin City and Suburbs was 265,670 and the number of people employed in Fingal County was 133,971, representing 13.2 % and 6.7 % of persons employed in Ireland.

Table 7.3 below shows employment figures for Q4 of 2020, 2021 and 2022. Over 2.5 million people are employed in Ireland according to the CSO Labour Force Survey from Q4 of 2022, which is an annual increase from 2.5 million in Q4 2021 and 2.57 million in Q4 2020.

Table 7.3: Number of persons employed in Ireland

Employment in Ireland	Number of persons employed
Q4 2020	2,276,800
Q4 2021	2,506,000
Q4 2022	2,574,500

Source: CSO Labour Force Statistics

Table 7.4 shows employment by industry of the electoral divisions within the study area in which the proposed development is located. It is evident that the majority of professions are in commerce and trade, followed by professional services, transport and communications and other industries while the minority of professions are in manufacturing, building and construction, public administration and agriculture, forestry and fishing.

[2] QUARTERLY ECONOMIC COMMENTARYSPRING 2023 (esri.ie)

Table 7.4: Number of Employed Persons in the Study Area by Industry

Industry	Number Employed
Commerce & Trading	9,293
Professional Services	7,901
Other	7,801
Public Administration	1,819
Transport & Communications	5,414
Manufacturing Industries	2,485
Building & Construction	1,427
Agriculture, Forestry & Fishing	105

Source: Census 2016

7.3.2.4 Unemployment

The CSO Monthly Unemployment[3] statistics, provides the most up to date information available and is indicative of the current unemployment situation in Ireland. Updated on 04/05/2023, the monthly unemployment rate for April 2023 was 4.4% for all persons aged 15-74.

For April 2023 the seasonally adjusted unemployment rate was:

- Unchanged at 4.3% for males from a revised rate in March 2023, and down from a rate of 4.6% in April 2022.
- Down to 3.6% for females from a revised rate of 3.8% in March 2023, and a decrease from the revised rate of 4.7% in April 2022.
- At 7.9% for persons aged 15-24 years (youth unemployment rate), from a revised rate of 8.9% in March 2023.

Up to 3.4% for persons aged 25-74 years from a revised rate of 3.3% in March 2023.The seasonally adjusted unemployment rate for April 2023 (for all persons aged 15-74 years) was down to 3.9% from a revised rate of 4.0% in March 2023, and down from a rate of 4.6% in April 2022. In April 2023 the unemployment rate for males was 4.3% and for females was 3.6%.

The seasonally adjusted number of persons unemployed was 108,200 in April 2023, compared with 109,600 in March 2023. There was a decrease of 15,200 in the seasonally adjusted number of persons unemployed in April 2023 when compared with a year earlier.

The seasonally adjusted number of males unemployed was up to 61,900 in April 2023, compared with 61,300 in March 2023. In April 2023 the seasonally adjusted number of females unemployed fell to 46,300 from the 48,300 observed in March 2023.

7.3.3 Housing

The Regional Spatial and Economic Strategy for the Eastern and Midlands Region (RSES), which came into effect in 2019, includes Metropolitan Area Strategic Plans (MASPs) which guide the future development of the Region. According to the MASPs for housing and regeneration, an objective is to provide for higher densities and qualitative standards for the future development of strategic residential development areas within the Dublin Metropolitan Area (DMA) in line with relevant guidelines and policy. (RPO 5.4: RSES, 2019)

[3] Monthly Unemployment September 2022 - CSO - Central Statistics Office

A search of recent planning applications to Fingal County Council and Dublin City Council undertaken in May 2023 reveal the following:

A number of planning applications relating to residential dwellings, retail, commercial developments and refurbishment of one farm buildings along the proposed cable routes. Typically, these applications relate to retention, alterations, extensions, demolition and construction of dwellings and installation of solar panels.

A review of applications to An Bord Pleanála received under Section 34 of the Planning and Development Act 2000, as amended, show that there is currently 2 no. Strategic Housing Applications in close proximity of the proposed development.

- An application has been made to An Bord Pleanála (ref: ABP: TA06F.311059). Lodged on 09/08/21 with the proposed decision date not available at this time. The application is for 1,365 no. units (346 no. houses, 1,019 no. apartments), creche and associated site works. Located at Corballis East, Donabate, Co. Dublin. 311059 | An Bord Pleanála (pleanala.ie.
- An application has been made to An Bord Pleanála (ref: ABP 312855), with the case is due to be decided by 28/06/2022, rechecked 11.05.23 and not yet determined. The proposal is for the construction of 87 residential dwellings and 3 ground floor retail units on lands located west of Malahide Road and north of Baskin Lane, Malahide Road, Kinsealy (also Kinsaley), Dublin 17. https://www.pleanala.ie/en-ie/case/312855
- An application has been made to An Bord Pleanála (ref: ABP 307887). Permission was granted 01/12/2020 for 191 apartments and associated site works, located at Site 2, Mayne River Avenue, Northern Cross, Malahide Road, Dublin 17. (www.ncblock2shd.ie). 307887 | An Bord Pleanála (pleanala.ie)
- An application has been made to An Bord Pleanála ABP (ref: TC06F.307248) and was granted permission on 16/09/2021 for 590 apartments, creche and associated site works at Charlestown Place, St. Margaret's Road, Charlestown, Co. Dublin. 307248 | An Bord Pleanála (pleanala.ie)
- An application has been made to An Bord Pleanála (ref: ABP: TA29N.310077) and was granted on 17/08/2021, for 260 apartments and associated site works. With the site located at Belmayne P4, on the corner of Churchwell Road and Churchwell Crescent, Belmayne, Dublin 13. 310077 | An Bord Pleanála (pleanala.ie)

7.3.4 Land Use

The majority of the cable will be installed within the existing road network. A combination of land use listed as airport, pasture, construction sites, non-irrigated arable land, industrial or commercial units, complex cultivation patterns and discontinuous urban fabric makes up the remaining portion of the cable route according, to Corine land cover data 2018.

The number of buildings within 250m of the proposed cable routes is detailed in Table 7.5. During construction works, nuisance effects are likely during the temporary construction period for properties along the cable route.

Table 7.5: Number of buildings within 250m of proposed cable routes

Route	Residential	Commercial	Both	Unknown	Total
Newbury to Ballystruan	398	64	3	13	78
Ballystruan to Forest Little	24	19	3	9	55
Forest Little to Belcamp – Option 1	661	31	29	28	749

Route	Residential	Commercial	Both	Unknown	Total
Forest Little to Belcamp – Option 2 (via Stockhole Lane)	19	6	2	2	29

Source: Geodirectory

Approximately 19.5 km of the proposed cable is located in Fingal County Council and approximately 4.5 km of the proposed cable is located in Dublin City Council. Notable development along the route include Dublin Airport, and numerous business / industrial parks such as Collinstown Industrial Estate, Airways Industrial estate, Port Tunnel Business Park and City Junction Business Park. Other notable large-scale areas include Clare Hall Shopping Centre located on the R139 junction and Forest Little Golf Course located in the ED of Swords-Forest.

Findings from EirGrid's evidence-based Environmental Study on settlement and land use (2016)[4] has established that there is no evidence of any significant impact arising from the construction or existence of electrical infrastructure in terms of patterns of settlement and land use. Notwithstanding, the study concluded that transmission infrastructure can be a local physical constraint on subsequent development. As such, local land-use, communities and supporting social infrastructure within and linked to the development are evaluated.

7.3.5 Roads Users

Chapter 17 Roads and Traffic details the roads which will be affected on a temporary basis during construction. In the event of road closures, the duration of the road closure will be confirmed and suitable diversions will be in place as necessary throughout the works. Road sections which will be subject to a localised lane closures are detailed within Chapter 17 Roads and Traffic.

The Construction Traffic Management Plan for the proposed development is presented as an appendix to the CEMP (Appendix D). Baskin lane will remain accessible to local traffic and emergency services throughout the works.

7.3.6 Tourism, Recreation and Amenities

Failte Ireland's *Guidelines for the Consideration of Tourism and Tourism Related Projects* outlines the importance of tourism to the economy and how developments which may disrupt or suppress a tourism resource or amenity can have very local or more strategic impacts either directly or indirectly.

According to the Fingal County Development Plan, recreation and amenity facilities contribute to the quality of life of the communities they serve. The provision of facilities that cater for the demands of an increasing population and which are accessible to all sectors and age groups is a key component in the creation of successful sustainable communities. The Fingal CDP lists social, community and multiuse facilities, childcare facilities, education, recreation and amenity, healthcare facilities and planning for aging all under their policies and objectives. Local sports clubs and schools function as important community assets and act as focus areas for the community. In general, community facilities are located within the towns and villages of the receiving environment.

Dublin Airport is a key national asset to Ireland's economic success which is linked with its global connectivity to trade and tourism markets and requires support to ensure it continues as

[4] https://www.eirgridgroup.com/site-files/library/EirGrid/EirGrid-Evidence-Based-Environmental-Study-9-Settlement-and-Landuse.pdf

an economic driver. Tourism is one of Ireland's most important sectors with Dublin Airport, Ireland's largest airport, acting as a key national asset to Ireland's economic success. This is due to the airport's global connectivity to trading and tourism markets and it requires support to ensure it continues as an economic driver for the country. With 80% of tourists to Dublin arriving via Dublin Airport, the airport is vital to the Irish tourism industry.

In 2019, revenue[5] gained from tourism was €9.5billion to the economy with Dublin Airport having received 8.46 million passengers[6] in 2021, a decrease of 74% compared with 2019, significantly impacted by the Covid-19 Pandemic. Figures are back to pre-Covid 19 levels, with 9.5 million passengers passing through Dublin Airport in the first four months of 2023.

As stated in the Fingal CDP, the location of Fingal is idyllic to achieve national targets set out in the Failte Ireland's Grow Dublin Tourism Alliance and Action Plan[7] (GDTA) due to the proximity to Dublin Airport.

Some amenities are within the vicinity of the proposed route and are detailed in Table 7.6. Community facilities in the area include schools, nursing homes, childcare facilities, medical care centres and shops.

Table 7.6: Amenities within the study area

Activity/Amenity	Facility
Clubs	● Kinsealy Inisfails GAA Club
	● Forrest Little Golf Club
	● Silloge Park Public Golf Course
	● Baskin Lane Soccer Field
	● Craobh Chiarain GAA Pitches
	● AUL Complex
	● Star Lights GFC
	● Paddy Mahoney Park
	● Hapenny Golf Driving Range
	● Splashtastic Swimming Club
	● Christy O'Connor Golf Course
Parks	● St. Doolagh's Park
	● Coolock Park
	● Belcamp Park

7.3.7 Human Health

The following chapters provide detail regarding the baseline environment in terms of air quality, noise, land, water, cultural heritage, traffic, material assets, and landscape.

- Chapter 11 – Air
- Chapter 13 – Noise and Vibration
- Chapter 8 – Land, Soils and Hydrogeology
- Chapter 9 – Surface Water and Flooding

[5] Tourism Facts 2019 Final March 2021 (failteireland.ie)

[6] Dublin Airport Passenger Numbers Up 14% Compared To Last Year

[7] https://www.failteireland.ie/FailteIreland/media/WebsiteStructure/Documents/Dublin/MCCP-FI-Grow-Dublin-Tourism-Alliance-Progress-and-Action-Plan.pdf

- Chapter 17 – Roads and Traffic
- Chapter 16 – Material Assets
- Chapter 15 – Archaeology, Architectural and Cultural Heritage
- Chapter 14 – The Landscape

ESBN designs, develops grid infrastructure in accordance with stringent safety recommendations which are made by national and international agencies. Several of these recommendations come from the ICNIRP. This is an independent body, funded by public health authorities around the world. ICNIRP has reviewed the safety of EMFs and recommended limits on exposure that are far below levels where adverse effects might occur.

Electricity cables have been placed underground in Ireland since the 1960's. There are currently approximately 320km of underground transmission cables in Ireland, with multiples of this figure of underground cabling associated with the lower-voltage distribution system. In addition, new underground cable projects are being completed or planned on an ongoing basis both by EirGrid as developer of the electricity transmission system, and by ESBN as developer of the electricity distribution system.

For AC EMFs, such as those produced by the production, transmission and use of most electricity in Ireland (i.e., 50 Hz) the EU EMF recommendation (1999/519/EC) advises the adoption of exposure guidelines published by ICNIRP in 1998 [Guidelines for Limiting Exposure to Time-Varying Electric, Magnetic and Electromagnetic Fields (up to 300GHz); Published in Health Physics 74 (4):494-522; 1998].

The ICNIRP also provides 'Reference Levels', which ensure that the guidelines are not exceeded and are defined in terms of measurable field values. The ICNIRP Reference Levels incorporate a significant safety margin and exposures to field levels above the limits are permitted if calculations of in situ current densities within the body do not exceed the Basic Restriction limit. The 1998 Reference Level for power frequency magnetic fields is 100 microtesla which was updated to 200 microtesla in 2010 (ICNIRP, 2010).

The public exposure limits adopted by ESB for AC fields are presented in Table 7.7 below.

Table 7.7: Public Exposure Reference Levels ICNIRP Reference Level/EU Recommendation (Estimated Fields)

	ICNIRP 1998 Reference Level	ICNIRP 2010 Reference Level	EU Recommendation 1999/519/EC[8]
Magnetic Field	100 micro Tesla	200 micro Tesla	100 micro Tesla
Electric Field	5 kV/m	5 kV/m	5 kV/m

Source: ESB 2017

The Metrolink HV Cables will be compliant with EU Recommendation 1999/519/EC as prescribed in Table 7.7.

For static magnetic fields, such as those produced by the transmission of electricity by Direct Current, the EU EMF recommendation for regulatory purposes references exposure guidelines published by ICNIRP in 1994 [Guidelines on Limits of Exposure to Static Magnetic Fields; Published in Health Physics 66(1):100-106; 1994].

[8] LexUriServ.do (europa.eu)

7.4 Likely Significant Impacts of the Proposed Development

7.4.1 Construction Phase

The potential for impacts on population and human health associated with the construction phase due to air, noise and dust emissions and traffic are discussed in the specialist chapters. This section considers construction phase effects relating to:

- Population Centres
- Demographic and Economic Profile
- Housing and Land Use
- Roads Users
- Tourism, Recreation and Amenities
- Human Health

7.4.1.1 Population Centres

During the Construction Phase of the project the following durations of civil/electrical work is anticipated:

- 110kV Forest Little to Ballystruan
  Civil works Q3 2026 to Q4 2027 – peak 15 staff on site with 36 weeks for electrical works
- 110kV/220kV Forest Little to Belcamp (Option 1 and Option 2)
  Civil works Q3 2027 to Q1 2029 – Peak 15 staff on site with 58 weeks for electrical works
- 110kV Ballystruan to Newbury
  Civil works Q2 2030 to Q1 2031 – Peak 15 staff on site with 32 weeks for electrical works

The construction methods employed, and the hours of construction proposed will be designed to minimise potential impacts to nearby residents, including schools and nursing homes.

There is potential for temporary disruption to the local population as a result of the works. This is considered to be a **slight** negative impact and will be temporary.

7.4.1.2 Demographic/Economic Profile

While there will be a temporary increase in economic spend in the local communities during the works as a result of construction workers spending in the area, it is not expected that the proposed development will affect the demographic profile (population or housing) during the construction phase.

The supply of building materials and the provision of professional services will generate some off-site employment and economic activity. Revenue generated will benefit the local economy by increasing spending on local goods and services. This will have a **slight** positive impact on the economic profile.

7.4.1.3 Housing and Land Use

There will be a temporary change in land use due to construction of UGC routes on private lands and off-road sections, including GAA pitches, developer's/agricultural lands, DAA lands, carparks, lands adjacent to M1 and M50 (Newbury to Ballystruan). Land will be re-instated to the satisfaction of the landowners. The effects will be temporary during construction having a **slight** effect and once reinstated the effect will be imperceptible. Temporary disruption will be transient in nature.

7.4.1.4 Impacts on Roads and Traffic

Due to the width of the joint bays and nature of the road network in the area means that temporary road closures may be required along the route during the cable laying and joint bay elements of the construction phase. Passing bays, may facilitate vehicle movements around joint bays where space allows. Accessibility to private properties and lands will be maintained at all times during construction, however there may be temporary disruptions. There will also be increased traffic in the area surrounding the site due to construction vehicles.

The impact on roads and traffic during the construction phase of the development is considered to be not significant and temporary in nature, as the majority of the UGC routes follow the existing road alignment. Temporary disruption will be transient in nature and will have brief / temporary impacts. Full details of effects associated with traffic are noted in Chapter 17 of this EIAR.

Traffic management measures have sought to minimise effects on road users. Where temporary road closures are required during the works, the duration of any road closure is to be confirmed and suitable diversions will be implemented, as necessary throughout the works. There will be lane closures required along a number of road sections. Chapter 17 Roads and Traffic, assesses the driver delay associated with these lane closures. It is estimated that delay times will be 0 – 10 minutes and the duration of closures varies dependant on the works undertaken. The effect on road users is considered to be not significant.

7.4.1.5 Tourism, Recreation and Amenities

There is potential for **slight** temporary disruption to some tourism and recreational amenities as a result of the proposed development due to potential disruption to access, and general disturbance.

7.4.1.6 Health and Wellbeing

The requirements of the Safety, Health and Welfare at Work (Construction) Regulations 2006, amended will be implemented and complied with in full during the construction phase of the development. However, as with any construction project, there is still potential for adverse impacts associated with the natural environment and nuisance (such as noise and dust emissions). The potential for these effects is discussed separately within the respective chapters. There will be no significant offsite health risks.

Given the nature of the development, the significance of impacts is considered **slight** and temporary in nature, during the construction phase and will not extend into the longer term.

7.4.2 Operational Phase and Maintenance

As detailed previously, given the nature of the proposals, the potential for impacts on population and human health is for the most part associated with the construction phase. Significant adverse impacts during the operational phase are not likely.

For completeness operational phase effects considered include:

- Population Centres
- Demographic and Economic Profile
- Housing, Land Use
- Road Users
- Tourism, Recreation and Amenities
- Human Health

7.4.2.1 Population Centres

There will be no long-term impact on population centres during the operational phase of the development. There will be temporary disturbance during maintenance works which will have an imperceptible effect.

7.4.2.2 Demographic Profile

There will be no impact on demography or the economy during the operational phase of the development.

7.4.2.3 Housing, Land Use

The UGC will require no invasive maintenance work along the cable trench or joint bay locations. Access may be required at joint bays on rare occasions to facilitate cable replacement if a failure occurs.

In general, there will be no long-term effects on land use and facilities during the operational phase of the development as the majority of the UGC will be located in the road. For off-road sections localised land use restrictions will apply to prevent damage to the UGC and to allow access to the joint bays.

7.4.2.4 Tourism, Recreation and Amenities

There will be no long-term impacts on tourism, recreation and amenities during the operational phase due to the underground nature of the development.

7.4.2.5 Human Health and Wellbeing

Independent and authoritative international panels of scientific experts have reviewed studies on possible health effects from EMFs. These panels have concluded, based on the weight of the evidence, that the power frequency electric and magnetic fields encountered in normal living and working conditions have not been shown to cause adverse health effects in humans. These reviews form the basis for guidelines published by ICNIRP with regard to EMF, to which EirGrid and ESB Networks comply in the design and operation of the transmission system.

Findings from EirGrid's evidence-based Environmental Study on EMF (2016)[9] established that;

The maximum magnetic field strength measured at all overhead lines, underground cables and substation perimeters surveyed was well below the ICNIRP public exposure reference level, set to protect public health. Based on the measured data, magnetic field strengths estimated for overhead power lines and underground cables using records of annual load are also well below the ICNIRP reference level to protect public health under typical (mean or median load) and high-power load (95th percentile) conditions. The maximum electric field strength measured at all overhead lines and substation perimeters surveyed was below the ICNIRP reference level to protect public health. Underground cables produce no electric field above ground.

In the context of the above evidence, the proposed development has been designed to ensure that the strength of the electric and magnetic fields during operation of the proposed development will comply with the ICNIRP and EU guidelines on exposure of the general public to EMF. Therefore the effect on Population and Human Health is considered imperceptible.

The potential for adverse effects associated with the natural environment and nuisance (such as noise and dust emissions is discussed separately within the respective chapters of this EIAR.

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[9] 1 http://www.eirgridgroup.com/site-files/library/EirGrid/EirGrid-Evidence-Based-Environmental-Study-1-EMF.pdf

ESB's EMF Policy

To minimize high EMF exposures to the public and workers, national and international health and regulatory authorities have recommended exposure limits for EMFs. It is ESB's policy:

- to design and operate generation, transmission and distribution networks and telecommunications infrastructure in compliance with legislation and with due regard to the latest recommendations and guidance of leading international experts and independent bodies of EMF, such that these limits are not exceeded.
- to closely monitor and support engineering/ scientific research on EMF;
- to comply with the requirements of 1999/519/EC regarding the limitation of exposure of the general public to electromagnetic fields (0 Hz to 300 GHz); and
- to provide information for the public on its website about the hazards and risks associated with EMF arising out of ESB equipment and/or premises. (ESB 2017).

In Ireland the following bodies are responsible for policy and guidance relating to EMF:

- The Department of Environment, Climate and Communications is responsible for national policy, including that relating to the health effects of non-ionising radiation, including EMF.
- The Environmental Protection Agency (EPA) is responsible for the provision of advice and guidance in relation to public exposure to EMF. In May 2019, Regulation S.I. 190 of 2019 was signed into law to extend the functions of the EPA to cover public exposure to EMF. These functions include:
  - to provide advice to the Government and the public on exposure to EMF (including on relevant standards for public protection);
  - to monitor scientific/technological developments likely to impact on public exposure to EMF; and
  - to carry out independent monitoring of public exposure to EMF to support its advisory role.
- The role of the Health and Safety Authority (HSA) is to protect workers in Ireland by enforcing occupational health and safety law, including EMF regulations. The regulations, set out in SI No 337 of 2016, require employers to carry out a risk assessment on EMF exposure in workplaces. All these bodies reference the ICNIRP international guidelines, which are endorsed by the World Health Organisation (WHO) and the European Union (EU).

7.4.3 Do Nothing

In the do-nothing scenario, there would be no change in terms of environmental effects. However, this is not a feasible alternative given that a power supply is required for MetroLink.

7.4.4 Decommissioning Phase

It is not intended to decommission the proposed electricity infrastructure, however, should it be decommissioned, the effects would be similar or less than those described for the construction phase.

7.4.5 Cumulative Effects

This section considers the cumulative impact of the proposed development with other proposed developments in the surrounding area.

7.4.5.1 Intra-Project Effects

Metrolink Project

The construction of the MetroLink rail project and the Metrolink UGC may coincide, therefore the construction programme will be developed so that effects on receptors are minimised, in particular at locations where the two projects intersect.

It is expected that there will be slight temporary cumulative effects associated with regards to Population and Human Health as the construction phasing is expected to coincide in part. However, mitigation measures are proposed to reduce effects.

7.4.5.2 Other Developments

There is a risk of the construction phases of the proposed development occurring at the same time as the construction phases of other developments. Consequently, there will be a need to ensure that where works are occurring in parallel that appropriate mitigation measures are considered, including the scheduling of works, regular liaison meetings between project teams to ensure plans are co-ordinated and effects are minimised. There are no perceptible impacts during the operational phase likely.

Prior to commencement of construction and during the construction phase, engagement with the proponents of these developments (including DAA, Transport Infrastructure Ireland, Fingal County Council, Dublin City Council, Irish Water, Starlight GAA, Statkraft) will occur and where there is potential for works to be carried out in parallel, appropriate mitigation measures will be implemented including the scheduling of works and regular liaison meetings between project teams to ensure that plans are co-ordinated and impacts on population and human health are minimised.

There will be temporary, imperceptible positive effect on local businesses as a result of the cumulation of developments in the area due to the presence of construction workers using local facilities and purchasing goods during the construction phase. There will be a temporary, slight adverse effect associated with the disruption associated with construction works, potential road closures and delays in travel and effects on tourism and amenities as the works continue.

7.5 Mitigation and Monitoring Measures

7.5.1 Construction Phase

Construction activities have the potential to create a nuisance and cause disruption. All work will be carried out in accordance with international and national legislation, and best practice guidance, as detailed in the topic-specific chapters of this EIAR.

A CEMP is included in Appendix D of this EIAR. The CEMP will be implemented by the contractor in consultation with ESB to safeguard the environment, site personnel, and nearby sensitive receptors, i.e. occupiers of residential and commercial properties, from site activities that may cause harm or nuisance. ESB have engaged with landowners directly affected by the proposed development and will continue to liaise with landowners throughout the construction period.

The appointed contractor(s) (in collaboration with ESBN) will be required to maintain close liaison with local community representatives, landowners and statutory consultees throughout the construction period. This is likely to include the circulation of information about ongoing activities; particularly those that could potentially cause a disturbance, including due to traffic. A telephone number will be provided and persons with appropriate authority to respond to calls and resolve or escalate any problems arising will be available.

The appointed Contractor will also implement the Traffic Management Plan included as Appendix D1 of this EIAR, which will be finally agreed upon with Fingal County Council, Dublin City Council and ESB to mitigate any potential construction traffic impacts on the public road network. All construction activities, including construction traffic, will be managed through the site CEMP. Alternative access arrangements (or diversions) will be put in place at relevant locations and appropriate temporary signage will be put in place on roads, footpaths or cycleways that will be temporarily affected by the construction works. This signage will be monitored to ensure that it guides local residents, commercial activities and visitors to the temporary access arrangements in place that facilitate access to homes and businesses.

There are no specific mitigation measures required to ameliorate potential impacts on population and human health in addition to the measures specified in other chapters of this EIAR. Specific measures to mitigate likely significant impacts on human health during the construction phase (i.e. Noise and Vibration, Air, Climate, Water, Landscape, Roads and Traffic) are dealt with separately in the relevant chapters in this EIAR.

7.5.2 Operational Phase

The location and nature of the proposed development is not expected to have a permanent impact on the population of the area and wider environs. The 110 kV cables will not require specific or routine maintenance activities along the cable trench or joint bay locations. Access may be required on a rare occasion to facilitate cable replacement if a failure occurs. Access will be required to link boxes and communications chambers scheduled for inspection and maintenance. These works will be temporary and result in imperceptible effects due to nuisance in the event that traffic management is required.

7.6 Residual Impacts

There will be temporary disturbance associated with the proposed development during construction, but these will be mitigated with the successful incorporation of specific mitigation measures detailed in this EIAR, the residual impact considered is considered to be not significant.

No significant adverse long-term residual effects are predicted during the operational phase.

7.7 Summary

There is potential for temporary disruption to the local population as a result of the works. This is considered to be a **slight** negative impact and will be temporary

Revenue generated will benefit the local economy by increasing spending on local goods and services. This will have a **slight** positive impact on the economic profile.

The effects on housing and land use will be temporary during construction having a slight effect and once reinstated the effect will be imperceptible. Temporary disruption will be transient in nature.

The effect on road-users is estimated that there may be some delay times, thought to be 0 – 10 minutes, with the duration of closures variable dependant on the works undertaken. The effect on road users is considered to be not significant.

There is potential for **slight** temporary disruption to some tourism and recreational amenities as a result of the proposed development due to potential disruption to access, and general disturbance.

Given the nature of the development, the significance of impacts on human health is considered **slight** and temporary in nature, during the construction phase and will not extend into the longer term.

As detailed previously, given the nature of the proposals, the potential for impacts on population and human health is for the most part associated with the construction phase. Significant adverse impacts during the operational phase are not likely.

There will be no long-term impact on population centres during the operational phase of the development. There will be temporary disturbance during maintenance works which will have an imperceptible effect.

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Metrolink 110kV Underground Cables

Volume 2: Environmental Impact Assessment Report
Chapter 8 - Land, Soils and Hydrogeology

June 2023

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8 Land, Soils & Hydrogeology

8.1.1 Introduction

This chapter presents an assessment of the likely significant effects arising from the Metrolink Underground Cables (UGC) proposed development on land, soils and hydrogeology resources. This assessment is based on the proposed development as outlined in Chapter 6.

This chapter considers the likely significant effect during construction and operational phases associated with:

- Land and Land Use;
- Soils and Geology;
- Hydrogeology; and
- Water Framework Directive Groundwater Bodies.

Proposed environmental control measures and additional mitigation measures to prevent, reduce and/or offset the anticipated potential impacts are presented.

Impacts to surface water receptors and flood risk is considered in Chapter 9: Surface Water and Flood Risk.

8.2 Methodology and Limitations

This chapter has been prepared in accordance with the requirements of European Union Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment (the 'EIA Directive') as amended by Directive 2014/52/EU (European Commission, 2014).

8.2.1 Legislative Context

- The Water Framework Directive (WFD) 2000/60/EC (European Commission, 2000) provides a framework for the protection of inland surface waters (rivers and lakes), transitional waters (estuaries), coastal waters and groundwater. The Directive requires Member States to establish river basin districts and, for each district, a river basin management plan (RBMP) which is revised, implemented and reviewed every six years. The Groundwater Daughter Directive 2006/118/EC (European Commission, 2006) establishes a regime which sets groundwater quality standards and introduces measures to prevent or limit the input of pollutants into groundwater, and was amended by Directive 2014/80/EU (European Commission, 2014). The WFD was implemented in Ireland by Statutory Instrument (S.I.) 722/2003 (Office of the Attorney General, 2003). Objectives for protection of groundwater against pollution and deterioration were implemented in S.I. 9/2010 (Office of the Attorney General, 2010).
- EU Directive 80/68/EEC (European Commission, 1979), amended by the Priority Substances Directive 2013/39/EU (European Commission, 2013), concerns the collection, treatment and discharge of urban waste water and the treatment and discharge of waste water from certain industrial sectors. The objective of the Directive is to protect the environment from the adverse effects of these waste water discharges, and is implemented in Ireland as S.I. No. 684/2007 (Office of the Attorney General, 2007).
- The Drinking Water Directive 98/93/EC (European Commission, 1998), amended by Directive 2020/2184 (European Commission, 2020) concerns water quality for human consumption, and is implemented in Ireland as S.I. No. 122/2014 (Office of the Attorney

General, 2014). Thresholds for potable groundwater quality indicators are specified in S.I. No. 366/2016 (Office of the Attorney General, 2016).

- The Waste Framework Directive 2008/98/EC (European Commission, 2008) provides waste management principles for the protection of water, soils and places of special interest, and establishes an order of preference for managing and disposing of waste.

8.2.1.1 Relevant Guidelines

The assessment was undertaken in accordance with the following guidance:

- Guidelines for the Preparation of Soils, Geology and Hydrogeology chapters of Environmental Impact Statements (Institute of Geologists of Ireland, 2013)
- Guidelines on the information to be contained in Environmental Impact Assessment Reports (Environmental Protection Agency, 2022)
- Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes (National Roads Authority, 2009)
- Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters (Inland Fisheries Ireland, 2016)
- Control of water pollution from linear construction projects. CIRIA C648. (Murnane, Heap, & Swain, 2006)

This chapter also provides a high-level assessment of the compliance of the proposed development with the Water Framework Directive. Environmental Protection Agency methodology classifies WFD groundwater bodies according to four quantitative status measures and five chemical status measures (Craig & Daly, 2010).

8.2.1.2 Desk Top Assessment

A desk study of the proposed development locations and surrounding area was undertaken to collate relevant geological, hydrogeological, land use and soils data for the study area, using the following data sources:

- Land and Land Use
  – Land use has been identified using Corine data (Corine, 2018) and aerial imagery.
- Soils and Geology
  – Soils have been identified using the Teagasc database (Environmental Protection Agency, Teagasc, Cranfield University, 2014).
  – Quaternary subsoils (scale 1:50,000) and bedrock (scale 1:100,000) have been identified using the Geological Survey of Ireland (GSI) Geology mapping (Geological Survey Ireland, 2018).
  – Approximate depth to bedrock has been identified from GSI GeoUrban mapping (Geological Survey of Ireland, 2011).
  – Geological heritage sites have been identified from GSI Geological Heritage mapping (Geological Survey of Ireland, 2021).
  – Geohazards including landslide susceptibility have been identified from GSI Geohazard mapping (Geologicial Survey of Ireland, 2016).
- Hydrogeology
  – Wells, springs, boreholes, karst features, group water scheme abstraction points and groundwater source protection areas (group schemes and public supply) have been identified using GSI Groundwater Data Viewer (Geological Survey of Ireland, 2019).
  – Aquifer types and vulnerability have been identified using GSI Groundwater Data Viewer (Geological Survey of Ireland, 2019).

- Drinking Water Protected Areas have been identified using Catcments.ie (Environmental Protection Agency, 2020).
- Water Framework Directive (WFD) groundwater bodies and their chemical, quantitative and overall status have been identified using Catcments.ie (Environmental Protection Agency, 2020).
- Designated Special Area of Conservation (SAC) and Designated Special Protection Areas (SPA) have been identified from National Parks and Wildlife Service mapping (National Parks and Wildlife Service, 2022)

8.2.2 Methodology

8.2.2.1 Assessment Scope

The scope of this assessment comprises:

1. Review of a centrally managed GIS database and completion of a gap analysis from the sources identified in Section 8.2.1.2 Desk Top Assessment.
2. Identify the proposed activities along each proposed route that may lead to impacts to the receiving environment or impacts from the existing environment to the proposed development. This includes consideration of elements including but not limited to earthworks, storage/transmission of contaminants, lowering of groundwater levels by pumping or drainage, discharges to ground, and excavations of material above or below the water table.
3. Establish the baseline conditions with respect to soil, geology and hydrogeology environments, including illustrative figures/maps. The baseline assessment considers the key receptors listed in Table 8-1, in relation to the following route sections:
   a. Forest Little to Belcamp Option 1 (ca. 9 km);
   b. Forest Little to Belcamp. Option 2 (ca. 4.3 km);
   c. Ballystruan to Newbury (ca. 5 km); and
   d. Forest Little to Ballystruan (ca. 10 km).
4. Identify the magnitude of impacts and the significance of effects.
5. Carry out a WFD screening assessment.

The methodology for these activities is discussed in further detail in the sections below.

8.2.2.2 Study Area

The study area for the purposes of this assessment includes a 500m buffer either side of the proposed development. The study area has been determined based on professional judgement, as impacts to land, soils and hydrogeology from the proposed relatively shallow and narrow route are considered unlikely to extend beyond this distance. Consideration has however been given to sensitive features such as springs and boreholes up to 1km from the route which might be impacted by dewatering.

8.2.2.3 Identification of Receptors

Receptors identified in Table 8- 1 are identified within 500m of the proposed route.

Table 8.1: Key receptors

Area	Key Receptor
Land Use	Land use types and potential contaminants
Soils	Soils
Geology	Quaternary Subsoils
	Bedrock Geology
	Geological Heritage Sites
	Economic Geological Sites
Hydrogeology	Aquifers
	Groundwater abstractions including Source Protection Zones (SPZs)
	Groundwater discharges
	Karst features
	Designated sites that are likely to be hydrologically or hydrogeologically connected to the proposed scheme
	Groundwater-dependent terrestrial ecosystems
	Aquifer vulnerability

8.2.2.4 Assessment of Sensitivity of Receptors

The sensitivity of land, soils, and hydrogeology receptors has been assessed in accordance with the National Roads Authority qualitative guidelines (National Roads Authority, 2009), as shown in Table 8-2.

Quantitative guidance regarding the sensitivity of land, land use, soil, sub-soil, and hydrogeological receptors is not available within the NRA guidance (National Roads Authority, 2009). As such, professional judgement has been used to assign receptor values based on the perceived ecological, economic and societal value of land use types, with rationale provided as appropriate in Section 8.3.

Table 8-2: Sensitivity of Receptors

Importance	Criteria	Typical Examples Hydrogeology	Typical Examples Soils and Geology
Extremely High	• Attribute has a high quality or value on an international scale.	• Groundwater supports river, wetland or surface water body ecosystem protected by EU legislation, e.g., SAC or SPA status.	Not provided
Very High	• Attribute has a high quality, significance, or value on a regional or national scale. • Degree or extent of soil contamination is significant on a national or regional scale. • Volume of peat and / or soft organic soil underlying route is significant on a national or regional scale.	• Regionally Important Aquifer with multiple wellfields. • Groundwater supports river, wetland or surface water body ecosystem protected by national legislation - NHA status. • Regionally important potable water source supplying >2500 homes Inner source protection area for regionally important water source.	• Geological feature rare on a regional or national scale (NHA). • Large existing quarry or pit. • Proven economically extractable mineral resource.
High	• Attribute has a high quality, significance, or value on a local scale. • Degree or extent of soil contamination is significant on a local scale. • Volume of peat and / or soft organic soil underlying site is significant on a local scale.	• Regionally Important Aquifer Groundwater provides large proportion of baseflow to local rivers. • Locally important potable water source supplying >1000 homes. • Outer source protection area for regionally important water source. • Inner source protection area for locally important water source.	• Contaminated soil on site with previous heavy industrial usage. • Large recent landfill site for mixed wastes. • Geologically feature of high value on a local scale (County Geological Site). • Well drained and / or high fertility soils. • Moderately sized existing quarry or pit. • Marginally economic extractable mineral resource.
Medium	• Attribute has a medium quality, significance, or value on a local scale. • Degree or extent of soil contamination is moderate on a local scale. • Volume of peat and / or soft organic soil underlying site is moderate on a local scale.	• Locally Important Aquifer. • Potable water source supplying >50 homes. • Outer source protection area for locally important water source.	• Contaminated soil on site with previous light industrial usage. • Small recent landfill site for mixed wastes. • Moderately drained and / or moderate fertility soils. • Small existing quarry or pit. • Sub-economic extractable mineral resource.

Table 8-2: Sensitivity of Receptors

Importance	Criteria	Typical Examples Hydrogeology	Typical Examples Soils and Geology
Low	• Attribute has a low quality, significance, or value on a local scale. • Degree or extent of soil contamination is minor on a local scale. • Volume of peat and / or soft organic soil underlying site is small on a local scale.	• Poor Bedrock Aquifer Potable water source supplying <50 homes.	• Large historical and / or recent site for construction and demolition wastes. • Small historical and / or recent site for construction and demolition wastes. • Poorly drained and / or low fertility soils. • Uneconomically extractable mineral resource.

8.2.2.5 Assessment of Magnitude of Impact and Significance of Effect

The sensitivity of the receptor (Table 8-2) and the magnitude of impact (Table 8-3) to the receptor determines significance of an effect (Table 8-4).

The terms used to define magnitude of impact, sensitivity of receptors and significance of effect are in accordance with National Roads Authority guidelines (National Roads Authority, 2009) for soils, geological and hydrogeological receptors.

The National Roads Authority (National Roads Authority, 2009) guidelines state that minor, moderate or major beneficial impacts are “positive” impacts. Minor, moderate or major adverse impacts are considered “negative” impacts. Negligible impacts are considered “neutral” impacts. Impacts may further be categorised according to type; they may be “direct”, or “indirect”, or in the case of a negligible/neutral impact have “no predicted impact”.

Additionally, the EPA (Environmental Protection Agency, 2022) further considers “positive”, negative” and “neutral” quality indicators, and “direct” and “indirect” type indicators, as significance of effect descriptors.

Table 8-3 Criteria for rating magnitude of impact

Magnitude of Impact	Criteria	Typical Examples Hydrogeology	Typical Examples Soils and Geology
Large Adverse (Negative) – Direct – Indirect	• Results in loss of attribute and / or quality and integrity of attribute.	• Removal of large proportion of aquifer • Changes to aquifer or unsaturated zone resulting in extensive change to existing water supply springs and wells, river baseflow or ecosystems • Potential high risk of pollution to groundwater from routine run-off • Calculated risk of serious pollution incident >2% annually	• Loss of high proportion of future quarry or pit reserves • Irreversible loss of high proportion of local high fertility soils • Removal of entirety of geological heritage feature • Requirement to excavate / remediate entire waste site • Requirement to excavate and replace high proportion of peat, organic soils and/or soft

Magnitude of Impact	Criteria	Typical Examples Hydrogeology	Typical Examples Soils and Geology
			mineral soils beneath alignment
Moderate Adverse (Negative) – Direct – Indirect	• Results in impact on integrity of attribute or loss of part of attribute.	• Removal of moderate proportion of aquifer • Changes to aquifer or unsaturated zone resulting in moderate change to existing water supply springs and wells, river baseflow or ecosystems • Potential medium risk of pollution to groundwater from routine run-off • Calculated risk of serious pollution incident >1% annually	• Loss of moderate proportion of future quarry or pit reserves • Removal of part of geological heritage feature • Irreversible loss of moderate proportion of local high fertility soils • Requirement to excavate / remediate significant proportion of waste site • Requirement to excavate and replace moderate proportion of peat, organic soils and/or soft mineral soils beneath alignment
Small Adverse (Negative) – Direct – Indirect	• Results in minor impact on integrity of attribute or loss of small part of attribute.	• Removal of small proportion of aquifer • Changes to aquifer or unsaturated zone resulting in minor change to water supply springs and wells, river baseflow or ecosystems • Potential low risk of pollution to groundwater from routine run-off • Calculated risk of serious pollution incident >0.5% annually	• Loss of small proportion of future quarry or pit reserves • Removal of small part of geological heritage feature • Irreversible loss of small proportion of local high fertility soils and/or high proportion of local low fertility soils • Requirement to excavate / remediate small proportion of waste site • Requirement to excavate and replace small proportion of peat, organic soils and/or soft mineral soils beneath alignment
Negligible (Neutral) – No predicted impact	• Results in an impact on attribute but of insufficient magnitude to affect either use or integrity	• Calculated risk of serious pollution incident <0.5% annually	• No measurable changes in attributes
Minor Beneficial (Positive) – Direct – Indirect	• Results in minor improvement of attribute quality	• Not specified	• Minor enhancement of geological heritage feature
Moderate Beneficial (Positive) – Direct – Indirect	• Results in moderate improvement of attribute quality	• Not specified	• Moderate enhancement of geological heritage feature

Magnitude of Impact	Criteria	Typical Examples Hydrogeology	Typical Examples Soils and Geology
Major Beneficial (Positive) – Direct – Indirect	• Results in major improvement of attribute quality	• Not specified	• Major enhancement of geological heritage feature

Source: (National Roads Authority, 2009)

Table 8-4 Significance of effect

Sensitivity of Receptor		Magnitude of Impact: Negligible	Small	Moderate	Large
	Extremely High	Imperceptible	Significant	Profound	Profound
	Very High	Imperceptible	Moderate/ Significant	Significant/ Profound	Profound
	High	Imperceptible	Slight/ Moderate	Moderate/ Significant	Significant/ Profound
	Medium	Imperceptible	Slight	Moderate	Significant
	Low	Imperceptible	Imperceptible	Slight	Slight/ Moderate

Source: (National Roads Authority, 2009)

8.2.2.6 WFD Assessment Methodology

A baseline WFD screening assessment has been conducted against WFD status for three groundwater bodies which are intersected by the scheme. This screening determines whether the physical works require a further assessment to be compliant with the WFD. Further assessment may be required if the proposed works are significantly altered in the future.

Following this assessment, where mitigation can be incorporated to maximise opportunities for enhancement, the activity will be considered to have very low residual risk and therefore will be compliant with the WFD. Where mitigation cannot be incorporated, assessment against criteria presented in WFD Article 4.7 ‘deterioration of status or non-achievement of good status or potential under certain distinct conditions’) will be applied (European Union, 2000).

8.2.3 Limitations to this EIAR

Identification of land use, soils and hydrogeology has been undertaken using desktop data as identified in Section 8.2.1.2 Desk Top Assessment.

It is possible that additional karstic features may exist which have not been identified in this EIAR, however, the mitigation detailed and proposed within this EIAR will be implemented in the event that unexpected karstic features are encountered.

There were no other limitations encountered in compiling the information required to carry out this assessment of likely significant impacts on land, soils and hydrogeology as a result of the proposed development.

8.3 Receiving Environment

The following sections present an overview of the baseline features within the receiving environment. For each section, the baseline features are summarised under the route sections defined in Chapter 6 Description of the proposed development, which are summarised in Table 8-9.

The receiving environment has been identified using the methodology outlined in Section 8.2.2 Methodology, using the data sources identified in Section 8.2.1.2 Desk Top Assessment, which includes:

- Land and Land Use
  - Land use, based on review of Corine data.
- Soils and Geology
  - Soils, subsoils, bedrock geology and other geological receptors.
  - Mapped karst landforms including wells and springs.
  - Geological heritage.
  - Recorded geohazard events, primarily landslides, within 500m of the scheme
- Hydrogeology
  - Groundwater body and both quantitative and qualitative status classification as assigned under the WFD.
  - Groundwater abstractions from Public Supply Schemes, Group Water Schemes, and local domestic/agricultural/industrial boreholes and wells.
  - Groundwater Drinking Water Protection Areas.
  - Aquifer Type and Vulnerability.
  - Designated Special Area of Conservation and Special Protection Areas that may be hydrologically or hydrogeologically connected to the proposals.

8.3.1 Land and Land Use

Current land use (Corine, 2018) along the combined route sections is indicative of a largely suburban environment. The majority of land use types along the combined route options are man-made (e.g. airport, road and rail, urban fabric), while the are rural land use types (e.g. pasture or arable land).

Baseline land-use designations in Table 8-5 have been sub-divided by route section, with the length of route within each land use type indicated. Potential contaminants typically associated with identified land-uses, based on housing development guidelines on contaminated land (Fordyce, Engineer, Price, Beale, & Mallett, 2008) are also provided.

As discussed in section 8.2.2 professional judgement has been used to assign receptor values based on the perceived ecological, economic and societal value of land use types. Rural land use types (pastures, arable land) are assigned a medium sensitivity. Urban land use types (e.g. airport, road and rail, urban fabric) are considered low sensitivity.

EPA Waste mapping (Environmental Protection Agency, 2019) indicates a historical waste facility (license surrendered in 2017) located at its closest point 100m east of the Forest Little to Ballystruan route.

There are three licensed and one surrendered Integrated Pollution Control (IPC) sites within 500m of the scheme (Environmental Protection Agency, 2020), which may impact all route sections.

A map of land use types, including waste management facility and IPC locations, is in Volume 3 Appendix E1 drawing number 229100846-MMD-00-GIS-0001 of this EIAR.

Table 8-5 Land use baseline (CORINE, 2018)

Route Option	Land Use Type	Length of route (km)	Potential Contaminants	Sensitivity
Ballystruan to Newbury (5.1 km)	Industrial or commercial units	3.19	Metals/metalloids, inorganic and organic chemicals, hydrocarbons.	Low
	Discontinuous urban fabric	0.28	Pesticides, fertilisers, ammonium, organic compounds, hydrocarbons.	Low
	Non-irrigated arable land	0.38	Pesticides, fertilisers, ammonium, organic compounds, hydrocarbons.	Medium
	Pastures	1.09	Pesticides, fertilisers, ammonium.	Medium
	Road and rail networks and associated land	0.71	Metals/metalloids, sulphates, asbestos, hydrocarbons, organic compounds, hydrocarbons	Low
Forest Little to Ballystruan (9.8 km)	Airports	2.30	Metals/metalloids, asbestos, organic compounds, hydrocarbons, PFAS	Low
	Construction sites	1.56	Metals/metalloids, inorganic and organic chemicals, hydrocarbons.	Low
	Industrial or Commercial Units	1.78	Metals/metalloids, inorganic and organic chemicals, hydrocarbons.	Low
	Non-irrigated arable land	1.56	Pesticides, fertilisers, ammonium, organic compounds, hydrocarbons.	Medium
	Pastures	1.98	Pesticides, fertilisers, ammonium.	Medium
	Sport and leisure facilities	0.63	Petroleum, pesticides, fertilisers,	Low
Forest Little to Belcamp Option 1 (9 km)	Airports	0.02	Metals/metalloids, asbestos, organic compounds, hydrocarbons, PFAS	Medium
	Complex cultivation patterns	0.49	Pesticides, fertilisers, ammonium, organic compounds, hydrocarbons.	Medium
	Discontinuous urban fabric	2.04	Pesticides, fertilisers, ammonium, organic compounds, hydrocarbons.	Low
	Industrial or Commercial Units	0.76	Metals/metalloids, inorganic and organic chemicals, hydrocarbons.	Low
	Non-irrigated arable land	0.1	Pesticides, fertilisers, ammonium, organic compounds, hydrocarbons.	Medium
	Pastures	4.91	Pesticides, fertilisers, ammonium.	Medium
	Road and rail networks and associated land	0.14	Metals/metalloids, sulphates, asbestos, hydrocarbons, organic compounds, hydrocarbons	Low
Forest Little to Belcamp Option 2 (Ca. 4.4km)	Airports	0.02	Metals/metalloids, asbestos, organic compounds, hydrocarbons, PFOS	Low
	Non-irrigated arable land	1.53	Pesticides, fertilisers, ammonium, organic compounds, hydrocarbons.	Medium
	Pastures	1.64	Pesticides, fertilisers, ammonium.	Medium
	Road and rail networks and associated land	0.23	Metals/metalloids, sulphates, asbestos, hydrocarbons, organic compounds, hydrocarbons	Low

Route Option	Land Use Type	Length of route (km)	Potential Contaminants	Sensitivity
	Complex cultivation patterns	0.89	Pesticides, fertilisers, ammonium, organic compounds, hydrocarbons.	Medium

8.3.2 Soils and Geology

Soil receptors were identified using the Teagasc database (Environmental Protection Agency, Teagasc, Cranfield University, 2014). Quaternary subsoils and bedrock were identified using the Geological Survey of Ireland (Geological Survey Ireland, 2018) database. Soils and geology maps are included in Volume 3 Appendix E2-5, drawings 229100846-MMD-00-GIS-0006, 229100846-MMD-00-GIS-0005, 229100846-MMD-00-GIS-0008, 229100846-MMD-00-GIS-0004 of this EIAR.

8.3.2.1 Soils

Soils are predominantly 'Fine loamy drift with limestones' or 'Urban', with some 'River alluvium'.

Soil sensitivity/value is based on the classifications in Table 8-2. Soils identified as 'loamy' or 'alluvium' are considered well drained and/or highly fertile and are classified as having High sensitivity. 'Urban' soil type is considered potentially significantly contaminated and also has High sensitivity.

8.3.2.2 Subsoils

Quaternary subsoils are predominantly 'Till derived from limestone', or 'Gravel derived from limestone'. Alluvium is also present.

According to geotechnical reports obtained from GSI Geotechnical Viewer (Geological Survey Ireland, 2022), Till comprises sandy gravelly clay in the vicinity of Dublin airport. Till is therefore considered moderately poorly drained for the purposes of this assessment, and therefore has Low sensitivity, subject to confirmation by infiltration testing. Alluvium and gravel are considered well drained and/or highly fertile and have High sensitivity.

8.3.2.3 Geology

Geological heritage sites have been identified from GSI Geological Heritage mapping (Geological Survey of Ireland, 2021). There are no geological heritage sites within 500m of the proposed development.

Landslide events and susceptibility have been identified from GSI Geohazard mapping (Geologicial Survey of Ireland, 2016). No landslide events have been recorded within 500m of the scheme. The landslide susceptibility within 500m of the scheme is 'low' or 'moderately low'.

Table 8-6 Soils and Geology

Route Option	Receptor	Length of route (km)	Receptor Value
Soils			
Ballystruan to Newbury (5.1 km)	Urban	3.43	High
	Elton (Fine loamy drift with limestones)	1.67	High

Route Option	Receptor	Length of route (km)	Receptor Value
Forest Little to Ballystruan (9.8 km)	Urban	2.40	High
	Elton (Fine loamy drift with limestones)	4.26	High
	Straffan (Fine loamy drift with limestones)	2.40	High
Forest Little to Belcamp Option 1 (9km)	Urban	1.16	High
	Elton (Fine loamy drift with limestones	7.17	High
	River (River alluvium)	0.15	High
Forest Little to Belcamp Option 2 (Ca. 4.4km)	Elton (Fine loamy drift with limestones	4.3	High
Quaternary subsoils			
Ballystruan to Newbury (5.1 km)	Alluvium	0.06	High
	Till derived from limestones	5.04	Low
Forest Little to Ballystruan (9.8 km)	Alluvium	0.34	High
	Till derived from limestones	2.07	Low
	Gravels derived from limestones	7.39	High
Forest Little to Belcamp Option 1 (9km)	Alluvium	0.17	High
	Till derived from limestones	8.34	Low
Forest Little to Belcamp Option 2 (Ca. 4.4km)	Till derived from limestones	4.30	Low
Bedrock Geology			
Ballystruan to Newbury (5.1 km)	Lucan Formation (Dark limestone & shale)	3.45	Sensitivity/value of bedrock aquifers is considered in Table 8-7
	Tober Colleen Formation (Calcareous shale, limestone conglomerate)	1.65	
Forest Little to Ballystruan (9.8 km)	Malahide Formation (Argillaceous bioclastic limestone, shale)	8.08	
	Tober Colleen Formation (Calcareous shale, limestone conglomerate)	1.74	
Forest Little to Belcamp Option 1 (9 km)	Malahide Formation (Argillaceous bioclastic limestone, shale)	2.51	

Route Option	Receptor	Length of route (km)	Receptor Value
	Tober Colleen Formation (Calcareous shale, limestone conglomerate)	4.95	
	Waulsortian Limestones (Massive, unbedded lime-mudstone)	1.03	
Forest Little to Belcamp Option 2 (Ca. 4.4km)	Tober Colleen Formation (Calcareous shale, limestone conglomerate)	3.7	
	Waulsortian Limestones (Massive, unbedded lime-mudstone)	0.5	
	Malahide Formation (Argillaceous bioclastic limestone, shale)	0.1	
Geological Heritage Sites			
No Geological heritage sites present within 500m of the scheme. The closest geological heritage sites are Feltrim Quarry, which is located approximately 1.1km north-east of the scheme, and Huntstown Quarry which is located approximately 1km southwest of the scheme. Both are working fossiliferous limestone quarries.			
Landslide Susceptibility Mapping			
No landslide events have been recorded within 500m of the scheme. The landslide susceptibility within 500m of the scheme is 'low' or 'moderately low'.			

8.3.3 Hydrogeology

Groundwater karst features, aquifer designations, aquifer vulnerability, wells, springs, boreholes and source protection zones (group and public) have been identified using GSI Groundwater Data Viewer (Geological Survey of Ireland, 2019).

Aquifer types are grouped by the GSI according to resource potential (regional, locally important or poor) and the type of groundwater flow (fissures, karst conduits or intergranular) (Geological Survey of Ireland, 2019). There are nine aquifer categories in total.

Aquifer sensitivity/value is based on the classifications in Table 8-2: Sensitivity of Receptors.

Aquifers which are identified by GSI as 'Locally Important' or 'Moderately productive' are classified as Medium sensitivity. Those which are identified by GSI as 'Poor' or 'Unproductive' are classified as Low sensitivity.

Groundwater vulnerability has been identified using GSI Groundwater Data Viewer (Geological Survey of Ireland, 2019). Groundwater vulnerability indicates how rapidly contaminants on the ground might reach the aquifer and is a function of soil and sub-soil thickness and permeability. Areas where there is no soil or subsoil protection above an aquifer (i.e., outcrops) are considered highly vulnerable. There are a number of areas of outcrop along the proposed route, which are considered highly vulnerable. Groundwater vulnerability decreases with distance from outcrop, as shown in mapping in Volume 3 Appendix E7, drawing number 229100846-MMD-00-GIS-0003 of this EIAR.

As there are no designated groundwater source protection areas within the Study Area, the sensitivity of borehole abstractions has been considered as follows;

- Abstraction for unknown, industrial or agricultural use is considered Medium sensitivity; and
- Abstraction for private drinking water supply is considered High sensitivity.

The sensitivity of groundwater-fed wells and springs is considered as follows;

- Groundwater-fed springs and wells are considered High sensitivity.

Notable groundwater-fed wells within the study area are of cultural significance (holy wells). Impacts to cultural receptors are further assessed in Chapter 15 - Archaeology, Architectural and Cultural Heritage.

Monitoring records of groundwater levels along the route are not available at the time of preparation of this chapter. Wells and springs adjacent to the route are assumed groundwater-fed, indicating locally shallow groundwater levels. The assessment therefore conservatively assumes shallow groundwater levels in order to infer maximum dewatering impacts.

Hydrogeological maps are included in Volume 3 Appendix E6-7, drawing numbers 229100846-MMD-00-GIS-0003 and 229100846-MMD-00-GIS-0007 of this EIAR.

Table 8-7 Hydrogeology

Route Segment	Receptor	Length/Distance to receptor (km)	Receptor value
Aquifers			
Ballystruan to Newbury (5.1 km)	Tober Colleen Formation Poor Aquifer - Bedrock which is Generally Unproductive except for Local Zones	1.6 km of route is within this receptor	Low
	Lucan Formation Locally Important Aquifer - Bedrock which is Moderately Productive only in Local Zones	3.5 km of route is within this receptor	Medium
Forest Little to Ballystruan (9.8 km)	Tober Colleen Formation Poor Aquifer - Bedrock which is Generally Unproductive except for Local Zones	1.7 km of route is within this receptor	Low
	Malahide Formation Locally Important Aquifer - Bedrock which is Moderately Productive only in Local Zones	8.1 km of route is within this receptor	Medium
Forest Little to Belcamp Option 1 (9 km)	Tober Colleen Formation Poor Aquifer - Bedrock which is Generally Unproductive except for Local Zones	4.9 km of route is within this receptor	Low
	Malahide Formation, Waulsortian Limestones Locally Important Aquifer - Bedrock which is Moderately Productive only in Local Zones	3.5 km of route is within this receptor	Medium
Forest Little to Belcamp Option 2 (Ca. 4.4km)	Tober Colleen Formation Poor Aquifer - Bedrock which is Generally Unproductive except for Local Zones	3.7 km of the route is within this receptor	Low
	Malahide Formation, Waulsortian Limestones Locally Important Aquifer - Bedrock which is Moderately Productive only in Local Zones	0.7 km of the route is within this receptor	Medium
Source Protection Areas			
There are no Group Scheme or Public Supply Source Protection Areas within 10km of the proposed route.			
Wells and Springs			
Forest Little to Ballystruan (9.8 km)	St Margaret's Well 1 and 2 (warm spring) *Groundwater Wells and Springs* (Geological Survey of Ireland, 2019)	300m west of route	High
Ballystruan to Newbury (5.1 km)	Toberbunny Spring	700m north-east of route	High

Route Segment	Receptor	Length/Distance to receptor (km)	Receptor value
	Groundwater Wells and Springs (Geological Survey of Ireland, 2019)		
Forest Little to Belcamp Option 1 *(9 km)*	St Doolagh's Well/St Catherine's Pond Limestone spring. *Groundwater Karst Features* (Geological Survey of Ireland, 2019)	40m west of route	High
Forest Little to Belcamp Option 2 *(Ca. 4.4km)*	Toberbunny Spring *Groundwater Wells and Springs* (Geological Survey of Ireland, 2019)	1 km west of route	High
Abstractions			
Forest Little to Ballystruan *(9.8 km)*	Borehole 2923NEW017 – Use not specified. Depth 9.1m Yield 164m^3/d	300m west of route	Medium
	Borehole 2923NEW035 – Use not specified. Depth 60m. Yield 48.5m^3/d	700m south of route	Medium
	Borehole 2923NEW034 - Industrial Use. Depth 13.7m. Yield 300m^3/d	Approximately 1km from both *Forest Little to Ballystruan* and *Ballystruan to Newbury*	Medium
Ballystruan to Newbury *(5.1 km)*	Borehole 2923NEW036 - Industrial Use. Depth 91.4m. Yield 87m^3/d	Cluster including these boreholes and trial wells is located approximately 300m south of route	Medium
	Borehole 2923NEW016 – Domestic use. Depth 35.4m. Yield 109m^3/d		High
Forest Little to Belcamp Option 2 *(Ca. 4.4km)*	Borehole 2923NEW034 - Industrial Use. Depth 13.7m. Yield 300m^3/d	Approximately 400m to 600m south and west of route.	Medium
Groundwater/Surface water interactions			
"Wells and Springs" are identified above. No additional groundwater/surface water interaction features have been identified in relation to ecologically designated SPA/SAC sites, the closest of which are estuarine/marine and therefore not considered groundwater-dependant. The Map of Irish Wetlands (Wetland Surveys Ireland, 2021) indicates St Doolagah's Quarry, which is located approximately 500m west of the Forest Little to Ballystruan route option, contains a lake resulting from flooding of the quarry. It is possible that lake recharge may include groundwater and surface water components.			
Karst Features			
Groundwater karst features are identified under "Wells and Springs" above			

8.3.3.1 WFD Groundwater Bodies

All Water Framework Directive (WFD) groundwater bodies have been identified in Catcments.ie (Environmental Protection Agency, 2020) as Drinking Water Protected Areas, due to the *potential* for qualifying abstractions of water for human consumption as defined under Article 7 of the Water Framework Directive. The groundwater drinking water protected areas (DWPA) are represented by the full extent of each WFD groundwater body (Environmental Protection Agency, 2018).

There are currently no designated public supply or group scheme source protection areas within 10km of the scheme.

The Swords and Dublin WFD Groundwater bodies have been identified in GSI Groundwater Data Viewer (Geological Survey of Ireland, 2019) as intersecting with Designated Special Areas of Conservation (SAC) and Designated Special Protection Areas (SPA) conservation objective habitats under the EU Habitats Council Directive 92/43/EE (1992), and therefore have been designated in entirety as protected areas for Groundwater in SPA/SAC habitats.

The closest SPA/SAC areas to the scheme are estuarine/marine related habitats, located at least 2km downgradient topographically of the scheme. For the purposes of this assessment, marine or estuarine SPAs and SCAs are not considered Groundwater Dependant Terrestrial Ecosystems (GWDTE).

A WFD groundwater body map is included in Volume 3 Appendix E8, drawing number 229100846-MMD-00-GIS-0002 of this EIAR, which includes SPA/SAC nature conservation sites.

Table 8-8: WFD Groundwater Bodies

Route Option	Groundwater Body (Cycle 2)	Overall Groundwater Status (2018)	Quantitative Groundwater Body Status (2018)	Chemical Groundwater Status (2018)	Protected Areas	Receptor Value
Ballystruan to Newbury (5.1 km)	Dublin (5.1 km)	Good	Good	Good	• Drinking water protected area • Groundwater in SPA/SAC habitats	Very high
Forest Little to Ballystruan (9.8 km)	Dublin (3.1 km)	Good	Good	Good	• Drinking water protected area • Groundwater in SPA/SAC habitats	Very high
	Industrial Facility (1.1 km)	Poor	Good	Poor	• Drinking water protected area	Very high
	Swords (5.6k m)	Good	Good	Good	• Drinking water protected area • Groundwater in SPA/SAC habitats	Very high
Forest Little to Belcamp Option 1 (9 km)	Industrial Facility (1.5k m)	Poor	Good	Poor	• Drinking water protected area	Very high
	Dublin (7.0 km)	Good	Good	Good	• Drinking water protected area • Groundwater in SPA/SAC habitats	Very high

Route Option	Groundwater Body (Cycle 2)	Overall Groundwater Status (2018)	Quantitative Groundwater Body Status (2018)	Chemical Groundwater Status (2018)	Protected Areas	Receptor Value
Forest Little to Belcamp Option 2 (Ca. 4.4km)	Industrial Facility (1.6k m)	Poor	Good	Poor	• Drinking water protected area	Very high
	Dublin (2.7 km)	Good	Good	Good	• Drinking water protected area • Groundwater in SPA/SAC habitats	Very high

8.4 Key Elements of the Proposed Development

Details of the proposed development are detailed in Chapter 6. A summary of aspects of the proposed development which are of note for land, soils and hydrogeology is provided in Table 8-9.

Table 8-9 Proposed Development Details

Asset	Route	Length of route / Frequency	Description
Trench[1]	*Ballystruan to Newbury*	5.1 km	110kV cable route. Road trench average dimensions 0.6m wide x 1.5m deep.
	Forest Little to Ballystruan	9.8 km	110kV/220kV Forest Little to Ballystruan trench dimensions 1.1m wide and 1.25m deep.
	Forest Little to Belcamp Option 1	9 km	Off-road dimensions may vary to avoid obstacles.
	Forest Little to Belcamp Option 2	4.3km	
110 kV Joint Bay	*All routes*	Approximately every 700m.	110kV joint bays each 6m long x 2.5m wide x 2.1m deep.
220 kV Joint Bay	*Forest Little to Belcamp*	Approximately every 700m.	220kV joint bays each 8m long x 2.5m wide x 2.1m deep.

8.5 Likely Significant Impacts of the Proposed Development

Construction phase effects considered include those which have the potential to impact the following receiving environments:

- Land and land use
- Soils and Geology

[1] For the purposes of this assessment, it is conservatively assumed that trenches will be required along the entirety of the proposed route. It is however understood that existing ducting may be used where feasible, and that trenchless techniques will be used under major roads and at river crossings.

- Hydrogeology

The construction phase activities of relevance to Land, soils and hydrogeology relate primarily to the excavation of trenches and joint bays and temporary dewatering of excavations during construction, summarised in Table 8-11Table 8-10.

8.5.1 Construction Phase

Table 8-10 Construction phase assessment of effects

Route Segment	Receiving Environment	Construction Phase Impacts	Design and construction best practice mitigation measures	Magnitude of remaining impact, sensitivity and effect	Duration of effect
All	Land Use	Quantitative loss of arable land.	Trench construction will be in small sections which will be negligible in scale compared to adjacent land use. The land surface above trenches and joint bays will be restored during construction to be similar to the existing. Agricultural crops on arable land would however be locally directly impacted by trench or joint bay construction.	Magnitude of impact: **Negative**. **Small adverse. Direct** Receptor Sensitivity: **Low, Medium** Significance of effect: **Negative. Slight adverse*[2]. Direct.** *Effect on crops in arable land would be local only to zone of construction.*	Construction (permanent and temporary)
All	Soils and Geology	Quantitative loss of soil and bedrock.	Excavated trench material may be used to partially backfill the trenches, Excess will be transported off site for disposal at a licenced facility.	Magnitude of impact: **Negative**. **Small adverse. Direct** Receptor Sensitivity: **Low, Medium, High** Significance of effect: **Negative. Slight adverse*[3]. Direct.** *Irreversible loss of soils and bedrock from linear shallow excavations is not expected to significantly impact local or regional scale soil or geological receptors.*	Construction (permanent)
All	Soils	Excavation of contaminated soils, if encountered, may release contaminants into the environment.	Contaminated soils will be taken off site in trucks and disposed of under licence from the relevant authority in accordance with the Waste	Magnitude of impact: **Neutral. Negligible. No predicted impact.** Receptor Sensitivity: **Low, Medium, High**	Construction (temporary)

[2] Significance values which have a choice between two options within the significance matrix are indicated by an asterisk (*), with justification provided for the choice

[3] Significance values which have a choice between two options within the significance matrix are indicated by an asterisk (*), with justification provided for the choice

Route Segment	Receiving Environment	Construction Phase Impacts	Design and construction best practice mitigation measures	Magnitude of remaining impact, sensitivity and effect	Duration of effect
			Framework Directive (European Commission, 2008). The risk to construction workers from dermal contact, inhalation, or ingestion of contaminated soil is excluded from this assessment as appropriate PPE will be worn during construction. The risk of ground gas (explosive risk) is excluded from this assessment as the route does not include buildings or confined spaces in which ground gas might accumulate. The risk of encountering asbestos within made ground will be assessed by a qualified professional and is excluded from this assessment.	Significance of effect: **Neutral. Imperceptible. No predicted impact.**	
All	Soils and Geology	Water discharge to land from dewatering of trenches and joint bays, impacts soil quality.	Dewatering discharge will be pumped through silt socks to a percolation area if the soil is not saturated, otherwise a settlement tank will be used to remove solids prior to discharge.	Magnitude of impact: **Neutral. Negligible. No predicted impact.** Receptor Sensitivity: **Medium to High** Significance of effect: **Neutral. Imperceptible. No predicted impact.**	Construction (temporary)
All	Soils and Geology, Hydrogeology	Contamination risk to soils and groundwater receptors from storage of excavated material Contamination risk to soils and aquifer from spillage of contaminants such as fuel.	Excavated material will be stored within a bund on level ground outside the floodplain and at least 15m from drains and watercourses The base of temporary soil stockpiles will be protected by silt fencing. Regular visual monitoring of the silt fence will be undertaken, and further protection added as required. Refuelling will not take place within the vicinity of exposed excavations, karst receptors or watercourses. Spill kits will be available. Daily visual and	Magnitude of impact: **Neutral. Negligible. No predicted impact.** Receptor Sensitivity: **Medium to High** Significance of effect: **Neutral. Imperceptible. No predicted impact.**	Construction (temporary)

Route Segment	Receiving Environment	Construction Phase Impacts	Design and construction best practice mitigation measures	Magnitude of remaining impact, sensitivity and effect	Duration of effect
			olfactory inspection of evacuations by a suitably qualified person. Contaminated materials will be disposed of in a licensed facility.		
All	Soils and Geology, Hydrogeology	Change to recharge potential due to compaction of soils by heavy plant.	Machinery will be managed to ensure that the number of trips is limited to the minimum required at each location. Geotextile or timber matting will be used on soft ground, and in all protected areas	Magnitude of impact: **Neutral. Negligible. No predicted impact.** Receptor Sensitivity: **Medium to High** Significance of effect: **Neutral. Imperceptible. No predicted impact.**	Construction (temporary)
All	Hydrogeology	Karst features exposed during construction may provide a contaminant pathway to the aquifer, may impact hydraulic connectivity within the aquifer and may collapse, locally impacting stability and subsidence risk.	Karst features exposed during construction will be inspected by a suitably qualified professional. Karst voids may be filled with permeable material to maintain hydraulic connectivity and overlain with impermeable membrane for protection. Plant movements will be limited in the vicinity of karst features to prevent karst collapse.	Magnitude of impact: **Neutral. Negligible. No predicted impact.** Receptor Sensitivity: **Medium to High** Significance of effect: **Neutral. Imperceptible. No predicted impact.**	Construction (temporary)
Forest Little to Ballystruan Option 1 and Option 2	Hydrogeology	Dewatering of trenches and joint bays mobilises leachate or hazardous material from contaminated sites, which may infiltrate to the aquifer. A historic waste facility is located at its closest point 100m east of the *Forest Little to Ballystruan* route (Environmental Protection Agency, 2019). Three Integrated Pollution Control sites are located within 500m of the route.	Daily visual and olfactory inspection of excavations by a suitably qualified person. Where contaminated water is encountered in trenches, the water will be tankered off site for disposal in a licensed facility or pumped to a portable on-site settlement tank for treatment. These operations will be monitored by a designated competent member of the construction team on a regular basis to ensure that they are working effectively.	Magnitude of impact: **Neutral. Negligible. No predicted impact.** Receptor Sensitivity: **Medium to High** Significance of effect: **Neutral. Imperceptible. No predicted impact.**	Construction (temporary)

Route Segment	Receiving Environment	Construction Phase Impacts	Design and construction best practice mitigation measures	Magnitude of remaining impact, sensitivity and effect	Duration of effect
All	Hydrogeology	Dewatering of trenches and joint bays during construction locally affects bedrock aquifer groundwater flows and levels. Dewatering may cause temporary changes in groundwater flows and levels, local to the trench sections.	None required. Groundwater levels are expected to recover quickly.	**Temporary** Magnitude of impact: **Negative**. **Small adverse. Direct.** Receptor Sensitivity: **Low to Medium** Significance of effect: **Negative. Slight adverse***[4].**Direct.** *Shallow, local effect which is insignificant at aquifer scale*. **Permanent** Magnitude of impact: **Neutral. Negligible. No predicted impact.** Receptor Sensitivity: **Low to Medium** Significance of effect: **Neutral. Imperceptible. No predicted impact.**	Construction (temporary & permanent)
All	Hydrogeology	Dewatering of trenches and joint bays during construction affects groundwater abstractions. Dewatering may cause temporary changes in groundwater flows and levels local to the trench sections. Domestic and industrial abstractions located approximately 300m from *Ballystruan to Newbury* route option. The top of bedrock is expected to be at least 5m below ground level in the	Groundwater levels are expected to recover quickly. A no-derogation agreement will be made with the owner/operator of sources that might be impacted by dewatering. In the unlikely event that groundwater was significantly impacted during construction, measures, such as tankered supply, would be taken to maintain supplies.	**Temporary** Magnitude of impact: **Negative**. **Small adverse. Direct.** Receptor Sensitivity: **Medium to High** Significance of effect: **Negative**. **Slight adverse***[5]. **Direct.** *Shallow excavations in subsoils expected to have little impact on deeper bedrock aquifer.*	Construction (temporary & permanent)

[4] Significance values which have a choice between two options within the significance matrix are indicated by an asterisk (*), with justification provided for the choice
[5] Significance values which have a choice between two options within the significance matrix are indicated by an asterisk (*), with justification provided for the choice

Route Segment	Receiving Environment	Construction Phase Impacts	Design and construction best practice mitigation measures	Magnitude of remaining impact, sensitivity and effect	Duration of effect
		immediate vicinity of the abstraction sources, and at least 3m below ground level within a 1km radius of the sources (Geological Survey of Ireland, 2011). Dewatering of subsoil excavations of up to 2.1m depth, in the vicinity of these abstraction sources is considered unlikely to significantly impact the bedrock aquifer.	Abstraction sources identified in Table 8-7 which are over 300m from the route, or of unknown (possibly historic) use, are considered unlikely to be impacted by the scheme and no further mitigation is required.	**Permanent** Magnitude of impact: **Neutral. Negligible. No predicted impact.** Receptor Sensitivity: **Medium** Significance of effect: **Neutral. Imperceptible. No predicted impact.**	
All	Hydrogeology	Dewatering of trenches and joint bays during construction affects springs and wells. Dewatering may cause temporary changes in groundwater flows and levels local to the trench sections. ● St Margaret's well, also known as St Brigid's, is located 300m from the *Forest Little to Ballystruan* route option. It was once groundwater-fed but is now mostly dry due to local drainage alterations (Branigan(a), 2012) and is therefore unlikely to be impacted by trench dewatering. ● St Doolagh's well is located within 40m of the *Forest Little to Belcamp Option 1*. St Catherine's pond is understood to be an overflow from the well (Branigan(b), 2012) . Both well and pond may be temporarily impacted by local trench dewatering. ● Toberbunny is located approximately 700m from the	No mitigation is possible in relation to the impact of dewatering on springs and wells. St. Doolagh's Well and St Catherine's pond may be temporarily impacted during dewatering. Groundwater levels are however expected to recover quickly. Monitoring requirements are considered in Section 8.6.2 Monitoring measures.	**Temporary** Magnitude of impact: **Negative**. **Small adverse**. **Direct.** Receptor Sensitivity: **High** Significance of effect: **Negative**. **Moderate adverse***[6]. **Direct.** *St Doolagh's well and St Catherine's pond are located within 40m of the route and may be temporarily affected.* **Permanent** Magnitude of impact: **Neutral. Negligible. No predicted impact.** Receptor Sensitivity: **High** Significance of effect: **Neutral. Imperceptible. No predicted impact.** *Note: The impact of construction on St Doolagh's Well as a cultural receptor*	Construction (temporary & permanent)

[6] Significance values which have a choice between two options within the significance matrix are indicated by an asterisk (*), with justification provided for the choice

Route Segment	Receiving Environment	Construction Phase Impacts	Design and construction best practice mitigation measures	Magnitude of remaining impact, sensitivity and effect	Duration of effect
		Newbury to Ballystruane route option and over 1km from *Forest Little to Ballystruan Option 2*. The spring is understood to be dry (Branigan(c), 2012). Due to its distance from the route and its current dry condition, this spring is considered unlikely to be impacted by dewatering.		*is considered in Chapter 15: Archaeology, Architectural and Cultural Heritage.*	
All	Hydrogeology	Spillages of potentially contaminating materials in trenches cause contamination of the aquifer. • Spillages may directly impact groundwater in trenches. • Areas of increased groundwater vulnerability coincide with areas of outcrop specifically on the *Forest Little to Ballystruan* and *Forest Little to Belcamp* route options. Excavation within these areas has potential to locally increase groundwater vulnerability, whereby spillages of potentially contaminating materials may rapidly reach the aquifer.	Trench construction will be in small sections with daily visual and olfactory inspection of evacuations by a suitably qualified person. Refuelling will not take place within the vicinity of exposed excavations, karst receptors or watercourses. Spill kits will be available. Contaminated materials will be disposed of in a licensed facility.	Magnitude of impact: **Neutral. Negligible. No predicted impact.** Receptor Sensitivity: **Medium** Significance of effect: **Neutral. Imperceptible. No predicted impact.**	Construction (temporary)
All	Hydrogeology	Trenches or ducts provide preferential pathway for groundwater	Industry accepted best practice for trench backfill, including the use of clay barriers at regular intervals, will be adopted to prevent trench infill materials acting as groundwater drain. Sections of ducting will be sealed both ends in preparation for subsequent cable installation.	Magnitude of impact: **Neutral. Negligible. No predicted impact.** Receptor Sensitivity: **Medium** Significance of effect: Neutral. Imperceptible. No predicted impact.	Construction (temporary and permanent)
All	Hydrogeology	Directional drilling impacts aquifer characteristics.	Where directional drilling through bedrock is required, industry best	Magnitude of impact: **Neutral. Negligible. No predicted impact.**	Construction (temporary and permanent)

Route Segment	Receiving Environment	Construction Phase Impacts	Design and construction best practice mitigation measures	Magnitude of remaining impact, sensitivity and effect	Duration of effect
			practice for works of this nature will ensure minimal disturbance to the surrounding aquifer.	Receptor Sensitivity: **Medium** Significance of effect: **Neutral. Imperceptible. No predicted impact.**	

8.5.2 Operational Phase

Operational phase effects considered include those which have the potential to impact the following receiving environments:

- Land and land use
- Soils and Geology
- Hydrogeology

Operational phase activities assessed relate to the long-term impact of the excavated trenches and joint bays, summarised in Table 8-12

Table 8-11 Operational phase assessment of effects

Route Segment	Receiving Environment	Operational Phase Impacts	Avoidance and mitigation measures included in design	Magnitude of remaining impact and effect	Duration of effect
All	Land and Land Use	Quantitative loss of arable land	Avoidance of third party lands for agricultural use is preferred, due to potential interference from root systems or digging.	Magnitude of impact: **Negative**. **Small adverse. Direct** Receptor Sensitivity: **Low, Medium** Significance of effect: **Negative. Slight adverse*[7]. Direct.** *Permanent effect upon agricultural use in arable*	Operational lifetime

[7] Significance values which have a choice between two options within the significance matrix are indicated by an asterisk (*), with justification provided for the choice

Route Segment	Receiving Environment	Operational Phase Impacts	Avoidance and mitigation measures included in design	Magnitude of remaining impact and effect	Duration of effect
				land would be local only to land above trench and joint bay locations.	
All	Soils	Risk of ground gas in joint bays	The risk of ground gas (explosive risk) collecting in joint bays will be mitigated by adequate venting. Appropriate PPE will be worn during maintenance activities.	Magnitude of impact: **Neutral. Negligible. No predicted impact.** Receptor Sensitivity: **Low, Medium, High** Significance of effect: **Neutral. Imperceptible. No predicted impact.**	Operation/Maintenance
All	Soils and Geology	No soils and geology impacts anticipated during operational phase	None required	Magnitude of impact: **Neutral. Negligible. No predicted impact.** Receptor Sensitivity: **Low, Medium, High** Significance of effect: **Neutral. Imperceptible. No predicted impact.**	Operational lifetime
All	Hydrogeology	Subsurface structures act as a barrier to groundwater flow. Joint bays are the deepest subsurface structures with depths of approximately 2.1m.	None required. Shallow subsurface structures are considered unlikely to significantly impede groundwater flow.	Magnitude of impact: **Neutral. Negligible. No predicted impact.** Receptor Sensitivity: **Medium** Significance of effect: **Neutral. Imperceptible. No predicted impact.**	Operational lifetime

8.5.3 Do Nothing

The 'Do-nothing' alternative describes the circumstance where the proposed development does not occur. There will be no impact on land, soils and hydrogeology if the 'Do-nothing' scenario is followed. The baseline would remain as described in Section 8.3.

8.5.4 Decommissioning Phase

It is not intended that the proposed development will be decommissioned. It is expected that trenches and ducting will remain in place, with the cable replaced if required. Therefore, provided that appropriate mitigation is used during decommissioning, the magnitude of impact on land, soils and hydrogeology will be negligible, and the significance of effect will be imperceptible.

8.5.5 Cumulative Effects

8.5.5.1 In-combination cumulative effects

The developments considered with respect to cumulative effects on land, soils and hydrogeology are;

- F20A/0550, PL06F.312476: Extension of Dublin Airport North Apron to provide twelve aircraft stands and a ground servicing equipment area. North Apron Dublin Airport airfield
- F20A/0668, PL06F.314485: Single storey substation (18m x 21m X 5m), including bunded fuel station on 1600m^2 hardstanding area. The substation will be linked by underground cables to the internal electrification of the airport. Dublin Airport airfield.
- F22A/0460: Subterranean underpass of Runway 16/34. Dublin Airport airfield.
- F21A/0681, 3041/22: Development of access to the Synchronous Compensator Development (Grid Stabilisation Facility). Land south of Belcamp 220kV substation, Belcamp, Dublin 17.

There is potential for cumulative irreversible quantitative loss of soils and bedrock due to excavation work associated with the developments listed above. However quantitative loss of soil and bedrock is not expected to significantly impact local or regional scale soil or geological receptors and the cumulative effect would be at most **slight adverse**.

8.5.5.2 Intra-project cumulative effects

The Railway Order (RO) for the Metrolink scheme incorporates the construction, operation, maintenance and improvement of a railway designated as a metro. The fully segregated and automated railway and metro will be mostly underground and will be approximately 18.8 kilometres in length running from north of Swords at Estuary to Charlemont south of Dublin City Centre.

The Metrolink RO scheme may locally pose a risk to recharge and infiltration potential. However at aquifer scale the cumulative effect on groundwater flows and levels would be imperceptible.

Risk of mobilisation of contaminants by the Metrolink RO scheme will be minimised by best construction practices and adherence to WFD directives and national guidelines. Therefore, the cumulative effect on soil, geology and hydrogeology receptors is considered imperceptible.

There is potential for the cumulative irreversible quantitative loss of soils and bedrock due to excavation work associated with the Metrolink RO scheme. However quantitative loss of soil and bedrock is not expected to significantly impact local or regional scale soil or geological receptors and the cumulative effect would be at most **slight adverse**

8.6 Mitigation and Monitoring Measures

8.6.1 Design and construction best practice mitigation measures

Design and construction best practice mitigation measures are specified in Table 8-11. During the construction phase, the Construction Environmental Management Plan (CEMP) specifies the range of measures to avoid and minimise impacts that may occur in construction. This requires the appointed contractor to have in place appropriate consents for works that could affect groundwater and to implement specific measures to protect groundwater dependant springs and boreholes, including control of silt-laden runoff.

CEMP measures of relevance to soils geology and hydrogeology include;

- Soil management: Excavated soil material for reuse will be stored at least 15m from drains and watercourses with silt fencing to prevent contaminant runoff. The Construction Waste Management plan specifies that excavated soil material, if not being reused will be disposed of offsite to licenced waste facilities.
- Dewatering: Ground water and surface water accumulating in the base of trenches will not be pumped directly to roadside drains or watercourses unless it is clean and free from solids. Trench and joint bay dewatering will be pumped through silt socks to percolation areas if the soil is not saturated. Otherwise a settlement tank will be used. Contaminated water will either be tankered off site for disposal in a licensed facility or pumped to a portable on-site settlement tank for treatment.
- Bentonite injection: Bentonite grout injection will occur within a bunded pit inside the cable trench. Unused bentonite grout and any spillages within the pit will be removed off site for disposal under licence in an approved facility. The construction team undertaking this work will be made aware of the contaminant risks associated with the use of the material.

8.6.2 Monitoring measures

The following pre-construction confirmatory survey of wells, springs and groundwater abstractions will be undertaken:

- Water level monitoring will be undertaken pre-construction, during construction and post-construction for wells and springs which may be impacted by dewatering, such as St Doolagh's Well and St Catherine's Pond.
- Water quality and water level testing will be undertaken pre-construction, during construction and post-construction for identified drinking water abstraction sources which may be impacted by construction activities.

Bentonite grout injection will be carefully monitored during and post-construction.

8.7 Residual Impacts

Following mitigation, the remaining component of an effect is considered a residual effect. Significance of residual effects is also determined using the criteria of Table 8-4.

In all assessments for both construction and operational phase, impacts are negligible or small and would be mitigated by rigorous land, soils and hydrogeology protection measures, resulting in effects which are not significant. On the basis that no significant adverse effects are predicted or further mitigation proposed, the residual effects for the majority of assessments remain the same as shown in Table 8-11 and Table 8-12. Residual effects are detailed in Table 8-13Table 8-12.

Table 8-12 Residual effects

Construction Phase Impacts	Magnitude of remaining impact and effect	Further Mitigation	Residual Effect	Duration of effect
Dewatering of trenches and joint bays during construction affects groundwater abstractions. Domestic and industrial abstractions located approximately 300m from *Ballystruan to Newbury* route option.	Magnitude of impact: **Small adverse** Receptor Sensitivity: **Medium to High** Significance of effect: **Slight adverse**. *Shallow excavations in subsoils expected to have little impact on deeper bedrock aquifer.*	No derogation agreement with owner/operators of groundwater sources to ensure continuity of water supply during period in which water supply may be impacted.	Magnitude of impact: **Negligible** Receptor Sensitivity: **Medium to High** Significance of effect: I**mperceptible**	Construction (temporary)

8.8 WFD Groundwater Status

A WFD groundwater screening assessment is summarised in Table 8-14 WFD screening elements follow EPA WFD groundwater quantitative status guidelines (Craig & Daly, 2010).

With the implementation of the mitigation measures proposed, the proposed development will not result in a change in status of any WFD groundwater body quantitative or chemical elements or prevent any groundwater bodies from reaching good status in the future

Table 8-13 WFD groundwater assessment

WFD Groundwater Body	Test	Impact Assessment
• Dublin, • Swords • Industrial Facility	**Quantitative Status**	
	Saline (or other) intrusions	No impact on saline intrusions anticipated due to the shallow nature of the scheme.
	Impact of groundwater on surface water ecological/quantitative status	Potential local temporary dewatering impact on springs/wells within close vicinity of the scheme. Groundwater levels are expected to recover quickly. Negligible temporary or permanent impact to wider WFD groundwater bodies.
	Groundwater Dependant Terrestrial Ecosystem (GWDTE) quantitative status	The Swords and Dublin WFD Groundwater bodies have been designated in entirety as protected areas for Groundwater in SPA/SAC habitats (see Section 8.3.3.1 WFD Framework Bodies). However, the closest SPA/SAC areas to the scheme are estuarine/marine related habitats, which are not considered GWDTEs. Therefore, no GWDTEs have been identified within these groundwater bodies.
	Water balance	Dewatering will be temporary and phased over short sections of the route. The temporary and permanent impact to water balance of the WFD groundwater bodies is expected to be negligible.
	Chemical Status	
	Saline (or other) intrusions	No impact on saline intrusions anticipated due to the shallow nature of the scheme

WFD Groundwater Body	Test	Impact Assessment
	Impact of groundwater on surface water ecological/chemical status	Dewatering discharge locations have not been identified. There is potential for small amounts of groundwater intercepted in trenches to be discharged to local streams or watercourses. This may have a minor, local, temporary impact on surface water chemistry, but would be expected to have a negligible temporary impact (and no permanent impact) to the wider WFD surface water bodies.
	GWDTE chemical status	The Swords and Dublin WFD Groundwater bodies have been designated in entirety as protected areas for Groundwater in SPA/SAC habitats (see Section 8.3.3.1 WFD Framework Bodies). However, the closest SPA/SAC areas to the scheme are estuarine/marine related habitats, which are not considered GWDTEs. Therefore, no GWDTEs have been identified within these groundwater bodies.
	Drinking water protected areas	All Water Framework Directive (WFD) groundwater bodies have been identified in Catcments.ie (Environmental Protection Agency, Accessed 19/09/2022) as Drinking Water Protected Areas. However, there are no designated public supply or group scheme source protection areas within 10km of the scheme and therefore the impact of this scheme to drinking water supplies is considered negligible.
	General chemical assessment	The risk of accidental spills and leaks of contaminants, including concrete and bentonite, will be minimised by standard rigorous groundwater protection measures implemented during construction. The impact to the chemical status of WFD groundwater bodies is considered negligible.

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MetroLink 110kV Underground Cables

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Chapter 9 - Surface Water and Flooding

June 2023

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9 Surface Water and Flooding

9.1 Introduction

This chapter presents the assessment of the likely significant effects from the proposed development on surface water resources.

This assessment focuses on impacts associated with the installation of the HV underground cable and is based on the proposed development detailed in Chapter 6 Description of the Proposed Development.

The assessment of the likely significant impacts arising from the proposed development on groundwater resources is presented in Chapter 8 Land, Soils and Hydrogeology. The assessment of impacts on biodiversity is discussed in Chapter 10 Biodiversity.

This chapter considers the potential impacts during construction, operation and decommissioning associated with:

- Surface water drainage (including watercourses);
- Water supply and wastewater discharge (including drinking water supply network, foul water and the drainage network);
- Water Framework Directive (WFD) surface water objectives; and
- Flood risk.

Proposed environmental control measures and additional mitigation measures to prevent, reduce and/or offset the anticipated potential impacts are presented as appropriate.

9.2 Methodology and Limitations

9.2.1 Legislative Context

This chapter has been prepared in accordance with the requirements of European Union Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment (the 'EIA Directive') as amended by Directive 2014/52/EU.

The requirements of the following legislation have also been complied with:

- S.I. No. 272 of 2009: European Communities Environmental Objectives (Surface Waters) Regulations 2009 (as amended by S.I. No. 296/2009; S.I. No. 386/2015; S.I. No. 327/2012; and S.I. No. 77/2019 and giving effect to Directive 2008/105/EC on environmental quality standards in the field of water policy and Directive 2000/60/EC establishing a framework for Community action in the field of water policy, i.e. the Water Framework Directive, WFD).
- European Communities (Water Policy) Regulations 2003 (S.I. No. 722 of 2003), which gave legal effect to the WFD in Ireland.
- EU Directive 2007/60/EC on the Assessment and Management of Flood Risks (Flood Directive) which was transpose into Irish law by Regulations 2010 (S.I No.122 of 2010).

The WFD 2000/60/EC commits EU member states to achieve good qualitative and quantitative status of all inland and coastal waters at six-year intervals.

The WFD classification scheme for surface water quality includes five status classes: High, Good, Moderate, Poor and Bad based on the biological and supporting physicochemical (nutrients, oxygen condition, temperature, transparency, salinity and river basin specific pollutants (RBSPs) and hydromorphological quality elements.

The Biological Quality Elements are phytoplankton, macrophytes, phytobenthos, benthic invertebrate fauna and fish.

The overall ecological status relates to the biological and physicochemical parameters. Overall ecological status classification for a waterbody is determined, according to the 'one out, all out' principle, by the element with the worst status out of all the biological and supporting quality elements.

Good status means achieving satisfactory quality water, suitable for local communities' drinking, bathing, agricultural, industrial and recreational needs, while maintaining ecosystems that can support all the species of plants, birds, fish and animals that live in these aquatic habitats.

While the overall objective of the WFD is to achieve good status for all waterbodies, some waterbodies require extra protection by virtue of their location in a protected area or their function as a drinking water or bathing water. In accordance with the requirements of the WFD and the associated national regulations a register of protected areas has been set out for each River Basin District in Ireland. The protected areas are identified as those requiring special protection under existing National or European legislation, either to protect the surface water resource, or to conserve habitats or species that directly depend on those waters.

The different protected areas included in this register are European drinking water protected areas, designated waters such as fish protected areas and shellfish protected areas, nitrates vulnerable zones, urban wastewater sensitive areas and bathing water protected areas.

9.2.2 Guidance

This assessment follows guidelines established by Transport Infrastructure Ireland (TII) / National Roads Authority (NRA) in its Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes (NRA, 2009), hereafter referred to as the NRA Guidelines. Regard has also been had to:

- Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters (Inland Fisheries Ireland, 2016);
- Planning for Watercourses in the Urban Environment: A Guide to the Protection of Watercourses through the use of Buffer Zones, Sustainable Drainage Systems, Instream Rehabilitation, Climate / Flood Risk and Recreational Planning (Inland Fisheries Ireland, 2020);
- Control of Water Pollution from Construction Sites - Guide to Good Practice (C532) (CIRIA, 2001); and
- The Planning System and Flood Risk Management, Guidelines for Planning Authorities (Office of Public Works, OPW, 2009), hereafter referred to as the Flood Risk Guidelines.

The Flood Risk Guidelines aim to integrate flood risk management into the planning process to assist the delivery of sustainable development. They aim to encourage a transparent and consistent consideration of flood risk in the planning process.

The objectives of the Flood Risk Guidelines are given as:

- Avoid inappropriate development in areas at risk of flooding;
- Avoid new developments increasing flood risk elsewhere, including that which may arise from surface water runoff;
- 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 Flood Risk Guidelines categorise flood risk in the form of three Flood Zones. These Flood Zones each relate to geographical areas at high, moderate or low flood risk, depending on if they are zone A, B or C respectively. Table 9.1 provides a definition of each Flood Zone.

The flood risk likelihood is defined as a percentage risk of occurring in any year. For example, a flood event may be described as having an annual exceedance probability (AEP) of 1%, this can also be written as a 1 in 100 year event. Critical infrastructure vulnerable to flooding should be located in Flood Zone C.

Table 9-1: Definition of Flood Zones

Flood Zone	Description
A	The AEP of flooding from rivers and seas is highest (greater than 1%AEP for flooding, or 0.5%AEP for coastal flooding)
B	The AEP of flooding from rivers and the sea is moderate (between 0.1% AEP and 1% AEP for river flooding, and between 0.1% AEP and 0.5% AEP for coastal flooding)
C	The probability of flooding from rivers and the sea is low (less than 0.1% AEP for both river and coastal flooding). Flood Zone C covers all areas of the plan which are not in Zone A or B

Source: The Office of Public Works, The Planning System and Flood Risk Management, Guidelines for Planning Authorities (November 2009).

9.2.2.1 Sources of Information for Flood Risk

Sources used to determine extent of flood risk

- OPW Flood Mapping [1](last accessed May 2023)
- Google Maps[2](last accessed May 2023)
- OPW Hydraulic Reports[3]
- Fingal County Council Flood Maps[4](last accessed May 2023)
- Dublin City Council Flood Strategic Flood Risk Assessment[5](last accessed May 2023)

9.2.3 Methodology for Assessment of Effects

A desktop qualitative appraisal was undertaken to identify the baseline characteristics relating to the hydrology of surface waterbodies proximal to the proposed development and using existing flood risk mapping from the OPW, Fingal County Council and Dublin City Council.

The key resources used for the purpose of this appraisal were as follows:

- Environment Protection Agency, EPA (Water Framework Ireland Map viewer) databases;
- Water Quality in Ireland 2013-2018 (EPA, 2019);
- OPW Flood Mapping (last accessed May 2023);
- Fingal County Council Development Plan - Flood Zone Maps 2022 (last accessed May 2023);

[1] https://www.floodinfo.ie/map/floodmaps/
[2] www.google.com/maps
[3] OPW, Eastern CFRAM Study, IBE0600Rp0027_HA09_Hydraulics Report_F06
[4]Development Plan - Stage 3 Documents | Fingal County Council
[5] Volume 7 - Strategic Flood Risk Assessment | Dublin City Council

- Dublin City Council Development Plan Volume 7 – Strategic Flood Risk Assessment 2022 (last accessed May 2023).

The review of the Flood Maps has prioritised Fingal County Council and Dublin City Council flood maps over the OPW flood maps due to being more up to date (2022 versus 2019) and they provide more detail on some minor watercourses.

The significance of impacts has been assessed in terms of the magnitude of the effect/impact and the importance of that receptor, based on the criteria outlined in the Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes (NRA, 2009). The WFD status detailed in Table 9.3 has been used in lieu of Biotic Index Q values as appropriate, as detailed in Table 9.2.

Table 9-2: Criteria for Rating Site Attributes (NRA, 2009)

Importance	Criteria	Typical Examples
Extremely High	Attribute has a high quality or value on an international scale	River, wetland or surface water body ecosystem protected by EU legislation
Very High	Attribute has a high quality or value on a regional or national scale	River, wetland or surface water body ecosystem protected by national legislation Regionally important potable water source supplying >2500 homes Quality Class A (Biotic Index Q4, Q5) Flood plain protecting more than 50 residential or commercial properties from flooding Nationally important amenity site for wide range of leisure activities
High	Attribute has a high quality or value on a local scale	Salmon fishery Locally important potable water source supplying >1000 homes Quality Class B (Biotic Index Q3-4) Flood plain protecting between 5 and 50 residential or commercial properties from flooding Locally important amenity site for wide range of leisure activities
Medium	Attribute has a medium quality or value on a local scale	Coarse fishery Local potable water source supplying >50 homes Quality Class C (Biotic Index Q3, Q2-3) Flood plain protecting between 1 and 5 residential or commercial properties from flooding
Low	Attribute has a low quality or value on a local scale	Locally important amenity site for small range of leisure activities Local potable water source supplying <50 homes Quality Class D (Biotic Index Q2, Q1) Flood plain protecting 1 residential or commercial property from flooding Amenity site used by small numbers of local people

Source: Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes (NRA, 2009)

Table 9-3: Reference Values for Q Value / WFD Status (Riverine only)

Q Value*	WFD Status	Pollution Status	Condition**
Q5, Q4-5	High	Unpolluted	Satisfactory
Q4	Good	Unpolluted	Satisfactory
Q3-4	Moderate	Slightly polluted	Unsatisfactory
Q3, Q2-3	Poor	Moderately polluted	Unsatisfactory
Q2, Q1-2, Q1	Bad	Seriously polluted	Unsatisfactory

Source: Environmental Protection Agency Ireland (epa.ie)

Notes:

* These Values are based primarily on the relative proportions of pollution sensitive to tolerant macroinvertebrates (the young stages of insects primarily but also snails, worms, shrimps etc.) resident at a river site.

** "Condition" refers to the likelihood of interference with beneficial or potential beneficial uses.

Table 9-4: Criteria for Rating Impact Magnitude

Magnitude of Impact	Criteria	Typical Examples
Large Adverse	Results in loss of attribute and /or quality and integrity of attribute	• Loss or extensive change to a waterbody or water dependent habitat • Increase in predicted peak flood level >100mm • Extensive loss of fishery • Calculated risk of serious pollution incident >2% annually[6] • Extensive reduction in amenity value
Moderate Adverse	Results in impact on integrity of attribute or loss of part of attribute	• Increase in predicted peak flood level >50mm • Partial loss of fishery • Calculated risk of serious pollution incident >1% annually • Partial reduction in amenity value
Small Adverse	Results in minor impact on integrity of attribute or loss of small part of attribute	• Increase in predicted peak flood level >10mm • Minor loss of fishery • Calculated risk of serious pollution incident >0.5% annually • Slight reduction in amenity value
Negligible	Results in an impact on attribute but of insufficient magnitude to affect either use or integrity	• Negligible change in predicted peak flood level • Calculated risk of serious pollution incident <0.5% annually
Minor Beneficial	Results in minor improvement of attribute quality	• Reduction in predicted peak flood level >10mm • Calculated reduction in pollution risk of 50% or more where existing risk is <1% annually
Moderate Beneficial	Results in moderate improvement of attribute quality	• Reduction in predicted peak flood level >50mm • Calculated reduction in pollution risk of 50% or more where existing risk is >1% annually
Major Beneficial	Results in major improvement of attribute quality	• Reduction in predicted peak flood level >100mm

Source: Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes (NRA, 2009)

6 Refer to Annex 1 of HA216/06 Highways Agency (2006) Road Drainage and the Water Environment (HA216/06), Design Manual for Roads and Bridges (DMRB). The UK DMRB suggests that where the probability of a serious pollution incident is greater than1%/year, spill-containment measures should be considered. It also suggests that, in particularly sensitive waters, areas at lower risk of serious pollution may also warrant special measures. The formula is however tailored for road developments where increasing traffic densities and higher proportions of heavy goods vehicles (HGVs) are likely to lead to an increased risk of accidents that could give rise to hazardous spills. While the calculation is not appropriate for use on this project, having regard to the characteristics of the proposals as detailed in Section 9.4, regard has been had to the proposed mitigation as appropriate.

Table 9-5: Rating of Significant Environmental Impacts

Importance of Attribute	Magnitude of Impact			
	Negligible	**Small**	**Moderate**	**Large**
Extremely High	Imperceptible	Significant	Profound	Profound
Very High	Imperceptible	Significant / Moderate	Profound / Significant	Profound
High	Imperceptible	Moderate / Slight	Significant / Moderate	Severe / Significant
Medium	Imperceptible	Slight	Moderate	Significant
Low	Imperceptible	Imperceptible	Slight	Slight / Moderate

Source: Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes (NRA, 2009)

The NRA define the Site Evaluation Criteria, as shown in Table 9.6. From the EPA mapping[7], information where available, the WFD Status for water courses and biological water quality is shown in Table 9.7.

Table 9.6: Site Evaluation Criteria (NRA, 2009)

Ecological Value	Description
Internationally Important	Sites designated (or qualifying for designation) as a SAC or SPA under the EU Habitats or Birds Directives Undesignated sites that fulfil criteria for designation as a European Site Features essential to maintaining the coherence of the Natura 2000 network Sites containing 'best examples' of the habitat types listed in Annex I of the Habitats Directive Resident or regularly occurring populations of birds listed in Annex I of the Birds Directive and species listed in Annex II and/or Annex IV of the Habitats Directive Ramsar Sites World Heritage Sites Biosphere Reserves Sites hosting significant species populations under the Bonn Convention Sites hosting significant populations under the Berne Convention Biogenetic Reserves European Diploma Sites Salmonoid waters
Nationally Important	Sites or waters designated or proposed as an NHA Statutory Nature Reserves Refuge for fauna and flora protected under the Wildlife Acts National Parks Undesignated sites fulfilling criteria for designation as a NHA; Statutory Nature Reserves; 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) of species protected under the Wildlife Acts and/or species listed on the relevant Red Data list) Sites containing viable areas of the habitat types listed in Annex I of the Habitats Directive
County Importance	Areas of Special Amenity Areas subject to a Tree Preservation Order Areas of High Amenity, or equivalent, designated under the County Development Plan Resident or regularly occurring populations (assessed to be important at the County level) of species of birds listed in Annex I of the Birds Directive, species listed in Annex II and/or IV of the

[7] EPA Maps

Table 9.6: Site Evaluation Criteria (NRA, 2009) **Ecological Value**	**Description**
	Habitats Directive, species protected under the Wildlife Acts and/or species listed on the relevant Red Data list Site containing area(s) of the habitat types listed in Annex I of the Habitats Directive that do not fulfil criteria for valuation as of International or National Importance County important populations of species, or viable area of semi-natural habitats or natural heritage features identified in the National or local Biodiversity Action Plan 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 Biodiversity Action Plan Resident or regularly occurring populations (assessed to be important at the Local level) of species of birds listed in Annex I of the Birds Directive, species listed in Annex II and/or IV of the Habitats Directive, species protected under the Wildlife Acts and/or species listed in 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 of features containing non-native species that are of some importance in maintaining habitat links

Source: NRA, 2009

9.2.4 Limitations of this EIAR

Identification of surface water features / waterbodies, such as rivers and lakes, desktop data such as those detailed on Environmental Protection Agency (EPA) and Office of Public Works (OPW) datasets and mapping, and consultation with statutory and non-statutory bodies.

It is possible that some minor drainage ditches located in proximity to the works may not be identified in this EIAR, however the mitigation detailed and proposed as part of this EIAR will be implemented when dealing with any such features to ensure that the proposed development will not cause them to deteriorate.

There were no other limitations encountered in compiling the information required to carry out this assessment of likely significant impacts on the water environment as a result of the proposed development.

Mott MacDonald has followed accepted procedure in providing the services but given the residual risk associated with any prediction and the variability which can be experienced in flood conditions, Mott MacDonald take no liability for, and gives no warranty against, actual flooding of any property (Client's or Third Party). The FRA has been prepared for the purpose of supporting the proposed development.

9.3 Receiving Environment

In general, the HV cable follows road networks and lands adjacent to the road networks from substation to substation.

A number of crossings will be required along the cable routes. These crossings will be facilitated by either open cut trenching or HDD and will be confirmed following the site investigation.

Water crossings will be required, mostly buried under the watercourse, but where appropriate existing crossings will be utilised. A number of water supply and wastewater (sewage / stormwater) drainage networks, and other utilities, are located within the receiving environment and will be required to be crossed.

9.3.1 Protected Areas

The proposed MetroLink Cable routes are not located within any European protected sites, but there are downstream linkages to SACs and SPAs.

Forest Little – Belcamp Option 1 is located approximately 4km west of Baldoyle Bay SAC (site code 000109) and Baldoyle Bay SPA (site code 004016).

Forest Little – Belcamp Option 2 is located approximately 5km west of Baldoyle Bay SAC (site code 000109) and Baldoyle Bay SPA (site code 004016).

Newbury – Ballystruan is located approximately 5.5km west of Baldoyle Bay SAC (site code 000109) and Baldoyle Bay SPA (site code 004016) and approximately 5.5km west of North Dublin Bay SAC and North Bull Island SPA (site code 004006).

Ballystruan – Forest Little, the easterly section of the route is approximately 4km from Malahide Estuary SAC (site code 000205) and Broadmeadow/Swords Estuary SPA (site code 004025).

According to EPA mapping, there are no downstream drinking water abstraction points or salmonoid designated rivers within or linked to the proposed development.

The Broadmeadow Estuary (Inner) Urban Waste Water Treatment Directive Sensitive Area, a nutrient sensitive areas is located approximately 9km downstream from Dunbro and Barberstown Streams.

9.3.2 Water Quality

9.3.2.1 Water Framework Directive Overview

The study area is located within the WFD catchments:

- Liffey and Dublin Bay
- Nanny-Delvin

The proposed development crosses several rivers/streams as detailed below:

Table 9.7: River/stream Crossings as classified by the EPA

Route Section	Location	EPA Name	River Waterbody Code	EPA Code
Newberry to Ballystruan	Swords Road @ Applegreen Santry	Mayne River	IE_EA_09M030500	09M03
Ballystruan to Forest Little	Holiday Blue Long Term Carpark	Santry River	IE_EA_09S010300	09S01
	Holiday Blue Long Term Carpark	Santry River	IE_EA_09S010300	09S01
	Western edge of the airport road, crosses R108 at Braberstown Road	Dunbro	IE_EA_08W010300	08D11
	Barberstown Road, adjacent to Food Central Drive	Barberstown	IE_EA_08W010300	08B05
	Naul Road junction with Forest Road (L3132)	Sluice	IE_EA_09S071100	09S07
Forrest Little to Belcamp - Option 1	Malahide Road and Limekiln Lane	Cuckoo Stream	IE_EA_09M030500	09C07
	Malahide Road and Parkside Boulevard (Belmayne)	Mayne River	IE_EA_09M030500	09M03
	R139/ entrance to Belcamp Substation	Mayne River	IE_EA_09M030500	09M03
Forrest Little to Belcamp – Option 2	Clonshaugh Road	Cuckoo Stream	IE_EA_09M030500	09C07

Table 9.8: Biological Water Quality Status

Watercourse	Ecological evaluation of importance[8]	WFD Status (2016-2021)	Q Value	NRA (2009) Importance Classification
Mayne River (09M03)	Local importance (Higher value)	Poor (Assessed through Monitoring)	Q2-3 (Poor status)	Medium
Cuckoo Stream (09C07)	Local importance (Higher value)	Poor (Assessed through Monitoring)	Q2-3 (Poor status)	Medium
Santry River (09S01)	Local importance (lower value)	Poor (Assessed through Monitoring)	Q2-3 (Poor status)	Medium
Sluice (09S07)	Local importance (lower value)	Poor (Assessed through Monitoring)	Q2-3 (Poor status)	Medium
Barberstown (08B05)	Local importance (lower value)	Moderate (Assessed through Monitoring)	Q2-3 (Poor status)	Medium
Dunbro 08D11)	Local importance (lower value)	Moderate (Assessed through Monitoring)	Q2-3 (Poor status)	Medium

9.3.3 Flood Risk

The cable route will be designed to not be vulnerable to flooding; this includes the avoidance of Flood Zones A and B where possible. The cable is underground and is designed to be floodable without affecting its operation. During operation the key vulnerability to the cable is its joints. All

[8] In accordance with TII/NRA Guidelines 'Guidelines for Assessment of Ecological Impacts of National Road Schemes. Revision 2, 2009.

joint bays are designed with watertight connections (IP68) as standard (as these installations are typically underground).

Link boxes are typically located near joints. The link boxes are vulnerable to flooding and the locations of these have been chosen to avoid Flood Zones A and B and high potential risk from surface water. The cable route is buried and so it will not affect flood flows. The cable route therefore passes the development management justification test.

In general, potential sources of flood risk to a development are as identified in Table 9.9.**Error! Reference source not found.**.

Table 9.9: Categories of Flood Risk

Category	Mechanism	Potential risk to development from category of flooding
Fluvial flooding	Exceedance of the flow capacity of the channel of a river, stream or other natural watercourse (which may be culverted in some cases). Fluvial flooding is typically associated with heavy rainfall events, and excess water spills onto the river floodplain.	The development is potentially at risk due to a number of local watercourses
Coastal and tidal flooding	Caused by high astronomical tide, storm surge, wave action, and local bathymetric effects, often in combination. In estuaries and watercourses affected by tide-locking, flooding can occur as a result of high tidal levels and high fluvial flows in combination.	The development is outside OPW tidal flood risk areas (www.floodinfo.ie), so is not at flood risk.
Surface water / overland flow	Water flowing over the ground surface that has not reached a natural or artificial drainage channel. This can occur when intense rainfall exceeds the infiltration capacity of the ground, or when the ground is so highly saturated that it cannot accept any more water.	Rainfall could affect the development
Groundwater flooding	Raised groundwater levels, typically following prolonged rain (that may be slow to recede). High groundwater levels may result in increased overland flow flooding. Normally associated with catchments where porous substrate and/or aquifers exist.	OPW Groundwater flood risk maps (www.floodinfo.ie) indicate no risk of groundwater flooding on the development route.
Human/mechanical error	Blockage or overloading of pipes, sewers, canals, and drainage channels or failure of pumping systems. Typically occurs following heavy rainfall or as a result of high water levels in a receiving watercourse.	Blockage could be a potential source of flood risk.

9.3.3.1 Fluvial Risk

Figure 9.1 represents the 0.1% AEP fluvial flood risk for the proposed development area, based on OPW flood mapping. OPW flood mapping was used to provide a consistent background flood map identifying local watercourses. Whilst there are some differences to other flood map sources (Fingal County Council and Dublin City Council), the map is considered suitable as background. Water crossings on the route present an increased risk of likelihood of flooding and therefore have been noted by the star symbol in Figure 9.1.

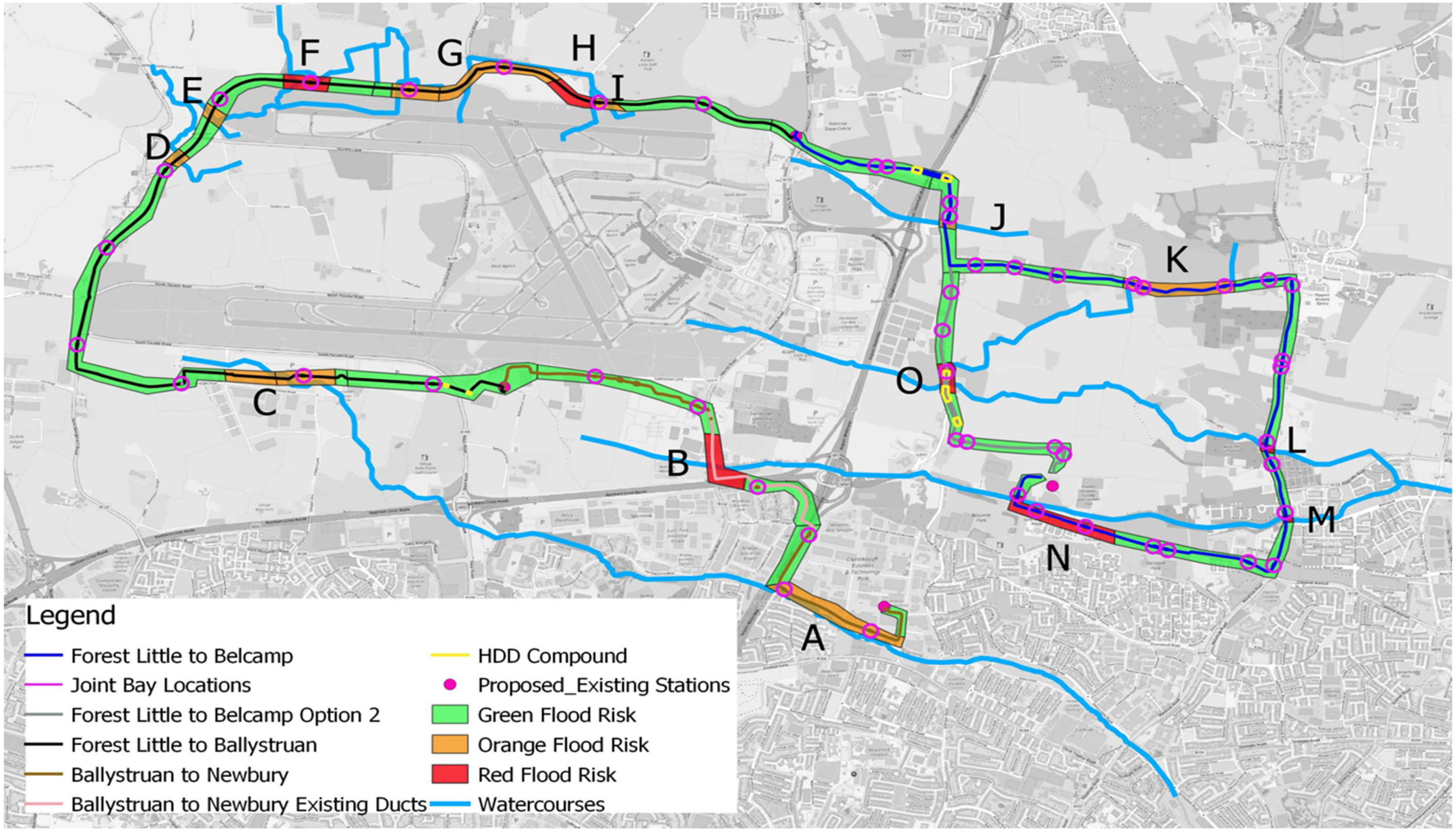
Route options were studied and determined to be within certain flood risk zones in accordance with Table 9.10.

Table 9.10: Flood Risk Classification

Colour Zone	Risk	Classification
Green	No Risk	Not in close proximity
Orange	Medium Risk	In close proximity to watercourse
Red	High Risk	Within flood zone (floodinfo.ie)

Flood Risk Classification of the cable route using Table 9.10 is shown in Figure 9.1. The cable route is shown by the lines and the zones represent the flood risk to the cable route section. It was determined that largely the route is in the green zone, however there are several areas in the orange and red zone which require further investigation into the extent of the risk.

Figure 9.1: Route Options Layout with Flood Risk Classification



Source: OSM Standard (© OpenStreetMap contributors)

The proposed and existing substations at the start and end of the cable route, as shown onFigure 9.1, are not been identified at fluvial flood risk by existing 0.1% AEP fluvial flood maps, and there are clear flow paths away from the substations.

In Table 9.11, the flood risk classification highlighted in Orange and Red in Figure 9.1 along the route have been noted, Green zones are excluded due to no significant risk being identified in these sections. The 1 in 1000 year or 0.1% AEP fluvial event was reviewed.

Table 9-11 – 0.1% AEP Fluvial Flood Risk

Route Option	Label	Area of Interest	Watercourse (EPA Name)/Drain	River Waterbody Code	Level of Flood Risk
Newberry to Ballystruan	A	Woodlawn Park	Santry River	IE_EA_09S010300	Orange
	B	Swords Road @ Applegreen Santry	Mayne River	IE_EA_09M030500	Red
Ballystruan to Forest Little	C	Holiday Blue Long Term Carpark	Santry River	IE_EA_09S010300	Orange
	D	Millhead	Millhead	IE_EA_08W010300	Orange
	E	Millhead	Dunbro	IE_EA_08W010300	Orange
	F	Barberstown Road	Barberstown	IE_EA_08W010300	Red
	G	Barberstown Road	Barberstown	IE_EA_08W010300	Orange
	H	Naul Road @ Flight Radar Station	Sluice	IE_EA_09S071100	Red
	I	Naul Road @ Flight Radar Station	Sluice	IE_EA_09S071100	Orange
Forrest Little to Belcamp Option 1	J	Stockhole Lane @Dublin Airport AGI	Unnamed	Unnamed	Orange
	K	Baskin Lane	Unnamed	Unnamed	Orange
	L	Malahide Road @Limekiln Lane	Cuckoo Stream	IE_EA_09M030500	Red
	M	Malahide Road @Belmaybe	Mayne River	IE_EA_09M030500	Red
	N	Access to Belcamp 220kV Substation	Mayne River	IE_EA_09M030500	Red
Forrest Little to Belcamp Option 2	O	Clonshaugh Road	Cuckoo Stream	IE_EA_09M030500	Red

9.3.3.2 Surface Water Risk

OPW surface water flood risks maps are unavailable for the site area. The location of the Dublin Airport is a watershed of a number of watercourses, so the volume of surface water crossing the cable route is small. The cable is buried and does not pose a restriction to surface water flow. Where the cable cross drainage ditches or watercourses these have been assessed by the fluvial flood risk. Therefore no detail surface water assessment has been undertaken.

9.4 Likely Significant Impacts of the Proposed Development

The following sections discuss the predicted likely significant impacts, prior to the implementation of additional proposed mitigation measures as discussed in Section 9.55 Mitigation and Monitoring.

Associated impacts are grouped in this assessment where they are common to multiple locations.

9.4.1 Construction Phase

Given the nature of the proposed development, the potential for impacts on the water environment are for the most part associated with the construction phase of the proposals and are similar to any civil engineering project. These include:

- Impacts to surface water quality from sediment runoff, spillages, discharges or physical modification.
- Impacts on drainage patterns from working in or near watercourses.
- Impacts on water supply and drainage infrastructure.
- Impacts on flood risk

9.4.1.1 Surface Water Quality

The precise method of watercourse crossings will be determined following the site investigation and in agreement with IFI. Method statements will also be agreed with IFI prior to the works commencing. This EIAR assesses in-road crossings, open cut crossings and HDD crossings of watercourses.

Open Cut Crossing

Excavation works, the storage of excavated material, vegetation clearance, crossing of watercourses and infilling of trenches by the open cut method (within carriageways or across lands) can pose a risk to surface water quality through surface water run-off and the release of sediment to watercourses.

Elevated levels of sediment could impact on spawning fish, through issues including the sedimentation of spawning gravels, clogging of fish gills and reduction in dissolved oxygen.

Accidental release of potentially polluting substances such as cement and oils (hydrocarbons) can result in significant impacts on the aquatic environment.

The release of hydrocarbons can impact water dependant species resulting in disruption to neurosensors, abnormal behaviour and development issues as well as direct impacts on fertility. Oil spills can reduce the capacity of a waterbody to exchange oxygen as well as result in oil coating the gills of aquatic species causing lesions on respiratory surfaces. This can result in significant respiratory difficulties for aquatic organisms. Benthic invertebrates can be adversely affected if fractions of hydrocarbons settle and accumulate in sediments. This can result in the mortality of populations and prevent future colonisation.

Concrete and cement (associated with joint bays) are highly alkali and fresh concrete has corrosive properties. Concrete wash water is a particularly severe pollutant, as it typically has a high pH (11-12) coupled with extremely high suspended sediment content. In the freshwater environment, pH levels which are elevated beyond natural conditions can have significant impacts upon water bodies.

Schedule 5 of SI 272 of 2009 (European Communities Environmental Objectives (Surface Waters) Regulations 2009) includes the following (WFD) pH limits for rivers and lakes:

- Soft water 4.5< pH < 9.0, where soft water is ≤100 mg/1 CaCO3; and
- Hard water 6.0< pH < 9.0, where hard water is > 100mg/l CaCO3.

The sensitivity of the receiving surface water environment is classed as medium.

The magnitude of adverse surface water quality impacts in the absence of additional mitigation is expected to be **Small** to **Moderate** resulting in **Moderate** to **Significant** adverse impacts, temporary in duration prior to the implementation of mitigation measures.

Water crossings by the open cut method of ditches/drains and rivers/streams are assessed as having the potential for an accidental release of pumped materials from dammed areas, an adverse effect, which could contaminate downstream areas and aquatic habitats. The significance of the effect is assessed as **Moderate**. Duration of the effect is assessed as being temporary.

HDD Crossing

Water crossings utilising the HDD method and bentonite in the drilling process also has the potential of contamination of the downstream aquatic environment with an adverse effect. The significance of the effect is assessed as **Slight** to **Moderate**. Duration of the effect is assessed as being temporary. Suitable mitigation measures employed will reduce the potential impacts to **Slight**.

Temporary Construction Compounds and Laydown Areas

Ground damage from construction vehicles and machinery can also cause rutting and increased erosion of soils. Access tracks used during construction may affect surface run-off patterns, creating alternative flow paths, promoting erosion and localised flooding. The parameters for the location of these areas is defined within section 6.4.4 of Chapter 6 Description of the Proposed Development, Based on these parameters, the significance of the effect is assessed as **Moderate**. Duration of the effect is assessed as being temporary during construction. Suitable mitigation measures employed will reduce the effect associated to **slight**.

9.4.1.2 Hydromorphology, Water Contributions and Drainage

Open Cut Crossing

Open cut trenching will be carried out in the dry. The existence of a temporary impermeable barrier to facilitate open cut trenching will have a direct impact on the cross section of the channel and is expected to give rise to localised but temporary changes in water depth, velocities and sediment erosion/deposition.

The proposed activities could result in localised changes to surface water drainage patterns and restrictions to infiltration of rainfall in soils. The proposed works lie in a mix of urban and agricultural areas, existing drainage networks may experience disturbance which will be localised and temporary in duration. Surface water contributions will remain unchanged and will likely discharge to the same catchment. Significant construction phase impacts on surface water drainage patterns are not likely with open-cut crossings.

The sensitivity of the receiving surface water environment is medium. The magnitude of adverse impacts in the absence of additional mitigation is expected to be **Slight** to **Moderate** as there could be some localised temporary impacts prior to the implementation of mitigation measures.

HDD Crossing

Surface water contributions will remain unchanged. Significant construction phase impacts on surface water drainage patterns are not likely with HDD crossings. HDD crossings will have a **neutral** effect on hydromorphology.

Construction Compounds and Laydown Areas

Construction compounds/Laydown areas will have a neural effect on hydromorphology as they will be located a minimum of 50m from watercourses and unlikely to have any influence.

All reasonable measures will be taken to avoid unplanned disruptions to any water supply and drainage infrastructure services during associated with the construction compounds and laydown areass.

This will include thorough investigations to identify and reconfirm the location of all utility infrastructure within the works areas, and the implementation of procedures to be agreed with utility providers when undertaking works around known infrastructure services. Analysis of the EPA Mapping did not identify any abstraction points in the vicinity of the water crossings.

The drainage patterns associated with watercourses confined to existing culverts will not be impacted significantly as a result of the proposals.

During the construction phase temporary construction compounds will be required in proximity to the trenching route. Welfare facilities will be provided at these locations and any discharges will be connected to a sealed holding tank to be emptied and disposed of off-site by a licenced contractor to an approved licenced facility. Water will be tankered onto site as required. Consequently, significant adverse impacts on water supply and drainage infrastructure during the construction phase are not likely.

Hydromorphology

Site restoration works will be carried out following completion of water crossings, in agreement with IFI. These works may include riverbank stabilization, gravel replacements etc. In all cases, the site will be restored post installation. Adverse impacts in terms of water depth, velocities and sediment erosion/deposition are therefore expected to be **imperceptible**.

9.4.1.3 Flood Risk

Open Cut

The majority of the cable route will be installed by open cut method, the route is in the upper catchment of the watercourses, therefore the volume of water affected by the proposed development is small and manageable. From **Figure 9.1** the risk varies depending on the proximity to watercourses. The significance of the effect is assessed from **Slight** to **Significant**. Duration of the effect is assessed as being temporary during construction. Suitable mitigation measures employed will reduce the effect associated to **Slight**.

Flood risk will be managed so as not to increase flood risk elsewhere by being of short duration and managed so that excavations would not occur during high flows.

Existing Cable Ducts

A section of the proposed development (Ballystruan to Newbury) has been proposed to use existing cable ducts. Existing cable ducts will have a **Neutral** effect on flood risk during construction.

HDD Crossing

HDD crossing is proposed to cross a watercourse at label O in Figure 9.1. HDD crossing does not pose any constraint on the watercourse, but the location of the access pits may impact surface water flows, however the effect is considered **Imperceptible**.

Construction Compounds and Laydown Areas

Construction compounds/Laydown areas will be located a minimum of 50m from watercourses and not within flood zones, but could influence surface water flow paths. The significance of the effect is assessed from **Slight** to **Significant** depending on the location of the compounds. Duration of the effect is assessed as being temporary during construction. Suitable mitigation measures employed will reduce the effect associated to **Slight**.

9.4.2 Operational and Maintenance Phase

As detailed previously, given the nature of the proposals, the potential for impacts on the surface water environment are for the most part associated with the construction phase. For completeness operational phase effects considered include:

- Impacts to surface water quality from sediment runoff, spillages, discharges or physical modification.
- Impacts on drainage patterns from working in or near watercourses.
- Impacts on water supply and drainage infrastructure.
- Impacts on flood risk

9.4.2.1 Cable Routes and Transition Joint Bay

The proposed development will require no specific maintenance along the cable trench or joint bay locations. Access may be required at joint bays on rare occasions to facilitate cable replacement if a failure occurs.

Access to link boxes and communications chambers will be required on an annual basis for inspection and any necessary maintenance, any adverse impacts will be **unlikely**.

9.4.2.2 Surface Water Quality

As the cables are solid insulation type there are no sources of pollution and as they are buried, they will not offer a pathway to any surface water receptors.

Given the nature of the proposals, it is expected that adverse impacts on surface water quality during operation will be **unlikely**.

9.4.2.3 Water Supply and Drainage Infrastructure

An imperceptible impact on surface water drainage routes along the cables routes is expected as the land will continue to drain as per the existing situation. No water supplies will be affected by the proposed development.

9.4.2.4 Flood Risk

A desk-based assessment of the cable route was undertaken which concludes that the impact on flood risk is **imperceptible** at operation stage due to the cables being buried, no new obstruction to watercourses and so not influencing flood waters. In addition, the cables are characterised by being designed not to be vulnerable to flooding within Flood Zones A and B.

Developments that need to be in Flood Zones A or B for reasons of proper planning and sustainable development require a Justification Test. However, as discussed in Section 9.3.3, the cable will be designed so that it is considered not to be vulnerable to flooding, thereby being considered appropriate and as such not subject to a Justification Test for flooding.

9.4.3 Do Nothing

The ‘Do-nothing’ alternative describes the circumstance where no development occurs. There will be no impact on the water environment if the ‘Do-nothing’ scenario is followed and the baseline would be as described in Section 9.3.

9.4.4 Decommissioning Phase

It is not intended to decommission the proposed electricity infrastructure, however, if decommissioning is required the effects would be as similar or less than the construction phase and similar mitigation would apply.

9.4.5 Cumulative Effects

9.4.5.1 Intra-Project Effects

The MetroLink Rail project may pose a risk to surface water quality through surface water run-off and the release of sediment and potentially polluting substances to watercourses, through excavation works and the storage of materials.

The Planning System and Flood Risk Management – Guidelines for Planning Authorities 2009 state "*The development proposal will not increase flood risk elsewhere and, if practicable, will reduce overall flood risk*". Therefore, any increase in flood risk should be managed within the project and so no cumulative effect is expected from any other project.

The cumulative significance of effects is considered to be slight due to the timings of the projects at the proposed intersection areas being unlikely to coincide, along with the distance associated between these intersections and the watercourses.

9.4.5.2 Other Developments

Engagement with the relevant developers including DAA, IDA and ESB along with Fingal County Council and Dublin City Council will be undertaken to discuss scheduling and ensure that appropriate mitigation measures are implemented and impacts minimised.

9.5 Mitigation and Monitoring Measures

9.5.1 Construction Phase

9.5.1.1 General

The following mitigation measures will be implemented prior to commencement and throughout the duration of the proposed works.

- An on-site Environmental Clerk of Works (EnCoW) will be appointed prior to commencement of works.
- Confirmatory pre-construction surveys will be carried out and seasonal constraints will be confirmed in agreement with IFI and National Parks and Wildlife Service (NPWS) and Fingal/Dublin City Council, as appropriate.
- Works will be carried out in accordance with the guidelines set out by IFI in 'Guidelines on Protecting Fisheries During Construction Works in and Adjacent to Waters' (IFI, 2016).
- The IFI Biosecurity Protocol for Field Survey Works will be complied with.
- Works will not be carried out during extreme rainfall or high flow events and watercourse crossings managed to minimise impact on flood risk. Plant and materials within the flood plain will be removed in the event of extreme rainfall or high flow events.
- The Contractor's EnCoW will monitor watercourse levels during construction, and if extreme watercourse levels are forecast then works will be programmed to avoid such times.
- In the case of a warning of a flood event, plant and materials vulnerable to flooding in 'at risk' construction compounds will be relocated to parts of the compound that are considered to be not at risk of flooding.

9.5.1.2 Surface Water Quality Protection Measures

The following 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 i.e. 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.
- A buffer zone of 15m will be maintained between storage and working areas and watercourses, taking account of the minimum working area required to facilitate the works. Laydown areas within flood risk zones will be minimised, but where necessary will be managed so that potential obstructions are removed in the event of an adverse weather warning
- The time period over which areas of clearance are left open will be reduced insofar as is reasonably practicable.
- Re-instatement 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 avoided where possible.
- The Contractor will ensure that all concrete truck wash watering / cleaning is undertaken offsite where possible and remote 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 in accordance with established best practice guidelines; and
  - Spill kits will be provided at all compound locations and carried by all crews during underground cable installation works.
- Temporary construction compounds shall not be located within a flood zone and will not be located within 50m of a watercourse. This is to minimise the impact on flood risk and reduce the flood risk to construction plant and materials.
- 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 to inform adaptive management as required. The locations of same will be determined by the EnCoW.
- Site restoration post works will be carried out, in agreement with IFI. These works may include riverbank stabilisation, gravel replacements etc. In all cases, the site will be restored post installation.

9.5.1.3 Silt Control Measures

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 include silt traps which can be located in small drains where flow is small and silt fences where runoff from large areas needs to be controlled.

Silt fences must 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, with inputs from the ECoW if required.

Where distances between the works and watercourse allow, a minimum setback distance of 25m from the watercourse will be maintained.

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 curtain must contain the area where silt is generated and must 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 two metre intervals.
- Once installed the silt fence will be inspected regularly, 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. Re-instatement method statements will be subject to approval by the EnCoW.
- The silt fencing must 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.
- 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.
- In sensitive areas a series of silt traps will be placed in the drain.
- The silt trap will not be pulled from the ground but cutaway at ground level and posts removed.
- A record of when it was installed, inspected and removed will be maintained by the EnCoW.

9.5.2 Operational Phase and Maintenance

In terms of the operational and maintenance phase, effects are likely to be limited. Works will involve periodic inspection of key elements to confirm that they are operating as intended and whether any cleaning or remedial maintenance works are required.

Access to joint bays may be required on a rare occasion to facilitate cable replacement if a failure occurs, therefore effects on surface watercourses are not likely to occur.

For maintenance works in the vicinity of watercourses, the mitigation measures detailed for the construction phase will be implemented. There are no additional mitigation measures required for the operational and maintenance phase.

9.6 Residual Impacts

With the implementation of the mitigation measures proposed, the proposed development will not result in a change in status of any WFD quality elements or prevent any waterbodies from reaching good status in the future. During the construction phase impacts on surface water quality are anticipated to be localised and brief to temporary in duration and of imperceptible to slight significance with suitable mitigation measures.

During the construction phase, impacts on surface water drainage and water supply are anticipated to be localised and brief to temporary in duration of imperceptible to slight significance. Adverse impacts during the operational phase are expected to be imperceptible.

9.7 Summary

This Surface Water and Flood Risk chapter has undertaken a desk-top assessment on the basis of the relevant legislation and guidelines. It presents a detailed analysis of the receiving environment in terms of surface water hydrology and water quality, on-site surface water drainage, water supply and wastewater and flood risk for the proposed development.

The characteristics of the development and mitigation have been described, alongside the anticipated construction phase and operational phase activities. The likely significant impacts of the proposed development have been assessed and, where significant uncertainties or risks remain, requirements for additional mitigation and monitoring measures have been stated.

Taking into account the mitigation, residual impacts to the water environment and flood risk are considered of **slight** significance and **temporary** in nature.

9.8 References

Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters(Inland Fisheries Ireland, 2016);

Planning for Watercourses in the Urban Environment: A Guide to the Protection of Watercourses through the use of Buffer Zones, Sustainable Drainage Systems, Instream Rehabilitation, Climate / Flood Risk and Recreational Planning (Inland Fisheries Ireland, 2020);

Control of Water Pollution from Construction Sites - Guide to Good Practice (C532), (CIRIA 2001); The Planning System and Flood Risk Management, Guidance for Planning Authorities, (OPW, November 2009)

Flood Risk Management, Climate Change Sectoral Adaptation Plan, Prepared under National Adaptation Framework, (OPW, September 2019);

Flood Risk Maps from various national studies, Available at: Home - Floodinfo.ie

Environmental Impact Assessment Report, (Appendix A15.7: Aquatic and Fisheries Assessment of Watercourses associated with the MetroLink Project ML1-JAI-EIA-ROUT_XX-SU-X15007 | P.01), (Jacobs IDOM, 2021);

MOTT MACDONALD

MetroLink 110kV Underground Cables

Volume 2: Environmental Impact Assessment Report
Chapter 10 - Biodiversity

June 2023

Contents

Tables

Figures

10 Biodiversity

10.1 Introduction

Biodiversity (or "biological diversity"), as defined at the United Nations Convention on Biological Diversity (CBD), is *'the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes genetic diversity within species, between species and of ecosystems'.*

This chapter presents an assessment of the likely and significant impacts arising from the proposed development on biodiversity. The following assessment is based on the development parameters as described in Chapter 6 of this EIAR.

Mitigation measures are provided to avoid / reduce significant effects on biodiversity receptors and residual effects are determined.

10.2 Legislation and Guidance

10.2.1 Legislation

In assessing the likely significant effects on biodiversity arising from the proposed development, due regard has been given to relevant legislation and guidance, including the following:

- EIA Directive (2014/52/EU)
- Planning and Development Acts 2000, as amended and the Planning and Development Regulations 2001, as amended
- Wildlife Act 1976, as amended
- Flora (Protection) Order 2015
- EU Water Framework Directive 2000/60/EC;
- European Communities (Birds and Natural Habitats) Regulations 2011 (as amended)
- Dublin City Development Plan 2016 – 2022
- Draft Dublin City Biodiversity Action Plan 2021 - 2025
- Dublin City Biodiversity Action Plan 2015 – 2020
- National Biodiversity Action Plan 2017 - 2021

10.2.2 Guidelines

The biodiversity chapter has been prepared in accordance with the following guidance:

- Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine. Version 1.1. [Chartered Institute of Ecology and Environmental Management (CIEEM), 2018, updated 2019]
- EirGrid (2020) Ecology Guidelines for Electricity Transmission Projects A Standard Approach to Ecological Impact Assessment of High Voltage Transmission Projects
- (EPA 2022); Guidelines on the information to be contained in Environmental Impact Assessment Reports (EIAR)
- Advice Notes for Preparing Environmental Impact Statements DRAFT (EPA, September 2015)
- Biodiversity Net Gain. Good practice principles for development. A practical guide. (CIRIA C776a, 2019)

- Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment (European Union, 2013)
- Guidelines for Assessment of Ecological Impacts of National Road Schemes (National Roads Authority, 2009)
- Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes (National Roads Authority, 2009)
- Guidelines for the Treatment of Badgers Prior to the Construction of National Road Schemes (National Roads Authority, 2005)
- Guidelines for the Treatment of Otters prior to the Construction of National Road Schemes (National Roads Authority, 2008)
- Guidelines for the Treatment of Bats During the Construction of National Road Schemes (National Roads Authority, 2005)
- A Guide to Habitats in Ireland (Fossit, 2000)
- Best Practice Guidance for Habitat Survey and Mapping (Smith et al., 2011)
- Inland Fisheries Ireland (2016) Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters
- Countryside Bird Survey (2012) CBS Manual Guidelines for Countryside Bird Survey participates
- Bat Surveys: Good Practice Guidelines, Third Edition (Bat Conservation Trust, 2016)

10.3 Methodology

10.3.1 Desktop Study

A desktop assessment was carried out to identify features of ecological importance which have potential to be affected by the proposed development. The assessment included an interrogation of aerial imagery and available GIS datasets to investigate the potential for connectivity to designated and ecologically sensitive areas. Habitats which might be affected by the development were identified and their suitability to support sensitive, rare and protected species was assessed (having regard to the typical ranges of species known to occur in the locality).

Principal sources of information utilised for the desktop assessment included:

- Existing relevant mapping and databases e.g. species (protected and rare) and habitat distribution etc. (sourced from the Environmental Protection Agency (EPA)[1], the National Biodiversity Data Centre (NBDC)[2] and the National Parks and Wildlife Services (NPWS)[3]
- Published and unpublished NPWS reports on protected habitats and species including Irish Wildlife Manual reports, Article 17 Reports, Species Action Plans and Conservation Management Plans
- Published data from Bat Conservation Ireland
- Published data from BirdWatch Ireland
- Published data from the Botanical Society of Britain & Ireland Database
- Published documents from Marine Institute Ireland
- EPA (Water Framework Ireland Map viewer) databases for information on surface water features within proximity to the proposed development

[1] https://gis.epa.ie/
[2] https://maps.biodiversityireland.ie/Map
[3] https://www.npws.ie/maps-and-data

A review of findings of previous ecological surveys undertaken in proximity to the proposed development site was also carried out.

Information from these surveys, and their location and relevance to the proposed project, are provided in Section 10.4 as relevant below. These surveys included extensive recent multi-year surveys conducted for the main MetroLink Rail project located in the vicinity of the proposed development for:

- Wintering birds
- Aquatic ecology
- General walkover surveys

10.3.2 Consultations

Pre-application consultations were carried out with the prescribed bodies and authorities, pertinent to the ecological and biological aspects of this project (see Table 10.1 below).

Table 10-1: Summary of Biodiversity related authorities consulted

Organisation	Response
Birdwatch	Acknowledgement of consultation receipt only
Department of Agriculture, Food and the Marine (DAFM)	No Response
DAU	Acknowledgement of consultation receipt, but will provide feedback should any issues become apparent
Department of Communications, Climate Action and Environment (DECC)	No Response
Inland Fisheries Ireland (IFI)	• Barberstown stream (in Ward system) limited fisheries value, the Ward system supports a small population of Atlantic salmon in lower reaches and a resident Brown trout population • The Sluice system supports a resident population of Brown trout. • The Cuckoo and Mayne Rivers are a non-salmonid system, however, IFI are currently assessing the viability of a salmonid reintroduction programme • The Mayne system does contain populations of European Eel and other fish species • The Santry River is non-salmonid in the upper reaches because of the presence of a number of impassable features to fish located toward the lower end of the system. Brown Trout have been recorded in the lower reaches. It should be highlighted that Dublin City Council has secured funding to develop an ambitious river restoration and greenway project along a 4,500m stretch of the River • The specific details of any works directly affecting watercourses or riparian habitats in the area, in particular plans for stream crossings must first be submitted to IFI for assessment • Telecon meeting held and confirmation that further contact will be made post-application
Irish Water	No Response

10.3.3 Field Survey

Walkover ecology surveys were conducted of lands, including roadsides, crossed by the proposed MetroLink cable routes. Also included were options under consideration during the design process. These surveys were conducted by experienced ecologists from Mott Macdonald on the following dates;

- 23rd April 2021;

- 30th May 2022;
- 10th October 2022
- 17th October 2022,
- 14th November 2022;
- 22nd November 2022;
- 2nd December 2022 and
- 28th April 2023.

The specific surveys conducted are summarised as follows.

10.3.3.1 Habitat Surveys

The field surveys were conducted along each proposed cable route (as described in Section 10.3, above), with the aim of identifying significant ecological features, such as protected flora and fauna, invasive species, and habitat features with potential ecological value.

Habitat and plant surveys of the entirety of the proposed development were carried out by the aforementioned appropriately experienced Mott MacDonald ecologists.

Habitats in all areas were classified to level three according to the scheme outlined in "*A Guide to Habitats in Ireland*"[4].

Fit to European Annex 1 habitats was informed with reference to the EU Interpretation Manual for EU Habitats[5]. Habitat survey methods were conducted in line with 'Best Practice Guidance for *Habitat Survey and Mapping*'[6]. Particular attention was paid to the possible occurrence of:

- Annex 1 (and priority Annex 1) habitats designated under the EU Habitats Directive 92/43/EEC
- Protected plant species listed in the 2015 Flora Protection Order S.I. No. 256/2015; European Communities (Birds and Natural Habitats) Regulations 2011
- Flowering plants of conservation concern in the Ireland Red List (No. 10): Vascular Plants[7]
- Invasive plant species scheduled to the Birds and Habitats Regulations
- Species and habitats of special conservation significance identified within relevant Biodiversity Action Plans.

10.3.3.2 Faunal Surveys

An assessment of the likely presence or absence of protected and notable animal species, listed on Annexes II, IV and V of the Habitats Directive was undertaken. This was based on the known distribution of species, habitat suitability and/or direct evidence such as field signs or observations.

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[4] Fossit (2000) A Guide to Habitats in Ireland

[5] European Comission (2013) Interpretation Manual of European Union Habitats.

[6] Smith et al (2011) Best Practice Guidance for Habitat Survey and Mapping

[7] Wyse Jackson, M., FitzPatrick, Ú., Cole, E., Jebb, M., McFerran, D., Sheehy Skeffington, M. & Wright, M. (2016) Ireland Red List No. 10: Vascular Plants. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs, Dublin, Ireland.

Otter

The methodologies and assessment criteria used were based on current published guidance. Otter survey followed "*Monitoring the Otter Lutra lutra"*[8]. The extent of survey area was defined with regard to *Guidelines for the Treatment of Otters during the Construction of National Road Schemes*[9] and therefore included survey of the riparian habitat 200m upstream and downstream of the proposed development. Signs of Otter were searched for including:

- Individual otters;
- Holts;
- Couches/resting sites;
- Spraints (categorised as dried fragmented, dried intact; not fully dry) and gland secretions;
- Footprints and paths;
- Slides;
- Feeding remains.

Badger

Badger survey followed *Surveying Badgers*[10]. The extent of survey area was defined with regard to *Guidelines for the Treatment of Badgers during the Construction of National Road Schemes*[11].

- Latrines & dung pits
- Hair
- Paths and footprints
- Scrapes
- Snuffle holes
- Setts (including a description of the sett location: hedgerows, earth banks, woodland, or scrub habitat. Type of sett and level of usage: main, maternity, ancillary, abandoned etc. Signs of activity: discarded bedding, spoil heaps etc.)

Bats

A daytime bat survey of the road culvert and trees was carried out in accordance with *Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd edn)*[12]*.* The visual assessment was carried out in line with Bat Tree Habitat Key[13] to determine potential roost features. Trees which might be affected by the works were examined for potential roost features which included

- Horizontal / vertical cracks along tree limbs / trunk
- Knot holes and cankers in trees
- Voids in trees
- Crevices including lifting bark or thick ivy growth (where stems are a minimum of 50mm diameter)

The suitability of habitat features for bats, within the survey area, were assessed in accordance with Collins (2016) as described in Table 10-2 below.

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[8] Chanin, P. (2003) Monitoring the Otter *Lutra lutra"* Conserving Natura 2000 Rivers Monitoring Series No.10.

[9] NRA (2008) Guidelines for the Treatment of Otters during the Construction of National Road Schemes.

[10] Harris, S., Cresswell, P., Jefferies, D.,. (1989). Surveying Badgers. The Mammal Society - No. 9

[11] NRA (2005) Guidelines for the Treatment of Badgers during the Construction of National Road Schemes.

[12] Collins, J (2016) Bat Surveys for Professional Ecologists: Good Practice Guidelines

[13] Andrews, H *et al*., (2013) Bat Tree Habitat Key

Table 10-2: Guidelines for Assessing potential Bat Roosts

Suitability	Description/Roosting Habitats	Commuting and Foraging Habitats
Negligible	Negligible habitat features on site likely to be used by roosting bats.	Negligible habitat features on site likely to be used by commuting or foraging bats.
Low	A structure with one or more potential roost sites that could be used by individual bats opportunistically. However, these potential roost sites do not provide enough space, shelter, protection, appropriate conditions, and/or suitable surrounding habitat likely to be used on a regular basis by larger numbers of bats (i.e., unlikely to be suitable for maternity or hibernation). A tree of sufficient size and age to contain potential roost features but with none seen from the ground or with features seen only with very limited roost potential.	Habitats, that could be used by small numbers of commuting bats such as gappy hedgerows or unvegetated streams, but are isolated, i.e., not very well connected to the surrounding landscape by another habitat. Suitable, but isolated habitat that could be used by small numbers of foraging bats such as a lone tree (not in a parkland situation) or a patch of scrub.
Moderate	A structure or tree with one or more potential roost sites that could be used by bats due to their size, shelter, protection, conditions, and surrounding habitat but unlikely to support a roost of high conservation status (with respect to roost type only – the assessments in this table are made irrespective of species conservation status, which is established after presence is confirmed).	Continuous habitat connected to the wider landscape that could be used by bats for commuting such as lines of trees and scrub or linked back gardens. Habitat that is connected to the wider landscape that could be used by bats for foraging such as trees, scrub, grassland, or water.
High	A structure with one or more potential roost sites that could be used that are obviously suitable for use by larger numbers of bats on a more regular basis and potentially for longer periods of time due to their size, shelter, protection, conditions, and surrounding habitat.	Continuous high-quality habitat that is well connected to the wider landscape that is likely to be used regularly by commuting bats such as river valleys, streams, hedgerows, lines of trees and woodland edges. High-quality habitat that is well connected to the wider landscape that is likely to be used regularly by foraging bats such as broadleaved woodland, tree-lined watercourses, and grazed parkland. Site is close to and connected to known roosts.

Source: Collins (2016)

Trees and buildings / structures which were assessed as having a Moderate or High suitability for bats were examined further for evidence of bat activity using an endoscope. Evidence of bat activity includes:

- Bat droppings
- Signs of bat use, such as polishing / smoothing of potential roost features and oily marks (from fur) around possible access points and roost areas
- Feeding remains such as moth wings or other insect parts
- Urine stains (staining / blackening of entrance to potential roost feature and below the feature)
- Direct evidence including dead bats and squeaking noises

10.3.3.3 Aquatic Surveys

The main source of information informing the freshwater aquatic ecology assessment was the recent baseline aquatic ecology/ fisheries survey of watercourses outlined in Trituris[14] (2021). These surveys informed the assessments for the main RO MetroLink Project[15].

Aquatic ecologists undertook sampling and evaluation of the following aquatic components;

- Fish community, including Salmonids and Lampreys
- Macroinvertebrates
- Salmonid and Lamprey habitat suitability
- White-clawed crayfish (under national licence C82/2018)

Updated confirmation surveys were conducted in May 2022 of relevant rivers previously surveyed (Trituris, 2021). The confirmation surveys were conducted by an experienced aquatic ecologist from Mott MacDonald. These surveys were to check and confirm the 2018 survey findings were still applicable. The 2022 survey was conducted at the Cuckoo Stream and River Maine which are proposed for crossing by Horizontal Directional Drilling (HDD). The survey included an appraisal of biological water quality based on EPA Q-value method (Ref: Appendix I in Toner et al 2005)[16].

An overview of watercourses in the wider area of the proposed MetroLink cable works addressed is provided in Figure 10.1.

[14] Triturus (2021). Aquatic and fisheries assessment of watercourses associated with the MetroLink project, Co. Dublin. Report prepared by Triturus Environmental Ltd. for Scott Cawley. Updated April 2021.

[15] https://www.metrolinkro.ie/

[16] Toner et al. Water Quality in Ireland 2001 – 2003. Environmental Protection Agency, 2005

Figure 10.1: Watercourses and associated sample sites previously surveyed (Trituris 2021) in the vicinity of the proposed MetroLink 110 kV cable development.

10.3.4 Limitations

All habitats within the Zone of Impact (ZoI) of the proposed MetroLink 110 kV cable development works were appropriately surveyed, with no reported access constraints or limitations.

Information regarding aquatic ecosystems surveyed has been provided by a report compiled by Triturus Environmental (Ltd) in April 2021. This survey included the lower reaches of the River Ward was surveyed and the associated information is contained within this report.

No formal breeding bird survey was conducted as works are predominantly in made ground. Bird species were recorded, when present, particularly in off road areas of the proposed development. The walkover surveys were conducted by an experienced bird surveyor. Surveys included the breeding and wintering bird season and species of conservation importance[17] were recorded, if present.

Consequently, the information gathered to inform this assessment can therefore be considered robust.

[17] Gilbert G, Stanbury A, Lewis L (2021), “Birds of Conservation Concern in Ireland 2020 – 2026”. Irish Birds 9: 523—544.

10.3.5 Ecological Valuation and Assessment of Impacts

10.3.5.1 Study Area (Ecological Zone of Influence)

The current guidance on ecological assessments states that: "*The 'zone of influence' for a project is the area over which ecological features may be affected by biophysical changes as a result of the proposed project and associated activities. This is likely to extend beyond the project site, for example where there are ecological or hydrological links beyond the site boundaries*" and that "*the zone of influence will vary for different ecological features depending on their sensitivity to an environmental change*."

The Zone of Influence (ZoI) varies depending on the construction and operational activity and the sensitivity of the receptor (e.g., flora, birds, terrestrial mammals) to the effect encountered.

The ZoI identified for the various ecological receptors are as outlined below:

- The footprint of the proposed development for direct damage to habitats.
- A study carried out on the potential for effects via impacts on air quality and climate arising from the proposed development has been carried out as part of this EIAR. Within this assessment the ZoI for dust effects to ecological receptors was identified as 50m. As such, the ZoI is taken as 50m for dust effects within this NIS.
- 40m for detectable noise effects[18] to wetland bird species during the construction phase only. The noise study found that the construction phase works noise will fall to below 65dB within up to 40m of the proposed development. As such, areas of suitable habitat in the vicinity of works are taken as the ZoI for the construction related noise impacts to wintering birds.
- 150m for breeding otter holts, (NRA 2006)[19].
- Catchment wide ZoI for surface waterbodies.

10.3.5.2 Ecological Value

The *Guidelines for Assessment of Ecological Impacts of National Road Schemes* (NRA)[20] were adopted as part of this methodology for the purpose of evaluating the importance of ecological features within the survey area. The site evaluation criteria from this assessment methodology are reproduced in Table 10-3 below.

In accordance with NRA guidelines and CIEEM[21] guidelines, impact assessment is only undertaken of Key Ecological Receptors (KERs). These are features within the zone of influence of the proposed scheme which are "*both of sufficient value to be material in decision making and likely to be affected significantly*". According to NRA guidelines, KERs are of local importance (higher value) or higher as per NRA value criteria. Features of local importance (lower value) are not considered in the guidance to be KERs and are therefore excluded from impact assessment. Table 10.3, below, provides a summary of the site evaluation criteria as set out by the NRA guidelines.

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[18] Cutts, N., Phelps, A., & Burdon, D. (2009). Construction and waterfowl: Defining sensitivity, response, impacts and guidance. Report to Humber INCA by the Institute of Estuarine and Coastal Studies, University of Hull. EN (2003) The Humber Estuary European Marine Site: English Nature's advice given under Regulation, 33(2).

[19] NRA (2006). Guidelines for the Treatment of Otters prior to the Construction of National Road Schemes.

[20] NRA (2009) Guidelines for Assessment of Ecological Impacts of National Road Schemes

[21] CIEEM (2018) Guidelines for Ecological Impact Assessment in the UK and Ireland.

Table 10-3: Site Evaluation Criteria (NRA, 2009)

Ecological Value	Description
Internationally Important	Sites designated (or qualifying for designation) as a SAC or SPA under the EU Habitats or Birds Directives Undesignated sites that fulfil criteria for designation as a European Site Features essential to maintaining the coherence of the Natura 2000 network Sites containing 'best examples' of the habitat types listed in Annex I of the Habitats Directive Resident or regularly occurring populations of birds listed in Annex I of the Birds Directive and species listed in Annex II and/or Annex IV of the Habitats Directive Ramsar Sites World Heritage Sites Biosphere Reserves Sites hosting significant species populations under the Bonn Convention Sites hosting significant populations under the Berne Convention Biogenetic Reserves European Diploma Sites Salmonid waters
Nationally Important	Sites or waters designated or proposed as an NHA Statutory Nature Reserves Refuge for fauna and flora protected under the Wildlife Acts National Parks Undesignated sites fulfilling criteria for designation as a NHA; Statutory Nature Reserves; 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) of species protected under the Wildlife Acts and/or species listed on the relevant Red Data list) Sites containing viable areas of the habitat types listed in Annex I of the Habitats Directive
County Importance	Areas of Special Amenity Areas subject to a Tree Preservation Order Areas of High Amenity, or equivalent, designated under the County Development Plan Resident or regularly occurring populations (assessed to be important at the County level) of species of birds listed in Annex I of the Birds Directive, species listed in Annex II and/or IV of the Habitats Directive, species protected under the Wildlife Acts and/or species listed on the relevant Red Data list Site containing area(s) of the habitat types listed in Annex I of the Habitats Directive that do not fulfil criteria for valuation as of International or National Importance County important populations of species, or viable area of semi-natural habitats or natural heritage features identified in the National or local Biodiversity Action Plan 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 Biodiversity Action Plan Resident or regularly occurring populations (assessed to be important at the Local level) of species of birds listed in Annex I of the Birds Directive, species listed in Annex II and/or IV of the Habitats Directive, species protected under the Wildlife Acts and/or species listed in 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 of features containing non-native species that are of some importance in maintaining habitat links

Source: NRA, 2009

10.3.5.3 Assessment of Impact

Impacts were assessed and characterised in accordance with the '*Guidelines on the Information to be Contained in Environmental Impact Assessment Reports*'[22] as reproduced in Table 10.4 below.

Table 10-4: Impact Magnitude and Duration Criteria (EPA, 2022)

Impact Magnitude	Definition
Quality of Effects	**Positive Effects** A change which improves the quality of the environment (for example, by increasing species diversity; or the improving reproductive capacity of an ecosystem, or by removing nuisances or improving amenities).
	Neutral Effects No effects or effects that are imperceptible, within normal bounds of variation or within the margin of forecasting error
	Negative/adverse Effects A change which reduces the quality of the environment (for example, lessening species diversity or diminishing the reproductive capacity of an ecosystem; or damaging health or property or by causing nuisance).
Significance of Effects	**Imperceptible** An effect capable of measurement but without significant consequences.
	Not significant An effect which causes noticeable changes in the character of the environment but without significant consequences.
	Slight Effects An effect which causes noticeable changes in the character of the environment without affecting its sensitivities.
	Moderate Effects An effect that alters the character of the environment in a manner that is consistent with existing and emerging baseline trends.
	Significant Effects An effect which, by its character, magnitude, duration or intensity alters a sensitive aspect of the environment
	Very Significant An effect which, by its character, magnitude, duration or intensity significantly alters most of a sensitive aspect of the environment.
	Profound Effects An effect which obliterates sensitive characteristics
Duration and Frequency of Effects	**Momentary Effects** Effects lasting from seconds to minutes
	Brief Effects Effects lasting less than a day
	Temporary Effects Effects lasting less than a year
	Short-term Effects Effects lasting one to seven years
	Medium-term Effects Effects lasting seven to fifteen years.
	Long-term Effects Effects lasting fifteen to sixty years.
	Permanent Effects

[22] EPA (2022) Guidelines on the Information to be Contained in Environmental Impact Assessment Reports.

Impact Magnitude	Definition
	Effects lasting over sixty years
	Reversible Effects Effects that can be undone, for example through remediation or restoration
	Frequency of Effects Once, rarely, occasionally, frequently, constantly – or hourly, daily, weekly, monthly, annually

10.4 Receiving Environment

10.4.1 Designated Sites

Designated sites in the vicinity of the proposed development are detailed in Appendix F and summarised below.

10.4.1.1 Sites of International Importance

European Sites

The Birds Directive (2009/147/EC) and the Habitats Directive (92/42/EEC) put an obligation on EU Member States to establish the Natura 2000 network. The Natura 2000 network comprises sites of high biodiversity importance for rare and threatened habitats and species across the EU. In Ireland, the Natura 2000 network of European sites comprises Special Areas of Conservation (SAC) and Special Protection Areas (SPA). SACs are selected for the conservation of Annex I habitats (including priority types which are in danger of disappearance) and Annex II species (other than birds). SPAs are selected for the conservation of Annex I birds and other regularly occurring migratory birds and their habitats.

The MetroLink 110kV Underground Cable route is outside of any European site.

Table 10-5: European Sites in the vicinity of the proposed 110 kV MetroLink cable routes

Site Name and Code	Distance from MetroLink Cable Route (at closest point)	Qualifying Interests / Special Conservation Interests (SCI) of the European Site (* denotes priority habitat)
Special Protection Area (SPA)		
Baldoyle Bay SPA (004016)[23]	2.6 km	• Light-bellied brent goose (*Branta bernicla hrota*) [A046] • Shelduck (*Tadorna tadorna*) [A048] • Ringed plover (*Charadrius hiaticu*la) [A137] • Golden plover (*Pluvialis apricaria*) [A140] • Grey plover (*Pluvialis squatarola*) [A141] • Bar-tailed godwit (*Limosa lapponica*) [A157] • Wetland and waterbirds [A999]
North Bull Island SPA (004006)[24]	3.1km	• Light-bellied Brent goose (*Branta bernicla hrota*) [A046] • Shelduck (*Tadorna tadorna*) [A048] • Teal (*Anas crecca*) [A052] • Pintail (*Anas acuta*) [A054] • Shoveler (*Anas clypeata*) [A056] • Oystercatcher (*Haematopus ostralegus*) [A130]

[23] NPWS (2013) Conservation Objectives: Baldoyle Bay SPA 004016. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

[24] NPWS (2015) Conservation Objectives: North Bull Island SPA 004006. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

Site Name and Code	Distance from MetroLink Cable Route (at closest point)	Qualifying Interests / Special Conservation Interests (SCI) of the European Site (* denotes priority habitat)
		• Golden plover (*Pluvialis apricaria*) [A140] • Grey plover (*Pluvialis squatarola*) [A141] • Knot (*Calidris canutus*) [A143] • Sanderling (*Calidris alba*) [A144] • Dunlin (*Calidris alpina*) [A149] • Black-tailed godwit (*Limosa limosa*) [A156] • Bar-tailed godwit (*Limosa lapponica*) [A157] • Curlew (*Numenius arquata*) [A160] • Redshank (*Tringa totanus*) [A162] • Turnstone (*Arenaria interpres*) [A169] • Black-headed gull (*Chroicocephalus ridibundus*) [A179] • Wetland and Waterbirds [A999]
Malahide Estuary SPA (004025)[25]	3.7km	• Great crested grebe (*Podiceps cristatus*) [A005] • Light-bellied brent goose (*Branta bernicla hrota*) [A046] • Shelduck (*Tadorna tadorna*) [A048] • Pintail (*Anas acuta*) [A054] • Goldeneye (*Bucephala clangula*) [A067] • Red-breasted merganser (*Mergus serrator*) [A069] • Oystercatcher (*Haematopus ostralegus*) [A130] • Golden plover (*Pluvialis apricaria*) [A140] • Grey plover (*Pluvialis squatarola*) [A141] • Knot (*Calidris canutus*) [A143] • Dunlin (*Calidris alpina*) [A149] • Black-tailed godwit (*Limosa limosa*) [A156] • Bar-tailed godwit (*Limosa lapponica*) [A157] • Redshank (*Tringa totanus*) [A162] • Wetland and Waterbirds [A999]
Ireland's Eye SPA (004117)[26]	6.8km	• Cormorant (*Phalacrocorax carbo*) [A017] • Herring gull (*Larus argentatus*) [A184] • Kittiwake (*Rissa tridactyla*) [A188] • Guillemot (*Uria aalge*) [A199] • Razorbill (*Alca torda*) [A200]
Rogerstown Estuary SPA (004015)[27]	7.8km	• Greylag Goose (*Anser anser*) [A043] • Light-bellied Brent Goose (*Branta bernicla hrota*) [A046] • Shelduck (*Tadorna tadorna*) [A048 • Shoveler (*Anas clypeata*) [A056] • Oystercatcher (*Haematopus ostralegus*) [A130] • Ringed Plover (*Charadrius hiaticula*) [A137] • Grey Plover (*Pluvialis squatarola*) [A141] • Knot (*Calidris canutus*) [A143] • Dunlin (*Calidris alpina*) [A149]

[25] NPWS (2013) Conservation Objectives: Malahide Estuary SPA 004025. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

[26] NPWS (2022) Conservation objectives for Ireland's Eye SPA [004117]. First Order Sitespecific Conservation Objectives Version 1.0. Department of Housing, Local Government and Heritage.

[27] NPWS (2013) Conservation Objectives: Rogerstown Estuary SPA 004015. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

Site Name and Code	Distance from MetroLink Cable Route (at closest point)	Qualifying Interests / Special Conservation Interests (SCI) of the European Site (* denotes priority habitat)
		• Black-tailed Godwit (*Limosa limosa*) [A156] • Redshank (*Tringa totanus*) [A162] • Wetland and Waterbirds [A999]
Howth Head Coast SPA (004113)[28]	8.4km	• Kittiwake (*Rissa tridactyla*) [A188]
Lambay Island SPA (004069)[29]	11.9km	• Fulmar (Fulmarus glacialis) [A009] • Cormorant (*Phalacrocorax carbo*) [A017] • Shag (*Phalacrocorax aristotelis*) [A018] • Greylag Goose (*Anser anser*) [A043] • Lesser Black-backed Gull (*Larus fuscus*) [A183] • Herring Gull (*Larus argentatus*) [A184] • Kittiwake (*Rissa tridactyla*) [A188] • Guillemot (*Uria aalge*) [A199] • Razorbill (*Alca torda*) [A200] • Puffin (*Fratercula arctica*) [A204]
Special Area of Conservation (SAC)		
Baldoyle Bay SAC (000199)[30]	2.6km	• Mudflats and sandflats not covered by seawater at low tide [1140] • Salicornia and other annuals colonising mud and sand [1310] • Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330] • Mediterranean salt meadows (*Juncetalia maritimi*) [1410]
North Dublin Bay SAC (000206)[31]	3km	• Mudflats and sandflats not covered by seawater at low tide [1140] • Annual vegetation of drift lines [1210] • Salicornia and other annuals colonising mud and sand [1310] • Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330] • Mediterranean salt meadows (*Juncetalia maritimi*) [1410] • Embryonic shifting dunes [2110] • Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) [2120] • Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130] • Humid dune slacks [2190] • *Petalophyllum ralfsii* (petalwort) [1395]

[28] NPWS (2022) Conservation objectives for Howth Head Coast SPA [004113]. First Order Sitespecific Conservation Objectives Version 1.0. Department of Housing, Local Government and Heritage.

[29] NPWS (2022) Conservation objectives for Lambay Island SPA [004069]. First Order Sitespecific Conservation Objectives Version 1.0. Department of Housing, Local Government and Heritage

[30] NPWS (2012) Conservation Objectives: Baldoyle Bay SAC 000199. Version 1.0. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

[31] NPWS (2013) Conservation Objectives: North Dublin Bay SAC 000206. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

Site Name and Code	Distance from MetroLink Cable Route (at closest point)	Qualifying Interests / Special Conservation Interests (SCI) of the European Site (* denotes priority habitat)
Malahide Estuary SAC (000205)[32]	3.5km	• Mudflats and sandflats not covered by seawater at low tide [1140] • Salicornia and other annuals colonising mud and sand [1310] • Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330] • Mediterranean salt meadows (*Juncetalia maritimi*) [1410] • Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) [2120] • Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130]
Howth Head SAC (000202)[33]	6.5km	• Vegetated sea cliffs of the Atlantic and Baltic coasts [1230] • European dry heaths [4030]
Ireland's Eye SAC (002193)[34]	7.2km	• Perennial vegetation of stony banks [1220] • Vegetated sea cliffs of the Atlantic and Baltic coasts [1230]
Rockabill to Dalkey Island SAC (003000)[35]	7.3km	• Reefs [1170] • *Phocoena phocoena* (harbour porpoise) [1351]
Rogerstown Estuary SAC (000208)[36]	7.5km	• Estuaries [1130] • Mudflats and sandflats not covered by seawater at low tide [1140] • Salicornia and other annuals colonising mud and sand [1310] • Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330] • Mediterranean salt meadows (*Juncetalia maritimi*) [1410 • Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) [2120] • Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130]
Lambay Island SAC (000204)[37]	11.9km	• Reefs [1170] • Vegetated sea cliffs of the Atlantic and Baltic coasts [1230] • *Halichoerus grypus* (Grey Seal) [1364] • *Phoca vitulina* (Harbour Seal) [1365]

[32] NPWS (2013) Conservation Objectives: Malahide Estuary SAC 000205. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

[33] NPWS (2016) Conservation Objectives: Howth Head SAC 000202. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs.

[34] NPWS (2017) Conservation Objectives: Ireland's Eye SAC 002193. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs

[35] NPWS (2013) Conservation Objectives: Rockabill to Dalkey Island SAC 003000. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

[36] NPWS (2013) Conservation Objectives: Rogerstown Estuary SAC 000208. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

[37] NPWS (2013) Conservation Objectives: Lambay Island SAC 000204. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

Ramsar Sites

Ramsar sites are wetland sites designated to be of international importance under the Ramsar Convention. The Ramsar Convention is an intergovernmental environmental treaty which was established in 1971 by UNESCO and came into force in 1975.

No Ramsar sites were identified within the footprint of the proposed development. Five Ramsar sites were identified in the wider landscape. These sites are all contiguous with European sites and so are assessed under the European Site headings. The location of these sites relative to the proposed development and any overlap with European sites is outlined below in Table 10.6.

Table 10-6: Ramsar Sites

Site Name	Approximate Distance (km) from Proposed Development	Corresponding European Sites
Baldoyle Bay	2.3km	Baldoyle Bay SPA, Baldoyle Bay SAC
North Bull Island	3km	North Bull Island SPA, North Dublin SAC
Broadmeadow Estuary	3.6km	Malahide Estuary SPA, Malahide Estuary SAC
Sandymount Strand/Tolka Estuary	6.9km	South Dublin Bay and River Tolka Estuary SPA, South Dublin Bay SAC
Rogerstown Estuary	8.7km	Rogerstown Estuary SPA, Rogerstown Estuary SAC

10.4.1.2 Sites of National Importance

Natural Heritage Areas

Natural Heritage Areas (NHA) are the basic wildlife designation in Ireland. These areas are considered nationally important for the habitats present or which holds species of plants and animals whose habitats needs protection. Under the Wildlife Amendment Act (2000), NHAs are legally protected from damage from the date they are formally proposed for designation (source: www.npws.ie). Proposed Natural Heritage Areas (pNHA) were published on a non-statutory basis in 1995 and have not since been statutorily proposed or designated.

No sites of national designation occur within or in proximity to the proposed development site. The closest NHA site to the site is Skerries Islands NHA (001218) which is located approximately 17km north of the site.

Proposed Natural Heritage Areas

Proposed NHAs (pNHAs) are sites which were published on a non-statutory basis in 1995 (and again in the 2010s) but have not since been statutorily proposed or designated. These sites are of significance for wildlife and habitats. Prior to statutory designation, pNHAs are still subject to limited protection, in the form of:

- Agri-environmental farm planning schemes support the objective of maintaining and enhancing the conservation status of pNHAs;
- There is a requirement for the Forest Service to gain NPWS approval before they will pay afforestation grants on pNHA lands; and,
- A recognition of the ecological value of pNHAs by Planning and Licencing Authorities.

No pNHAs were recorded within the immediate footprint of the proposed MetroLink cable works, although several pNHAs were identified in the wider landscape. The location of these pNHAs and those that are coincident with one or more European designated sites are outlined hereunder in Table 10.7. The NPWS has not produced site synopses for such pNHAs due to their shared reason for designation with European sites. As such, the potential for effects to these specific pNHAs are considered further under the relevant European designation at the impact stage.

Table 10-7: Proposed National Heritage Areas

Proposed Natural Heritage Name (site code)	**Distance from MetroLink 110kV Underground Cable**	**Corresponding European Sites**	**Key Features**
Santry Demesne (000178)	0.6km	None	Historic record of FPO species hairy St.John's wort (*Hypericum hirsutum*) and comprised of remnants of a demesne woodland.[38]
Feltrim Hill (001208)	1.0km	None	Synopsis not available.
Sluice River Marsh (001763)	1.5km	None	This site is of importance as a relatively intact freshwater marsh, a habitat that is now rare in County Dublin.[39]
Baldoyle Bay (000199)	2.3km	Baldoyle Bay SPA, Baldoyle Bay SAC	Synopsis not available.
Malahide Estuary (000205)	3.5km	Malahide Estuary SPA, Malahide Estuary SAC	Synopsis not available.
Royal Canal (002103)	4.8km	None	The site synopsis notes that "*The ecological value of the canal lies more in the diversity of species it supports along its linear habitats than in the presence of rare species*"[40]
Howth Head (000202)	5.8km	Howth Head Coast SPA, Howth Head SAC	Synopsis not available.
Grand Canal (002104)	6.2km	None	The site synopsis notes that "*The ecological value of the canal lies more in the diversity of species it supports along its linear habitats than in the presence of rare species*"[41]
North Dublin Bay (000206)	3.0km	North Bull Island SPA, North Dublin Bay SAC	Synopsis not available.
South Dublin Bay (000210)	6.9km	South Dublin Bay and River Tolka Estuary SPA, South Dublin Bay SAC	Synopsis not available.
Portraine Shore (001215)	7.2km	None	The site synopsis notes that "*This site is a good example of a rocky bedrock shore with a typical flora and fauna. The grassy vegetation above the shore adds habitat diversity. The site is also an important geological site*."
Rogerstown Estuary (000208)	7.4km	Rogerstown Estuary SAC and Rogerstown Estuary SPA	Synopsis not available.

[38] NPWS (year unknown) Site Synopsis. Santry Demesne. Site Code 000178.

[39] NPWS (2006) Site Synopsis. Sluice River Marsh. Site Code 001763.

[40] NPWS (1995) Site Synopsis. Royal Canal. Site Code 002103.

[41] NPWS (1995) Site Synopsis. Grand Canal. Site code 002104.

Proposed Natural Heritage Name (site code)	Distance from MetroLink 110kV Underground Cable	Corresponding European Sites	Key Features
Liffey Valley (000128)	7.6 km	None	The site synopsis notes that "*The site is important because of the diversity of the habitats within the site, ranging from aquatic to terrestrial. A number of rare and threatened plant species have been recorded from the site.*" Rare and threatened species noted by the synopsis include the FPO species hairy St. John's-wort.
Lambay Island (000204)	11.8 km	Lambay Island SPA, Lambay Island SAC	Synopsis not available.

10.4.1.3 Other Designated Sites

No National Park occurs within the vicinity or have connectivity to the proposed development.

Other sites of nature conservation in relation to the proposed development are discussed hereunder.

- Baldoyle Estuary, North Bull Island and Rogerstown Estuary are also designated as Nature Reserves and are located approximately 2.3km, 3.1km and 7.8km from the development site respectively;
- North Bull Island and Rogerstown Estuary are designated Wildfowl Sanctuaries;
- Dublin Bay is also designated as a UNESCO Biosphere reserve.

The above sites are encompassed within the European site boundaries of North Dublin Bay SAC, South Dublin Bay SAC, North Bull Island SPA and South Dublin Bay and River Tolka Estuary SPA, Baldoyle Bay SAC, Baldoyle Bay SPA, Rogerstown Estuary SAC and Rogerstown Estuary SPA. As such, they are considered further under the relevant European designation at the impact stage.

10.4.2 Records of Protected Species and Habitats

10.4.2.1 National Biodiversity Data Centre ((NBDC)

NBDC records of flora recorded within the two 10km grid squares (O14 and O24) which encompass the proposed development site are outlined hereunder. NBDC records show three records of threatened flowering plant species within the two 10 km grid squares (O14 and O24) within the last 50 years. None of these species are protected under Flora (Protection) Order 2022[42]. These species, and their habitat associations are provided in Table 10.8, below.

No rare, endangered or species of high conservation status of mosses or liverworts have been recorded within the O14 and O24 grid squares.

Table 10-8: Record of Rare and/or Protected Flowering Plants

Common Name	Scientific Name	Conservation Status	Habitat Association[43]	Potential to occur Within the ZoI of the proposed development
Blue Fleabane	*Erigeron acer*	Endangered	Habitats include sand dunes, sand-pits, spoil and waste heaps from quarries, railway ballast, industrial waste and cinders. It also grows on rock outcrops, especially of chalk and limestone and on mortared walls.	No – These habitats are not associated with the proposed development.
Smooth Brome	*Bromus racemosus*	Vulnerable	An annual of unimproved hay and water meadows, usually on damp, periodically flooded alluvial soils. It is most frequent on the drier margins of fields, sometimes growing on the dredgings from the ditches bordering them. It is also found as a grass-seed casual in arable margins and on verges.	Yes – potential to occur in field margins within the ZoI of the proposed development
Spring Vetch	*Vicia lathyroides*	Vulnerable	An annual of sand dunes and short, summer-parched grasslands on sandy soils by the coast; also on disturbed ground, old walls, and in dry heathland on sands and gravels inland.	Yes – potential to occur in disturbed ground within the ZoI of the proposed development

[42] S.I. No. 235 of 2022 FLORA (PROTECTION) ORDER 2022

[43] BRC (2022) Online Plant Atlas of the British and Irish Flora. Available at: https://plantatlas.brc.ac.uk/

10.4.2.2 Records of Rare and/or Protected Fauna Species

NBDC records of fauna recorded within the two 10km grid squares (O14 and O24) which encompass the proposed development site are outlined hereunder.

Mammals

Protected mammal species recorded within the two 10km grid squares (O14 and O24) surrounding the MetroLink 110kV Underground Cable are presented below in Table 10.9.

Table 10-9: Protected Terrestrial Mammal Species Recorded in the Vicinity of the Proposed Development

Species name	10km grid square	Conservation Status (Marnell, 2019)	Designation
Brown long-eared bat (*Plecotus auritus*)	O14, O24	Least Concern	EU Habitats Directive Annex IV Wildlife Acts
Daubenton's bat (*Myotis daubentonii*)	O14	Least Concern	EU Habitats Directive Annex IV Wildlife Acts
Eurasian badger (*Meles meles*)	O14, O24	Least Concern	Wildlife Acts
Eurasian pygmy shrew (*Sorex minutus*)	O14, O24	Least Concern	Wildlife Acts
Eurasian red squirrel (*Sciurus vulgaris*)	O14	Least Concern	Wildlife Acts
European otter (*Lutra lutra*)	O14, O24	Least Concern	EU Habitats Directive Annex II, Annex IV
Lesser noctule (*Nyctalus leisleri*)	O14, O24	Least Concern	EU Habitats Directive Annex IV Wildlife Acts
Natterer's bat (*Myotis nattereri*)	O14	Least Concern	EU Habitats Directive Annex IV Wildlife Acts
Pine marten (*Martes martes*)	O14, O24	Least Concern	EU Habitats Directive Annex V || Wildlife Acts
Common pipistrelle (*Pipistrellus pipistrellus*)	O14, O24	Least Concern	EU Habitats Directive Annex IV Wildlife Acts
Soprano pipistrelle (*Pipistrellus pygmaeus*)	O14, O24	Least Concern	EU Habitats Directive Annex IV Wildlife Acts
West European hedgehog (*Erinaceus europaeus*)	O14, O24	Least Concern	Wildlife Acts
Mountain hare (*Lepus timidus*)	O24	Least Concern	EU Habitats Directive Annex V Wildlife Acts

Amphibians

Recent records (within the last ten years) of common frog (*Rana temporaria*), and smooth newt (*Lissotriton vulgaris*) were identified within the O14 and O24 grid squares.

Birds

All birds and their nests and eggs are protected by Irish legislation. Given this, records of species listed in Annex I of the Birds Directive within the 10km grid squares were examined as these are species which are:

- In danger of extinction
- Vulnerable to changes in their habitat
- Considered rare due to small populations or a restricted local distribution
- In need of particular attention due to the nature of the habitat they rely on

Annex I Bird species recorded within the 10km grid squares surrounding the proposed MetroLink 110kV Underground Cable route are provided below in Table 10.10, below.

Table 10-10: Annex I Listed Bird Species Recorded in the Vicinity (O14 and O24 Grid Squares) of the Proposed Development

Species Name	BoCCI Status
Arctic tern (*Sterna paradisaea*)	Amber Listed
Bar-tailed godwit (*Limosa lapponica*)	Red Listed
Black-throated diver (*Gavia arctica*)	Amber Listed
Common kingfisher (*Alcedo atthis*	Amber Listed
Common tern *(Sterna hirundo*)	Amber Listed
Corn crake (*Crex crex*)	Red Listed
Dunlin (*Calidris alpina*)	Red Listed
European golden plover (*Pluvialis apricaria*)	Red Listed
Great northern diver (*Gavia immer*)	Amber Listed
Hen harrier (*Circus cyaneus*)	Amber Listed
Little egret (*Egretta garzetta*)	Green Listed
Little gull (*Larus minutus*)	Amber Listed
Little tern (*Sternula albifrons*)	Amber Listed
Mediterranean gull (*Larus melanocephalus*)	Amber Listed
Merlin (*Falco columbarius*)	Amber Listed
Peregrine falcon (*Falco peregrinus*)	Green Listed
Red-throated diver (*Gavia stellata*)	Amber Listed
Roseate tern (*Sterna dougallii*)	Amber Listed
Ruff (*Philomachus pugnax)*	Amber Listed
Sandwich tern (*Sterna sandvicensis*)	Amber Listed
Short-eared owl (*Asio flammeus*)	Amber Listed
Whooper swan (*Cygnus cygnus*)	Amber Listed

10.4.3 Past Ecological Surveys Within the ZoI of the Proposed Development

10.4.3.1 Aquatic Ecology

A comprehensive aquatic ecological survey was conducted by Triturus Environmental in September 2018 along the identified watercourses. This survey was carried out to inform the EIAR for the MetroLink project.

Ecological assessments conducted along each watercourse included;

- Water quality
- Current instream health
- Riparian vegetation
- Fish community (including salmonids and lampreys)
- Salmonid habitat suitability
- Lamprey habitat suitability

Four watercourses were identified within the ZoI of the proposed development. Table 10.11 below provides an overview of these watercourses as outlined in the Triturus report.

Table 10-11: Rivers / Streams within the ZoI of the Proposed Development

River / Stream	Distance to development works	Connectivity to European sites
River Santry	25m	• South Dublin Bay and River Tolka Estuary SPA • North Bull Island SPA
River Mayne	<5m (crossing)	• Baldoyle Bay SPA • Baldoyle Bay SAC
Cuckoo Stream	<5m (crossing)	• Baldoyle Bay SPA • Baldoyle Bay SAC
Sluice Stream	90m	• Baldoyle Bay SPA • Baldoyle Bay SAC

Table 10.12 provides a summary of the fish community sampled along watercourses identified within the ZoI of the proposed development, as well as the assessed suitability of the watercourses to hold fish communities.

Table 10-12: Fish Community and Fish Habitat Suitability Assessment

River / Stream Name	Fish captured (#:Species)	Salmon Habitat Assessment	Lamprey Habitat Assessment	Historical Record of Salmonids
River Santry	• 0	Poor	Poor	No
River Mayne	• 7: Three Spined Stickleback	Poor	Poor	No
Cuckoo Stream	• 0	Poor	Poor	No
Sluice Stream	• 0	Moderate	Moderate	No

Table 10.13 provides an overview of the 2018 surveys of each watercourse within the ZoI of the proposed development.

Table 10-13: Summary of Aquatic Ecological Features and Health of Watercourses Within the ZoI of the Proposed Development

River / Stream	Distance from cable route	Crossing required?	Downstream Connectivity to European Site	Ecological Evaluation
River Santry	25m	No	• South Dublin Bay and River Tolka Estuary SPA • North Bull Island SPA	• The geomorphology of the River Santry has been modified but has retained some semi-natural features. • The riparian zone (where unmodified) exhibited patches of mixed broad-leaved woodland, including examples of Sycamore and Beech. • The river channel was ca.1.5 m wide, 0.2 m deep, and had a 1.5 m bank height. The riverbed was primarily comprised of cobbles and coarse gravel, but was influenced by heavy siltation. Moreover, further investigation revealed that the silt was anoxic and black in colour. • The River Santry watercourse has been subjected to heavy nutrient enrichment, evidenced by elevated electrical conductivity (877 µs), and poor dissolved oxygen concentration (7.9 mg/L). Moreover, the surface water at the sample site exhibited a blue-green water colour.
River Mayne	<5m	Yes – 2	• Baldoyle Bay SPA • Baldoyle Bay SAC	• The River Mayne exhibited a heavily modified river channel, more representative of a drainage channel habitat than that of a lowland river, whilst the watercourse exhibited low flow volume (≤ 0.1 m deep). • The river channel contained pockets of coarse gravel and cobble (all bedded) and had at ca. 40% silt cover. • Water quality exhibited elevated concentrations of electrical conductivity (1106 µs), low concentrations of dissolved oxygen (1.8 mg/L) and high pH (8.17). • The River Mayne traverses commercial agricultural land subjected to tillage, which will undoubtably influence the water quality and health of the watercourse through sediment and nutrient run-off into the watercourse. • The watercourse sample site was bordered by species tolerant of disturbed ground and high nutrient levels, such as Lesser Burdock (*Arctium minus*), Hogweed (*Heracleum sphondylium*), Creeping Thistle (*Cirsium arvense*), Bramble and Willowherbs (*Epilobium spp.*).
Cuckoo Stream	<5m	Yes – 1	• Baldoyle Bay SPA • Baldoyle Bay SAC	• The Cuckoo Stream has been modified such that the watercourse has been straightened and deepened but has retained some geomorphological natural features (i.e. riffle and glide sections). • The Cuckoo Stream has historically been known as a heavily polluted river system within the Greater Dublin area. • The water channel was ca. 1.5 m wide, 0.15 m deep and exhibited a moderate flow rate.

River / Stream	Distance from cable route	Crossing required?	Downstream Connectivity to European Site	Ecological Evaluation
				• The field survey revealed that the Cuckoo Stream exhibited elevated conductivity (1342 µs), elevated pH (8.11), and a low concentration of dissolved oxygen (5.8 mg/L). Evidence of hydrocarbon pollution was evident within the sample site (e.g. surface slicks), whilst sewage fungus and a grey coloured sediment was observed covering much of the riverbed substrate.
Sluice Stream	<5m	Yes – 1	• Baldoyle Bay SPA • Baldoyle Bay SAC	• The Sluice Stream is a small, heavily-modified, deepened and straightened channel. • The Sluice Stream was bordered by mature Ash, Hawthorn (*Crataegus monogyna*) and Blackthorn (*Prunus spinosa*), with abundant scrub in the understory predominantly comprised of Bramble, Spear Thistle (*Cirsium vulgare*), Nettle and Hedge Bindweed. • The watercourse exhibits tall banks (between 2.0 m and 2.5 m), which, in the context of the narrow 1.5 m wide “U”-shaped channel, will increase riparian shading effects. • The flow of the Sluice Stream was low during the time of sampling (0.05 m), with the sample site being comprised of riffles and glides, although some areas were almost dry and pools of water were localised. The channel bed was dominated by cobble and gravel (ca. 70%), whilst clay, sand and silt dominated the remaining 30% of the river substrate matrix. • There was strong evidence of illegal refuse dumping within the watercourse, whereby tyres, car batteries and common household waste was observed throughout the sample site. • Water quality analysis revealed elevated electrical conductivity (628 µs), moderate concentration of dissolved oxygen (8.6 mg/L), with a pH of 7.93. • The Sluice Stream sample site is adjacent to commercial agricultural land subjected to frequent tillage, which will undoubtably influence the water quality and health of the watercourse through sediment and nutrient run-off into the watercourse.

10.4.3.2 Wintering Birds

A review of recent wintering bird surveys carried out in 2018, and between 2019 – 2021[44] was carried out. The survey carried out assessed a 300m ZoI surrounding the MetroLink project. This included lands intersecting with the proposed development.

Species recorded by this project within the ZoI for the proposed development are outlined below in Table 10.14.

Table 10-14: Wintering Bird Species Recorded Historically Within the ZoI of the Proposed Development

Species	**BoCCI Status**Error! Bookmark not defined.	SCI Species
Black-headed gull	Amber listed (Breeding/Wintering)	Yes
Curlew	Red listed (Breeding/Wintering)	Yes
Golden plover	Red listed (Breeding/Wintering)	Yes
Herring gull	Amber listed (Breeding/Wintering)	Yes
Black-tailed godwit	Red listed (Breeding/Wintering)	Yes
Snipe (*Gallinago gallinago*)	Red listed (Breeding/Wintering)	No
Meadow pipit (*Anthus pratensis*)	Red listed (Breeding)	No
Buzzard (*Buteo buteo*)	Green listed (Breeding)	No

10.4.3.3 Breeding Birds

A review of recent breeding bird surveys carried out as part of the MetroLink EIAR[44] was carried out. These surveys were conducted in 2018, 2019, and 2020 breeding bird seasons. The survey carried out assessed a 300m ZoI surrounding the MetroLink project. This included some lands intersecting with the proposed development at Dardistown.

Species of conservation interest recorded by this project within the ZoI for the proposed development are outlined below in Table 10.15.

Table 10-15: Breeding Bird Species Recorded Historically Within the ZoI of the Proposed Development

Species	**BoCCI Status**Error! Bookmark not defined.
Greenfinch (*Carduelis chloris)*	Amber listed (Breeding)
Herring gull	Amber listed (Breeding/Wintering)
Swallow (*Hirundo rustica*)	Amber listed (Breeding)
Starling (*Sturnus vulgaris*)	Amber listed (Breeding)

10.4.3.4 Bats

A review of recent bat surveys carried out as part of the MetroLink EIAR[44] was carried out. These surveys were conducted in 2018, 2019, and 2020. Three surveys included building surveys, transects, static detector surveys, and tree surveys.

No bat roosts were recorded within the ZoI of the proposed development.

Species recorded included:

- Common pipistrelle
- Soprano pipistrelle,
- Leisler's bat

[44] Jacobs (2021) Metrolink Environmental Impact Assessment

- Unidentified pipistrelle

10.4.4 Field Surveys

10.4.4.1 Habitat Surveys

The majority of the proposed cable development follows existing roadways, but in some instances the development will be required to pass through improved agricultural grasslands, amenity grasslands and arable lands, and in the vicinity of hedgerows, planted trees, treelines, scrub habitat. Additionally, the proposed cable route is proximal to and / or traverses several watercourses.

The footprint of the proposed development does not overlap with any European sites. However, watercourses within the vicinity of the footprint of the proposed development have direct hydrological connectivity with several European sites further afield. Habitat classification codes are provided with reference to level 3 under Fossit[45].

Habitats observed along each proposed cable route are detailed in Table 10.16and the subsequent following sections. A habitat map outlining the locations of these habitats is provided in Appendix F.

Table 10-16: Habitats identified along each proposed cable route

Proposed Cable Route	Habitats Within Footprint of the Proposed Development.
Forrest Little to Belcamp	• The proposed cable route is located within existing tarmacked roads (BL3), before traversing agricultural land including improved agricultural grassland (GA1), tillage fields (BC3). Other habitats encountered in offroad sections include hedgerows (WL1), treelines (WL2), scrub (WS1), watercourses (FW2), and drainage ditches (FW4). An area of marsh (GM3)/ scrub (WS1) and mature treelines (WL2) is noteworthy at the northern side of the Cuckoo stream
Forrest Little to Belcamp Option 2	• The proposed cable route for this section is entirely within the existing road (BL3).
Ballystruan to Newbury	• The proposed cable route for this section is split into two. The northern section traverses recolonised bare ground (ED3), amenity grassland (GA2), arable farmland (BC1), and dry meadows and grassy verge (GS2) before entering into existing hardstanding (BL3). • The southern section runs within an existing road and hardstanding surfaces (BL3).
Ballystruan to Forrest Little	• The proposed cable route for this section runs within the existing road network (BL3) for the majority of its length. Other habitats traversed within this section include agricultural grassland (GA1), dry meadows and grassy verges (GS2), amenity grassland (GA2), and tillage fields (BC1).

Further details on habitats identified along the proposed cable routes is provided hereunder:

Scrub (WS1)

Scrub was observed sporadically, primarily along the eastern and southern portions of the study area. This habitat is generally dominated blackthorn (Prunus spinosa), brambles (*Rubus fruticosus*) and sycamore (*Acer pseudoplatanus*). Other species recorded included hazel (*Corylus avellana*), field maple (*Acer campestre*), dog rose (*Rosa canina*), Japanese knotweed (*Fallopia japonica*), winter heliotrope (*Petasites fragrans*), and alder (*Alnus glutinosa*).

[45] Fossit (2000) A Guide to Habitats in Ireland, The Heritage Council

This habitat is assessed as being of **Local Importance (Higher Value)**.

Scrub (WS1)/ Marsh (GM3) (Mosaic)

An area of wet marsh dominated by Iris, nettle, willowherb and other tall herb wetland species occurs on the northern side of the Cuckoo Stream. Dense bramble scrub with willow (spp.) and scattered hawthorn also occurs. Marsh and trees will be avoided by works.

This habitat is assessed as being of **Local Importance (Higher value)**.

Broadleaved Woodland (WD1)

The route passes adjacent to areas of ash, hazel, sycamore and bramble dominated planted deciduous woodland on the east site of the M1.

This habitat is has local ecological value and is evaluated as being of **Local Importance (Higher value)**.

Scattered Trees and Parkland (WD5)

The route passes an area of scattered ornamental tree planting and managed amenity grassland near the Horizon logistics park. Tree species include Scots pine, alder, silver birch, lime and ash.

This habitat is assessed as being of **Local Importance (Lower value)**.

Arable Farmland (BC1)

Arable farmland habitat was identified along the route of the proposed Ballystruan to Newbury cable route. This habitat is highly modified and with a low species diversity due to its management.

This habitat is assessed as being of **Local Importance (Lower value)**.

Improved Agricultural Grassland (GA1)

Improved agricultural grassland was one of the most common habitat types recorded throughout the study area. This habitat was typically comprised of heavily managed and fertilised homogenous fields of perennial ryegrass (*Lolium perenne*), often bordered scrub and/or treelines. Species observed within this habitat throughout the study area included ragwort (*Jacobaea vulgaris*), nettles (*Urtica dioica*), creeping buttercup (*Ranunculus repens*), meadow buttercup (*Ranunculus acris*), spear thistle (*Cirsium vulgare*), creeping thistle (*Cirsium arvense*) Yorkshire fog (*Holcus lanatus*), Cock's foot grass (*Dactylis glomerata*), ribwort plantain (*Plantago lanceolata*), dandelion (*Taraxacum vulgaria*), broad dock (*Rumex obtusifolius*), silverweed (*Potentila anserina*), chickweed (*Stellaria media*); birds foot trefoil (*Lotus corniculatus*), and great willowherb (*Epilobium hirsutum*). Some of this habitat is less improved and reverting to a more semi improved **neutral grassland (GS1)** type in a field edge south of the R108 near Dublin Airport. The grassland habitats are all modified and being managed as intensive grassland at least up to the recent past.

Grassland habitats are assessed as being of **Local Importance (Lower value)**.

Dry Meadow and Grassy Verge (GS2)

The boundary of roadsides in some areas includes less managed tall ruderal grassland species including Cow parsley (*Anthriscus sylvestris*), Hogweed (*Heracleum sphondylium*), Nettle, thistles (*Cirsium arvense*, *C. vulgare*) docks (*Rumex* spp.) and Meadow Vetchling (*Lathyrus pratensis*)

Dry meadow grassland habitats are dominated by common widespread species that will readily re-establish if topsoil is retained. This habitat is assessed as being of **Local Importance (Lower value)**.

Recolonising bare ground (ED3)

Areas of previously disturbed ground were noted at Malahide Road. Common grassland species including Colt's Foot (*Tussilago farfara*), Nettle (*Urtica dioica*), Dandelion (*Taraxacum* spp.), willow-herbs (*Epilobium* spp.) and ragworts (*Senecio* spp.) were recorded.

This habitat is assessed as being of **Local Importance (Lower value)**.

Wet Grassland (GS4)

An area of developing relatively species poor wet grassland occurs immediately west of the M1 along the Ballystruan to Newbury section. Species recorded are common species of semi improved grassland and included Yorkshire fog (Holcus lunatus), Red clover (Trifolium pratense), Creeping buttercup (Ranunculus repens), Meadow buttercup (Ranunculus acris), Creeping Cinquefoil (Potentilla repens), ribwort plantain (Plantago lanceolata), tufted vetch, dandelion, ragwort, great willowherb, hard rush, Pendulus sedge (Carex pendula), meadow vetchling (Lathyrus pratensis) and Silverweed (Potentilla anserina).

This habitat is relatively scarce locally and has biodiversity value. It is assessed as being of **Local Importance (Higher value).**

Treeline (WL2)

Treelines were commonly recorded along all three proposed cable routes. This habitat has a similar species assemblage to the hedgerows but with a greater amount of mature trees. Within the study area this habitat primarily occurred on the edges of agricultural fields and along roadsides. Species recorded within treelines included ash (*Fraxinus excelsior*), willow (*Salix sp.*), brambles, hawthorn (*Crataegus monogyna*), Scots pine (*Pinus sylvestris*), elder (*Sambucus nigra*), wild cherry (*Prunus avium*), and silver birch (*Betula pendula*).

This habitat is assessed as being of **Local Importance (Higher Value)**.

Hedgerow (WL1)

Hedgerows were recorded bordering the roadsides and forming field boundaries. Species recorded within this habitat included hawthorn, bramble, ivy (*Hedera helix*), elder; alder, silver birch, ash, hazel, oak (*Quercus robur*, *Quercus petraea*), hawthorn, and dog rose.

This habitat is assessed as being of **Local Importance (Higher Value)**.

River / Stream (FW1)

River and stream habitats were observed along the Forrest Little to Belcamp route and Ballystruan to Newbury route only. Specific details on watercourses identified along the proposed cable routes is provided in Section 10.5.2.

This habitat is assessed as being of **Local Importance (Higher Value).**

Drainage Ditches (FW4)

Drainage ditches were recorded infrequently throughout the study area. The structure of the drainage ditches observed were primarily concrete lined drainage channels. All drainage ditches encountered were heavily altered watercourses and carried low levels of water. No further information pertaining to bankside vegetation is available.

This habitat is assessed as being of **Local Importance (Higher Value).**

10.4.4.2 Invasive Species

The alien invasive species Japanese Knotweed (*Fallopia japonica*) was recorded at several locations within the ZoI of the proposed development.

Areas were Japanese knotweed was observed included;

- Along the roadside amenity grassland (GA1) in the vicinity of the Trinity Care Nursing Home (on the roadside verge of the Stockhole Lane). There are signs, however, indicating that the Knotweed has being treated for removal and there is evidence that there is no regenerative growth;
- A stand of **Japanese knotweed** and Winter Heliotrope (*Petasites pyrenaicus*) was observed within a hedgerow (WL1) along the Baskin Lane, ca. 65m east of the Baskin Lane / Stockhole Lane junction;
- Two stands of Winter heliotrope were observed along the roadside hedgerow ca.100m west of the Baskin Lane – R107 road intersection;
- Winter heliotrope and a planted hedge of cherry laurel were noted on the eastern side of the Malahide road near the Cuckoo stream crossing:
- An expansive stand of knotweed was observed ca. 90m west of the propose Belcamp joint cable bay site, ca. 30m east of the proposed Forrest Little – Belcamp cable development route. The stand of Japanese knotweed was estimated to encompass an area of 1000m^2, and appears to be contained within the grounds of the old walled garden of a dilapidated house property;
- A moderate stand (ca. 30m^2) of **Japanese knotweed** was observed in scrub habitat alongside residential gardens along the Turnapin Grove road, which is adjacent to the M1/R139 interchange.

A habitat map outlining locations where Japanese Knotweed was recorded is provided in Appendix F.

10.4.4.3 Aquatic Surveys

A summary of the key findings of a 2022 aquatic survey including Q value assessment and description of baseline ecology and notes on any changes observed compared to 2018 surveys (MetroLink project baseline surveys) are outlined in Table 10.17 below.

Table 10-17: Summary Aquatic baseline findings at two river crossing points 2022 compared to 2018 findings

River Crossing	Q-Value Assessment value 2018	Key findings 2022	Q-Value Assessment value 2022	Difference compared to 2018
River Mayne, Dardistown	Q1	No fish noted. *Baetis rhodani* (present) - moderately clean water species, Cased caddis (present), *Asellus aquaticus* (dominant, abundant). Excessive siltation and filamentous algae	Q3	Evidence of slight water quality improvement since 2018.
Cuckoo stream	Q1	No fish noted	Could not be accessed	Unknown. Based on visual water quality has not worsened.

10.4.4.4 Faunal Assessment

Badger Survey

The majority of the proposed MetroLink cable route is within the existing road curtilage which is not suitable for supporting badger setts.

Two Badger setts were identified along the proposed MetroLink cable development route, within the vicinity of the Belcamp cable connection joint bay site, just north of the R139 (Figure 10.2) and another probable sett along the Ballystruan to Forrest Little cable route, just south of the R108 (Figure 10.3).

At the Belcamp site, one badger sett was observed in in a dry ditch along the eastern boundary of the site, 150m east of the proposed development. The second, more extensive badger set with two entrances, was observed in a scrub vegetated hummock 85m north of the proposed development, within the Belcamp cable connection site. Both setts exhibited signs of recent use, with loose soil excavated at the entrances.

A third badger sett is located within a hedgerow, 39m south of the proposed development. This also exhibited signs of recent activity. Table 10.18 provides a summary of badger setts identified during the field survey.

Table 10-18: Summary of Badger Sett Locations

Cable Route	Distance to development works	Associated Habitat
Forrest Little – Belcamp	65m	Calcareous grassland (GS1)
Forrest Little – Belcamp	85m	Calcareous grassland (GS1)
Ballystruan – Forrest Little	39m	Hedgerow (WL1)

Figure 10.2: Potential Badger Setts.

Figure 10.3: Potential Badger Sett.

Otter Survey

No signs of otter were recorded during site walkovers.

Bats

No potential bat roost sites were recorded within proposed works areas including bridges adjacent to proposed watercourse crossings of the Cuckoo stream and River Mayne. Table 10.19 below provides a summary of potential bat roosting sites identified close to the proposed development. Photographs of these potential roosting sites are provided below in Figure 10.4 and Figure 10.5.

Table 10-19: Potential Bat Roosts Identified Within the ZoI of the MetroLink 110kV cable route

Roost type	Cable route and location description	Distance to proposed works	Potential Bat Roost Suitability
Mature Tree	Forrest Little – Belcamp;	30m	Moderate
Mature Tree (dead)	Forrest Little – Belcamp;	90m	Moderate
Derelict bungalow	Forrest Little – Belcamp;	90m	High
Stone arch bridge	Forrest Little – Belcamp;	<5m (works include river crossing)	High
Stone arch bridge	Forrest Little – Belcamp; Malahide Road bridge over the River Mayne	<5m (works include river crossing)	Low
Stone arch bridge	Forrest Little – Belcamp; Limekiln-Malahide road intersection over the Cuckoo stream	<5m (works include river crossing)	Low
Derelict bungalow	Ballystruan – Forrest Little	50m	High
Derelict bungalow	Ballystruan – Forrest Little	84m	High

Figure 10.4: Potential Bat Roosting Sites Near the Belcamp Cable Connection Site.

Figure 10.5: Potential Bat Roosting Sites Near the South-Western Border of the Dublin Airport, Along the Ballystruan – Forrest Little Route.

Bats, and their potential roosting features are assessed as being of **Local Importance (Higher Value).**

Breeding Birds

The study area supports typical common passerine species which typically nest in areas of wooded vegetation. Table 10.20 below, provides a summary of bird species of conservation interest observed during the field survey. These were recorded mainly in farmland west of the proposed Ballystruan station (south of Dublin Airport). Based on MetroLink bird survey data potential breeding species of conservation importance are outlined

Table 10-20: Bird Species of Interest Observed Along the Proposed MetroLink Cable Development Route.

Common Name	**Latin Name**	**Peak Count**	**BOCCI**Error! Bookmark not defined. **Status**	**Potential breeding status**
Curlew	*Numenius arquata*	2	Red Listed	Non breeding
Linnet	*Carduelis cannabina*	35	Amber Listed	Breeding species (farmland/ scrub)
Grey wagtail	*Motacilla cinerea*	2	Red Listed	Possible breeder (riparian/ streams)
Skylark	*Alauda arvensis*	5	Amber Listed	Breeding species (farmland)
Meadow pipit	*Anthus pratensis*	3	Red Listed	Breeding species (farmland)
Yellowhammer	*Emberiza citrinella*	2	Red Listed	Breeding species (farmland/ hedgerows)
Tree sparrow	*Passer montanus*	2	Amber Listed	Breeding species (farmland/ hedgerows)

Wintering Birds

Walkover surveys conducted during the winter bird period (October to March Inclusive) including 10th and 17th October 2022, 14th and 22nd November 2022 and 2nd December 2022 included checks for flocks of wintering waterfowl potentially associated with European sites were conducted. No significant flocks of wintering waterfowl were recorded.

Other Fauna

No potential breeding sites were identified within direct works areas. Drainage ditches that occur close to potential works areas may provide potential amphibian (Common frog – *Rana temporaria*) breeding sites.

10.5 Summary of Key Ecological Receptors

The key ecological receptors within the Zone of Influence of the proposed development are evaluated in accordance with the evaluation criteria set out in Table 10.3 in Section 10.3.5 of this Chapter. The existing baseline condition / population stability, conservation status, rarity and legal protection of the key ecological receptors was considered as part of this evaluation. A summary of the ecological valuation and identification of Key Ecological Receptors is provided below in Table 10.21.

Table 10-21: Ecological valuation and identification of Key Ecological Receptors (KER)

Habitats/Species	Ecological Value (as per NRA guideline)	Potential to occur within the zone of influence (ZoI)	Key Ecological Receptors
Designated sites			
Natura 2000 Sites			
Baldoyle Bay SAC (000199)	International Importance	Yes – hydrological connectivity identified	**Yes**
North Dublin Bay SAC (000206)		Yes – hydrological connectivity identified	**Yes**
Malahide Estuary SAC (000205)		Yes – hydrological connectivity identified	**Yes**
Howth Head SAC (000202)		No	No
Ireland's Eye SAC (002193)		No	No
Rockabill to Dalkey Island SAC (003000)		No	No
Rogerstown Estuary SAC (000208)		No	No
Lambay Island SAC (000204)		No	No
Baldoyle Bay SPA (004016)		Yes – hydrological connectivity.	**Yes**
North Bull Island SPA (004006)		Yes – hydrological connectivity	**Yes**
Malahide Estuary SPA (004025)		Yes – hydrological connectivity	**Yes**
Ireland's Eye SPA (004117)		No	No
Rogerstown Estuary SPA (004015)		No	No
Howth Head Coast SPA (004113)		No	No
Lambay Island SPA (004069)		No	No
Ramsar Sites			
Baldoyle Bay	International Importance	Yes – hydrological connectivity	**Yes**
North Bull Island		Yes – hydrological connectivity	**Yes**
Broadmeadow Estuary		Yes – hydrological connectivity	**Yes**
Sandymount Strand/Tolka Estuary		No	No

Habitats/Species	Ecological Value (as per NRA guideline)	Potential to occur within the zone of influence (ZoI)	Key Ecological Receptors
Rogerstown Estuary		No	No
Proposed Natural Heritage Areas			
Santry Demesne pNHA (000178)	National Importance	No – no viable source pathway connector links identified	No
Feltrim Hill pNHA (001208)	National	No – no viable source pathway connector links identified	No
Sluice River Marsh pNHA (001763)	National	No – no viable source pathway connector links identified	No
Baldoyle Bay pNHA (000199)	International	Yes – hydrological connectivity	**Yes**
Malahide Estuary pNHA (000205)	National	Yes – hydrological connectivity	**Yes**
Royal Canal pNHA (002103)	National	No – no viable source pathway connector links identified	No
Howth Head pNHA (000202)	International	No – no viable source pathway connector links identified	No
Grand Canal pNHA (002104)	National	No – no viable source pathway connector links identified	No
North Dublin Bay pNHA (000206)	International	Yes – hydrological connectivity	**Yes**
South Dublin Bay pNHA (000210)	International	No – no viable source pathway connector links identified	No
Portraine Shore pNHA (001215)	National	No – no viable source pathway connector links identified	No
Rogerstown Estuary pNHA (000208)	International	No – no viable source pathway connector links identified	No
Liffey Valley pNHA (000128)	National	No – no viable source pathway connector links identified	No
Lambay Island pNHA (000204)	International	No – no viable source pathway connector links identified	No
Other Designated Sites			
Dublin Bay UNESCO Site	International	Yes – hydrological connectivity	**Yes**
Baldoyle Estuary Nature Reselve	International	Yes – hydrological connectivity	**Yes**
North Bull Island Nature Reserve	International	Yes – hydrological connectivity	**Yes**
Rogerstown Estuary Nature Reserve	International	No – no viable source pathway connector links identified	No
North Bull Island Wildfowl Sanctuary	International	Yes – hydrological connectivity	**Yes**
Habitats			
All Watercourses (FW1 and FW4)	Local Importance (Higher Value)	Yes, this habitat occurs within the ZoI of the proposed development	**Yes** – due to connectivity with other KERs
Scrub (WS1)	Local Importance (Higher Value)	Yes, this habitat occurs within the ZoI of the proposed development	**Yes**

Habitats/Species	Ecological Value (as per NRA guideline)	Potential to occur within the zone of influence (ZoI)	Key Ecological Receptors
Scrub (WS1)/ Marsh (GM3) (Mosaic)	Local Importance (Higher Value)	Yes, this habitat potentially occurs within the ZoI of the proposed development	**Yes**
Broadleaved Woodland (WD1)	Local Importance (Higher Value)	Yes, this habitat potentially occurs within the ZoI of the proposed development	**Yes**
Scattered Trees and Parkland (WD5)	Local Importance (Lower Value)	Yes, this habitat occurs within the ZoI of the proposed development	No
Arable Farmland (BC1)	Local Importance (Lower Value)	Yes, this habitat occurs within the ZoI of the proposed development	No
Improved Agricultural Grassland (GA1)	Local Importance (Lower Value)	Yes, this habitat occurs within the ZoI of the proposed development	No
Dry Meadow and Grassy Verge (GS2)	Local Importance (Lower Value)	Yes, this habitat occurs within the ZoI of the proposed development	No
Recolonising bare ground (ED3)	Local Importance (Lower Value)	Yes, this habitat occurs within the ZoI of the proposed development	No
Wet Grassland (GS4)	Local Importance (Higher Value)	Yes, this habitat potentially occurs within the ZoI of the proposed development	**Yes**
Treelines (WL2)	Local Importance (Higher Value)	Yes, this habitat occurs within the ZoI of the proposed development	**Yes**
Hedgerows (WL1)	Local Importance (Higher Value)	Yes, this habitat occurs within the ZoI of the proposed development	**Yes**
Invasive Species			
Japanese Knotweed (*Fallopia japonica*)	N/A	This species occurs at a number of locations within ZoI of the proposed development (refer to Appendix F2).	**Yes**
Rare and Protected Flora			
Blue Fleabane	Local Importance (Higher Value)	No – this species was not recorded during field walkovers, and supporting habitats were not recorded within the footprint of the Proposed Development.	No
Smooth Brome	Local Importance (Higher Value)	Yes – On precautionary basis due to potential to occur in field margins within the ZoI of the Proposed Development	**Yes**
Spring Vetch	Local Importance (Higher Value)	No – this species is very unlikely to occur.	No
Fauna			
Badger Setts	Local Importance (Higher Value)	Yes, these features occur within the ZoI of the proposed development	**Yes**
Otter holts and couches	Local Importance (Higher Value)	Yes – on precautionary basis given suitable habitat within the ZoI of the proposed development	**Yes**
Breeding birds	Local Importance (Higher Value)	Yes. Suitable habitat for breeding birds occurs within the ZoI of the proposed development in particular hedgerows crossed on farmland.	**Yes**
Wintering birds	International Importance	No - while small numbers of wintering waders, waterfowl and other bird species utilise farmland in the area, temporary works proposed (installation of cable) are mostly in unsuitable	No

Habitats/Species	Ecological Value (as per NRA guideline)	Potential to occur within the zone of influence (ZoI)	Key Ecological Receptors
		made ground/ existing disturbed areas. Where works occur locally outside made ground it will be at the edge of fields or across fields (Belcamp area) that are not used regularly by wintering birds. It is noted that no disturbance will arise to identified potential *ex situ* foraging and loafing areas used by species such as brent geese. Any possible localised disturbance during construction will not affect wintering birds and if disturbed they will move to alternative forage habitat which is still widely available in this locality. No measurable impacts will arise to more sensitive SPA roost and core forage areas used by wintering bird flocks. These areas are concentrated on the coast.	
Bat roosts (confirmed or potential roosts)	Local Importance (Higher Value)	No features that provide potential as bat roosts are likely to be impacted by the proposed development.	No
Bat species foraging habitat features	Local Importance (Higher Value)	Yes, foraging and commuting habitat occurs within the ZoI of the proposed development. Possible roost features will be avoided by the development.	**Yes**
Amphibian breeding habitat	Local Importance (Higher Value)	Yes, these features (drainage ditches) occur in the vicinity of the proposed development	**Yes**

10.6 Likely Significant Impacts of the Proposed Development

10.6.1 Do-Nothing

In the Do-Nothing scenario, the existing works area will remain as at present. There would be no effect on biodiversity.

10.6.2 Construction Phase

The following outlines potential impacts identified associated with the works:

- **Direct Loss of Habitat:** There is potential for a permanent loss of habitat associated with the construction phase of the proposed development.
- **Surface water run-off:** There is potential for impacts to surface water caused by the construction phase of the proposed development.
- **Dust:** Breaking out of existing hardstanding has the potential to cause dust. The proposed construction works are likely to result in the temporary generation of dust. Chapter 11 outlines the assessment of dust effects associated with the construction phase of the proposed development. This assessment incorporates earthworks, construction and track out from site areas.
- **Noise**: There is potential for a temporary increase in noise during the construction phase of the proposed development.
- **Visual Disturbance**: There is potential for a temporary increase in personnel and machinery presence during construction along the coastal area of the proposed development which may disturb coastal species.
- **Lighting**: Temporary working will be required to facilitate night working during the construction phase of the proposed development. This has potential to cause locally increased light levels.

The potential for these to cause significant effects to KERs is outlined hereunder.

10.6.2.1 Internationally Designated Sites

Designated sites with potential for impact were identified as Key Ecological Receptors.

Mott MacDonald prepared a screening for Appropriate Assessment and Natura Impact Statement report (which accompanies this application) which investigated the potential for the proposed development to have significant effects on European Site(s) either alone or in combination with other plans or projects. The screening report identified the potential for significant effects on the Natura 2000 Network arising from the proposed development in the absence of mitigation.

No direct habitat loss is likely to QI habitat within European site boundaries.

Other impacts are identified as outlined hereunder in Table 10.22.

Table 10-22: Potential Effects Identified to European Sites

European Site	Impact to QIs/SCIs Identified
Baldoyle Bay SAC	Potential for surface-water emissions / construction-based pollution to cause degradation to mudflat, and sandflat habitat
	Potential for degradation to Atlantic Salt Meadow, and Mediterranean salt meadow habitat caused by introduction of invasive species
North Dublin Bay SAC	Potential for surface-water emissions / construction-based pollution to cause degradation to mudflat, and sandflat habitat

European Site	Impact to QIs/SCIs Identified
	Potential for degradation to Atlantic Salt Meadow, and Mediterranean salt meadow habitat caused by introduction of invasive species
Malahide Estuary SAC	Potential for surface-water emissions / construction-based pollution to cause degradation to mudflat, and sandflat habitat
	Potential for degradation to Atlantic Salt Meadow, and Mediterranean salt meadow habitat caused by introduction of invasive species
Baldoyle Bay SPA	Potential for degradation in supporting habitats due to surface water emissions
	Potential for degradation to habitats caused by introduction of invasive species
North Bull Island SPA	Potential for degradation in supporting habitats due to surface water emissions
	Potential for degradation to habitats caused by introduction of invasive species
Malahide Estuary SPA	Potential for degradation in supporting habitats due to surface water emissions
	Potential for degradation to habitats caused by introduction of invasive species

In summary potential **significant adverse effects** are identified in the absence of mitigation to the above European sites.

10.6.2.2 Nationally Designated Sites

The following nationally designated sites were identified as KERs.

- Baldoyle Bay pNHA (000199)
- Malahide Estuary pNHA (000205)
- North Dublin Bay pNHA (000206)
- Rogerstown Estuary pNHA (000208)

These pNHA sites are contiguous with European sites as outlined in Section 10.4.1.2.

Potential for impacts to these sites are as outlined previously in relation to European Sites. Additional information in relation to degradation of habitats and impacts on wintering birds associated with these sites is outlined below. In summary potential **significant adverse effects** are identified in the absence of mitigation.

10.6.2.3 Other Designated Sites

The following other designated sites were identified as KERs:

- Dublin Bay UNESCO Site
- Baldoyle Estuary Nature Reserve
- North Bull Island Nature Reserve
- Rogerstown Estuary Nature Reserve
- North Bull Island Wildfowl Sanctuary

These sites are contiguous with European sites as outlined in Section 10.4.1.2.

Potential for impacts to these sites are as outlined in previously in relation to European Sites. Additional information in relation to degradation of habitats and impacts on wintering birds associated with these sites is outlined below. In summary potential **significant adverse effects** are identified in the absence of mitigation.

10.6.2.4 Habitats

The following habitats were identified as Key Ecological Receptors within, or in proximity to the proposed works:

- All Watercourses (FW1 and FW4)
- Scrub (WS1)
- Treelines (WL2)
- Hedgerows (WL1)

Table 10.23 below outlines the extent of direct impacts within the planning boundary (Zone of Influence - ZoI) that may be impacted by the works, in a worst case scenario.

Table 10-23: Impact on Habitat KERs

Habitat	Impacts Within the Project Boundary
All Watercourses (FW1 and FW4)	Nine watercourse crossings. One to be crossed via HDD. All other watercourses will be crossed within the existing road. No riparian or instream impacts will occur.
Scrub (WS1)	1.1 Ha occurs within the potential ZoI (planning boundary). Disturbance/ permanent removal of some of this habitat, within this 1.1 Ha area, will be required to facilitate cable installation.
Scrub (WS1)/ Marsh (GM3) (Mosaic)	An area of this habitat occurs adjacent to the north side of Cuckoo stream, that is included in the Planning Boundary. There is no requirement to impact this area but monitoring during construction at this location is required to confirm no impact.
Broadleaved Woodland (WD1)	3 Ha occurs within the potential ZoI (planning boundary). Disturbance/ permanent removal of some of this habitat, will be required to facilitate cable installation.
Wet Grassland (GS4)	0.4 HA occurs within the potential ZoI (planning boundary). Disturbance of some of this habitat, will be required to facilitate cable installation.
Treelines (WL2)	Based on a 3 – 5m works area width at nine treelines crossings, it is estimated that between 27m and 45m of treeline will be removed to facilitate cable installation.
Hedgerows (WL1)	Based on a 3 – 5m works area width at nine hedgerow crossings, it is estimated that between 27m and 45m of hedgerow will be removed to facilitate cable installation. 165m of hedgerow will be impacted within passing bays.

In the absence of mitigation there will be a permanent loss or temporary disturbance to of up to (4.1Ha) of woodland / scrub and 90m of hedgerow/ treeline, habitats of local importance (higher value) as outlined above in Table 10.23 associated with site clearance activities.

In addition works will be required within up to 0.4Ha of wet grassland.

Non KER habitats including semi improved neutral grassland (GS1) and scattered trees and parkland (WD5) have some ecological value and localised impacts may arise. Mitigation is outlined also in these cases, see Section 10.7.

Overall, these impacts are assessed as **permanent moderate negative effects** at a local scale.

10.6.2.5 Invasive Species (Japanese Knotweed)

There is a risk of disturbance and spread of Japanese Knotweed off the site where works occur in the vicinity of stands of this species identified along the proposed development, refer to Habitat Map (Appendix F2).

Overall, these impacts are assessed as unlikely **permanent moderate negative effects** at a local scale.

10.6.2.6 Rare and Protected Flora

No protected flora were recorded in surveys or have been outlined in the desk study. Smooth brome is the only rare species that may possibly occur. No impacts are likely but on a precautionary basis preconstruction surveys are appropriate in works at field margins.

Overall, potential impacts are assessed as unlikely **slight negative effects** at a local scale.

10.6.2.7 Aquatic Ecology/ fisheries

The potential for effects on surface water features as a result of the construction phase associated with drainage is discussed in Chapter 9.

All stream crossings will be either Horizontal Directional Drilling (HDD), trenching or above existing culverts within roads.Direct impacts to instream and adjacent riparian habitat will be avoided for in-road works and for HDD.

Indirect impacts such as water pollution / silt runoff/ cement discharge have potential to add to existing pollution loads in the River Mayne and Cuckoo stream which are already heavily impacted by pollutants with consequential reduced fisheries value and moderate to low water quality. For HDD and in-road crossings, these have the potential to result in **temporary slight impacts** to aquatic ecology noting these watercourses are already significantly impacted. For trenched crossings effects would be **temporary slight – moderate** in the absence of mitigation.

10.6.2.8 Badger

Three badger setts were identified during the site walkovers. These setts are located outside of the footprint of the works for the proposed development but may be subject to temporary noise and vibration effects during the construction phase.

In addition, there is potential for additional direct impacts and disturbance effects should additional badger setts become established within the ZoI in the time period following the survey and prior to construction.

In the absence of mitigation, these impacts are assessed as **permanent significant negative effect** at a local scale.

10.6.2.1 Otter

No otter holts or couches were recorded within the ZoI of the proposed development. However, there is potential for direct impacts and disturbance effects should holts become established within the ZoI in the time period following the survey and prior to construction.

The impacts are therefore assessed on a precautionary basis as **temporary moderate negative effect** at a local scale, noting no direct impacts will arise to riparian areas suitable for this species.

10.6.2.2 Breeding birds

Vegetation clearance has potential to result in a loss of nesting habitat for these breeding bird species in the local area. In addition, should clearance be carried out during the nesting season (1st March-31st August) there is potential for direct impact to nesting birds within scrub, treeline, and hedgerow habitats within the study area. The disturbance of these species during the construction phase has potential to result in temporary movement out of the ZoI and is assessed to be a **temporary moderate negative effect** at local scale.

10.6.2.3 Wintering Birds

Wetland birds have been documented to tolerate noise levels at or below 70dB(A) (Institute of Estuarine & Coastal Studies, University of Hull, 2009). The noise study found that the construction phase works will fall to below 65dB within up to 40m of the proposed development.

The RO MetroLink NIS notes in relation that the wintering birds within the ZoI of the proposed development were typically recorded with low frequency (only recorded once), indicating that they do not regularly use, or rely upon these lands, and that there is a large availability of suitable foraging and roosting habitat for these birds in the wider locality.

As such, any noise effects associated with the construction phase will not result in a significant disturbance event for these species. There is potential, therefore, for a **short-term imperceptible effect** to wintering bird populations at a local scale due to construction phase disturbance.

10.6.2.4 Bats

The site walkovers identified two trees, a building, and three stone arches with potential bat roost features. These features were all outside of the direct footprint of the proposed development.

Loss of treeline, hedgerow, and scrub habitat has the potential to result in loss and/or degradation of foraging habitat for bat species in the wider landscape. Further, there is potential for potential roost features to become established in trees prior to the commencement of the construction phase. The loss of trees with potential roost features therein, and foraging habitat, has the potential to result in a **permanent slight negative effect** at a local scale due to loss of suitable linear woodland type foraging habitat (as outlined under potential impacts to habitats).

10.6.2.5 Amphibians

No features likely to support breeding frogs were encountered. However, drainage ditches, linked to project works though offsite hydrological connections, may support breeding amphibians. There is potential for impacts to amphibians near the proposed development due to works within drainage ditch habitat. As such, there is potential for a **permanent slight negative effect** on local population of amphibians.

10.6.3 Operational Phase

The potential for effects on surface water features as a result of the operational phase associated with drainage is discussed in Chapter 9.

Clearance of woody vegetation overgrowth on offline sections of the cable routes may be required periodically by ESB maintenance crews. Hedgerows will be retained. Given the nature of the operations associated with the proposed development, no potential for significant adverse effects to biodiversity receptors are identified.

10.6.4 Decommissioning Phase

Works during the decommissioning phase are anticipated, applying a worst-case approach, to be similar to those during construction as similar types of activities would be undertaken. Therefore, where the potential for KERs exists, the potential for impact will also be present.

The activities associated with the decommissioning phase will be similar to those associated with the construction phase. Therefore, provided that appropriate mitigation is used, the impacts of the decommissioning phase should be, as a worst-case scenario, similar to those at construction phase.

10.6.5 Cumulative Effects

An assessment of projects with the potential for cumulative effects in association with the proposed MetroLink cable development was undertaken.

A search of planning applications[46] in the vicinity of the proposed cable connection sites and cable development routes was undertaken in May 2023 to examine projects with potential for in combination/cumulative effects. Applications which were made typically consisted of residential and commercial developments, and the retention of existing developments. There are several large development projects that may act in combination with the proposed MetroLink cable development. The main development identified in the local area is the MetroLink RO project.

10.6.5.1 MetroLink Project

The MetroLink Rail project alone will not impact European or Nationally important designated sites. Therefore no cumulative impacts will arise with the proposed development.

Residual impacts (post mitigation) are outlined in Table 10.24 that are common to the proposed development.

Table 10-24: Cumulative Impacts of the project with Metrolink Rail

Metrolink Rail – Residual Impacts	Proposed Development Impacts	Cumulative Impacts
Hedgerows (WL1) - Permanent loss of 385m	45m	**430m**
Treelines (WL2) - Permanent loss of 77m	45m	**122m**
Breeding Birds including Yellowhammer (red listed) - Likely significant effect at the local geographic scale	temporary moderate negative effect at local scale	**Likely significant effect at the local geographic scale**
Fish species (streams and watercourses) - Likely significant effect at the local geographic scale to due to impacts to surface water quality.	The project has the potential to result in temporary slight impacts to aquatic ecology noting these watercourses are already significantly impacted	**Likely significant effect at the local geographic scale to due to impacts to surface water quality.**

In summary, in the absence of mitigation, the MetroLink cable proposed development identifies impacts from the proposed development alone (habitats: section 10.6.2.4, breeding birds section 10.6.2.2 and aquatic ecology section 10.6.2.6) and cumulatively with the main MetroLink project (Table 10.24) to above-described biodiversity receptors in the local area.

10.6.5.2 Other Developments

There are other developments within the study area as detailed within Chapter 2 of this EIAR. Engagement with the relevant developers including DAA, IDA and ESB along with Fingal County Council and Dublin City Council will be undertaken to discuss scheduling.

[46] Planning Websites: Fingal County Council

10.6.5.3 Summary

Cumulative impacts, principally with The MetroLink Rail project are assessed as potentially **significant effects at the local geographic scale** to specific biodiversity receptors detailed.

Mitigation for the project alone (section 10.8) is outlined which is relevant for the main MetroLink rail and other projects.

10.7 Mitigation and Monitoring Measures

Mitigation measures were designed having regard to the Mitigation Hierarchy. This is a sequential order of mitigation actions, whereby the preference for mitigation measures are as outlined below:

- Avoidance: Steps to avoid harm to biodiversity.
- Minimisation: Where adverse effects cannot be avoided, action is taken to minimise these effects.
- Compensation: Only considered after all possibilities for avoidance and minimisation of effects have been implemented.

Careful consideration has been taken throughout the design process to use existing infrastructure (e.g. ducting) and to follow existing roadways which will ultimately minimise potential impacts to the surrounding habitats. As such, substantial mitigation through avoidance and minimisation has already been achieved. Additional mitigation measures to further avoid and/or minimise the potential impacts (described in section 10.7, above), are outlined hereunder.

10.7.1 Construction Phase

10.7.1.1 Monitoring of Mitigation Measures

During construction, monitoring will be carried out, and reported by the Contractors' Ecological Clerk of Works (ECoW), in agreement with the Employer's Representative Team, with regard for relevant conditions and licenses where required.

Monitoring will take place at river crossings where instream works, and river bankside disturbance works are to take place. Monitoring will also be required where works are necessary in close proximity to stands of Invasive Species, potential roost features, and at badger setts.

The specific intervals at which the monitoring will take place will be determined by the relevant ecologist, having regard for licenses, and planning conditions.

10.7.1.2 Ecological Clerk of Works (ECoW)

An Ecologist/ Ecological Clerk of Works (ECoW) will be employed by the Contractor to oversee implementation of mitigation and deliver toolbox talks and preconstruction confirmatory ecology surveys, as appropriate. This will include monitoring and auditing the works and contractor programmes and works method statements, to ensure mitigation is correctly implemented and impacts to KER habitats and other non-made ground habitats are minimise and avoided where practical.

The ECoW will be a full member of a relevant environmental institute, such as the Chartered Institute of Ecology and Environmental Management (CIEEM) and have demonstrable experience in ecological supervision and habitat restoration works.

The Contractor's ECoW will also ensure any disturbance licenses are arranged if any significant findings are determined from confirmatory pre-construction surveys outlined above. The

Contractor's ECoW will advise on mitigation measures implementation including the scheduling of works and will be included in regular liaison meetings between project teams to ensure that plans are co-ordinated and effects are minimised.

Separate to the ECoW, or if the EcOW does not have appropriate experience, an Environmental clerk of works (EnCOW)/ Environmental Engineer, with appropriate experience of managing surface water runoff/ pollution control will be employed on the site. The EnCOW will have responsibility for ensuring water quality and other general environmental protection measures are suitable and appropriate, and that they are effectively monitored.

Independent Environmental Clerk of Works (EnCow)

An Independent Environmental Clerk of Works (EnCoW) will be employed on behalf of the Employers Representative team, who will review and comment on the pre-construction survey reports, mitigation proposals, monitoring and compliance reports generated by the Contractor's ECoW.

10.7.1.3 Pre-Construction Confirmatory Surveys

Given the dynamic distribution of species and habitats over time, significant changes can arise between baseline surveys and construction. For example, invasive species distribution may change following treatment (such as sites observed under treatment along the Forrest Little – Belcamp route), or dispersal by humans, animals, or water.

In advance of enabling works, the Contractor will commission pre-construction confirmatory surveys of identified significant ecological receptors, to update the findings of the surveys outlined in Section 10.4.4. Surveys will specifically confirm updated distribution of, and inform any revisions to proposed mitigation for:

- Demarcate Local Importance (Higher value) habitats and works areas for so to minimise impacts and monitor works
- Badger setts at off road sections that bisect hedgerows
- Potential bat roosts
- Potential for Smooth Brome (rare flora) where works offroad in grassland type habitats;
- Surface water flow and condition of watercourse crossings
- Invasive species within the ZoI of the proposed development;
- Amphibians
- Breeding birds

Invasive species surveys will be carried out having regard to Guidance of Transport Infrastructure Ireland[47].

The Contractor's ECoW will conduct confirmatory badger surveys having regard to *Surveying Badgers***Error! Bookmark not defined.** and record signs of badgers including tracks, hair, latrines and setts at locations where potentially active badger setts have been identified including;

- Belcamp cable connection site and
- South-West point on the boundary of the Dublin airport.

The extent of survey area for badger surveys will be defined with regard to Guidelines for the Treatment of Badgers during the Construction of National Road Schemes**Error! Bookmark not defined.** as 150m beyond all works areas within suitable habitat.

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[47] TII (2020) https://www.tiipublications.ie/library/GE-ENV-01105-01.pdf

Should works progress within habitat identified as suitable for amphibians (drains, flooded areas) during the breeding season (February and March), a pre-construction confirmatory survey for frogs will be undertaken.

All surveys will be undertaken by a suitably qualified ecologist(s) who may be the Contractors ECoW, but who will have demonstrable experience in the survey and assessment of the feature. The results of pre-construction confirmatory surveys will inform the refinement of mitigation measures (if required) in Contractor method statements, and all results will be incorporated into Contractor's constraint mapping.

10.7.1.4 Mitigation for the Compensation and Retention of Habitats

Table 10.25 below summarises the potential for retention of key habitat features, such as drainage ditch, scrub, treeline and hedgerow, and replanting of woody vegetation species to mitigate for the loss of scrub and hedgerow.

Table 10-25: Landscaping Mitigation for Habitat KER Loss

Habitat	Estimate of Area Which May Be Lost	Mitigation
Watercourse crossings	As outlined in table 10.23 eight watercourses will be crossed within the existing road, while one will be crossed via HDD. There will be no loss of watercourse habitats.	No specific habitat loss mitigation is required for watercourses. Mitigation pertaining to water quality is outlined in 10.7
Scrub (WS1)	Loss of 1.1 Ha of habitat	Clearance within scrub habitat will be kept to the minimum required to facilitate the works. This will be monitored by the EcOW and topsoil reinstated post works and allowed to regrow with brambles, grass and forbs available in retained topsoil.
Scrub (WS1)/ Marsh (GM3) (Mosaic)	None likely.	This area will be avoided, demarcated (if required) and monitored during works by the site EcOW
Broadleaved Woodland (WD1)	Loss of 3ha of habitat	Clearance within broadleaved woodland habitat will be avoided where possible and level of impacts outlined will not arise. This area will be avoided, demarcated (if required) and monitored during works by the site EcOW. Topsoil will reinstated post works and allowed to regrow with brambles, grass and forbs available in retained topsoil.
Wet Grassland (GS4)	Loss of 0.4ha of habitat	Clearance will be avoided where possible and level of impacts outlined will not arise. This area impacted will be minimised and monitored during works by the site EcOW. Topsoil and turves will reinstated post works and regrow.
Treelines (WL2)	Loss of 45m of linear habitat.	Clearance of treelines will be kept to the minimum required to facilitate works. Treelines on either side of areas removed for the cable route will be bolstered as outlined below to replace area lost.

Habitat	Estimate of Area Which May Be Lost	Mitigation
Hedgerows (WL1)	Permanent loss of 45m of habitat. Temporary loss (passing bays) 165m of habitat.	Clearance of hedgerows will be kept to the minimum required to facilitate works. Hedgerows on either side of areas removed for the cable route will be bolstered as outlined below to replace area lost. Hedgerows within passing bays (total of 165m) will be fully reinstated/ replanted with local hedgerow species e.g. hawthorn, blackthorn, hazel, holly and willow. These will be of native provenance.

Reinstatement

Where reinstatement is not possible (i.e. within the line of the cable itself) treelines and hedgerows will be bolstered either side of the cable route to compensate for the loss.

Unless otherwise agreed with the Employer's Representative, 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 suited to the locality. Reinstated hedgerows and treelines are to be protected from browsing damage by wildlife and livestock using tree guards and/or exclusion fencing, as appropriate.

The Contractor will seed all grassland verges with a native wildflower mix of Irish provenance (to specification of EC12 Wild Flora for Earth Banks, Bunds and Ditches[48]).

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 ECoW. Plant species of native provenance will be used in all replanting of semi natural habitats. It is preferable from an ecology and pollinator perspective that no reseeding takes place and natural seedbank in reinstated topsoil regrow.

The Contractor will commit to a five year after-care plan for hedging, grassland, and agricultural reinstatement, or as otherwise agreed with the local authority.

The Contractor's agronomist will inspect, photograph and report in writing to the Employer's Representative on the establishment-phase of all vegetation.

The Contractor's agronomist will review and advise on any corrective measures required to ensure good condition, immediately after reinstatement, and at least twice yearly thereafter for a five year period.

10.7.1.5 Mitigation for the protection of Rare Plant Species

Prior to works commencing a confirmatory survey for Smooth brome within grassland type habitats, where direct impacts will arise, will be carried out by an experienced botanist during its flowering season (optimal survey season for grass is between May and July). The botanist, to be appointed by the Contractor, will coordinate with the Contractors ECoW and, report findings to the ENCoW within the Client's Representative Team. The botanist will be contracted for a period lasting at least one year following the cessation of potentially damaging construction works at the plant location(s) (see monitoring below).

[48] http://www.wildflowers.ie/mixes/ec/ec12.htm or similar

In the event where one or more plants are identified at risk of impact, an assessment of risk of impact will be carried out by the appointed botanist, in consultation with a NPWS grassland specialist. The assessment will be specific to the species which identify any additional measures required to protect the species by either avoiding and protecting the plant species *in situ*, or (only as a last resort) through the translocation of the plant species to new receptor locations nearby, under licence from the NPWS. Any additional measures as outlined under the terms of the license will also be included.

For a period lasting at least one year following the cessation of potentially damaging construction works at the plant location(s), the appointed botanist will undertake quarterly site visits to photograph and document the success of the mitigation measures, and discharge any conditions associated with any license(s). Where issues regarding the establishment are encountered, the botanist will consult with the NPWS, in agreement with the Contractor and the Ecologist within the Employer's Representative Team, to identify reasonable steps to improve the chances of re-establishment.

10.7.1.6 Mitigation for the Protection of Mammals

Mitigation for the Protection of Badger

As outlined previously, prior to works commencing a preconstruction survey for badgers will be undertaken. Where active badgers setts have been identified within the ZoI of the proposed development, the use of camera monitoring, setting of footprint traps, soft blocking of the sett entrance or similar will be required to confirm their presence.

A description of the setts i.e. main sett, annex sett, or outlier sett will be provided by the ECoW along with the level of activity at the sett. This will allow for an understanding of the importance of the setts in the wider context of the local population. As per the Guidelines for the Treatment of Badgers during the Construction of National Road Schemes**Error! Bookmark not defined.**, where setts have been confirmed, no heavy machinery will be used within 30m of badger setts (unless carried out under licence from the NPWS).

Lighter machinery (generally wheeled vehicles) will not be used within 20m of a sett entrance; light work, such as digging by hand or scrub clearance will not take place within 10m of sett entrances.

None of the above works will be undertaken within 50m of active setts during the breeding season (December to June inclusive). An assumption that the sett is active will apply unless proven otherwise during the course of investigation. Where works may interfere with the badger sett directly, exclusion will take place as per NRA guidelines.

Mitigation for the Protection of Bats

The design and construction of bat mitigation measures herein has had regard for relevant documents including the NRA's "Guidelines for the Treatment of Bats During the Construction of National Road Schemes"[49], the NPWS Bat Mitigation Guidelines for Ireland[50], and (with specific regard to roosts in trees), the Bat Tree Habitat Key [51].

No specific bat roost features have been identified as likely to be disturbed by the Proposed Development but a number of trees have been identified close to potential work areas. Trees with suitability for roosting bats will not be felled in advance of surveying for bats, unless in

[49] https://www.tii.ie/tii-library/environment/construction-guidelines/Guidelines-for-the-Treatment-of-Bats-during-the-Construction-of-National-Road-Schemes.pdf

[50] http://battreehabitatkey.co.uk/

[51] Marnell, F., Kelleher, C. & Mullen, E. (2022) Bat mitigation guidelines for Ireland v2. Irish Wildlife Manuals, No. 134. National Parks and Wildlife Service, Department of Housing, Local Government and Heritage, Ireland.

agreement with the ECoW, and NPWS as relevant. Prior to felling of any trees, an initial bat survey of trees to be felled will be undertaken, by a licensed qualified specialist, to assess the suitability of the tree to contain bat roosts as per the documents cited.

Prior to construction, trees identified with potential roost features of a Moderate to High value will be thoroughly re-examined during confirmatory surveys, to ascertain the presence or absence of roosting bats. A licence will be sought from the NPWS, as required. Surveys will be conducted by an experienced bat ecologist. The trees will be examined for the presence or absence of bats / bat roosts immediately prior to felling. Features in trees identified from ground level as of medium or high suitability for, will be climbed and/or accessed by a Mobile Elevated Working Platform; and inspected using a digital endoscope to confirm the ground-level rating, and where possible identify presence of roosting bats. Where timing facilitates it (i.e. when felling is being undertaken during the active season for bats from May to September inclusive), emergence surveys may additionally be carried out to confirm presence or absence of roosting bats, subject to the advice of the bat ecologist, and any licence conditions. Where felling does not occur within one day of the examination, the trees will be re-assessed, unless otherwise agreed with the NPWS.

Where evidence of a roost, or roosting bats has been determined, a license for destruction of a roost and/or exclusion of bats will be required from the NPWS. The procedures for the exclusion of bats and destruction of roost as detailed in the license document will be obeyed, at all times, by the Contractor.

Where bat exclusions are required, they will be undertaken in accordance with the requirements of the bat specialist. They will not be carried out during the breeding season, between the months of June to August inclusive, or during hibernation in the months of November to March inclusive, unless under license from the NPWS. Where the felling of trees found to be suitable as bat roosts cannot be avoided, any mitigation conditioned by the NPWS (e.g. replacement bat roost features on public lands following consultation with the NPWS, and the local authority) will be and put in place at least one month in advance of any felling or disturbance.

10.7.1.7 Mitigation for the Protection of Breeding Birds

The clearance of all vegetation (except vegetation with no nesting potential as determined by the ECoW), will take place outside of the breeding season for birds where possible or as determined by risk of disturbance to a nest site.

The ECoW or other suitably qualified ecologist will conduct further confirmatory pre-construction surveys to assess risk of disturbance to nesting birds to inform vegetation clearance activity. In the event where confirmatory pre-construction surveys confirm or presume nesting birds are present, an exclusion zone will be established around the nesting bird (to include the risk of abandonment due to indirect disturbance), and no vegetation clearance may proceed until young are presumed to have fledged, or nesting has failed. Confirmatory pre-construction surveys have a shelf life of 72 hours, after which repeat surveys will be required if vegetation has not been cleared.

10.7.1.8 Mitigation for the Protection of Amphibians

As outlined previously, pre-construction confirmatory survey for frog will be undertaken prior to works commencing during the common frog breeding season (February and March), at potential suitable breeding habitat (drains impacted).

When surveying for the species biosecurity measures will be followed to ensure that there is no incidental spread of vector borne diseases between waterbodies. This includes the cleaning, disinfection and drying of all equipment and will have regard to guidelines from Inland Fisheries Ireland[52].

Should frogs be recorded, translocation of the species to suitable receptor sites will be undertaken, in consultation with the NPWS, and local authority where relevant. Any translocation of these species will be under licence by the NPWS.

Where common frog is recorded within the footprint of the works, spawn will be captured and removed from affected habitat by hand net and translocated to the nearest area of available suitable habitat. Adult and young frogs are likely to flee disturbance and will not require translocation.

10.7.1.9 Mitigation for the Protection of Watercourses

Mitigation for the protection of water quality with regard to sediment control is outlined in Chapter 9.

Construction works should nevertheless be carried out in accordance with the guidelines set out by IFI in 'Guidelines on Protecting Fisheries During Construction Works in and Adjacent to Waters' (IFI, 2016) in areas where watercourses are encountered.

Additionally, the open season (July-September) restriction for any instream works will apply at watercourse crossings, which will be agreed with IFI and will include along the Ballystruan – Forrest Little cable route, which coincide with the upper reaches of the River Ward.

Works method statements will be agreed with IFI for all watercourse crossings, following Geotechnical Investigation data review.

The works method statement may include details on silt fencing, pH monitoring requirements, and handheld turbidity monitoring. Stop works authority escalation, including during Met Eireann (Red, Orange, Yellow) warnings will be informed by turbidity and pH monitoring, and require agreement of the Contractors ECoW and the Employers Representative EnCoW (i.e ESBN) if inspections indicate mitigation at risk of not performing effectively.

At a minimum, all pollution control measures will be designed, installed, and maintained in accordance with measures outlined below and under the supervision of the Contractor's Environmental Clerk of Works (EnCoW).

The pouring of concrete will be required during the construction phase. To prevent the runoff of concrete into nearby watercourses and drains, the following will be implemented:

- No on-site batching will be permitted at the proposed works areas. Concrete will instead be transported to the site within a concrete truck.
- Quick setting concrete mixes will be used to reduce the risk of contaminated run-off to the nearby watercourses.
- Concrete trucks will be washed down in a sealed mortar bin / skip which has been examined in advance for any defects. This requirement will be communicated to each concrete truck driver prior to entering into the works area.
- Where concrete pours are to take place instream they will only take place within an isolated, dry, works area.
- Where the isolated working area requires constant pumping to maintain a dry works area, pumps shall be turned off during the pour, and remain off until concrete has hardening

[52] Inland Fisheries Ireland (2016) Guidelines on protection of Fisheries During Construction Works in and Adjacent to Waters.

negating a run-off risk; and such that the discharge will not result in a change in pH of +/-0.5 units.

- Where concrete pours are required within a watercourse, the Contractors EnCoW will regularly monitor the pH of the watercourse during concrete works using a handheld pH meter. Should any change in pH +/-0.5 be detected concrete works shall immediately be ceased (handheld monitors will have maximum variance of +/- 0.1). The entry point to the watercourse will then be identified and implement appropriate measures to prevent further escape to the environment
- The Contractor's EnCoW will ensure that covers are available for freshly poured concrete to avoid wash off in the event of rain.
- Waste concrete slurry will be allowed to dry and taken to a licensed waste depot for disposal.
- The Contractor will schedule concrete works during relatively dry weather conditions (i.e. when there are no active Met Eireann yellow, orange or red warnings) to reduce the elevated risk of runoff.
- The Contractor's EnCoW will notify the Independent EnCoW employed within the Employer's Representative Team, the NPWS and IFI immediately of any concrete spills into watercourses.

10.7.1.10 Mitigation to Prevent the Spread of Invasive Species

Japanese knotweed has been recorded within the ZoI of the proposed development. There is potential for additional stands of invasive species to be present within or adjacent to the works areas following establishment of new populations between baseline surveys, and construction.

- Prior to works commencing a full invasive species survey will be carried out. The pre-construction invasive species survey will be carried out within the works areas, including compound locations and laydown areas, and along proposed access routes to identify the presence of all invasive species within and adjacent to works areas.
- The invasive species survey will be carried out during the appropriate growing season (May – October). The findings of this invasive species survey will be incorporated into the measures below, by the Contractor's EnCoW and any specialists.
- Any stands of invasive species recorded within the ZoI will be clearly marked out as restricted areas. This exclusion zone will incorporate a buffer such that below ground growth is accounted for (4m for Japanese knotweed[53] buffer not required for other species). No works will be carried out within the exclusion zones unless approved by the Contractor's EnCoW.
- The Contractor's EnCoW will carry out a toolbox talk for all construction personnel which will provide information on how to identify and manage invasive species. The toolbox talk will take place prior to works commencing in any areas where Invasive Species have been recorded.
- All machinery will be steam-cleaned prior to entering and before leaving site

10.8 Residual Impacts

With the implementation of mitigation measures the proposed development will not result significant impacts. During the construction phase impacts on surface water quality and associated aquatic receptors are anticipated to be localised and brief to temporary in duration of imperceptible significance.

[53] Fennell, M., Wade, M., Bacon, K., (2018); Japanese knotweed (*Fallopia japonica*): An analysis of capacity to cause structural damage (compared to other plants) and typical rhizome extension

With implementation of hedgerow and treeline replanting residual impacts are summarised below in Table 10.26.

Table 10-26: Residual Impacts Biodiversity

Habitat	Maximum Habitat Area Impacted	Residual Impact Significance
Scrub (WS1)	Loss of 1.1 Ha of habitat will be reduced further to minimum requirements for works.	Permanent slight/ moderate negative (worst case scenario) effect at a local scale.
Broadleaved Woodland (WD1)	Loss of 3 Ha of habitat will be reduced further to minimum requirements for works.	Permanent slight/ moderate negative (worst case scenario) effect at a local scale.
Wet Grassland (GS4)	<0.4Ha	Permanent slight negative effect at a local scale.
Treelines (WL2)	Loss of up to 45m of linear habitat, which can be compensated for via bolstering.	Permanent slight negative effect at a local scale.
Hedgerows (WL1)	Loss of up to 45m of linear habitat, which can be compensated for via bolstering.	Permanent slight negative effect at a local scale.

Metrolink 110kV Underground Cables

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Chapter 11 - Air

June 2023

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11.1 Introduction

This chapter provides an assessment of the potential effects and likely significance of the proposed development on local air quality.

The proposed development will install three new underground high voltage cables to provide power to the Metrolink, which is a rail link between Swords and Charlemont. The assessment is based on the project description provided in Chapter 6 Description of the Proposed Development.

This assessment considers the effects of the proposed development at sensitive receptor locations, both human health and ecological. The assessment considers the existing baseline and the impacts of the proposed development, assessing air quality during construction and operation phase.

This air quality assessment includes:

- Identification of applicable legislation and emission limits;
- Assessment of existing air quality conditions;
- Assessment of construction dust and construction road traffic effects;
- Assessment of operation and maintenance phase road traffic effects; and
- Identification of mitigation measures where necessary.

11.2 Methodology and Limitations

The assessment of air quality has been carried out in accordance with the Institute of air quality management's (IAQM) 'Guidance on the assessment of dust from demolition and construction'[1] and addresses the construction impacts resulting from emissions to air.

11.2.1 Relevant Legislation

This section summarises the relevant international and national legislation, policy and guidance in relation to air quality for the proposed development.

11.2.1.1 Ambient Air Quality

Directive 2008/50/EC[2] on ambient air quality and cleaner air for Europe was adopted in May 2008 and consolidates previous air quality directives (apart from the Fourth Daughter Directive). This Directive sets out a range of mandatory limit values (LVs) for different pollutants and times by which they are to be achieved for the purpose of protecting human health and the environment by avoiding, reducing or preventing harmful concentrations of air pollutants.

The Air Quality Standards Regulations[3] implement the EU Ambient Air Quality Directive (2008/50/EC) and define the air quality standards currently applicable in Republic of Ireland.

Table 11.1 presents the air quality standards and target values for the pollutants relevant to this assessment as prescribed by the EU and Irish legislation, hereafter referred to as air quality

[1] Institute of Air Quality Management (2014). 'Guidance on the assessment of dust from demolition and construction.'

[2] European Union. (April 2008), 'Directive on Ambient Air Quality and cleaner Air for Europe', Directive 2008/50/EC Official Journal, vol. 152, pp. 0001-0044.

[3] Air Quality Standards Regulations **2011** (S.I. No. 180 of 2011)

standards (AQS). Standards for the protection of vegetation and ecosystems are referred to as ‘critical levels’.

Table 11.1: Air quality standards for NO_x and NO_2

Pollutant	Averaging period	AQS / Critical Level (µg/m³)	Allowance
For the protection of human health			
Nitrogen dioxide (NO_2)	1-hour	200	18 times pcy
	Annual	40	–
Particulates (PM_{10})	24-hour	50 µg/m³	35 times pcy
	Annual	40 µg/m³	
Fine particulates ($PM_{2.5}$)	Annual	20 µg/m³	–
Critical level for the protection of vegetation and ecosystems			
Nitrogen oxides (NO_X)	Annual	30	–

Source: Directive 2008/50/EC
Notes: pcy = per calendar year

Directive 2008/50/EC and Air Quality Standards Regulations sets out that the limit values (AQS) apply everywhere with the exception of:

a) any locations situated within areas where members of the public do not have access and there is no fixed habitation;
b) in accordance with Article 2(1), on factory premises or at industrial installations to which all relevant provisions concerning health and safety at work apply;
c) on the carriageway of roads; and
d) on the central reservations of roads except where there is normally pedestrian access to the central reservation.

The areas where the critical levels for the protection of vegetation apply are as follows:

a) More than 20 kilometres from an agglomeration (i.e. an area with a population of more than 250,000); and
b) More than 5 kilometres away from other built-up areas, industrial installation or motorways or major roads with traffic counts of more than 50,000 vehicles per day

11.2.2 Construction Phase Methodology

Construction activities can result in temporary effects from dust. Dust is a generic term usually refers to particulate matter in the size range of 1-75 microns in diameter. The most common impacts from dust emissions are soiling and increased ambient PM_{10} concentration. Dust can arise from numerous construction activities such as concrete batching, piling, wind erosion on material stock piles and earth moving. It can be mechanically transported either via wind or through the movements of vehicles onto public highways (transport of debris on vehicle wheels or uncovered loads). Although construction activities would be relatively limited given the type of development, effects have been scoped in to develop a suitable level of mitigation.

11.2.2.1 Dust Emissions

Guidance from the Institute of Air Quality Management (IAQM)[4] states that, where appropriate, a site can be divided into ‘zones’ for the dust risk assessment to allow different mitigation levels to be applied to each zone. As the proposed development will consist of different construction

[4] Institute of Air Quality Management (2014). ‘Guidance on the assessment of dust from demolition and construction.’

activities for three different routes with two options for Route 3 (only one will be constructed), four separate construction dust assessments have been undertaken for the following:

- Route 1 - 110 kV Newbury – Ballystruan; and
- Route 2 - 110 kV Ballystruan – Forest Little.
- Route 3 - 110 kV / 220 kV Forest Little – Belcamp - Option 1 (via Baskin Lane/Malahide Road);
- Route 3 - 110 kV / 220 kV Forest Little – Belcamp - Option 2 (via Stockhole Lane);

This is to allow the most appropriate mitigation measures to be applied to each of the routes, rather than applying the same generic mitigation to the entire proposed development.

Guidance from the IAQM recommends splitting the construction activities into four separate source categories and determining the dust risk associated with each of these individually. This assessment has determined the risk of each of the following categories:

- Demolition;
- Earthworks;
- Construction; and
- Trackout.

The risk of each source for dust effects can be described as 'negligible, 'low risk', 'medium risk' and 'high risk' depending on the nature and scale of the construction activities and the proximity of sensitive receptors to the construction activities or site boundary. The assessment is used to identify the mitigation measures proportional to the level of risk to reduce the effects such that they are not significant.

The assessment considers three separate effects from dust:

- Annoyance due to dust soiling;
- Harm to ecological receptors; and
- The risk of human effects due to increased exposure to PM_{10}.

Step 1 of the assessment applies screening criteria to the proposed development which states that an assessment will be required where there is:

- A 'human receptor' within:
  - 350m of the boundary of the site; and / or
  - 50m of the route(s) used by construction vehicles on the public highway up to 500m from the site entrance(s)
- An 'ecological receptor' within
  - 50m of the boundary of the site; and / or
  - 50m of the route(s) used by construction vehicles on the public highway up to 500m from the site entrance(s)

To assess the likely dust risk, the need to quantify the overall dust emission magnitude (Small, Medium or Large) from each of the dust sources identified (demolition, earthworks, construction and trackout) is first established in alignment with the criteria provided in EIAR Volume 3: Appendix G Table G.1.

The sensitivity of the surrounding area is determined for each activity using the matrices provided in Table G.2 to Table G.5 in Appendix G. The sensitivity of the area is based on the distance of the source to the closest receptors, the receptors sensitivity and in the case of PM_{10} effects, the local background concentration. The highest level of area sensitivity defined for dust effect has been conservatively used in this assessment.

The final step of the assessment combines the dust emission magnitude and the sensitivity of the surrounding area using the matrices presented in Table G.6 to Table G.9 in Appendix G to determine the dust risk categories for each activity for dust soiling and health effects.

The dust risk category defined for each dust source and effect is then used to determine appropriate site-specific mitigation measures to be adopted. It should be noted that, in line with the recommendations of IAQM guidance, significance is only assigned to construction effects following mitigation. Results of the dust assessment are presented in Section 11.4.1.1.

11.2.2.2 Construction site plant and machinery emissions

Construction requires the use of different equipment such as excavator, cranes and on-site generators. All construction plant have an energy demand with some resulting in direct emission to air from exhausts. Guidance from the IAQM notes that effects from exhausts will likely not be significant. Given the nature of the proposed development, effects of plant emissions on local air quality are considered of negligible significance compared to surrounding road traffic contributions on the local road network. Construction plant emissions have therefore not been assessed further in this chapter. However, mitigation measures to reduce the impacts on local air quality are presented in Section 11.5.1.

11.2.2.3 Construction road traffic emissions

Overview

This section sets out the approach that has been undertaken to assess construction traffic impacts.

The construction programmes of the proposed development are anticipated to take place in following periods (refer to Chapter 6 (Description of the Proposed Development):

- Route 1 - Newbury - Ballystruan: Q2 2030 to Q1 2031 (civil works only).
- Route 2 – Ballystruan - Forest Little: Q3 2026 to Q4 2027 (civil works only).
- Route 3 - Forest Little – Belcamp: Q3 2027 to Q1 2029 (civil works only).

Chapter 17 (Roads and Traffic) describes the impacts of cumulative construction traffic from the proposed development and the Metrolink Rail project. Construction traffic associated with Route 1 (Newbury- Ballystruan Cable) and the Metrolink Rail Project are predicted to overlap in 2030 in the area of the R108 road between the Old Airport Road and M50.

Assessment requirements

Guidance from the Transport Infrastructure Ireland (TII)[5] states that risk-based approach to determine the need for a construction traffic air quality assessment (AQA) is required. A stepped approached is recommended in the guidance as below.

- Step 1: Determine if the duration of the construction phase of the proposed scheme is programmed to last more than 6 months.
- Step 2: Undertake a qualitative construction traffic review.
- Step 3: Screen construction phase traffic data.

  The screening criteria are based on the changes between the Do-something and Do-minimum traffic:
  - Road alignment will change by 5m or more; or
  - Annual average daily traffic (AADT) flows will change by 1,000 or more; or

[5] Transport Infrastructure Ireland (2022), 'Air Quality Assessment of Specified Infrastructure Projects – Overarching Technical Document (PE-ENV-01106)'

- Heavy duty vehicle (HDV) (vehicles greater than 3.5 tonnes, including buses and coaches) flows will change by 200 HDV or more; or
- Daily average speed change by 10kph or more; or
- Peak hour speed will change by 20kph or more.
- Step 4: Undertake an AQA, if required.

Chapter 6 (Description of the Proposed Development) sets out the indicative construction programme for civil engineering works for the proposed project. The durations and number of construction traffic increase of each route are presented in Table 11.2.

Table 11.2: Durations and number of construction traffic of each route

Route	Duration of construction phase (civil works)	Number of construction traffic increase in a single day
Route 1 Newbury – Ballystruan	32 weeks	30 HDV
Route 2 Ballystruan – Forest Little	63 weeks	46 HDV
Route 3 Forest Little – Belcamp (Option 1)	79 weeks	42 HDV*
Route 3 Forest Little – Belcamp (Option 2)	43 weeks	30 HDV

Note: * Assuming that civil works for the cable trenches and passing bays would take place during the same period.

As shown in Table 11.2, the durations of all three routes are expected to last more than 6 months. However, the number of construction traffic of all three routes are less than criteria set out in Step 3 of the Guidance of the TII (200 HDV per day). Therefore, the assessment of construction of the proposed development has been scoped out.

Construction traffic associated with Route 1 (Newbury- Ballystruan Cable) and the Metrolink Rail project are predicted to overlap in 2030 for more than 6 months. The cumulative construction traffic impact from both projects is expected to increase HDV movements by up to 293 AADT on the R108 road between Old Airport Road and the M50 and therefore exceed the TII criteria. Therefore, the construction traffic impact assessment has been scoped in to evaluate the significance.

Assessment Approach

As presented in Section 11.3.2, the background concentrations are below 90% of the annual mean of NO_2, PM_{10} and $PM_{2.5}$ AQOs. Therefore, an assessment using the TII Road Emission Road (REM) has been undertaken to assess cumulative construction traffic impact from both projects.

The TII REM[6] calculates NOx emissions by integrating traffic volumes and speeds for and Irish fleet composition information. The emissions of NOx from vehicle exhaust are converted to NO_2 within the TII REM. The air quality tool uses the emissions calculated by the emission tool to predict atmospheric pollutant concentrations (in µg/m^3) at identified receptors.

Only NO_2 has been considered within this assessment as projected background concentrations of PM_{10} and $PM_{2.5}$ are well below the respective objectives (as indicated in Section 11.3.2). Therefore, the change in concentrations and associated impact magnitude for PM_{10} and $PM_{2.5}$ as a result of the construction traffic of both projects would be less than assessed for NO_2.

Modelled Scenarios

To assess changes in pollutant concentrations associated with construction of the proposed development, the following scenarios have been considered:

[6] Transport Infrastructure Ireland (2022), 'Air Quality Assessment of Specified Infrastructure Projects – Overarching Technical Document (PE-ENV-01106)'

- 2030 Do-minimum (overlap construction year without the proposed development and Metrolink Rail project)
- 2030 Do-something (overlap construction year with the proposed development and Metrolink Rail project)

Based on the available information, the assessment has assumed that 2030 is worst case year when construction traffic will overlap and all additional traffic movements associated with both projects and will be present in this year.

Traffic data for Do-minimum and Do-Something are extracted from Table 17.26 of Chapter 17 (Roads and Traffic).

Traffic speeds on all roads modelled within this assessment have been assumed to be equal to the speed limit. For receptors modelled near junctions, speeds have been reduced by 10kmph in accordance with best practice guidance from Defra (TG22)[7]. The traffic data used within this assessment are presented in Table 11.3.

Table 11.3: Traffic data used within the assessment

Road	2030 Do-minimum			2030 Do-something (Proposed Development + Cumulative Assessment)		
	AADT (two way)	HDV	Average speed (kph)	AADT (two way)	HDV	Average speed (kph)
L2015 Old Airport Road (Collinstwon Lane)	16,113	2,182	50	17,110	2,331	50
R108 between Old Airport Road and M50	16,825	1,211	60	18,771	1,504	60

Receptors

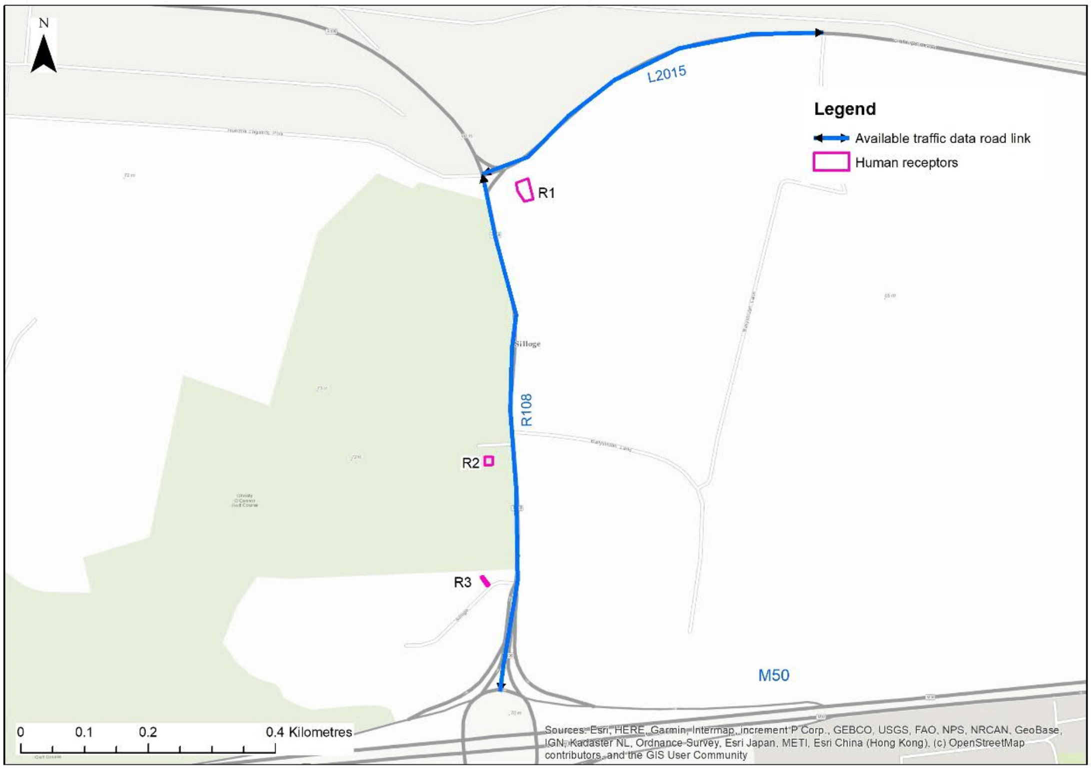
The assessment has considered the change in NO_2 concentrations at worst case receptor locations within 200m of the affected roads. The locations of the receptors considered within the assessment are presented in Table 11.4 and Figure 11.1.

Table 11.4: Modelled receptors

Receptor ID	Location	National Grid Reference	
		X	Y
R1	Ballymun Kickhams GAA Club	715316	742163
R2	Golf Club	715280	741733
R3	Silloge Green	715274	741533

[7] Department for Environment, Food and Rural Affairs and Devolved Administrations (August 2022). Local Air Quality Management – Technical Guidance LAQM.TG22

Figure 11.1: Receptor Locations



Background concentration

Monitoring data from Blanchardstown station has been used to background concentrations at receptor R3 as this is considered representative of conditions close to the M50. Monitoring data from Ballyfermot station in 2019 (refer to Table 11.6) has been used to determine background concentrations for R1 and R2 as these receptors are further away from the M50. The most recent year of monitoring data available is for 2020 and 2021, however data from 2020 and 2021 have the potential to be impacted by effects associated with the coronavirus pandemic such as a reduction in traffic movements resulting in reduced monitored pollutant concentrations. Therefore, as data from 2020 and 2021 may not be representative of existing concentrations, data from 2019 has been used to inform the assessment.

The monitoring station Blanchardstown is located adjacent to N3 and M50. The monitoring data from Blanchardstown station includes the contributions from roadside emissions. No removal of emissions sources included in the assessment has been undertaken and therefore the assessment includes an element of double counting and can be considered conservative.

To further undertake a conservative assessment, the background concentrations from 2019 have been used to represent concentrations in 2030. In practice, it is anticipated future background concentrations would reduce due to improvement in vehicle technologies reducing emissions, this approach adds to the conservative nature of the assessment.

Assessment Criteria

Guidance from the TII[8] presents the impact descriptors used to assist in determining the significance of the effect. Table 11.5 is intended as a tool to help interpret the results to the air quality assessment along with factors such as the number of people affected, whether there is an exceedance and the area affected and will therefore be employed in conjunction with professional judgement to determine overall significance.

Table 11.5: Impact descriptors

Long term average concentration at receptor in assessment year	% Change in concentration relative to Air Quality Assessment Value (AQAV)			
	1	2-5	6-10	>10
75% or less of AQAV	Neutral	Neutral	Slight	Moderate
76%-94% of AQAV	Neutral	Slight	Moderate	Moderate
95%-102% of AQAV	Slight	Moderate	Moderate	Substantial
103%-109% of AQAV	Moderate	Moderate	Substantial	Substantial
110% of AQAV	Moderate	Substantial	Substantial	Substantial

Notes: (a) AQAV = Air Quality Assessment Value i.e. 40µg/m^3 for annual mean NO_2. The table is only designed to be used with annual mean concentrations
(b) Percentage pollutant concentrations are intended to be rounded to whole numbers. For example, the '<1%' category in this table includes all changes from 0.5% to 1.4% (equivalent to an annual mean NO_2 absolute concentration change of between 0.2µg/m^3 and 0.6µg/m^3). Changes of 0% (i.e. less than 0.5%) are described as negligible.
(c) When defining the concentration as a percentage of the AQAV, use the 'do minimum' concentrations where there is a decrease in pollutant concentration and the 'do something' concentration for an increase.

Addressing Uncertainty

The TII REM tool has associated with it an inherent level of uncertainty, primarily as a result of:

- Uncertainties with traffic data
- Simplifications made in the model algorithms

A process known as model verification as stated in Guidance from the TII aims to address these uncertainties. This is done by comparing modelled concentrations with monitored concentrations to identify any disparity.

Model verification is a two-stage process. First, predicted concentrations are compared with monitored concentrations to identify any disparity. Where disparity occurs, the model inputs are revisited to identify any potential errors or opportunity for improvement. Second, where disparity remains following the first stage, model results can be adjusted to account for systematic bias.

However, no suitable roadside monitoring data exists where traffic data is available to compare modelled concentrations against so full model verification has not been possible. Therefore, to account for uncertainty in the assessment approach, an adjustment factor of two has been applied to the predicted model road traffic outputs. Applying an adjustment of two is considered highly conservative based on professional judgment and experience from previous similar assessments and is likely to result in an overprediction of pollutant concentrations. This approach is considered robust for this assessment to determine the likely air quality risks.

[8] Transport Infrastructure Ireland (2022), 'Air Quality Assessment of Specified Infrastructure Projects – Overarching Technical Document (PE-ENV-01106)'

11.2.3 Operational Phase Methodology

11.2.3.1 Operational road traffic emissions

The proposed development will only install new underground high voltage cables to provide power to Metrolink. Access may be required on rare occasion to facilitate cable replacement if failure occurs. Annual access to link boxes and communication chambers will be required for inspection and maintenance. Given the frequency of inspection and maintenance, the effects of operation road traffic contributions from the proposed development are considered of negligible significance compared to the existing surrounding road traffic contributions on the local road network. Operation road traffic emissions have therefore not been assessed further in this chapter.

11.3 Receiving Environment

11.3.1 Overview

Information on existing air quality in Ireland can be obtained from the EPA, who undertake monitoring at a number of locations across the country. For the purposes of air quality management, Ireland is divided into four zones:

- Zone A: Dublin conurbation;
- Zone B: Cork conurbation;
- Zone C: 23 large towns with population >15,000; and
- Zone D: Remainder (i.e. rural Ireland).

The proposed development is located within Zone A. The closest suburban background monitoring site was installed at Dublin Airport in 2020. However, data from 2020 and 2021 (data capture less than 75%) should be treated with caution due to COVID-19 restrictions and has not been considered further in this assessment.

The next closest monitoring site is the suburban background monitor 'Swords'. Swords is located approximately 3.1km north east of the proposed development (Route 2 - Ballystruan to Forest Little Cable Route) and monitors NOx, NO_2 and ozone.

Monitoring data from the monitoring sites at Ballyfermot, Finglas, Phoenix Park and St. Anne's Park have also been presented as they are considered representative of the environments surrounding Routes 2 and 3 (Option 1 and Option 2). This is because these monitoring sites are located in suburban areas away from major roads/emission sources.

The monitoring site at Blanchardstown has also been presented as it is considered most representative of the environment surrounding Route 1. Route 1 is located near to the M50 and a major road junction connecting the M1 and M50 while the Blanchardstown monitoring site is located near a major road junction connecting the M50, N3 and R147.

11.3.2 Background air concentrations

Data for Ballyfermot, Blanchardstown, Finglas, Marino, Phoenix Park, St. Anne's Park, Swords have been obtained from the EPA data archive and are summarised in Table 11.6 to Table 11.8.

Table 11.6: Annual Mean NO_2 Concentration

Site name	Location		Annual mean concentration (µg/m^3)					Representative Route
	X	Y	2017	2018	2019	2020	2021	
Ballyfermot	709801	733446	17 (100)	17 (94)	20 (100)	12 (99)	13 (99)	Route 2 and 3 (Option 1 and 2)
Blanchardstown	708547	738470	26 (83)	25 (83)	31 (100)	12 (88)	31 (100)	Route 1
Swords	717978	747372	14 (100)	16 (91)	15 (99)	11 (99)	11 (99)	Route 2 and 3 (Option 1 and 2)

Source: EPA Data Archive
Note: Data capture shown in brackets

Table 11.7: Annual Mean PM_{10} Concentration

Site name	Location		Annual mean concentration (µg/m^3)					Representative Route
	X	Y	2017	2018	2019	2020	2021	
Ballyfermot	709801	733446	12 (98)	- [(a)]	14 (99)	12 (100)	12 (100)	Route 2 and 3 (Option 1 and 2)
Blanchardstown	708547	738470	15 (100)	17 (100)	19 (88)	15 (94)	14 (99)	Route 1
Finglas	712795	739102	- [(a)]	- [(a)]	13 (100)	12 (100)	12 (100)	Route 2 and 3 (Option 1 and 2)
Marino	717998	736751	7 (100)	- [(a)]	14 (99)	13 (100)	12 (99)	Route 2 and 3 (Option 1 and 2)
Phoenix Park	710004	736193	9 (100)	11 (100)	11 (100)	10 (81)	10 (92)	Route 2 and 3 (Option 1 and 2)
St Anne's Park	721222	737379	- [(a)]	- [(a)]	12 (100)	11 (100)	11 (100)	Route 2 and 3 (Option 1 and 2)

Source: EPA Data Archive
Note: - Data capture shown in brackets
(a): No data available (not yet operational or low data capture (<75%))

Table 11.8: Annual Mean $PM_{2.5}$ Concentration

Site name	Location		Annual mean concentration (µg/m^3)					Representative Route
	X	Y	2017	2018	2019	2020	2021	
Ballyfermot	709801	733446	- [(a)]	- [(a)]	10 (99)	8 (100)	8 (100)	Route 2 and 3 (Option 1 and 2)
Blanchardstown	708547	738470	- [(a)]	- [(a)]	- [(a)]	- [(b)]	8 (98)	Route 1
Finglas	712795	739102	7 (93)	8 (88)	9 (100)	7 (100)	8 (99)	Route 2 and 3 (Option 1 and 2)
Marino	717998	736751	7 (100)	6 (90)	9 (99)	8 (100)	8 (99)	Route 2 and 3 (Option 1 and 2)

Site name	Location		Annual mean concentration (µg/m^3)					Representative Route
	X	Y	2017	2018	2019	2020	2021	
Phoenix Park	710004	736193	- (a)	- (a)	8 (100)	7 (81)	6 (90)	Route 2 and 3 (Option 1 and 2)
St Anne's Park	721222	737379	- (a)	- (a)	8 (100)	7 (100)	7 (100)	Route 2 and 3 (Option 1 and 2)

Source: EPA Data Archive
Note: - Data capture shown in brackets.
(a): No data available (not yet operational or low data capture (<75%))
(b)Annual mean $PM_{2.5}$ concentration of Blanchardstown monitoring site in 2020 is available, the data capture is less than 75%.

Data presented demonstrates annual mean NO_2, PM_{10}, and $PM_{2.5}$ concentrations between 2017 and 2021 are well below the corresponding AQS.

11.4 Likely Significant Impacts of the Proposed Development

11.4.1 Construction Phase

11.4.1.1 Construction Dust emissions

The magnitude and sensitivity descriptors that have been applied to assess the overall effect of the construction phase are presented in Appendix G. The construction dust assessment was undertaken based on available information.

During the cable trenching and ducting works, trenches will be excavated to install the cable and then filled before moving on to the next section of the route, as discussed in Chapter 6 Description of the Proposed Development. However, to assess a worst-case, construction activities along the whole alignment of each route was considered concurrently. The potential trackout routes were assumed to be located only on the sections of public highways leading away from the proposed alignments (and therefore the trackout routes do not overlap with the proposed alignments).

There are no ecological designated sites within 50m of potential dust sources of the proposed development (for any of the cable routes) or from roads to be used by construction traffic. The nearest ecological designation is the Santry Demesne pNHA located approximately 0.5km west of the proposed Newbury to Ballystruan cable route. Therefore, ecological designations are not considered further.

Route 1 - 110 kV Newbury – Ballystruan

The magnitude descriptors that have been applied to the potential construction activities associated with the Route 1 are presented in Table 11.15.

Table 11.9: Dust Emission Magnitude of the Route 1

Activity	Dust emission magnitude	Justification
Demolition	Not Applicable.	No demolition works associated with this project.
Earthworks	Medium	Total excavation area is 5,100m^2 for Route 1, and less than 5 heavy earth moving vehicles are likely to be active at any one time. Assumed total site area of Route 1 is less than 10,000m^2.
Construction	Small	Total building volume is assumed to be less than 25,000m^3 and materials would have a low potential for dust release (piping, cable and pre-cast material).

Activity	Dust emission magnitude	Justification
Trackout	Medium	Assuming that civil works for the cable trenches and passing bays would take place during the same period, it is estimated that there could be up to approximately 30 outbound heavy goods vehicle movements in a single day.

Table 11.16 presents the sensitivity of the receptors to effects caused by Route 1 construction activities and is based on the criteria presented in Table G.2: Table G.2 to Table G.5, Appendix G. Figure 11.7 and Figure 11.8 present the dust assessment buffers.

Table 11.10: Area Sensitivity of the Route 1

Activity	Dust soiling		Health effects of PM_{10}	
	Sensitivity	**Comment**	**Sensitivity**	**Comment**
Earthworks	High	There are between 10 and 100 high sensitivity receptors (residential properties) within 20m of Route 1. These are mainly located on Old Airport Road, R132 Swords Road, Turnapin Grove, and Turnapin Cottages.	Low	Background annual mean PM_{10} concentrations are $<24\mu g/m^3$[9] (See Table 11.7). There are between 10 and 100 high sensitivity receptors (residential properties) within 20m of Route 1. These are mainly located on Old Airport Road, R132 Swords Road, Turnapin Grove, and Turnapin Cottages
Construction	High		Low	
Trackout	Low	There are approximately 1 - 10 high sensitivity receptors within 50m (residential properties) from the side of potential routes used for construction traffic (up to 200m from potential site exits).	Low	As above, background annual mean PM_{10} concentrations are $<24\mu g/m^3$[10] (See Table 11.7). There are approximately 1 - 10 high receptors sensitivity to health effects of PM_{10} are within 50m (residential properties) from the side of potential routes used for construction traffic (up to 200m from potential site exits).

The overall risk of receptors to dust soiling effects and PM10 effects are presented in Table 11.17. Risk is based on the criteria presented in Table G.6 to Table G.9 in Appendix G.

Table 11.11: Summary of the Risk of Construction Effects of the Route 1

Activity	Dust soiling effects	PM_{10} effects
Demolition	Not Applicable	Not Applicable
Earthworks	Medium	Low
Construction	Low	Negligible
Trackout	Low	Low

Dust soiling effects are ‘Low’ to ‘Medium’ and PM_{10} effects are ‘Negligible’ to ‘Low’ without mitigation. Mitigation measures appropriate for the proposed development have been presented in Section 11.5.1. These measures are included within the Construction Environmental Management Plan (CEMP), Appendix D, to further reduce the risk.

[9] EPA Data Archive – Summary Data Tables

[10] EPA Data Archive – Summary Data Tables

Figure 11.2: Construction Dust Assessment Buffers (Demolition, Earthworks and Construction) of the Route 1

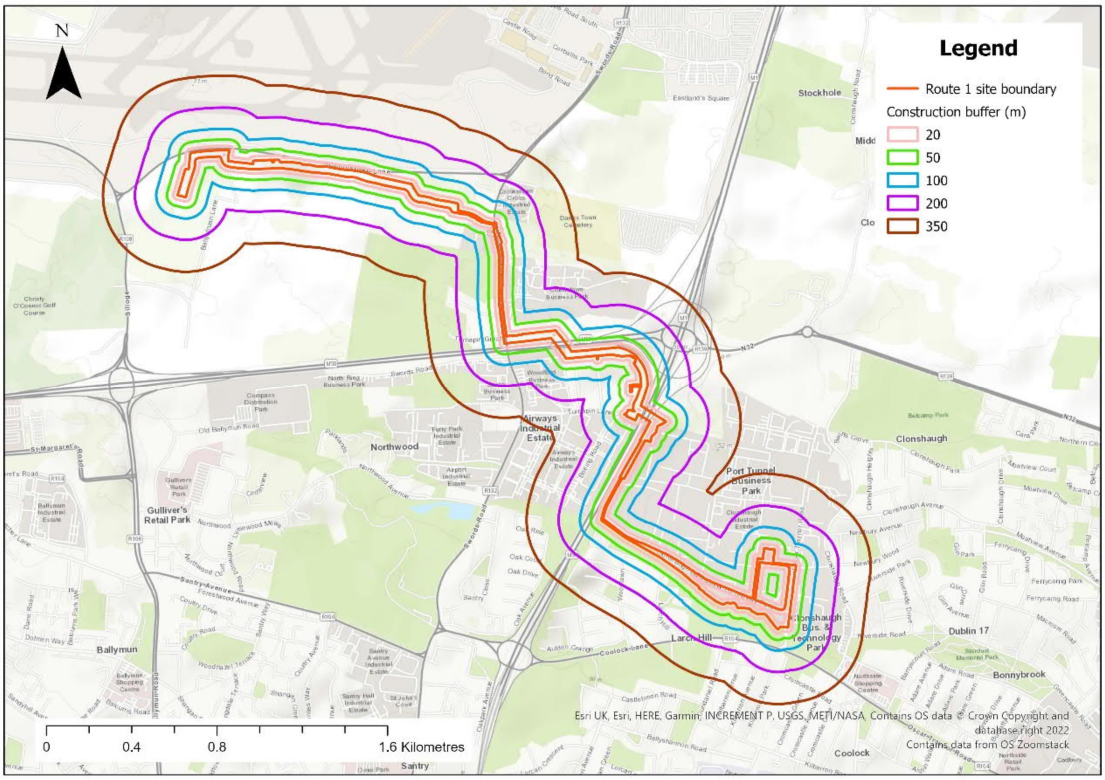
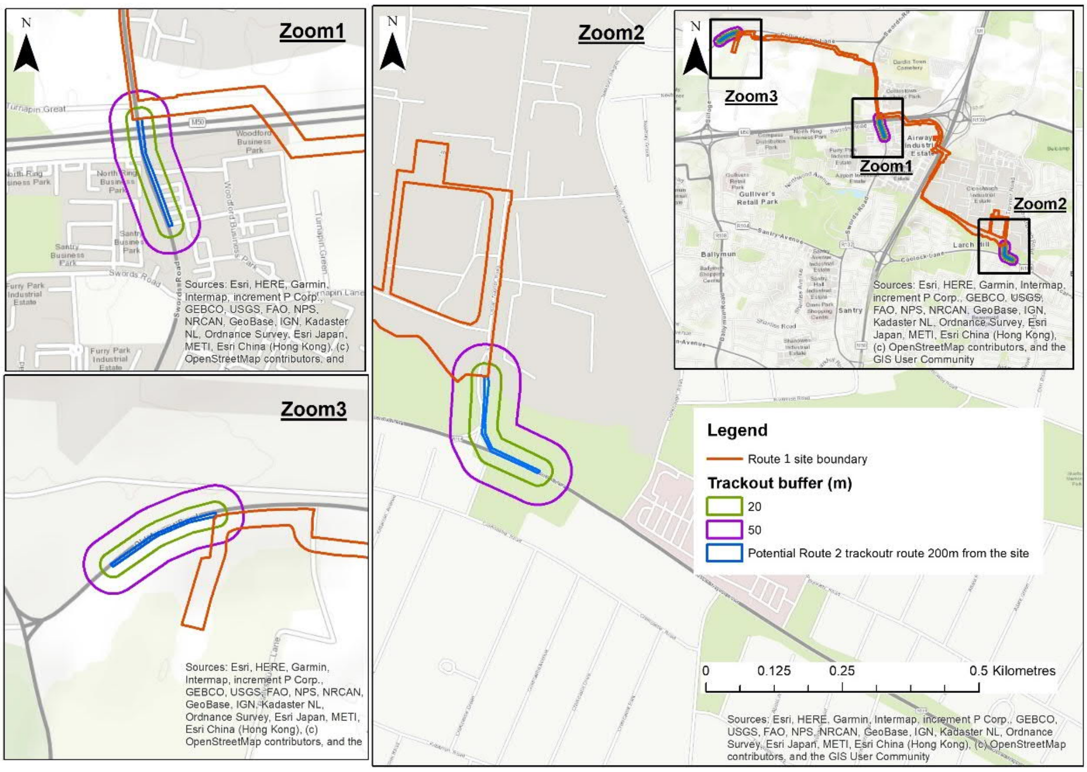


Figure 11.3: Construction Dust Assessment Buffers (Trackout) of the Route 1



Route 2 - 110 kV Ballystruan – Forest Little

The magnitude descriptors that have been applied to the potential construction activities associated with the Route 2 are presented in Table 11.18.

Table 11.12: Dust Emission Magnitude of the Route 2

Activity	Dust emission magnitude	Justification
Demolition	Not Applicable.	No demolition works associated with this project.
Earthworks	Large	Total excavation area is 17,500m^2 for Route 2, and less than 29 heavy earth moving vehicles are likely to be active at any one time. Assumed total site area of Route 2 is larger than 10,000m^2.
Construction	Small	Total building volume is assumed to be less than 25,000m^3 and materials would have a low potential for dust release (piping, cable and pre-cast material).
Trackout	Medium	Assuming that civil works for the cable trenches and passing bays would take place during the same period, it is estimated that there could be up to approximately 46 outbound heavy goods vehicle movements in a single day.

Table 11.19 presents the sensitivity of the receptors to effects caused by Route 2 construction activities and is based on the criteria presented in Table G.2 to Table G.5, Appendix G. Figure 11.9 and Figure 11.10 present the dust assessment buffers.

Table 11.13: Area Sensitivity of the Route 2

Activity	Dust soiling		Health effects of PM_{10}	
	Sensitivity	**Comment**	**Sensitivity**	**Comment**
Earthworks	Medium	There are between 1 and 10 high sensitivity receptors (residential properties) within 20m of Route 2. These are mainly located on R108, Newtown Cottages, Road R122, Naul Road and Harristown Lane.	Low	Background annual mean PM_{10} concentrations are <24µg/m^3[11] (See Table 11.7). There are between 1 to 10 high sensitivity receptors (residential properties) within 20m of Route 2. These are mainly located on R108, Newtown Cottages, Road R122, Naul Road and Harristown Lane.
Construction	Medium		Low	
Trackout	Low	There are between 1 and 10 medium sensitivity receptors (places of work) within 50m of potential routes used for construction traffic (up to 200m from potential site exits), on Dublin Road and Old Airport Road.	Low	As above, background annual mean PM_{10} concentrations are <24µg/m^3[12] (See Table 11.7). There are between 1 and 10 medium sensitivity receptors (places of work) within 50m of potential routes used for construction traffic (up to 200m from potential site exits), on Dublin Road and Old Airport Road.

The overall risk of receptors to dust soiling effects and PM10 effects are presented in Table 11.20. Risk is based on the criteria presented in Table G.6 to Table G.9 in Appendix G.

Table 11.14: Summary of the Risk of Construction Effects of the Route 2

Activity	Dust soiling effects	PM_{10} effects
Demolition	Not Applicable	Not Applicable
Earthworks	Medium	Low
Construction	Low	Negligible
Trackout	Low	Low

Dust soiling effects are 'Low' to 'Medium' and PM_{10} effects are 'Negligible' to 'Low' without mitigation. Mitigation measures appropriate for the proposed development have been presented in Section 11.5.1. These measures will be incorporated within a CEMP to further reduce the risk.

[11] EPA Data Archive – Summary Data Tables

[12] EPA Data Archive – Summary Data Tables

Figure 11.4: Construction Dust Assessment Buffers (Demolition, Earthworks and Construction) of the Route 2

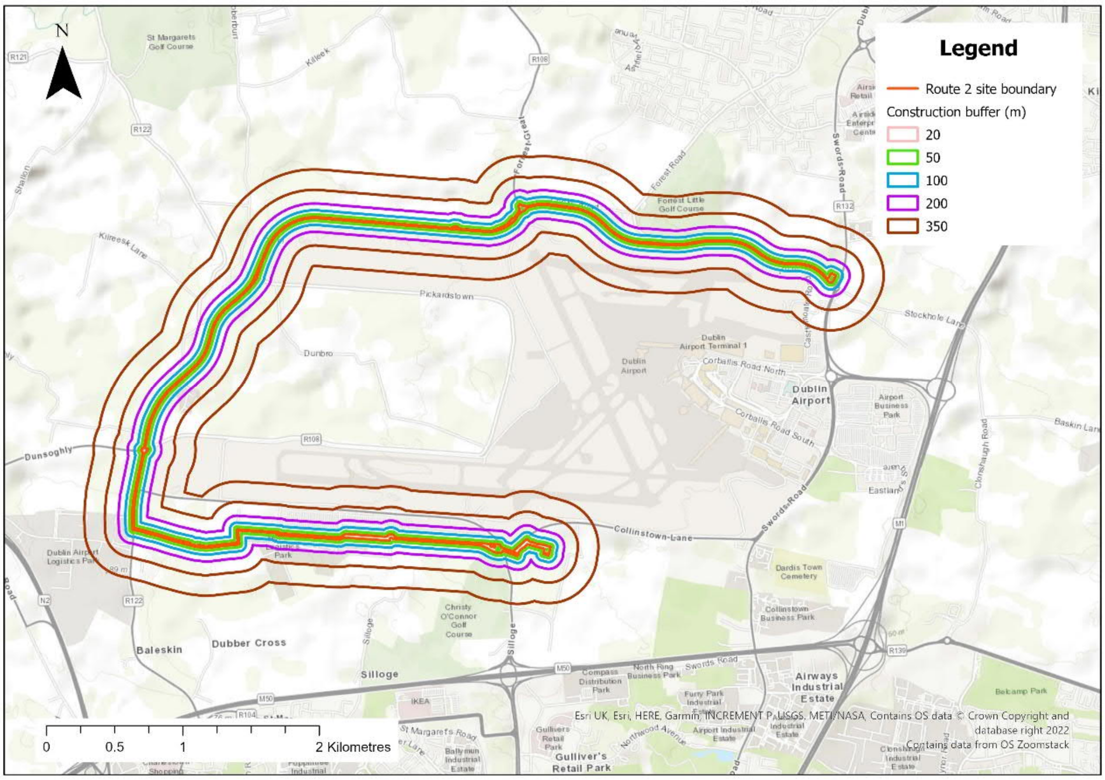
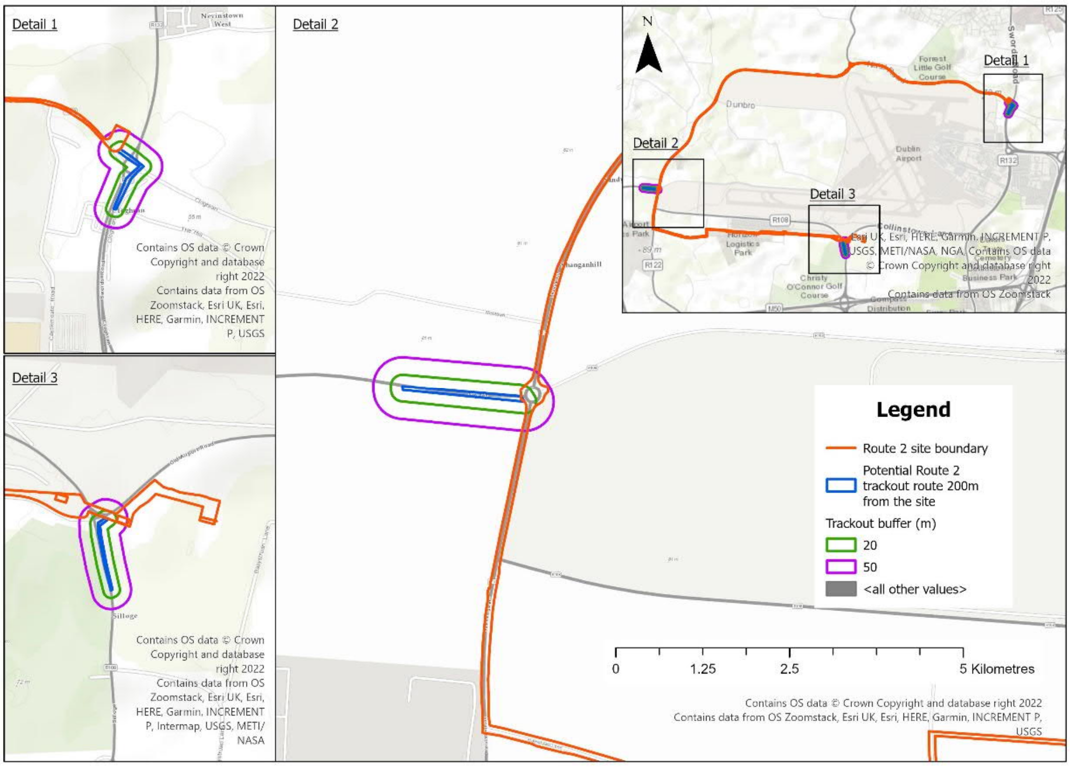


Figure 11.5: Construction Dust Assessment Buffers (Trackout) of the Route 2



Route 3 - 110 kV / 220 kV Forest Little – Belcamp - Option 1 (via Baskin Lane/Malahide Road)

The magnitude descriptors that have been applied to the potential construction activities associated with the Route 3 (Option 1) are presented in Table 11.9.

Table 11.15: Dust Emission Magnitude of the Route 3 (Option 1)

Activity	Dust emission magnitude	Justification
Demolition	Not Applicable.	No demolition works associated with this project.
Earthworks	Large	Total excavation area is 22,000m^2 for Route 3 (Option 1), and less than 5 heavy earth moving vehicles will be active at any one time. Assumed total site area of Route 3 (Option 1) is larger than 10,000m^2.
Construction	Small	Total building volume is assumed to be less than 25,000m^3 and materials would have a low potential for dust release (piping, cable and pre-cast material).
Trackout	Medium	Assuming that civil works for the cable trenches and passing bays would take place during the same period, it is estimated that there could be up to approximately 42 outbound heavy goods vehicle movements in a single day.

Table 11.10 presents the sensitivity of the receptors to effects caused by the Route 3 (Option 1) construction activities and is based on the criteria presented in Table G.2 to Table G.5, Appendix G. Figure 11.2 to Figure 11.4 present the dust assessment buffers.

Table 11.16: Area Sensitivity of the Route 3 (Option 1)

Activity	Dust soiling		Health effects of PM_{10}	
	Sensitivity	Comment	Sensitivity	Comment
Earthworks	High	There are more than 100 high sensitivity receptors (residential properties) within 20m of Route 3 (Option 1). These are mainly located on Stockhhole Lane, Baskin Lane, Malahide Road and R139. The St Nicholas of Myra National School in Kinsealy is also within 20m of the route.	Medium	Background annual mean PM_{10} concentrations are <24µg/m^3[13] (See Table 11.7).
Construction	High		Medium	There are more than 100 high sensitivity receptors (residential properties) within 20m of Route 3 (Option 1). These are mainly located on Stockhhole Lane, Baskin Lane, Malahide Road and R139. The St Nicholas of Myra National School in Kinsealy is also within 20m of the route.
Trackout	Medium	There are approximately 1-10 high sensitivity receptors (residential properties) within 20m of local roads which could be used for construction traffic (up to 200m from potential site exits).	Low	As above, background annual mean PM_{10} concentrations are <24µg/m^3 (See Table 11.7). There are approximately 1 - 10 high sensitivity receptors (residential properties) within 20m of the kerb of local roads which could be used for construction traffic (up to 200m from potential site exits).

The overall risk of receptors to dust soiling effects and PM_{10} effects are presented in Table 11.11. Risk is based on the criteria presented in Table G.6 to Table G.9 in Appendix G.

[13] EPA Data Archive – Summary Data Tables

Table 11.17: Summary of the Risk of Construction Effects of the Route 3 (Option 1)

Activity	Dust soiling effects	PM_{10} effects
Demolition	Not Applicable	Not Applicable
Earthworks	High	Medium
Construction	Low	Low
Trackout	Low	Low

Dust soiling effects are 'Low' to 'High' and PM_{10} effects are 'Low' to 'Medium' without mitigation. Mitigation measures appropriate for the proposed development have been presented in Section 11.5.1. These measures will be incorporated within a CEMP to further reduce the risk.

Figure 11.6: Construction Dust Assessment Buffers (Demolition, Earthworks and Construction) of the Route 3 (Option 1)

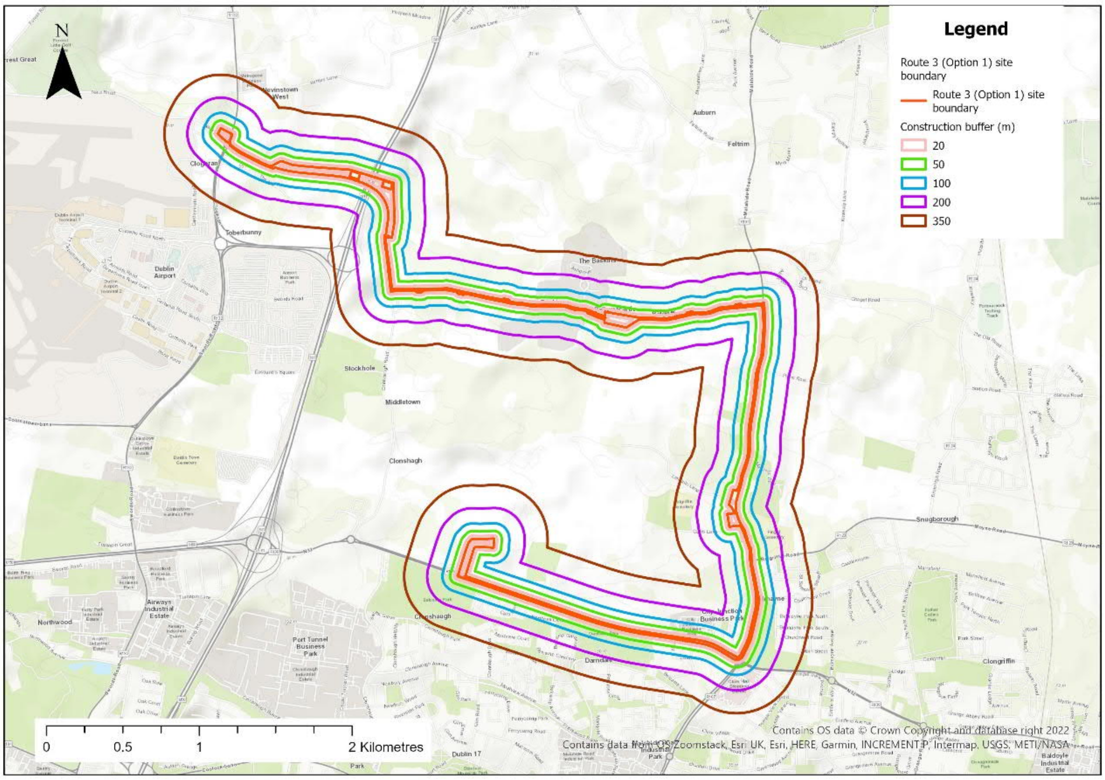


Figure 11.7: Construction Dust Assessment Buffers (Trackout) of the Route 3 (Option 1) (Part 1)

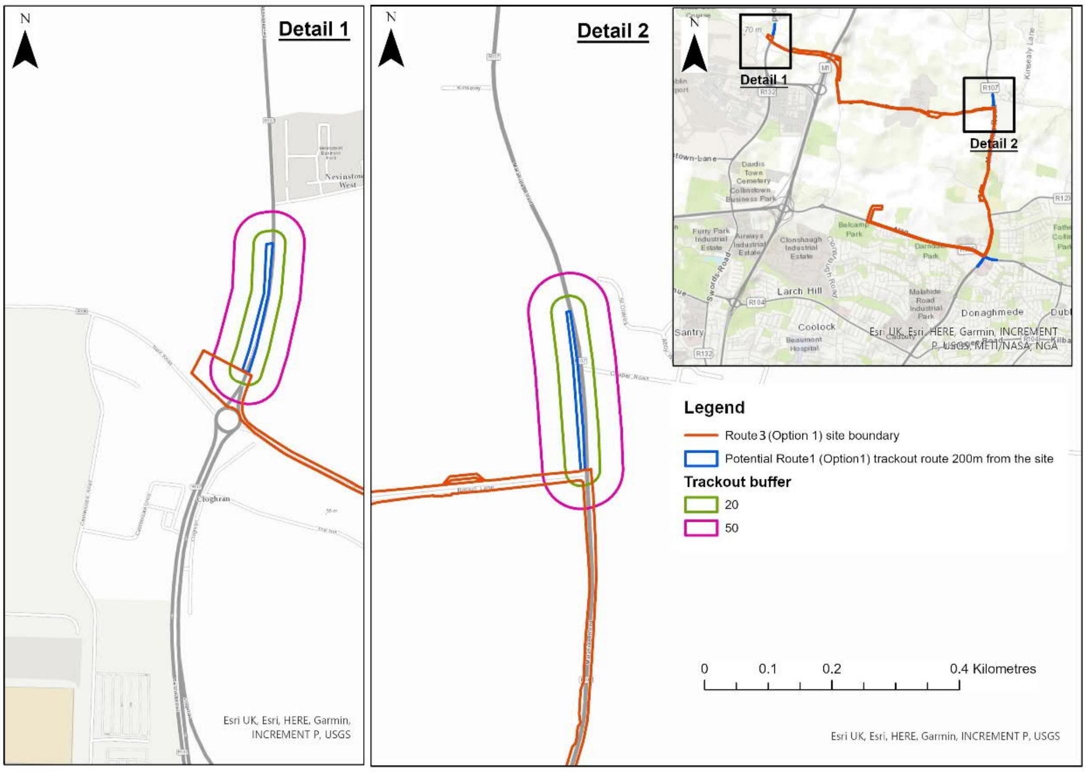
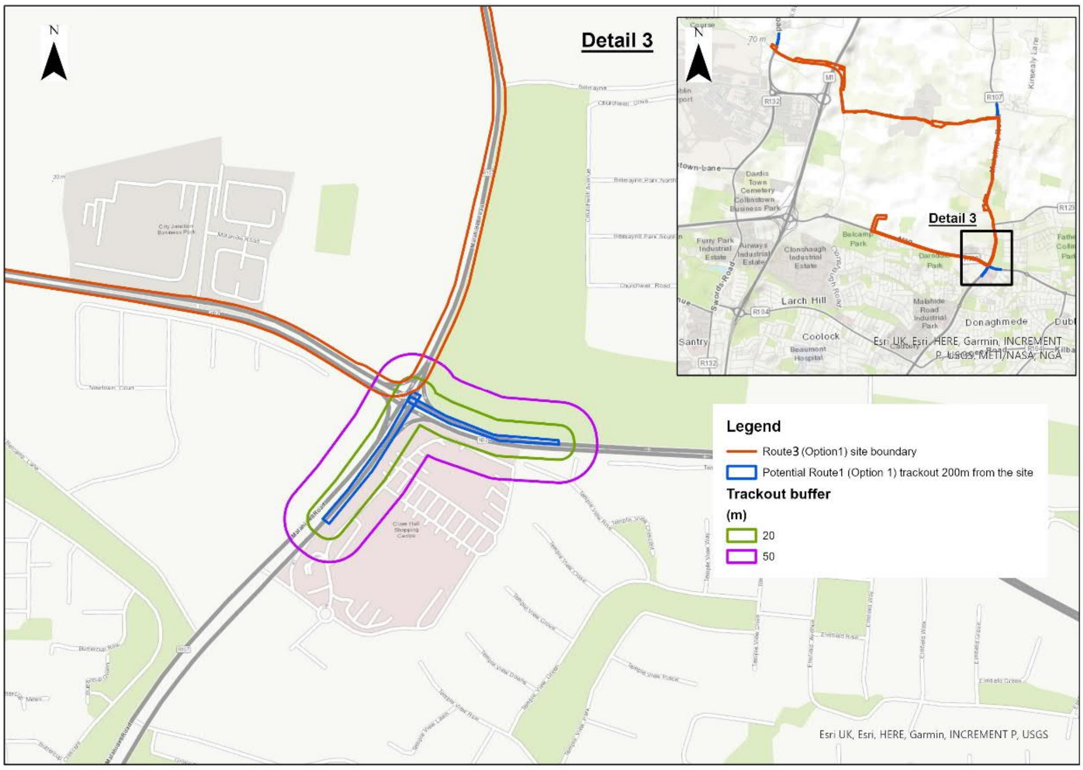


Figure 11.8: Construction Dust Assessment Buffers (Trackout) of the Route 3 (Option 1) (Part 2)



Route 3 - 110 kV / 220 kV Forest Little – Belcamp - Option 2 (via Stockhole Lane)

The magnitude descriptors that have been applied to the potential construction activities associated with the Route 3 (Option 2) are presented in Table 11.9.

Table 11.18: Dust Emission Magnitude of the Route 3 (Option 2)

Activity	Dust emission magnitude	Justification
Demolition	Not Applicable.	No demolition works associated with this project.
Earthworks	Medium	Total excavation area is 22,000m^2 for Route 3 (Option 1), and less than 5 heavy earth moving vehicles will be active at any one time. Assumed total site area of Route 3 (Option 1) is larger than 10,000m^2.
Construction	Small	Total building volume is assumed to be less than 25,000m^3 and materials would have a low potential for dust release (piping, cable and pre-cast material).
Trackout	Medium	It is estimated that there could be up to approximately 30 outbound heavy goods vehicle movements in a single day.

Table 11.10 presents the sensitivity of the receptors to effects caused by the Route 3 (Option 2) construction activities and is based on the criteria presented in Table G.2 to Table G.5, Appendix G. Figure 11.5 to Figure 11.6 present the dust assessment buffers.

Table 11.19: Area Sensitivity of the Route 3 (Option 2)

Activity	Dust soiling		Health effects of PM_{10}	
	Sensitivity	**Comment**	**Sensitivity**	**Comment**
Earthworks	High	There are between 10 and 100 high sensitivity receptors (residential properties) within 20m of Route 3 (Option 2). These are mainly located on Stockhole Lane and Clonshaugh Road.	Low	Background annual mean PM_{10} concentrations are <24µg/m^3[14] (See Table 11.7). There are between 10 and 100 high sensitivity receptors (residential properties) within 20m of Route 3 (Option 2). These are mainly located on Stockhole Lane and Clonshaugh Road.
Construction	High		Low	
Trackout	Medium	There are between 1 and 10 high sensitivity receptors (residential properties) within 20m of the local roads which could be used for construction traffic (up to 200m from potential site exits).	Low	As above, background annual mean PM_{10} concentrations are <24µg/m^3 (See Table 11.7). There are between 1 and 10 high sensitivity receptors (residential properties) within 20m of the kerb of local roads which could be used for construction traffic (up to 200m from potential site exits).

The overall risk of receptors to dust soiling effects and PM10 effects are presented in Table 11.14. Risk is based on the criteria presented in Table G.6 to Table G.9 in Appendix G.

Table 11.20: Summary of the Risk of Construction Effects of the Route 3 (Option 2)

Activity	Dust soiling effects	PM_{10} effects
Demolition	Not Applicable	Not Applicable
Earthworks	Medium	Low
Construction	Low	Negligible
Trackout	Low	Low

Dust soiling effects are 'Low' to 'Medium' and PM_{10} effects are 'Negligible' to 'Low' without mitigation. Mitigation measures appropriate for the proposed development have been presented in Section 11.5.1.These measures will be incorporated within a CEMP to further reduce the risk.

[14] EPA Data Archive – Summary Data Tables

Figure 11.9: Construction Dust Assessment Buffers (Demolition, Earthworks and Construction) of the Route 3 (Option 2)

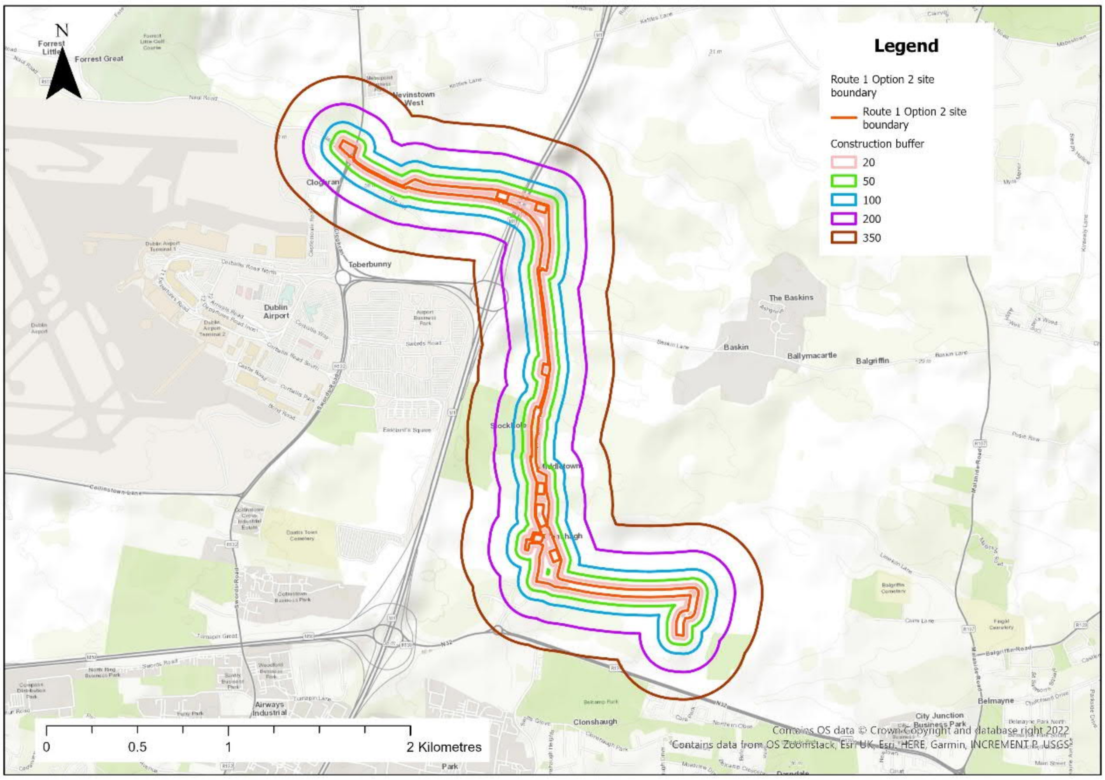
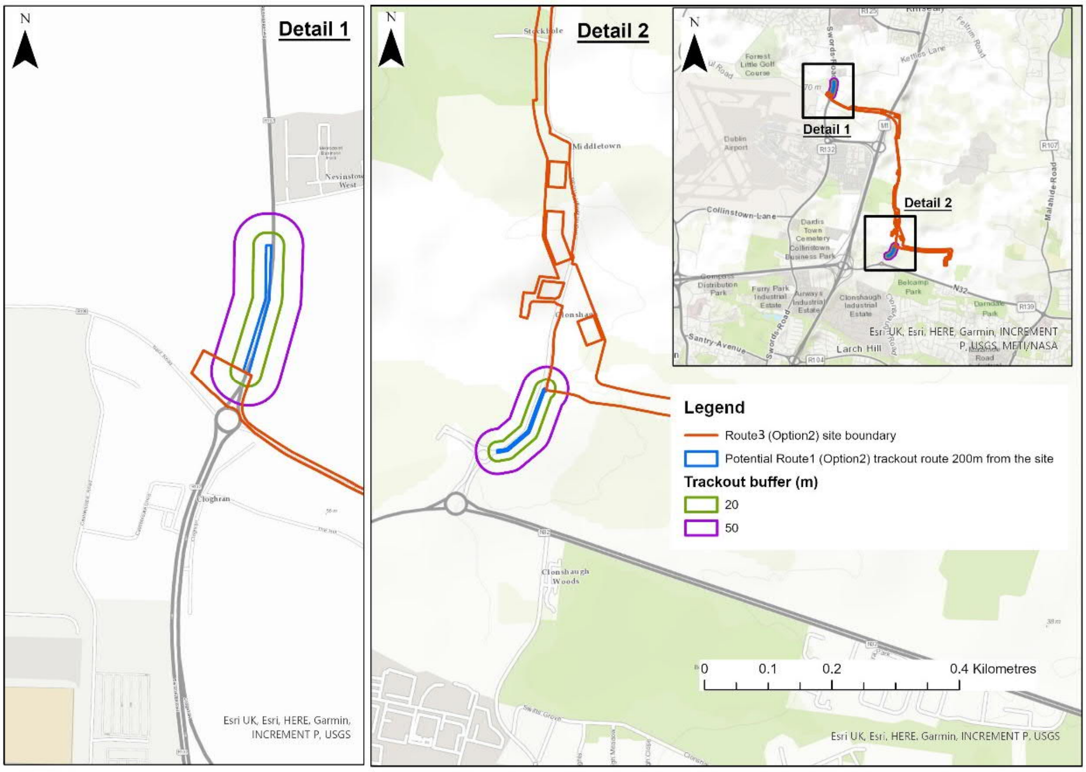


Figure 11.10: Construction Dust Assessment Buffers (Trackout) of the Route 3 (Option 2)



11.4.2 Operational and Maintenance Phase

As presented in Section 6.6 and 6.7 of Chapter 6, access may be required on rare occasion to facilitate cable replacement if failure occurs. Annual access to link boxes and communication chambers will be required for inspection and maintenance. Given the frequency of inspection and maintenance, the effects of operation road traffic contributions from the proposed development are considered of negligible significance.

11.4.3 Do-Nothing Assessment

There would be no air quality or climate impacts in a Do-Nothing scenario. Therefore, no further Do-Nothing assessment has been made.

11.4.4 Decommissioning Phase

The impact associated with the decommissioning phase is similar to the impacts associated with the construction phase for air quality. No detailed information is available to complete an assessment for the decommissioning. However, the impacts and mitigation measures stated for the construction phase should be referred to for the decommissioning phase. Therefore, provided that appropriate mitigation is used, the impact of the decommissioning phase on air quality should be reduced to a level that is not significant.

The mitigation measures detailed in Section 11.5.1 are however applicable to reducing the impact of decommissioning and would be considered by the overseeing organisation, contractor and designer facilitating the decommissioning.

11.4.5 Cumulative Impacts

Intra project cumulative effects

In general, there should be no intra project cumulative impact associated with dust from construction activities due to short duration and phasing of the construction periods. In addition, trenches will be excavated to install the cable and then filled before moving on to the next section of the route so at any one time potential impacts will be located to small discrete areas.

The Metrolink Railway Order (RO) has been submitted to An Bord Pleanála. The RO, if granted, will authorise to carry out railway works and all works necessary to enable the construction, operation, maintenance and improvement of the railway. The proposed alignment of the RO would cross the Route 1 and Route 2 alignment of the project at Collinstown Lane and Naul Road respectively. Construction activities of the railway are localised, and construction periods will be phased so that only a small area would be affected at any given time. Appropriate mitigation measures as stated in the IAQM guidance are to be implemented to minimise air quality impact during construction phase of the railway Metrolink project. Therefore, the potential air quality impacts will be located to small areas and limited in time and are not considered significant.

Other developments

There is a risk of cumulative construction dust impacts associated with the construction phases of the proposed development occurring at the same time as the construction phases of nearby committed developments or future developments (see Table 2.2 in Chapter 2 of this EIAR for further details of these developments). It is therefore recommended, in line with IAQM guidance, that regular liaison meetings are held with other high risk construction sites within 500m of the site boundary to ensure plans are co-ordinated and dust and particulate matter emissions are minimised. Provided this and other appropriate mitigation measures are implemented, such as those outlined in this chapter, the cumulative air quality impact associated with the construction phase will not be significant, the residual effect is imperceptible.

Chapter 17 (Roads and Traffic) describes the impacts of cumulative construction traffic from the proposed development and other committed developments. Traffic impacts from other developments which are unlikely to occur at the same time as the construction phase of the proposed development, have not been considered further.

Cumulative construction traffic impacts from the Metrolink Rail Project, which are planned to take place in the same period as the proposed development in 2030 have been assessed. In addition, operational traffic impacts from the following cumulative projects, which are planned to increase vehicle traffic from 2024 or 2025 onwards have been included within the traffic data.

- Proposed Dublin Airport Section 34C (night-time runway use)
- Light industrial warehouse, Harristown
- Greater Dublin Drainage (GDD) Project

Based on the requirements of TII guidance[15] only the R108 between Old Airport Road and the M50, where a maximum predicted increase of 293 HDV, exceeds the assessment criteria (200 HDV) and has been included in the assessment.

Table 11.21 presents the predicted annual mean NO_2 concentration at the three worst case sensitive receptors located along the R108. Predicted annual mean concentrations of NO_2 are below the annual mean objectives in both the 'Do-Minimum' (without) and 'Do-Something' (with) the proposed development and other cumulative developments.

The largest increase in annual mean NO_2 concentrations is 0.2µg/m^3 at receptor R1. This receptor is located adjacent to road junction on R108.

The impacts are considered to be 'Neutral' at all receptors in accordance with the TII guidance[16] impact criteria adopted for this assessment. Based on these magnitudes of impact and the conservative assumptions made within the assessment, the impact of both proposed development and cumulative projects on annual mean NO_2 at the nearby receptors are not significant.

Table 11.21: Predicted annual mean NO_2 results and description of change

Receptor ID	Annual mean concentration with background (µg/m^3)		Predicted pollutant concentration change (µg/m^3)	Change in concentration as a percentage of AQAV (%)	Impact Descriptor
	Do-Minimum	Do-Something			
R1	27.5	27.7	0.2	1%	Neutral
R2	23.0	23.2	0.2	0%	Neutral
R3	34.2	34.3	0.1	0%	Neutral

Note:
- AQAV = Air Quality Assessment Value (NO_2: 40µg/m^3)
- Background concentration from Ballyfermot station has been used for receptors R1 and R2 while Blanchardtown station has been used for R3.
- Adjustment factor of two has been applied to the predicted model road traffic outputs as described in Section 11.2.2.3.

[15] Transport Infrastructure Ireland (2022), 'Air Quality Assessment of Specified Infrastructure Projects – Overarching Technical Document (PE-ENV-01106)'

[16] Transport Infrastructure Ireland (2022), 'Air Quality Assessment of Specified Infrastructure Projects – Overarching Technical Document (PE-ENV-01106)'

11.5 Mitigation and Monitoring Measures

11.5.1 Construction Phase

Construction activities associated with the proposed development with no mitigation are predicted to have:

- A 'negligible' to 'medium' risk for construction for Route 1;
- A 'negligible' to 'medium' risk for construction for Route 2;
- A 'low' to 'high' risk for construction for Route 3 – Option 1; and
- A 'negligible' to 'medium' risk for construction for Route 3 – Option 2.

Best practice mitigation measures adapted from the IAQM guidance are presented below. The potential dust risk of Route 3 (Option 1) is comparatively higher, therefore specific mitigation measures have been recommended for this route. These mitigation measures are incorporated into the proposed development's CEMP, as included within Appendix D. The dust and emission control methods presented below will be agreed with the local authority and implemented effectively throughout the construction period.

Standard Mitigation applicable to Route 1, 2, and 3 (Option 2)

- Communication and Site Management
  - Develop and implement a stakeholder communications plan that includes community engagement before work commences on site.
  - Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary. This will be the environment manager / engineer or the site manager.
  - Display the head or regional office contact information.
  - The Contractor will develop and implement a dust management plan (DMP) as part of the updated CEMP, which will include measures to control other emissions, approved by the Local Authority.
  - Record all dust and air quality complaints, identify causes and take appropriate measures to reduce emissions in a timely manner and record the measures taken.
  - Make a complaint log available to the planning authority, when requested.
  - 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, record inspection results and make an inspection log available to the planning authority, when requested.
- Preparing and maintaining the site
  - Avoid site runoff of water or mud.
  - Erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles on site.
  - Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site. If they are being re-used on-site cover with Hessian, mulches or trackifiers.
  - Cover, seed or fence stockpiles to prevent wind whipping.
- Operations 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
  - Manage the sustainable delivery of goods and materials.
- Operations
  - Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction.
  - Ensure an adequate water supply on the site for effective dust/ particulate matter suppression/ mitigation using non-potable water, where possible and appropriate.
- Mitigation specific to trackout:
  - Use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any material tracked out of the site. Avoid dry sweeping of large areas.
  - Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport.
  - Inspect on-site haul routes for integrity and instigate necessary repairs to the surface as soon as reasonably practicable.
  - Record all inspections of haul routes and any subsequent action in a site log book.
  - Install hard surfaced haul routes, which are regularly damped down with fixed or mobile sprinkler systems, or mobile water bowsers and regularly cleaned.
  - Access gates to be located at least 10 m from receptors where possible.

Additional mitigation applicable to Route 3 (Option 1)

- Communication and Site Management
  - Ensure community engagement before work commences on site.
  - Hold regular liaison meetings with other high risk construction sites within 500m of the site boundary, to ensure plans are co-ordinated and dust and particulate matter emissions are minimised. It is important to understand the interactions of the off-site transport/deliveries which might be using the same strategic road network routes.
- Monitoring:
  - Undertake daily on-site and off-site inspection, where receptors (including roads) are nearby, to monitor dust, record inspection results, and make the 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.

11.5.2 Operational and Maintenance Phase

As stated in Section 11.4.2 of this EIAR, given the frequency of inspection and maintenance, the effects of operation road traffic contributions from the proposed development are considered of negligible significance compared to the existing traffic contributions on the local road network. Consequently, there are no mitigation measures required during the operation phase of the proposed development.

11.6 Residual Impacts

There are imperceptible impacts predicted during the construction and operational phases for air quality with the successful incorporation of best practice mitigation.

Metrolink 110kV Underground Cables

Volume 2: Environmental Impact Assessment Report
Chapter 12 - Climate

June 2023

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12 Climate

12.1 Introduction

This chapter considers the both the effects on the climate arising from the proposed development (caused by greenhouse gases) and the effects of the changing climate on the proposed development (physical risks, or adaptation and resilience). Any descriptions of the characteristics of the proposed development in this chapter should be read in conjunction with Chapter 6 Description of the Proposed Development.

Physical climate risks

Climate change is projected to lead to shifts in the frequency and severity of extreme weather events such as heatwaves, storms, and flooding[1]. These events pose risks to the reliability, safety, and performance of transport infrastructure. It is therefore important in any infrastructure project to embed resilience measures to address the physical risks of climate change.

Potential risks associated with climate change during the construction, operation and maintenance phases of the proposed development are identified within this report and a significance rating assigned based on the likelihood and consequence of the risks occurring.

The assessments consider both the construction and operation phase of the proposed development, identifying vulnerabilities of the design and local environment to climate change and measures that will be included to provide resilience to future climate and extreme weather conditions.

The physical climate change risk assessment uses available data on current and historic climate conditions alongside the latest climate projections from Met Éireann and the World Bank. The timescale considered for the proposed development is from present-day to the 2090s.

Refer to Chapter 6 Description of the Proposed Development which describes the study area for the assessment of climate. This is defined as three new underground high voltage cables to provide power to the Metrolink, a rail link between Swords and Charlemount, and takes into context the wider Dublin area. Receptors at risk from future changes in climate and resultant increased frequency and intensity of extreme weather events have been considered throughout the lifetime of the proposed development and the various proposed elements.

Greenhouse gases (GHGs)

The assessment estimates the greenhouse gases associated with the proposed development arising from the construction and operation of the proposed development and, where appropriate, specifies mitigation measures to reduce potential effects. An assessment is made on the significance of the residual effects. The key pollutants considered relevant to the proposed development are greenhouse gases including carbon dioxide (CO_2) and sulphur hexafluoride (SF_6).

[1] IPCC (2021) Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change. Available at: https://www.ipcc.ch/report/ar6/wg1/downloads/report/IPCC_AR6_WGI_Full_Report.pdf. [Accessed: April 2022].

12.2 Methodology and limitations

12.2.1 Relevant legislation

Table 12-1 summaries the policy landscape for climate adaptation in Ireland.

Table 12-1 Policy landscape for climate adaptation in Ireland (adapted from the Climate Change Sectoral Adaptation Plan[2])

Policy	Legislation	Framework for action	Sectoral adaptation planning
• National Policy Position on Climate Change (2014) • Paris Agreement (2016) • Climate Action Plan 2023	• Climate Action and Low Carbon Development Act (2015) and associated amendments	• National Adaptation Framework (2018) • Sectoral adaptation plans • Local adaptation strategies	• Seafood • Agriculture • Biodiversity • Built & archaeological heritage • Transport infrastructure • Electricity & gas networks • Communications networks • Flood risk management • Water quality • Water services infrastructure • Health

12.2.1.1 International climate change legislation and policy

Paris Agreement 2016

To address the issue of climate change risks, world leaders at the United Nations (UN) Climate Change Conference (COP21) held in Paris in 2015 came together and reached a landmark agreement to undertake ambitious efforts to combat climate change and adapt to its impacts. The agreement is a legally binding international treaty which came into force on 4 November 2016 and consists of 191 countries (UN, 2016). The agreement sets long-term goals which include:

- Significantly reduce global greenhouse gas (GHG) emissions to limit global temperature increase in this century to 2º C with aspirations to limit increase even further to 1.5ºC;
- Review countries' commitments every five years; and
- Provide financing to developing countries to mitigate climate change, strengthen resilience and enhance abilities to adapt to climate change.

The Paris Agreement establishes a global goal on adaptation with a focus on enhancing adaptive capacity, strengthening resilience, and reducing risks from climate change in the context of the temperature goal of the agreement. It aims to significantly strengthen national adaptation efforts and asks all signatories to formulate and implement National Adaptation Plans and should submit and periodically update an adaptation communication, describing their priorities, needs, plans, and actions.

Ireland's contribution to the Paris Agreement will be determined by the EU to help achieve an EU-wide Greenhouse Gas (GHG) emissions reduction of at least 40% by 2030 compared to 1990 levels. Under the EU Effort Sharing Decision, Ireland had a target of reducing GHG emissions not included in the EU Emissions Trading Scheme by 20% below 2005 levels by

[2] Government of Ireland (2019) Water Quality and Water Services Infrastructure. Climate Change Sectoral Adaptation Plan. Available from: dhplg_sectoral_adaptation_plan_final_en.pdf (old.gov.ie). [Accessed: May 2022].

2020. For the period 2021 to 2030, under the EU Effort Sharing Regulation, Ireland has a target of reducing GHG emissions by 30% compared to 2005 levels[3].

European Climate Law

The European Climate Law[4] puts into law the European Green Deal goal to become climate-neutral (a net zero balance of greenhouse gas (GHG) emissions) by 2050. The law also includes an intermediate target of 55% GHG emissions reduction by 2030 (against 1990 levels).

Kyoto Protocol

In addition, Ireland is a party to the United Nations Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol. Both provide a legal framework for addressing global climate change.

The GHG emissions assessments completed include consideration of GHGs additional to carbon dioxide. As determined by the Kyoto Protocol these GHGs include seven gases: carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, sulphur hexafluoride and nitrogen trifluoride. To provide consistent reporting of these gases, each is weighted by its global warming potential and converted to a carbon dioxide equivalent (CO_2e) in accordance with GHG reporting protocol[5].

12.2.1.2 Domestic climate change policy and legislation

National Policy on Climate Action and Low Carbon Development[6]

Ireland's first piece of climate action policy on its coherent journey towards a low-carbon, climate resilient and sustainable economy was the Climate Action and Low-Carbon Development National Policy Position, which was launched in 2014. The policy position:

- Recognises the threat of climate change for humanity.
- Anticipates and supports mobilisation of a comprehensive international response to climate change, and global transition to a low-carbon future.
- Recognises the challenges and opportunities of the broad transition agenda for society.
- Aims, as a fundamental national objective, to achieve transition to a competitive, low-carbon, climate resilient and environmentally sustainable economy by 2050.

The policy position also sets out a high-level roadmap for future climate policy in Ireland, based on the adoption of a series of national plans addressing both climate adaptation and greenhouse gas mitigation efforts in the period to 2050.

Climate Action and Low-Carbon Development Act, 2015 (Amended 2021[7]**)**

The Act was the first piece of legislation following the launch of the National Policy Position. The Act provides the statutory basis for the national transition laid out in the national policy position.

[3] Department of Communications. (2020) Climate Action and Environment. Available at: https://www.dccae.gov.ie/en-ie/climate-action/topics/eu-and-international-climate-action/2020-eu-targets/Pages/default.aspx [Accessed: June 2023].

[4] European Union (2021). European Climate Law. Available at: European Climate Law (europa.eu) https://climate.ec.europa.eu/eu-action/european-green-deal/european-climate-law_en. [Accessed: June 2022].

[5] GHG Protocol. (n.a.) GHG Protocol Available at: https://ghgprotocol.org/. [Accessed: June 2022].

[6] Department of the Environment, Climate and Communications (2013) National Policy Position on Climate Action and Low Carbon Development. Available from: gov.ie - National Policy Position on Climate Action and Low Carbon Development (www.gov.ie). [Accessed May 2022].

[7] Department of the Environment, Climate and Communications (2021) Climate Action and Low Carbon Development (Amendment) 2021. Available from: gov.ie - Climate Action and Low Carbon Development (Amendment) Bill 2021 (www.gov.ie). [Accessed May 2022].

It provides arrangements for achieving transition to a low-carbon, climate-resilient and environmentally sustainable economy by 2050. The Act includes the following key elements:

- Places on a statutory basis a 'national climate objective', which commits to pursue and achieve no later than 2050, the transition to a climate resilient, biodiversity-rich, environmentally sustainable and climate-neutral economy.
- Mandated the creation of sector level adaptation plans.
- A National Long Term Action Strategy will be prepared every five years.
- Introduces a requirement for each local authority to prepare a Climate Action Plan which will include both mitigation and adaptation measures and be updated every five years.

National Adaptation Framework (NAF), 2018[8]

The NAF specifies the national strategy for the application of adaptation measures in different sectors and by local authorities in order to reduce the vulnerability of Ireland to the adverse impacts of climate change and realise any positive impacts. Adaptation actions under this framework range from building adaptive capacity through to policy and finance-based actions. Additional key actions under the framework include:

- Putting in place revised governance and reporting arrangements.
- Formalising the status of existing guidelines.
- Formalising long term operational support for key sectors.
- Facilitating the establishment of regional local authority climate action offices.
- Increasing awareness around climate adaptation and resilience.
- Integrating climate adaptation into key national plans and policies.

Climate Action Plan, 2023[9]

The Climate Action Plan provides a detailed plan on how to reduce Ireland's emissions and enhance climate resilience to ensure Ireland is put on a more sustainable path. The plan details a number of actions to achieve this aim. Some of these actions include:

- Action Number AD/23/11: Incorporate adaptation to climate change in the ongoing programme of renewal and maintenance by EirGrid, ESB Networks and Gas Networks Ireland.
- Action Number AD/23/18: Engage with key stakeholders and adaptation practitioners in relation to building climate resilience and the importance of adapting to climate change.

Transport – Climate Change Sectoral Adaptation Plan[10]

This is the first sectoral Adaptation Plan for transport to be developed under the NAF. The plan describes the likely climate impacts for Ireland and the risks posed to transport infrastructure, as well as highlighting adaptation measures undertaken by transport stakeholders. The implementation objectives set out in the plan are:

- Improve understanding of the impacts of climate change on transport infrastructure, including cross-sectoral cascading impacts, and close knowledge gaps.

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[8] Department of the Environment, Climate and Communications (2018) National Adaptation Framework. Available from: gov.ie - National Adaptation Framework (NAF) (www.gov.ie). [Accessed: May 2022].

[9] Department of the Environment, Climate and Communications (2023) Climate Action Plan 2023. Available from: gov.ie - Climate Action Plan 2023 (www.gov.ie) [Accessed January 2023].

[10] Government of Ireland (2019) Transport – Climate Change Sectoral Adaptation Plan. Available from: 92e6d141-7616-438e-b8cf-ab7cbb55a175.pdf (www.gov.ie). [Accessed: May 2022].

- Assist transport stakeholders in identifying and prioritising climate risks to existing and planned infrastructural assets and enabling them to implement adaptation measures accordingly.
- Ensure that resilience to weather extremes and longer-term adaptation needs are considered in investment programmes for planned future transport infrastructure.

Fingal County Council Climate Change Action Plan 2019-2024[11] and Dublin City Council Climate Change Action Plan 2019-2024[12]

Dublin's four local authorities developed individual Climate Change Action Plans as a collaborative response to the impact that climate change is having, and will continue to have, on the Dublin region. The Fingal County and Dublin City Council Climate Action Plans feature a range of actions across five key areas, which include energy and buildings, transport, flood resilience, nature-based solutions and resource management. By addressing these areas, both councils aim to collectively address four targets:

- A 33% improvement in the Council's energy efficiency by 2020.
- A 40% reduction in the Council's greenhouse gas emissions by 2030.
- To make Dublin a climate resilient region, by reducing the impacts of future climate change-related events.
- To actively engage and inform citizens on climate change.

12.2.2 Assessment Methodology

12.2.2.1 Physical climate risks

A bespoke methodology has been developed for this assessment. The IEMA guide to climate resilience and adaptation (2020)[13] and TII climate guidance for national roads, light rail and rural cycleways[14] have been used to inform the methodology in terms of selecting the scenarios for climate projections, identifying risks based on their likelihood and severity of occurrence and, determination of significance.

Climate baseline and data sources

Information on current weather and climate for Ireland is described by the Status of Irelands Climate, 2020[15] and the 1981-2010 climate averages data for Dublin Airport from Met Éireann[16] describes the smaller Dublin area where the proposed development is located.

Future climate projections were obtained from two sources. Nolan, P. and Flanagan, J. (2020)[17] provides a set of mid-21st century (2041-2060) high-resolution climate projections for all of

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[11] Fingal County Council (2019) Climate Change Action Plan 2019-2024. Available from: 20190812_fcc_climate_change_action_plan_final_0.pdf (fingal.ie). [Accessed: May 2022].

[12] Dublin City Council (2019) Climate Change Action Plan 2019-2024. Available from: 2019-dcc-climate-change-action-plan.pdf (dublincity.ie). [Accessed July 2022].

[13] IEMA (2020) IEMA EIA Guide to: Climate Change Resilience and Adaptation (2020). [Accessed: April 2020].

[14] Transport Infrastructure Ireland (2022) TII Publications: Cliamte Guidance for National Roads, Light Rail, and Rural Cycleways. Available from: PE-ENV-01104 (tiipublications.ie). [Accessed June 2023].

[15] Environmental Protection Agency (2021) The Status of Ireland's Climate, 2020. Available from: Climate Change | Environmental Protection Agency (epa.ie). [Accessed May 2022].

[16] Met Éireann (2012) 30 Year Averages 1981-2000 – Dublin Airport. Available from: Dublin 1981–2010 averages (met.ie). [Accessed: May 2022].

[17] Nolan, P. and Flanagan, J. (2020) High-resolution Climate Projections for Ireland – A multi-model ensemble approach. Available from: Climate Change | Environmental Protection Agency (epa.ie). [Accessed: May 2022].

Ireland. These projections use a baseline of 1981-2000 and considers two Representative Concentration Pathway (RCP) [18] emission scenarios. These are RCP 4.5, which considers an intermediate carbon emissions scenario that assumes global net zero targets are broadly achieved, and RCP8.5, which considers a precautionary scenario that assumes less successful reductions in global carbon emissions and a higher degree of resultant climate change.

Climate projections have also been obtained for the Dublin area from the World Bank Climate Change Knowledge Portal (CCKP)[19] which provides a range of time horizons, climate variables and climate scenarios. Time horizons of 2020-2039, 2040-2059, 2060-2079 and 2080-2099 have been chosen which covers the estimated construction period of 2026-2031 and 30-50-year design life of the Project using a baseline of 1995-2014. The CCKP uses data from the latest climate projections and uses the Shared Socioeconomic Pathways (SSPs)[20] climate scenarios which supersedes the RCPs. This assessment uses the SSP5-8.5 climate scenario which represents a precautionary approach. Data from the 50th percentile have been selected representing a ‘as like as not’ scenario.

Climate risk assessment

Risks associated with climate change have been identified using the current and future climate baseline. The risk assessment and determination of significance considers embedded resilience measures.

Risk in this context is defined as the risk that a weather or climate event occurs and results in an adverse impact. Impacts due to weather and climate typically take two forms: sudden-onset (acute) or slow-onset due to cumulative events over time (chronic). For example:

- the risk of sudden-onset damage to an asset, following a specific weather event such as a storm.
- the risk that asset condition deteriorates below acceptable standards following years of seasonal weather.

A significance rating is then estimated using expert judgement. This is done by quantifying the likelihood of each risk occurring and the severity of the risk if it were to occur. Secondly, an overall rating determining significance is calculated through multiplication of its likelihood and severity scores. Definitions of likelihood, severity and significance ratings are set out in the following sections.

Likelihood

The likelihood of each risk occurring refers to the likelihood that a specified risk, as a result of climate change, should occur as defined in Table 12-2Table 12-2: Definition of likelihood rating. The evaluation of future likelihood is based on expert judgement, consultation with the design and environmental specialist teams and review of future climate baseline information.

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[18] Representative Concentration Pathways (RCPs) are greenhouse gas (GHG) concentration trajectories adopted by the IPCC for its Fifth Assessment Report (AR5) in 2014. The pathways are used for climate modelling and research; they describe four possible climate futures, dependent on the level of future GHG emissions. The RCPs are labelled after a range of radiative forcing values in the year 2100 (2.6, 4.5, 6.0, and 8.5W/m^2). The four pathways are named RCP2.6, RCP4.5, RCP6, and RCP8.5 with RCP2.6 representing the lowest emissions scenario and RCP8.5 the highest emissions scenario.

[19] World Bank (2022). Climate Change Knowledge Portal. Available from: Home | Climate Change Knowledge Portal (worldbank.org). [Accessed May 2022].

[20] Shared Socioeconomic Pathways (SSPs) are future climate scenarios presented through five SSPs: SSP1-1-9, SSP1-2.6, SSP2-4.5, SSP3-7.0 and SSP5-8.5, all of which present different societal development pathways. SSP1-1.9 presents an optimistic scenario with net-zero global emissions and SSP5-8.5 presents a future based on intensified exploitation of fossil fuel resources.

Table 12-2: Definition of likelihood rating

Likelihood category	Description (probability and frequency of occurrence)
Very high	The event occurs multiple times during the lifetime of the project (e.g. approximately annually).
High	The event occurs several times during the lifetime of the project (e.g. approximately once every five years).
Medium	The event occurs limited times during the lifetime of the project (e.g. approximately once every 20 years).
Low	The event occurs once during the lifetime of the project.
Very low	The event may occur once during the lifetime of the project.

Severity

The severity refers to the magnitude of a risk upon an asset. Severity ratings are defined using the following categories as outlined in Table 12-3

Table 12-3: Definition of severity ratings

Severity	Definition
Very large adverse	Severe acute damage to asset and / or reduction in life expectancy. Major disruption to functionality of asset or interdependent activities / services.
Large adverse	Measurable decrease in asset performance (short-term, acute change or chronic change over longer-term) or lifespan or increase in necessary maintenance frequency and costs following the occurrence of climate risks.
Moderate adverse	Small, measurable adverse impact to asset’s performance (acute, or slow onset over time), or small reduction in asset’s lifespan due to chronic deterioration (e.g., slight decrease in lifespan of an asset due to increased higher temperatures).
Minor adverse	Small change in asset health or life expectancy.
Negligible	Minimal or undetectable change in asset health or life expectancy.

Significance matrix

The significance of each risk is calculated through multiplication of the likelihood and severity ratings using the significance matrix shown in Table 12-4: Significance MatrixTable 12-4.

Table 12-4: Significance Matrix

		Severity				
		Very large adverse	**Large adverse**	**Moderate adverse**	**Minor adverse**	**Negligible**
Likelihood	**Very high**	Significant	Significant	Significant	Significant	Not significant
	High	Significant	Significant	Significant	Significant	Not significant
	Medium	Significant	Significant	Significant	Not significant	Not significant
	Low	Significant	Significant	Not significant	Not significant	Not significant
	Very low	Not significant	Not significant	Not significant	Not significant	Not significant

Assumptions and limitations

The baseline for climate considers both current climate and how the climate may change in the future as a result of climate change, expressed as the outputs of climate modelling, referred to as projections. This chapter considers design information available at the time of assessment.

Due to the nature of climate change projections, there is unavoidable uncertainty within climate model outputs. Some of these uncertainties are addressed when the models are downscaled to provide higher spatial granularity. Figures for climate variables provided in this report represent possible outcomes and are not predictions.

The information included in the current and future baseline is based on open information from third parties, including Nolan, P. and Flanagan, J. (2020) and the World Bank CCKP. The climate change projections provided are based on the following climate scenarios from these two sources:

- The 'business-as-usual' precautionary emissions scenario referred to as RCP8.5 (Nolan, P. and Flanagan, J. (2020));
- The 'moderate' emissions scenario referred to as RCP4.5 (Nolan, P. and Flanagan, J. (2020)); and
- The 'very high' emissions scenario referred to as SSP5-8.5 (World Bank CCKP).

Nolan, P. and Flanagan, J. (2020) was chosen as it provides projections specific to Ireland. However, this source uses regional climate model data downscaled from the Coupled Model Inter-comparison project, phase 5 (CMIP5) suit of global climate datasets which are becoming increasingly outdated. Projections from the World Bank CCKP was therefore obtained as it uses the latest suite of climate models from CMIP6 and incorporates updated climate scenarios, SSPs (which supersede RCPs) across a number of time horizons. The CCKP is a global repository on climate change data including future projections at the national, regional and watershed level.

Where summer months are described, this includes July, August and September. Where winter months are described, this includes December, January and February.

Climate baseline

Current climate baseline

Ireland's climate is described by the climate averages for 1981-2010 summarised by Met Éireann[21]. Ireland's climate is dominantly influenced by the Atlantic Ocean and therefore does not suffer from the extremes of temperatures experienced by other countries at similar latitudes. Mean temperature generally range between 9^{o}C and 10^{o}C with higher mean temperatures in coastal regions. Summer is the warmest season, followed by autumn, spring and winter. Highest rainfall occurs in the western half of Ireland and on high ground, with rainfall decreasing towards the northeast. Averaged over all of Ireland, mean annual rainfall is 1230mm. The driest seasons are spring and summer with mean rainfall of 260mm and autumn and winter with a mean rainfall of 350mm.

The summary 1981-2010 climate averages show that, averaged over the country, there has been an increase of 5% in rainfall totals between the periods 1961-1990 and 1981-2010 with all seasons showing an overall increase in rainfall. There has also been an increase of 0.5^{o}C in mean temperature between the 1961-1990 and 1981-2010 periods. Minimum and maximum temperatures have also increased by 0.5^{o}C with all seasons showing a rise in temperature with spring and summer seasons showing the largest differences between the two time periods with an increase of 0.7$^{.o}$C.

[21] Met Éireann (2012) A summary of Climate Averages for Ireland. Available from: normals_supplement_1_ANNUAL_2010.qxd (met.ie). [Accessed: May 2022].

Data from Met Éireann shows 1981-2010 climate averages for the Dublin Airport station[22], the closest weather station to the proposed development location. This is described in Table 12-5.

Table 12-5: Dublin Airport 1981-2010 climate averages

Climate variables	Annual	Summer	Winter
Temperature (°C)			
Mean temperature	9.8	14.8	5.4
Mean daily max	13.3	18.6	8.2
Mean daily min	6.4	11	2.5
Rainfall (mm)			
Mean monthly total	758	63	61.4
Relative humidity (%)			
Mean at 1500UTC	73.3	69.9	79.8
Sunshine (hours)			
Mean daily duration	3.9	4.9	2.1
Wind (knots)			
Mean monthly speed	10.3	8.9	11.9
Weather (mean no. of days with…)			
Snow or sleet	16.6	0	11.7
Thunder	5.5	0.7	0.2
Fog	41.5	3.8	3.5

Observed climate data, as contained within Volume 3 Appendix H of this EIAR for Dublin Airport is in agreement with Met Eireann's climate summary for Ireland.

Future climate baseline

Climate projections for Ireland from Nolan, P. and Flanagan, J. (2020) are summarised in Table 12-6.

Table 12-6 Climate projections for Ireland (Nolan, P. and Flanagan, J. 2020)

Climate variables	Climate projections summary (2041-2060 relative to 1981-2000)	Resultant future climate
Temperature	Mean annual temperature is projected to increase up to 1.2 °C and 1.6 °C for the RCP4.5 and RCP8.5 scenarios respectively. Summer months are projected to increase up to 1.3 °C and 1.8 °C for the RCP4.5 and RCP8.5 scenarios respectively. Winter months are projected to increase up to 1.2 °C and 1.6 °C for the RCP4.5 and RCP8.5 scenarios respectively.	Ireland is projected to experience an increase in ambient air temperature across both emission scenarios.
Precipitation	Decreases in precipitation are projected for the summer months with up to an 11% decrease and 17% decrease for the RCP4.5 and RCP8.5 scenarios respectively. Frequencies of heavy precipitation events show notable increases over the year and in the winter and autumn months with projected increases in frequency of up to 19%.	Ireland is projected to experience drier summers and wetter winters across both emission scenarios. Ireland is also projected to see an increase in heavy rainfall events throughout the year.
Heatwaves	Heatwave events are projected to increase with a range of 1 to 8 events for the RCP4.5 scenario and from 3 to 15 for the RCP8.5 scenario. There is a clear gradient across Ireland where the highest number of heatwaves is projected to occur	Ireland is projected to experience an increase in heatwave events across both emission scenarios with most

[22] Met Éireann (2012) 30 Year Averages 1981-2000 – Dublin Airport. Available from: Dublin 1981–2010 averages (met.ie). [Accessed: May 2022].

Climate variables	Climate projections summary (2041-2060 relative to 1981-2000)	Resultant future climate
	in the south-east. This is relative to the 1981-2000 baseline which observed 1 to 6 heatwaves across Ireland.	heatwave events occurring in the south-east.
Frost and ice days	Number of frost days is projected to decrease by 45% and 58% for the RCP4.5 and RCP8.5 scenarios respectively. Number of ice days is projected to decrease by 68% and 78% for the RCP4.5 and RCP8.5 scenarios respectively.	Ireland is projected to experience a decrease in frost and ice days due to rising ambient air temperatures.
Snowfall	Snowfall is projected to decrease with reductions of 51% and 60% for the RCP4.5 and RCP8.5 scenarios respectively.	Ireland is projected to experience a decrease in snowfall events due to rising ambient air temperatures.
Wind speed	Mean 10-m wind speeds are projected to decrease for all seasons up to 3.4% and 5.4% for the RCP4.5 and RCP8.5 scenarios respectively.	Ireland is projected to experience a decrease in average wind speeds throughout the year across all emission scenarios.

Climate projections for Dublin from the World Bank CCKP are presented in Table 12-7.

Table 12-7 Climate Projections for Dublin (World Bank CCKP)

Climate variables	Baseline (1995-2014)	Climate Scenario (Anomaly change, SSP5-8.5, 50th percentile)			
		2020-2039	2040-2059	2060-2079	2080-2099
Mean air temperature (ºC change)	Annual: 9.7	Annual: +0.6	Annual: +1.3	Annual: +2	Annual: +3
	Summer: 14.4	Summer: +0.9	Summer: +1.8	Summer: +2.7	Summer: +4.3
	Winter: 5.7	Winter: +0.4	Winter: +1	Winter: +1.7	Winter: +2.4
Maximum temperature (ºC change)	Annual: 13.5	Annual: +0.6	Annual: +1.2	Annual: +2.1	Annual: +3.1
	Summer: 18.9	Summer: +0.9	Summer: +1.8	Summer: +2.9	Summer: +4.4
	Winter: 9.1	Winter: +0.5	Winter: +0.9	Winter: +1.8	Winter: +2.4
Minimum temperature (ºC change)	Annual: 6	Annual: +0.6	Annual: +1.2	Annual: +2	Annual: +3.2
	Summer: 10.5	Summer: +0.8	Summer: +1.7	Summer: +2.6	Summer: +4.3
	Winter: 2.4	Winter: +0.4	Winter: +1	Winter: +1.8	Winter: +2.6
Precipitation (% change)	Annual: 84.4mm	Annual: -0.26	Annual: -1.1	Annual: -0.8	Annual: -1.3
	Summer: 68.3mm	Summer: -3.8	Summer: -9.1	Summer: -15	Summer: -20.2
	Winter: 103.3mm	Winter: +1.12	Winter: +5	Winter: +12.1	Winter: +19.4

Projections for Dublin generally follow the climate trends projected for Ireland. In general, temperatures are projected to increase throughout the year with warmer summers and winters. Precipitation is projected to see small changes on average across the year with larger seasonal variations following a trend of drier summers and wetter winters. The frequency of extreme events across Ireland such as heatwaves are projected to increase substantially while cold-weather related events such as frost and ice days and snowfall may experience large reductions. These projections are in line with climate change trends identified in the observed changes in climate for Ireland between 1981-2010.

12.2.2.2 GHG assessment

According to the Guidance on the preparation of the Environmental Impact Assessment Report[23] (Directive 2011/92/EU as amended by 2014/52/EU), the environmental impact

[23] EU's Environmental Impact Assessment (EIA) Directive (2011). Available from: Environmental impact assessment (europa.eu).) [Accessed June 2023].

assessment shall identify, describe and assess significant effects of a project, including as impact the nature and magnitude of greenhouse gas emission as part of the climate change mitigation.

In addition, the Institute of Environmental Management and Assessment – IEMA, updated in February 2022 the guidance on "Assessing Greenhouse Gas Emissions and Evaluating their Significance[24]", setting out considerations to the treatment of GHG emissions within an EIA.

Where estimated data is available, carbon is measured based on the rate of activity (e.g. quantity, mass and type) of each material multiplied by an emission factor of a recognised source:

$$\text{Emissions } (tCO_2e) = \text{rate of activity (unit) x emission factor } (tCO_2e\text{ /unit})$$

The GHG emissions assessment of the proposed development considers the life cycle stages to determine the sources of assesses the embodied carbon across the construction (A1-A5) lifecycle, complemented with the modelling of embodied and operational (B1-B5) carbon stages, as defined in the PAS 2080 infrastructure life cycle stages[25]. The Moata carbon portal, a Mott MacDonald tool for modelling the embodied and operational carbon of assets, was used to estimate construction (A1-A5) materials emissions. The scope and methodology of the assessment are described in Table 12-8

Table 12-8 Summary of methodology for carbon assessment

Lifecycle stage	Methodology
A1-A3 Products and materials	Quantity of materials based on the description of the proposed development in Chapter 6 mapped to carbon emissions factors using the Moata Carbon portal and Inventory of Carbon and Energy (ICE)[26]. Due to data availability, cables are assessed qualitatively based on other cables' Environmental Product Declarations (EPDs) as reference.
A4 Transport to works site	Quantity of materials based on the description of the proposed development in Chapter 6 and converted to mass where required. Transport distances per material assumed using Royal Institute of Chartered Surveyors (RICS)[27] guidance and BEIS 2022 emission factors[28].
Excavation and backfill-related A5 emissions	Quantity of materials based on the description of the proposed development in Chapter 6 mapped to carbon emissions factors using the Moata Carbon portal.
B1-B9 Operational emissions	Emissions derived from electricity transmission losses are assessed qualitatively due to data availability.

A number of assets or items have not been designed to a level of detail that was possible to determine the associated carbon. The embodied carbon assessment represents the known information at the time of assessment and taking a proportionate approach it focuses on the likely greatest contributors to the carbon footprint. Identified exclusions are outlined below.

[24] Assessing Greenhouse Gas Emissions and Evaluating their Significance (2022), Available from: IEMA - Launch of the Updated EIA Guidance on Assessing GHG Emissions - February 2022. [Accessed June 2023].

[25] The British Standards Institution (2023), *PAS 2080: 2023. Carbon Management in Infrastructure*. Available at: Revised PAS 2080:2023 | BSI (bsigroup.com) [Accessed June 2023]

[26] Circular Ecology (2019). ICE Database. Available at: Embodied Carbon Footprint Database - Circular Ecology [Assessed June 2023]

[27] RICS (2017). *Whole Life Carbon Assessment for the Built Environment 1ST Edition.* RICS. Available at: https://www.rics.org/uk/upholding-professional-standards/sector-standards/building-surveying/whole-life-carbon-assessment-for-the-built-environment/ [Accessed June 2023]

[28] BEIS (2022), *Final UK greenhouse gas emissions national statistics: 1990 to 2020.* Available at https://www.gov.uk/government/statistics/final-uk-greenhouse-gas-emissions-national-statistics-1990-to-2020 [Accessed June 2023]

Taking a conservative approach, the calculated construction footprint has been uplifted by 25% as an estimated margin for uncertainty to account for these unknown elements as far as possible.

Table 12-9 Identified excluded items

Exclusion	Rationale	Impact on footprint
Ducts, tape, rope	Insufficient information on materials quantities for emission calculation, likely to be negligible impact	low
A4 emissions related to transporting cables to site, A5 emissions for fuel intensity of specific cutting techniques	Insufficient information on materials quantities for emission calculation, likely to be low impact relative to whole life carbon	low
Maintenance and repair	Insufficient information on materials quantities for emission calculation, likely to be low impact relative to whole life carbon	low

GHG emissions would be expected from the maintenance of assets, including annual checks for faulty equipment and replacement of such equipment as required. Given the frequency of replacement is unknown, the worst case would be to assume a complete replacement of all cabling over the 40-year period and so a repetition of the cabling construction material footprint. This assumes that the foundations, earthworks, and road resurfacing are designed for the full 40-year lifetime.

12.3 Likely significant impacts of the Proposed Development

12.3.1 Construction phase

12.3.1.1 Physical climate risks

Climate resilience during construction has been scoped out of the assessment as there are likely to be negligible changes in climate within the timescales of construction. The construction phase of the proposed development is currently programmed between 2026 and 2031 and climate is not anticipated to have noticeably changed from the current day.

12.3.1.2 GHG assessment

As state in Chapter 6, the proposed development comprises electricity transmission infrastructure as part of the the MetroLink project and consists of a 110 kV UGC between Newbury and Ballystruan substations, a 110 kV UGC between Ballystruan and Forest Little substations, a 110 kV / 220 kV UGC between Forest Little and Belcamp substations, excavation of cable trenches and associated joint bays and crossings. Construction will include temporary activities, such as temporary passing bays, site works and ancillary staff facilities and parking, which could impact on GHG emissions generation.

Table 12-10 summarises the carbon emissions estimated for the construction stage of the proposed development. The total value has been uplifted by 25% to allow for uncertainty at this stage of design. Within A1-A3 stage, concrete and steel plates produce the majority of these emissions. It is understood that the UGC will be installed in either a trefoil or a flat formation when crossing existing services. In line with the other assessments in this EIA, as discussed in

Chapter 6, the carbon assessments[29] are based on a flat formation. Joint bays, which mainly consist of precast concrete walls, are estimated to produce 1,060 $kgCO_2e$ and 1,310 $kgCO_2e$ per 100kV and 220 kV joint bays respectively.

Table 12-10 Summary of carbon assessment

Life cycle stage	Emissions ($kgCO_2e$ per km of route length)	Emissions (tCO_2e for 24km in route length)[30]
A1-A3 Products and materials	757,300	18,200
A4 Transport of materials to site	42,200	1,000
A5 Excavation and backfill	4,700	100
Total	804,200	19,300
25% uplift	1,005,300	24,100

*Rounded to nearest 100kg

According to EirGrid Underground Cable Functional Specification[31], the main configuration of a cable is commonly aluminium or copper conductor, semi-conducting layer, XLPE insulation, and an HDPE outer sheath overall. As a high-level reference, a 20/34kV 240mm^2 triplex cable accounts for 44 $kgCO_2e$ of carbon per km[32], while a 36kV 630mm^2 single core cable is 16,000 $kgCO_2e$ per km[33]. Therefore, cables used in this project, which are of higher diameter size and voltage level, are estimated to have higher emissions than the above examples.

12.3.2 Operational Phase and Maintenance

12.3.2.1 Physical climate risks

This assessment determines the resilience of the proposed development to future climate change during its operational lifetime post-construction of 50 years, up to 2099. These changes in climate may result in a range of impacts on the operation and maintenance of the proposed development. The assessment is presented in Table 12-8. The description of likelihood and severity are described in Table 12-2 and Table 12-3 respectively.

[29] Carbon is used here to refer to carbon dioxide and other greenhouse gases (GHGs) which contribute to climate change. GHGs are the seven gases covered by the Kyoto Protocol: carbon dioxide (CO_2), methane (CH4), nitrous oxide (N2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulphur hexafluoride (SF6) and nitrogen trifluoride (NF3). These are measured in units of carbon dioxide equivalent (CO_2e) which express the impact of each gas in terms of the amount of CO_2 that would create the same impact.

[30] This assumes the 110 kV / 220 kV UGC between Forest Little and Belcamp substations adopts Option 1 route.

[31] EirGrid Group (2020).*110 kV, 220 kV and 400 kV Underground Cable Functional Specification General Requirements.* Available at: 10-110-kV-Underground-Cable-Functional-Specifications.pdf (eirgridgroup.com) [Accessed June 2023]

[32] EPD (2022). *MV Underground Triplex Cable 20/34 (37,95) - 240 mm2 EPD.* Available at: S-P-04878 - MV Underground Triplex Cable 20/34 (37,95) - 240 mm2 (environdec.com). [Accessed June 2023]

[33] EPD (2021). *Medium Voltage Single Core Underground Cables AXLJ-TT 36kV EPD.* Available at: S-P-05140 - Medium Voltage Single Core Underground Cables AXLJ-TT 36kV (environdec.com) [Accessed June 2023]

Table 12-8: Projected climate change risks

Risk ID	Climate variable	Potential risk	Embedded mitigation	Likelihood	Severity	Significance rating
RID1	High temperatures	Inability to perform maintenance activities in high temperatures (>32°C) due to increased level of discomfort for staff.	The cable routes will not require specific or routine maintenance activities along the cable trench or joint bay locations. Routine maintenance will be required for link boxes and communication chambers. However, this will be at a frequency of once per annum and so is not likely to be affected by high temperatures.	Low	Minor adverse	Not Significant
RID2	High temperatures	Increase in temperature could result in increased risk of structural failure from thermal expansion of trenches. This may lead to increased maintenance costs and disruption to operations.	Energy infrastructure in Ireland has a significant degree of resilience to climate change. The proposed development is designed to international standards which allow infrastructure to operate in varying climatic conditions.	Low	Moderate adverse	Not Significant
RID3	High temperatures	Increase in temperature could result in increased risk of structural failure from thermal expansion of metallic features and concrete structures, resulting in need for repair. This may lead increased risk of damage to underground cables during road repair activities.	Energy infrastructure in Ireland has a significant degree of resilience to climate change. The proposed development is designed to international standards which allow infrastructure to operate in varying climatic conditions.	Low	Moderate adverse	Not Significant
RID4	High temperatures	Increase in temperature could result in increased risk of surface failure from thermal expansion, melting and deformation of road crossing sections. This may lead to increased maintenance costs and disruption to operations.	Energy infrastructure in Ireland has a significant degree of resilience to climate change. The proposed development is designed to international standards which allow infrastructure to operate in varying climatic conditions.	Low	Moderate adverse	Not Significant
RID5	High temperatures, freeze-thaw	Rising temperatures will reduce risk of freeze-thaw events which lead to	Energy infrastructure in Ireland has a significant degree of resilience to	Low	Moderate adverse	Not significant

Risk ID	Climate variable	Potential risk	Embedded mitigation	Likelihood	Severity	Significance rating
		erosion, cracking and spalling of metallic features and concrete structures. However, the risk will still occur.	climate change. The proposed development is designed to international standards which allow infrastructure to operate in varying climatic conditions.			
RID6	Precipitation	Increases in winter precipitation could increase groundwater levels with the potential to cause ground movements. This may damage buried cables.	Energy infrastructure in Ireland has a significant degree of resilience to climate change. The proposed development is designed to international standards which allow infrastructure to operate in varying climatic conditions.	Low	Moderate adverse	Not significant
RID7	Precipitation	Increase in winter precipitation could lead to accumulation of water within open trenches, reducing access for repairs and maintenance.	Energy infrastructure in Ireland has a significant degree of resilience to climate change. The proposed development is designed to international standards which allow infrastructure to operate in varying climatic conditions.	Medium	Minor adverse	Not significant
RID8	Precipitation	Increase in winter precipitation, in particular extreme precipitation events, may increase rate of soil erosion, exposing and damaging cables.	Energy infrastructure in Ireland has a significant degree of resilience to climate change. The proposed development is designed to international standards which allow infrastructure to operate in varying climatic conditions. Cables are protected as they are buried underground within sealed concrete walls.	Low	Moderate adverse	Not significant
RID9	Precipitation	Increase in winter precipitation could result in flooding, reducing access to cable structures, communication equipment and link boxes for maintenance or emergency repair.	The cable routes will not require specific or routine maintenance activities along the cable trench or joint bay locations. Routine maintenance will be required for link boxes and	Low	Minor adverse	Not significant

Risk ID	Climate variable	Potential risk	Embedded mitigation	Likelihood	Severity	Significance rating
			communication chambers. However, this will be at a frequency of once per annum and so is not likely to be affected by flooding.			
RID10	High temperatures and drought	Increase in temperature and drought may cause soil creep and instability of earthwork slopes (where cables are buried in sloped verge/sloped field edge) if soils dry out. This may damage buried cables.	Energy infrastructure in Ireland has a significant degree of resilience to climate change. The proposed development is designed to international standards which allow infrastructure to operate in varying climatic conditions. Cables are protected as they are buried underground within sealed concrete walls.	Low	Moderate adverse	Not significant
RID11	Precipitation and temperature	Cyclic wetting and drying may result in soil shrink-swell action, increasing the risk of ground movement including landslip or subsidence. This may damage buried cables.	Energy infrastructure in Ireland has a significant degree of resilience to climate change. The proposed development is designed to international standards which allow infrastructure to operate in varying climatic conditions. Cables are protected as they are buried underground within sealed concrete walls.	Low	Moderate adverse	Not significant

12.3.2.2 GHG assessment

Research[34] on the lifecycle of the transmission network suggests that operational GHG emissions are likely to be relatively large when compared to the construction GHG emissions. This is due to the relatively high impact of transmission losses and sulphur hexafluoride (SF_6) emissions. The GHG intensity of electricity generation in 2021 in Ireland is 0.36 $kgCO_2e/kWh$[35]. However, grid losses are expected to reduce by 135,000 KWh per year[36], and as the Climate Action Plan aims to achieve 70% renewables on the grid by 2030[37], annual operational emissions are expected to reduce over time.

12.3.3 Do-Nothing Scenario

In a 'Do-Nothing' alternative, the scenario considers climate resilience where the proposed development is not constructed. In this alternative scenario, it is anticipated that conditions will be the same as the baseline described in Section 0.

For GHG, it is assumed that no emissions are associated with the "Do-Nothing" alternative scenario.

12.3.4 Decommissioning Phase

It is not intended to decommission the proposed electricity infrastructure.

12.3.5 Cumulative Impacts

12.3.5.1 Physical climate risks

Intra-Project Effects

The MetroLink Rail project is a sizeable development located within proximity to this proposed development and includes plans for proposed substations. Due to the relatively short construction duration and as energy infrastructure in Ireland is designed to international standards which allow infrastructure to operate in varying climatic conditions, it is not anticipated that the MetroLink Rail project will have an influence on climate change and its impacts. Other Developments

There are other developments within the study area as detailed within Chapter 2 of this EIAR. Engagement with the relevant developers and stakeholders will be undertaken to discuss scheduling and ensure that appropriate mitigation measures are implemented and any impacts arising from climate change are minimised.

12.3.5.2 GHG assessment

The nature of GHG emissions means that the ultimate receptor is the global climate system. The GHG assessment does not consider cumulative effects, as GHG emissions do not result in a regional or local effects on climate and, therefore, the effects of the project's emissions on climate will not differ when combined with other developments.

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[34] Harrison, GP, Maclean, EJ, Karamanlis, S & Ochoa, LF (2010), 'Life cycle assessment of the transmission network in Great Britain', *Energy Policy,* vol. 38, no. 7, pp. 3622-3631. Available at: https://doi.org/10.1016/j.enpol.2010.02.039 [Accessed June 2023]

[35] EEA (2022). *Greenhouse gas emission intensity of electricity generation.* Available at: Greenhouse gas emission intensity of electricity generation — European Environment Agency (europa.eu) [Accessed June 2023]

[36] EirGrid Group (2021). *Shaping Our Electricity Future Roadmap.* Available at: Shaping_Our_Electricity_Future_Roadmap.pdf (eirgridgroup.com). [Accessed June 2023]

[37] Department of the Environment, Climate and Communications (2023). Climate Action Plan 2023. Available at: gov.ie - Climate Action Plan 2023 (www.gov.ie). [Accessed June 2023]

12.1 Mitigation and monitoring measures

12.1.1 Construction phase

12.1.1.1 Physical climate risks

Climate resilience during the construction phase of the proposed development has been scoped out of the assessment. Any risks arising due to extreme weather events during construction will be addressed by appropriate measures in the Construction Environmental Management Plan (CEMP). This may include:

- Procedures and precautions will be implemented for areas that may experience flooding, including use of temporary flood defence barriers and preparation of temporary demobilisation plans. These procedures will consider prolonged and intense rainfall events that may lead to staff safety risks or pollution risks where construction materials (e.g. dust, contaminants, metals, or oils) have potential to runoff into watercourses. This will consider likely surface water runoff routes and plans for the protection of plant such as fuel storage and materials stockpiles, and the demobilisation of vehicles and items of mobile plant;
- Workforce health and safety plans and welfare management systems will be put in place by the contractor, including details to be outlined within works plans and task briefs as appropriate. This will consider periods of high temperatures that may lead to risks of heatstroke for construction staff and severe precipitation events that may lead to slips and falls;
- Contingency plans will be in place for situations where flooding leads to restricted site access or key staff being unable to get to work, leading to construction delays;
- Contingency plans will be in place for situations where storms, high winds or flooding lead to loss of mains power supply or communications, and the identification of safety critical risks and construction programme consequences; and
- Include regular monitoring of flood alerts and weather warnings from Met Éireann.

12.1.1.2 GHG assessment

The following mitigation measures apply in relation to construction impacts on climate change:

- Integrate GHG emissions reduction since the early design stage, promoting GHG saving opportunities when determining the definitive specifications of products, materials and layouts, and explore alternatives to achieve the desired development.
- Take a planned approach focused on GHG emissions reduction, through the use of good construction practices and energy efficient processes and technologies, including the re-use or refurbishing of existing assets.
- Promote fuel switching or substitution in transport of materials to site, as well as efficient route scheduling with suppliers.
- Engagement with other stakeholders, to reduce resource and energy consumption and associated GHG emissions over the life cycle of this development.
- Compensate unavoidable residual emissions.

12.1.2 Operational and Maintenance phase

12.1.2.1 Physical climate risks

The assessment in Table 12-8 concludes no significant risks were identified due to the embedded mitigation of the proposed development. Therefore, additional design measures to enhance resilience is not required.

12.1.2.2 GHG assessment

The following mitigation measures apply in relation to operational impacts on climate change:

- As considered in Chapter 6, throughout the design and assessment process, all reasonable and practically achievable measures have been taken to minimise and avoid impacts, including design specifications and standards to minimise and avoid GHG emissions, as recommended IEMA and aligned with PAS 2080.
- Implement the mitigation hierarchy recommended by IEMA, operating efficiently through the use of good practices and techniques that reduce resource and energy consumption.
- Regular maintenance checks to ensure that the UGC are operating according to calculated efficiency rates and that best practice control measures will be implemented to mitigate against GHG emissions.
- Application of the circular economy hierarchy, in order to reduce, re-use, repair and recover when maintenance is undertaken, as well as use of good practices by value-chain members.
- The annual GHG emissions will be driven by the operating profile of the proposed development. The total GHG emissions will therefore be minimised by increasing efficiency and reducing conductivity losses.
- Engagement with other stakeholders, to avoid physical damages and losses, requiring additional repairs and materials.
- Compensate unavoidable residual emissions.

12.2 Residual Impacts

12.2.1.1 Physical climate risks

There are no significant residual climate impacts anticipated for the operational phase of the proposed development.

12.2.1.2 GHG assessment

IEMA guidance [38] establishes that all GHG emissions from projects will contribute to climate change and may be considered significant. In a further IEMA guidance document on evaluating significance of GHG emissions in EIA, Box 1 of the guidance entitled "*Key updates to the 2017 guidance"* states *"This update of the guidance does not change IEMA's position (or the science) that all emissions contribute to climate change (…)"*. The IEMA guidance suggests that the level of significance is not only based on GHG emissions of a project, but how this project contributes or not towards achieving science-based targets and net-zero.

[38] IEMA (2022) Guidance of Assessing Greenhouse Gas Emissions and Evaluating their Significance (2022). Available at: J35958_IEMA_Greenhouse_Gas_Guidance-1.pdf. [Accessed June 2023]

This development is estimated to emit 24,100tCO_2e for 24km in route length[39]. To provide context, this is approximately equivalent to 0.2% of Ireland's national total CO_2e emissions from public electricity and heat production or approximately 0.07% of Ireland's national total CO_2e emissions from energy in 2021[40]. Therefore, the emissions associated with the proposed development are not immaterial.

While opportunities for carbon reduction (mitigation) have been identified, as they are not quantifiable at this stage of the project, this residual effects assessment assumes that no mitigation has been implemented.

Given that the UGC is expected to result in some direct GHG emissions during the construction and operation, it is reasonable to conclude that the UGC could result in some short-term, negative significant effects. However, this conclusion arises from considering the UGC in isolation, which ignores the UGC's role in powering and enabling a low-carbon form of public transportation.

Calculating the net impact of the proposed UGC on system wide GHG emissions is inherently complex, impossible to predict with any confidence and well beyond the scope of this assessment. However, considering the need for the development as set out in Chapter 6, it follows that the UGC can be considered as supportive of system-wide decarbonisation.

[39] The estimation is based on the quantitative assessment of the construction stage of the proposed development. Not all carbon sources are considered within the calculation due to data availability.

[40] Ireland. 2023 National Inventory Report (NIR). (2023). Available at: Ireland. 2023 National Inventory Report (NIR). | UNFCCC. [Accessed June 2023]

MetroLink 110kV Underground Cables

Volume 2: Environmental Impact Assessment Report
Chapter 13 - Noise and Vibration

June 2023

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13 Noise and Vibration

13.1 Introduction

This chapter considers the impacts due to noise and vibration arising from the proposed development and the corresponding effects on noise and vibration sensitive receptors.

The assessment predicts the potential noise and vibration impacts on the surrounding environment arising from the construction of the proposed development and, where appropriate, specifies mitigation measures to reduce potential impacts.

The construction of the proposed development will involve activities and equipment which emit noise. Some types of construction work will also result in ground-borne vibration.

The proposed development includes new underground cables (UGC) that will connect Belcamp and Newbury Substations through two new substations – Forest Little and Ballystruan. It is noted that the assessment of construction and operational noise associated with the substations are not considered in this EIAR and are assessed within the RO EIAR, submitted to An Bord Pleanála on 30 September 2022, case reference: NA29N.314724. Hence, the construction and operational noise impacts associated with the substations have been scoped out of this report. The UGC is expected to produce minimal noise after cable and duct installation therefore operational noise for the UGC is also not considered.

The UGC routing will go along road networks surrounding Dublin Airport in close proximity to several residential areas including St. Margaret's, Belmayne, Kinsealy and The Baskin. Therefore, there is potential for the construction of the proposed development to result in adverse noise effects on sensitive receptors. The following assessment is based on the development parameters as described in Chapter 6 of this EIAR

13.2 Methodology and limitations

13.2.1 Legislation and guidance

The Environmental Noise Regulations (ENR)[1] transposes EU Directive 2002/49/EC[2] (commonly referred to as the Environmental Noise Directive (END)) for the strategic control of environmental noise in Ireland. The ENR was revised and revoked by the European Communities (Environmental Noise) Regulations 2018[3].

The project site falls within the Dublin agglomeration[4] and therefore it is within the scope of the ENR. However, this is mainly concerned with the strategic management of noise within the agglomeration whereas the IE Licence regulations give powers to the Environmental Protection Agency (EPA), as the competent authority, to place controls on noise from industrial sites. The Environmental Protection Agency has produced guidance relevant to the proposed development.

Nuisance due to noise is dealt with by the Environmental Protection Agency Act S.I. No. 7/1992 (as amended), and the Environmental Protection Agency Act, 1992 (Noise) Regulations, 1994

[1] Environmental Noise Regulations, 2006 (S.I. No. 140/2006) and European Communities (Environmental Noise Regulations) 2018 (S.I. No. 549/2018).

[2] The European Parliament and the Council of the European Union, 2002. Directive 2002/49/EC of 25 June 2002 relating to the assessment and management of environmental noise.

[3] The European Communities (Environmental Noise) Regulations 2018 (Statutory Instrument No. 549/2018).

[4] https://gis.epa.ie/EPAMaps/ [Last accessed 13/02/2023]

S.I. No. 179/1994. and the Protection of the Environment Act 2003 S.I. No.27/2003 (as amended) require Best Available Techniques in controlling noise as a result of human activity "*which may be harmful to human health or the quality of the environment, result in damage to material property, or impair or interfere with amenities and other legitimate uses of the environment*". It clarifies that noise includes vibration.

The Environmental Protection Agency has not produced guidance relevant to the proposed development. EPA noise guidance[5] relates only to scheduled activities, and wind turbine operations. However, this chapter has had regard for relevant content of other guidance documents, including Transport Infrastructure Ireland's Good Practice Guidance for the Treatment of Noise during the Planning of National Road Schemes (TII, 2014)[6].

13.2.2 Methodology and assessment of effects

13.2.2.1 Study Area

The study area for the airborne noise and ground-borne vibration focuses on the closest sensitive receptors within 300m of the construction work boundaries. This is in accordance with BS 5228 for the prediction and assessment of potential construction noise and vibration impacts.

For construction traffic noise, the study area comprises roads that will likely experience an increase in road traffic volumes and traffic types associated with the construction to cause a change in noise level of at least 1 dB $L_{Aeq,\ T}$.

13.2.2.2 Construction noise

British Standard 5228 'Code of practice for noise and vibration control on construction and open sites – Part 1: Noise' (BS5228-1:2009+A1:2014) has been adopted for the assessment of effects at noise sensitive receptors. It provides comprehensive guidance including details of typical noise levels associated with items of plant and activities, prediction methods, and options for mitigation measures, and therefore has been considered appropriate for use in this assessment.

Based on the 'Example method 1 – ABC Method' within Annex E of BS 5228-1:2009+A1:2014, noise levels generated by site activities are deemed to be potentially significant if the predicted construction noise level ($L_{Aeq,T}$) at the receptor exceeds the applicable threshold value. Table F.1 of the BS 5228 Part 1:2009+A1:2014 is reproduced in Table 13.1 and the levels at which a significant effect is indicated.

Table 13.1: Acoustic threshold for potential significant effects due to construction noise at sensitive receptors (residential)

Assessment category and threshold value period	**Threshold value $L_{Aeq,T}$ dB**		
	Category A	**Category B**	**Category C**
Night-time (Any day 11 p.m. – 7 a.m.)	45	50	55
Evenings and Weekends (Weekdays 7 p.m. – 11 p.m., Saturdays 1 p.m. – 11 p.m., and Sundays 7 a.m. – 11 p.m.)	55	60	65

[5] Environmental Protection Agency Office of Environmental Enforcement (2016). Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relations to Scheduled Activities (NG4).

[6] National Roads Authority (2014). Good Practice Guidance for the Treatment of Noise during the Planning of National Road Schemes.

Assessment category and threshold value period	Threshold value $L_{Aeq,T}$ dB		
	Category A	Category B	Category C
Standard working hours (Weekdays 7 a.m.- 7 p.m. and Saturdays 7 a.m. – 1 p.m.)	65	70	75

The threshold value is assigned based on the representative baseline ambient noise level for the receptor:

- Category A: Threshold value to use when ambient noise levels (when rounded to the nearest 5 dB) are less these threshold values;
- Category B: Threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are the same as Category A values; and,
- Category C: Threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are higher than Category A values.

If the (baseline) ambient noise level exceeds the Category C threshold value, a significant effect is identified if the contribution of site noise results in a 3 dB increase in the period ambient noise level.

BS 5228 Part 1:2009+A1:2014 states: "*The assessor then needs to consider other project-specific factors, such as the number of receptors affected and the duration and character of the impact, to determine if there is a significant effect*".

BS 5228 Part 1:2009+A1:2014 provides the following criteria for impact duration for the purposes of assessing eligibility for the provision of noise insulation and temporary rehousing due to the impact of construction noise:

- A period of 10 or more days of working in any 15 consecutive days; or
- A total number of days exceeding 40 in any 6 consecutive months.

Thus, for the purposes of the noise assessment, a 'Significant' effect is determined if the construction noise levels at the receptor exceeds the applicable threshold by a duration of 10 or more days of working in any 15 consecutive days or 40 days in any 6 consecutive months.

The noise impacts arising from construction noise are deemed 'Not Significant' if:

- Construction noise levels fall below the applicable noise thresholds; or
- The exceedance of applicable noise thresholds falls below aforementioned duration criteria.

13.2.2.3 Construction vibration

BS 5228 Part 2:2009+A1:2014 provides comprehensive guidance on the assessment of vibration due to construction activity. It considers levels of vibration from construction in terms of peak particle velocity (ppv) defined as the instantaneous maximum velocity reached by a vibrating element as it oscillates about its rest position and is expressed in millimetres per second (mm/s).

BS 5228 Part 2:2009+A1:2014 provides guidance on the levels of vibration associated with human perception and disturbance and the onset of potential structural damage to different types of buildings.

Table 13.2 presents guidance on threshold values for the human perception of vibration arising during construction. For the purpose of this EIAR, the significance of effects is also given.

Table 13.2: BS 5228 Part 2 guidance on the human perception effects of vibration due to construction activity and significance of effect

Vibration level ppv mm/s	Effect	Significance
0.14	Vibration might be perceptible in most sensitive situations for most vibration frequencies associated with construction. At lower frequencies, people are less sensitive to vibration.	Not significant
0.3	Vibration might be just perceptible in residential environments.	Not significant
1.0	It is likely that vibration of this level in residential environments will cause complaint but can be tolerated if prior warning has been given to the residents.	Significant
10.0	Vibration is likely to be intolerable for any more than a very brief exposure to this level in most building environments.	Significant

BS 5228 Part 2:2009+A1:2014 states that low frequency vibration at a ppv of 15mm/s may cause cosmetic damage in un-reinforced or light framed structures e.g. for residential / light commercial use. BS 5228 Part 2:2009+A1:2014 states that vibration at a ppv of 50mm/s may cause cosmetic damage in heavy commercial buildings. These values apply to transient vibration which does not induce a resonant response in structures and low-rise buildings. A source of continuous low frequency vibration may induce a vibration response in buildings or structures at their resonant frequencies. The building would then be subject to additional dynamic forces arising from its own motion. Therefore, BS 5228 Part 2:2009+A1:2014 recommends that the values given should be reduced by 50% to take into account for dynamic magnification due to resonances.

Table 13.3 presents guidance on threshold values for the potential onset of cosmetic damage to buildings due to vibration arising during construction. For the purpose of this EIAR, the significance of effects is also given.

Table 13.3: BS 5228 Part 2 guidance on potential cosmetic damage to buildings due to construction activity and significance of effect

Vibration level ppv mm/s	Effect	Significance
Less than 7.5	Low risk of cosmetic damage to un-reinforced or light framed structures / buildings (e.g. residential buildings)	Not significant
7.5 or more	Onset of increased risk of cosmetic damage to un-reinforced or light framed structures / buildings	Significant

Vibration, even of very low magnitude, can be perceptible to people. It is generally tolerated, at low magnitudes, if prior notification has been issued. Vibration from construction activity can affect the occupiers or the structure itself.

BS 5228-2 states:

> *“Human beings are known to be very sensitive to vibration, the threshold of perception being typically in the PPV range of 0.14 mm/s to 0.3 mm/s. As vibrations increase above these values they can disturb, startle, cause annoyance or interfere with work activities. At higher levels they can be described as unpleasant or even painful.”*

A significant adverse effect due to construction vibration is identified where vibration is predicted to exceed 1.0 mm/s for a duration exceeding 10 or more days or nights in any 15 consecutive days; or a total number of days exceeding 40 in any six consecutive months.

It is noted that the thresholds for human exposure to vibration in Table 13.2 are lower than those for building damage in Table 13.3 and compliance with the former is sufficient to protect against building damage as well.

13.2.2.4 Construction traffic noise

The Design Manual for Roads and Bridges (DMRB) LA 111 2020 'Noise and Vibration' describes the methodology for the assessment of highways projects in the UK and best reflects EIA methodology as applied to highways. The guidance provides magnitudes of impacts based on an increase in Basic Noise Level (BNL) and are shown in Table 13.4.

Table 13.4: Magnitude of impacts for construction traffic noise

Magnitude of impact	Increase in BNL of closest public road used for construction traffic, dB
Major	>5.0
Moderate	Between 3.0 to 4.9
Minor	Between 1.0 to 2.9
Negligible	<1.0

For traffic noise assessment, the duration of the change in road traffic movements will also be accounted for in determination of a significant adverse effect. Therefore, a significant adverse effect arises when the BNL of the closest public road to relevant receptors increases due to construction traffic by 3 dB or more for a period of 10 or more days in any 15 consecutive days or for 40 days in any consecutive six months.

13.2.3 Limitations of this chapter

The specific inventory of plant and working methods to be applied during the construction phase will be devised by the appointed construction contractor. The construction contractor is not yet appointed therefore, these specific details are not available to inform the assessment of potential noise and vibration impacts. However, the assessment has been undertaken based on the impacts of typical construction activities that are expected to be required and extensive experience of construction of these types of electrical and civil infrastructure development. This approach is considered to be robust.

13.3 Receiving environment

13.3.1 Study area

The proposed UGC routing options are shown in Figure 13.1 with identified noise sensitive receptors listed in Table 13.5. The UGC route from Forest Little to Belcamp substation is split into 2 options. Option 1 goes along Baskin Lane and R107 while Option 2 goes along Stockhole and Clonshaugh Lane. This presents two distinct sets of receptors as the study area for the UGC route from Forest Little to Belcamp substations. Receptors R9 to R14 will be affected by Option 1 while receptors R15 and R16 will be affected by Option 2. Each receptor is considered representative of the construction noise level at the surrounding area. As the works progress linearly, receptors chosen were considered representative of the properties along the road. For example, R3 is considered representative of receptors along Harristown Lane while R14 receptor is considered representative of receptors along Baskin Road as well as the adjacent Kinsealy Riding Stable Centre.

Figure 13.1: Metrolink UGC route options

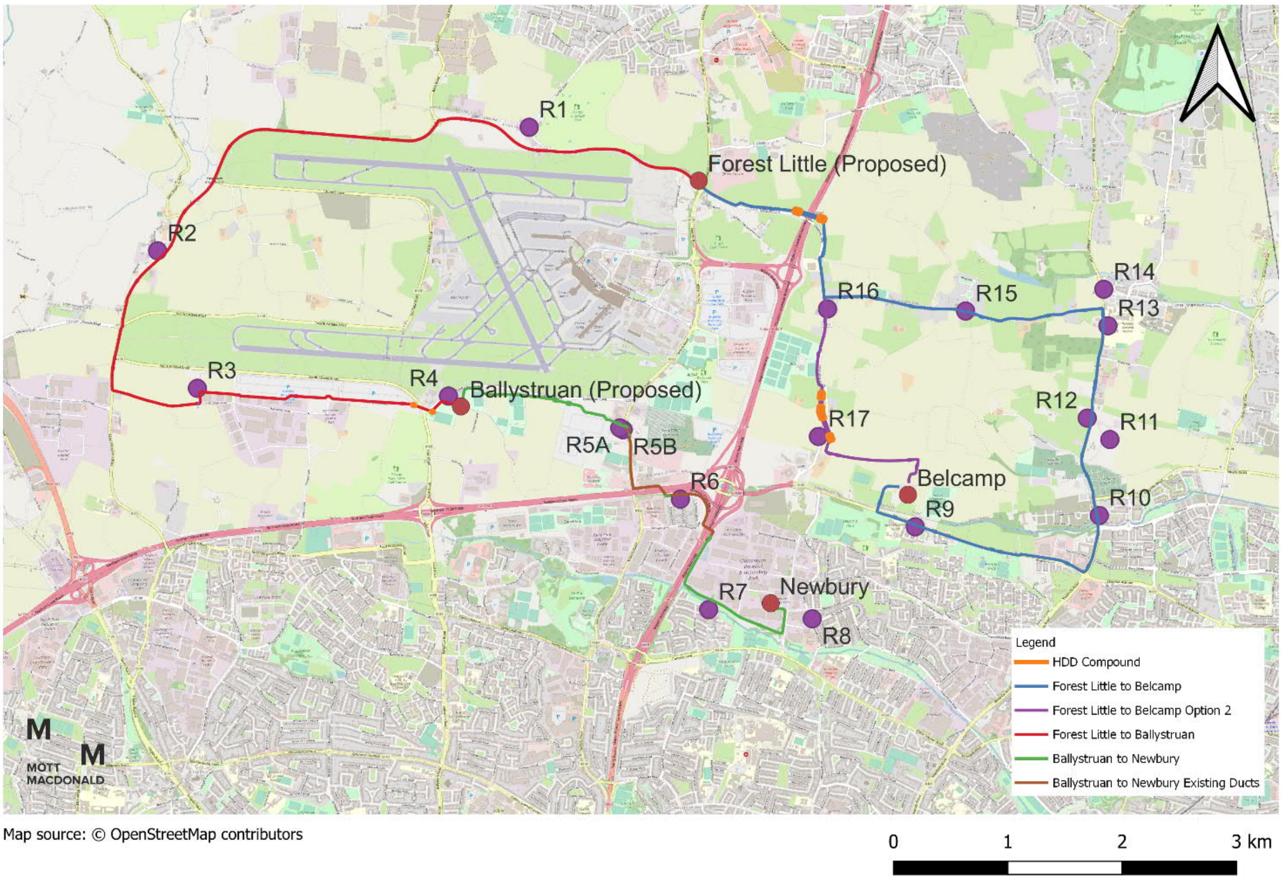


Table 13.5: Identified noise sensitive receptors

Receptor ID	Receptor name
R1	Residential properties along Cooks Road
R2	St. Margaret's school, representative of residential properties of St. Margaret's area
R3	Residential properties at Harristown Lane
R4	Residential properties at Old Airport Road
R5A	Carlton Hotel Dublin Airport North Façade
R5B	Carlton Hotel Dublin Airport East Façade
R6	18, Turnapin Cottage, representative of residential properties at Turnapin
R7	30, Woodlawn Park, representative of residential properties at Woodlawn
R8	78, Clonshaugh Road, representative of residential properties at Newburys
R9	Residential properties at St. Dominic's Park (and along R139)
R10	Representative of residential properties at Belmayne area
R11	St. Doolagh's Nursing Home, representative of residential properties in St. Doolagh's area
R12	St. Doolagh's Church
R13	St. Nicholas of Myra National School Kinsealy
R14	St. Nicholas of Myra Church, representative of receptors at Chapel Road
R15	11, Baskin Cottage, Representative of receptors along Baskin Lane
R16	10, Baskin Park, Representative of receptors along Stockhole Lane
R17	Edenville Lodge, Representative of receptors along Clonshaugh Road

13.3.2 Ambient noise levels

The section presents a description of the existing noise climate within the area of the closest noise sensitive receptors. Two noise action plans for 2018 – 2023 were considered in the assessment to inform ambient noise levels: The Dublin Agglomeration Environmental Noise Action Plan[7] for rail and traffic noise and Noise Action Plan for Dublin Airport for aircraft noise.[8] A detailed view of these noise maps can be obtained from the EPA maps application[9].

The existing noise environment is dominated by aircraft noise from Dublin Airport and major road traffic noise from M1, M50, R107 and R139.

The noise maps are expressed in L_{DEN} (day, evening, night) and L_{Night} (night-time) values. L_{DEN} values are not directly comparable to L_{Day} values as L_{DEN} is the average sound level over a 24-hour period, with a penalty of 5 dB added for evening period ($L_{Evening}$) and 10 dB for night-time period (L_{Night}), while L_{Day} is the daytime sound level[10].

L_{Day} values can be obtained through equivalent L_{DEN} values. For road traffic noise, the Dublin Agglomeration Environmental Noise Action Plan has made a comparison between average network measured values from long term noise measurements and average modelled values. These are reproduced in Table 13.6.

[7] Dublin Agglomeration Environmental Noise Action Plan December 2018 – July 2023, Volume 1, Dublin City Council

[8] Noise Action Plan for Dublin Airport 2019 – 2023y, Fingal County Council

[9] https://gis.epa.ie/EPAMaps/ [Last accessed 13/02/2023]

[10] Appendix A, Dublin Agglomeration Environmental Noise Action Plan December 2018 – July 2023, Volume 1, Dublin City Council

Table 13.6: Comparison between modelled and measured noise levels in Dublin City Council Noise Action Plan 2018-2023

	L_{Day} dB(A)	L_{Night} dB(A)	L_{DEN} dB(A)
Measurement	56.57	51.11	59.25
Modelled	58.81	47.87	59.81
Difference	2.24	-3.24	0.56

Source: Noise Action Plan 2018 - 2023, Dublin City Council Table 4

Dublin City Council found that the L_{DEN} is 3 dB higher than the L_{Day} for the average network measured values. Hence, a 3 dB correction was applied to the L_{DEN} values to obtain an indicative L_{Day} ambient noise level at the receptors for road traffic noise.

The Dublin Airport Noise Action Plan uses $L_{Aeq, 16hour}$ values in addition to L_{DEN} and L_{Night}. The aircraft movements in and out of the airport are relatively consistent throughout day and evening time periods while decreasing during the night-time period. Hence, it was assumed that the L_{Day} and $L_{Evening}$ values will be relatively similar. The L_{Day} can thus be determined from the L_{DEN} and L_{Night} values within the noise map.

Where the airport and road traffic noise maps overlap at a receptor, the higher of the two noise levels have been used to inform the ambient noise levels. The identified receptors and their corresponding ambient noise levels are outlined in Table 13.7. Each receptor was also assigned a threshold category based on ‘Example method 1 – ABC Method’ within Annex E of BS 5228-1:2009+A1:2014.

Table 13.7: Ambient noise level at receptors and their assigned acoustic threshold category

Receptor ID	Name	Ambient noise level, L_{Day} dB(A)	Day Threshold Category	Ambient noise level, L_{Night} dB(A)	Night Threshold Category
R1	Residential properties along Cooks Road	53	A	45	B
R2	St. Margarets school, representative of residential properties of St. Margaret’s area	58	A	56	C
R3	Residential properties at Harristown Lane	70	C	63	C
R4	Residential properties at Old Airport Road	70	C	63	C
R5A	Carlton Hotel Dublin Airport North Façade	61	A	56	C
R5B	Carlton Hotel Dublin Airport East Façade	64	B	56	C
R6	18, Turnapin Cottage, representative of residential properties at Turnapin	64	B	60	C
R7	30, Woodlawn Park, representative of residential properties at Woodlawn	55	A	46	B
R8	78, Clonshaugh Road, representative of residential properties at Newburys	57	A	50	B
R9	Residential properties at St. Dominic's Park (and along R139)	65	B	58	C
R10	Representative of residential properties at Belmayne area	66	B	59	C
R11	St. Doolagh's Nursing Home, representative of residential properties in St. Doolagh's area	58	A	53	C
R12	St. Doolagh's Church	63	B	56	C

Receptor ID	Name	Ambient noise level, L_{Day} dB(A)	Day Threshold Category	Ambient noise level, L_{Night} dB(A)	Night Threshold Category
R13	St. Nicholas of Myra National School Kinsealy	60	A	54	C
R14	St. Nicholas of Myra Church, representative of receptors at Chapel Road	63	B	56	C
R15	11, Baskin Cottage, Representative of receptors along Baskin Lane	56	A	49	B
R16	10, Baskin Park, Representative of receptors along Stockhole Lane	58	A	55	C
R16	Edenville Lodge, Representative of receptors along Clonshaugh Road	60	A	54	C

13.4 Proposed works and associated noise emissions

This assessment is based on the proposed development, as described in Chapter 6 of this EIAR. The proposed development is broken down to the following main phases:

- Ducting and trenching works
- Horizontal directional drilling works (HDD)
- Joint bay installation works
- Cable installation works
- Construction laydown areas set-up

The assessment of a potential significant effect arising at a noise sensitive receptor is determined by the duration that the appropriate threshold value is exceeded. Works such as HDD, joint bay installation and temporary construction compound set-up are localized at selected locations and do not progress along the route. Thus, the predicted noise levels at receptors will remain similar across the construction duration. Ducting, trenching and cable installation works will progress linearly along sections of the route. It follows that the predicted noise levels at the receptors will vary as the distances between the works and the receptors changes. The assessment predicts the noise levels at the closest distances, and is further refined by accounting for the daily rate at which the works move away from these receptors. A significant effect is predicted if the acoustic thresholds have been exceeded by a duration of 10 or more days of working in any 15 consecutive days or 40 days in any 6 consecutive months. Table 13.8 summarizes the anticipated daily progression of each work.

Table 13.8: Average daily progression of proposed works

Proposed Works	Average daily progression per day	Comments
Ducting and trenching works	30-50m per day	Referenced from section 6.4.1, assumed 40m for as representative average
Horizontal directional drilling works (HDD)	NA	
Joint bay installation works	5 days per joint bay	Assumed 4 days of cutting and filling per joint bay, and 1 day for any additional work.
Cable installation works	150m per day	Cable installation process typically assumes 750m of cable pulling per day, with cleaning and proving operations done a day prior. Accounting for the duration of works shown in Table 6.2, and the length of each UGC route listed in Section 6.2, it was assumed that the representative average of

Proposed Works	Average daily progression per day	Comments
		the whole cable installation process will be approx. 150m a day as a conservative approach.
Construction laydown areas set-up	NA	

Best Practicable Means (BPM) and mitigation outlined in Section 13.6 should be applied with additional active mitigation such as temporary site hoardings should a significant effect arise at a noise sensitive receptor.

The list of construction plants for the proposed works, quantity and the percentage on-time of each plant during typical construction hours are summarised in Table 13.9.

Table 13.9: List of construction plants proposed

	Proposed works	Plants required	QTY	% On Time	Equivalent BS5228 Data	BS5228 $L_{Aeq,T}$ 10m, dB(A)	Corrected $L_{Aeq,T}$ 10m, dB(A)	Proposed works $L_{Aeq,T}$ 10m, dB(A)
Ducting and trenching works	Excavator for earthworks	1	50	C.1.12	79	76	78	
	Lorry for material transportation	1	10	C.2.34	80	70		
	Vibratory Roller	1	50	C.5.20	75	72		
	Cement/sand mixer pump for base laying	1	50	C.4.24	67	64		
Horizontal directional drilling works (HDD)	Mud Pump	1	50	Manufacturers Data	70	67	69	
	Power Pack	1	50	Manufacturers Data	63	60		
	Mud Screen	1	50	Manufacturers Data	66	63		
Cable installation works	Excavator for tight bends (earthworks)	1	25	C.1.12	79	73	75	
	Trailer/Lorry for drum transportation	1	10	C.2.34	80	70		
	Cable pulling machine	1	50	Manufacturers Data	58	55		
Joint bay installation works	Lorry/trailer for precast joint bay transportation	1	10	C.2.34	80	70	78	
	Excavator for backfill materials	1	50	C.1.12	79	76		
	Cement/sand mixer pump for base laying	1	50	C.4.24	67	64		
	Vibratory roller (reinstate road temporarily)	1	50	C.5.20	75	72		

As stated in Section 6, it is anticipated that night working, if required, will be localised at congested areas. At the time of writing, it is unknown where these identified areas will be, or the works associated. Hence, the following assessment will focus on daytime workingNight working should be avoided if the night-time acoustic thresholds is exceeded by a duration of 10 or more days of working in any 15 consecutive days or 40 days in any 6 consecutive months. Separate mitigations pertaining to potential night working is specified in Section 13.6.

13.5 Likely significant effects of the proposed development

13.5.1 Construction phase

13.5.1.1 Ducting and trenching works

The typical workflow of the duct and trenching process will start with the opening of a trench through earthworks. Following duct installation, the trench is then backfilled and compacted and the road reinstated in accordance with Fingal County Council, Dublin City Council and Dublin Airport Authority standards.

Multiple duct installation works could happen simultaneously along the proposed route. The construction area moves along in tandem with the progress of the duct installation, with only the relevant portion of the section cordoned off while under construction. Across the period of construction, a progress of 30 to 50m of ducting and trenching per day was considered a representative average for the proposed works.

Construction noise

Table 13.10: Summary of the predicted noise levels for ducting and trenching

Receptor ID	Name	Assessment threshold value L_{Day}, dB(A)*	Site noise level at receptor, dB(A)	Initial significant impact assessment
R1	Residential properties along Cooks Road	65	54	Not Significant
R2	St. Margaret's school, representative of residential properties of St. Margaret's area	65	63	Not Significant
R3	Residential properties at Harristown Lane	75	68	Not Significant
R4	Residential properties at Old Airport Road	75	63	Not significant
R5A	Carlton Hotel Dublin Airport North Façade	65	69	Significant depending on duration
R5B	Carlton Hotel Dublin Airport East Façade	70	67	Not Significant
R6	18, Turnapin Cottage, representative of residential properties at Turnapin	70	67	Not Significant
R7	30, Woodlawn Park, representative of residential properties at Woodlawn	65	59	Not Significant
R8	78, Clonshaugh Road, representative of residential properties at Newburys	65	51	Not Significant

Receptor ID	Name	Assessment threshold value L_{Day}, dB(A)*	Site noise level at receptor, dB(A)	Initial significant impact assessment
R9	Residential properties at St. Dominic's Park (and along R139)	70	74	Significant depending on duration
R10	Representative of residential properties at Belmayne area	70	74	Significant depending on duration
R11	St. Doolagh's Nursing Home, representative of residential properties in St. Doolagh's area	65	52	Not Significant
R12	St. Doolagh's Church	70	65	Not Significant
R13	St. Nicholas of Myra National School Kinsealy	65	67	Not Significant
R14	St. Nicholas of Myra Church, representative of receptors at Chapel Road	70	54	Not Significant
R15	11, Baskin Cottage, Representative of receptors along Baskin Lane	65	74	Significant depending on duration
R16	10, Baskin Park, Representative of receptors along Stockhole Lane	65	74	Significant depending on duration
R17	Edenville Lodge, Representative of receptors along Clonshaugh Road	65	73	Significant depending on duration

*Based on ambient sound levels in Table 13.7

The results show that the noise level at R5A, R9, R10, R15, R16 and R17 could potentially be significant as they exceed the applicable noise level thresholds. BS 5228 states that the assessment for a significant effect at a receptor will also depend on the duration of work.

As the representative average of the ducting and trenching is 30m to 50m per day, the noise impact will be temporary as for each section of road, construction work will last 1-2 days before moving on to the next section of route. Each receptor is expected to be exposed to noise levels above the applicable threshold for 1-2 days. The noise impact is therefore considered ‘Not Significant’ as it falls below the duration criteria of 10 in any 15 consecutive days or 40 days in any six-month period. Table 13.11 summarises the significant impact assessment after duration of exposure has been accounted for in relation to R5A, R9, R10, R15, R16 and R17.

Table 13.11: Summary of significant impact assessment after accounting for work duration

Receptor ID	Name	Distance where noise levels fall below acoustic threshold, m	Number of days above acoustic threshold, Day(s)	Final significant impact assessment
R5A	Carlton Hotel Dublin Airport North Façade	27	1	Not significant after accounting for duration
R9	Residential properties at St. Dominic's Park (and along R139)	25	1	Not significant after accounting for duration
R10	Representative of residential properties at Belmayne area	25	1	Not significant after accounting for duration

Receptor ID	Name	Distance where noise levels fall below acoustic threshold, m	Number of days above acoustic threshold, Day(s)	Final significant impact assessment
R15	11, Baskin Cottage, representative of receptors along Baskin Lane	39	1	Not significant after accounting for duration
R16	10, Baskin Park, Representative of receptors along Stockhole Lane	37	1	Not significant after accounting for duration
R17	Edenville Lodge, Representative of receptors along Clonshaugh Road	34	1	Not significant after accounting for duration

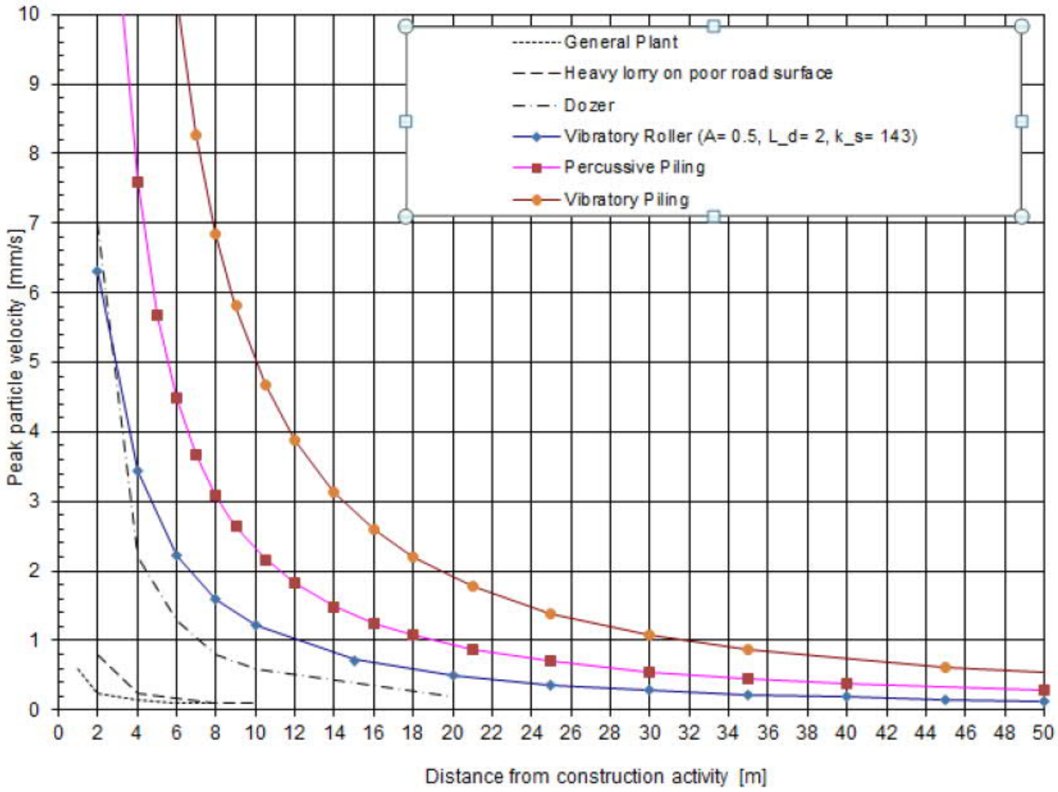
Construction vibration

Construction activities associated with duct and trenching that are expected to generate ground-borne vibration during the construction phase include:

- Excavation; and
- Vibratory compaction to fill materials and rolling of surfacing as part of reinstatement.

Vibration levels due to excavation is expected to be generally lower in magnitude than vibratory compaction. An assessment on the vibratory compaction activities will yield the worst-case scenario. Annex E of BS 5228 Part 2:2009+A1:2014 includes an empirical method for the prediction of vibration arising from steady state vibratory compaction. Using parameters corresponding with a moderate-size vibratory roller (one vibrating drum, 2m width and 0.5mm maximum amplitude of drum vibration), the distances at which the thresholds of significant effects are exceeded are given in Figure 13.2.

Figure 13.2: Empirical data from BS 5228 part 2



Source: Mott MacDonald Based on BS5228

This shows that vibration arising during vibratory compaction at distances within ~12m of surfacing works is likely to be of sufficient magnitude to cause complaint, and within 1.5m it may cause cosmetic damage to residential buildings or light-framed structures.

A review of the receptors show that the closest receptors to the duct and trenching works are at distances >15m. Therefore, the vibration impact arising from the works are predicted to be 'Not Significant'.

13.5.1.2 Horizontal directional drilling (HDD)

Horizontal directional drilling (HDD) works are potentially proposed to avoid utilities, rivers and the crossing of the M1 Motorway. HDD works are proposed at several locations including:

- Stockhole Lane over M1 motorway
- Stockhole Lane/Clonshaugh Road
- 1000 Swords Road Car park.
- Intersection between Harristown Road, R108 and Old Airport Road

Of the four proposed locations, the HDD works at Stockhole Lane/Clonshaugh Road and Old Airport Road intersection is within 300m of any receptors. The receptors identified that could potentially be affected by HDD works are R4 and R16.

Construction Noise

Table 13.12: Summary of the predicted noise levels for HDD works

Receptor ID	Name	Assessment threshold value L_{Day}, dB(A)*	Predicted construction noise level dB(A)	Significance assessment
R4	Residential properties at Old Airport Road	75	44	Not Significant
R16	Edenville Lodge, Representative of receptors along Clonshaugh Road	65	58	Not Significant

*Based on ambient sound levels in Table 13.7

Table 13.12 shows the noise impact arising from HDD works at R4 and R16 are predicted to be **'Not Significant'** as it does not exceed the applicable noise level threshold.

Construction vibration

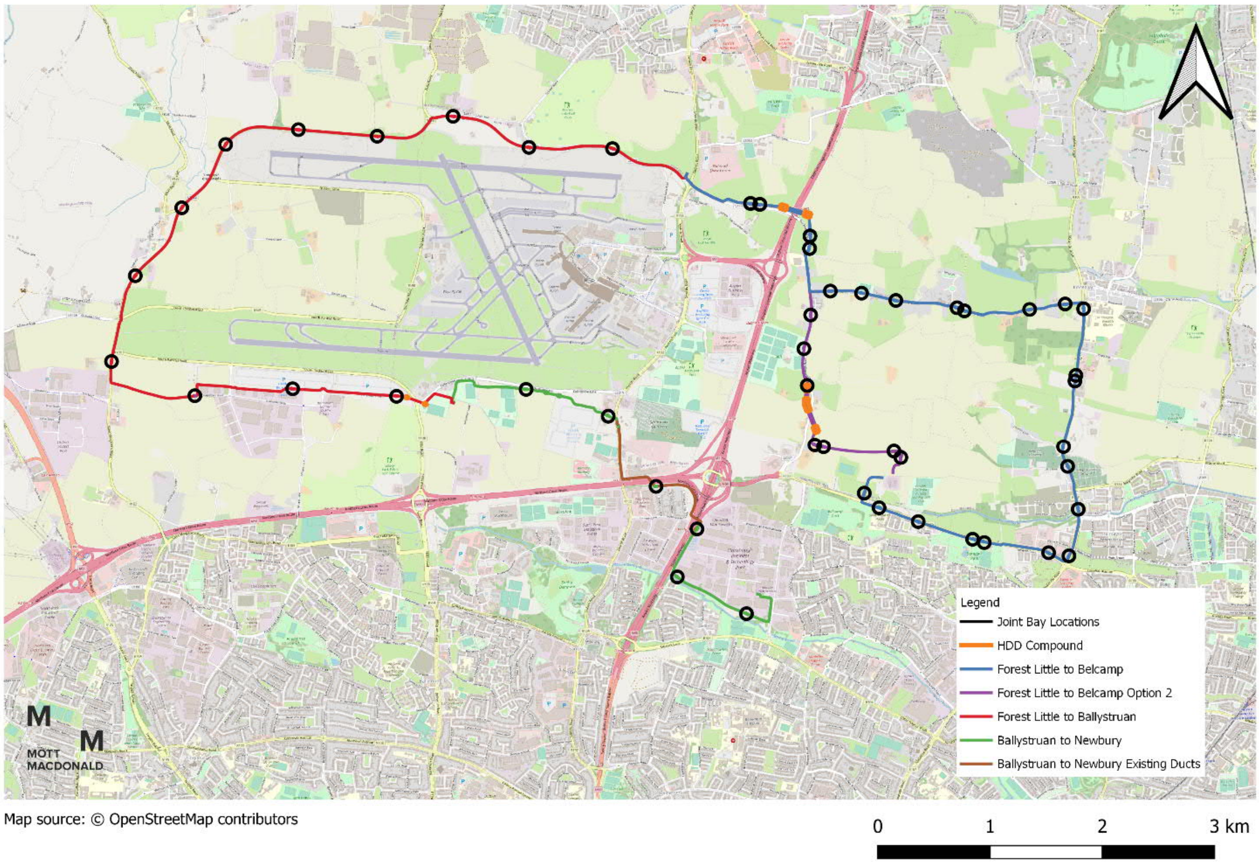
HDD works are considered vibration intensive. Reference has been made to *Vibrations due to horizontal directional drilling in Lucan Formation rock and Dublin Boulder Clay*, Civil Engineering Research in Ireland 2020. It outlines vibration measurements conducted during directional drilling for a 100kv line in Drimnagh, Dublin. Measurements were taken near rail tracks at approximately 9m from the line of directional drilling with measured vibration levels of less than 1mm/s recorded.

The minimum distance between the HDD works receptors were located at R16 at 34m. Hence the predicted vibration impacts arising from HDD works is deemed **'Not Significant'** for all receptors.

13.5.1.3 Joint bay installation

Joint bays are required to be installed along the cable route to join consecutive lengths of cable and to facilitate cable pulling. The approximate joint bay locations are circled and shown in Figure 13.3.

Figure 13.3: Joint bay locations along proposed route



Construction noise

Table 13.13: Summary of the predicted noise levels for joint bay installation works

Receptor ID	Name	Assessment threshold value L_{Day}, dB(A)*	Site noise level at receptor, dB(A)	Initial significant impact assessment
R1	Residential properties along Cooks Road	65	52	Not Significant
R2	St. Margaret's School, representative of residential properties of St. Margaret's area	65	49	Not Significant
R3	Residential properties at Harristown Lane	75	56	Not Significant
R4	Residential properties along Old Airport Road	75	40	Not Significant
R5A	Carlton Hotel Dublin Airport North Façade	65	69	Significant depending on duration
R5B	Carlton Hotel Dublin Airport East Façade	70	63	Not Significant
R6	18, Turnapin Coattage, representative of residential properties at Turnapin	70	58	Not Significant

Receptor ID	Name	Assessment threshold value L_{Day}, dB(A)*	Site noise level at receptor, dB(A)	Initial significant impact assessment
R7	30, Woodlawn Park, representative of residential properties at Woodlawn	65	64	Not Significant
R8	78, Clonshaugh Road, representative of residential properties at Newburys	65	45	Not Significant
R9	Residential properties at St. Dominic's Park (and along R139)	70	75	Significant depending on duration
R10	Representative of residential properties at Belmayne area	70	75	Significant depending on duration
R11	St. Doolagh's Nursing Home, representative of residential properties in St. Doolagh's area	65	50	Not Significant
R12	St. Doolagh's Church	70	50	Not Significant
R13	St. Nicholas of Myra National School Kinsealy	65	63	Not Significant
R14	St. Nicholas of Myra Church, representative of receptors at Chapel Road	70	52	Not Significant
R15	11, Baskin Cottage, Representative of receptors along Baskin Lane	65	63	Not Significant
R16	10, Baskin Park, Representative of receptors along Stockhole Lane	65	60	Not Significant
R17	Edenville Lodge, Representative of receptors along Clonshaugh Road	65	54	Not Significant

*Based on ambient sound levels in Table 13.7

The results show that the noise level for R5A, R9 and R10 could potentially be significant as they exceed the applicable noise level thresholds. BS 5228 states that the assessment for a significant effect at a receptor will also depend on the duration of work.

The installation of the joint bays is expected to last a couple of days at each location. Each receptor is expected to be exposed to noise levels above the applicable threshold for no more than 5 days (1 working week). The noise impact is therefore considered '**Not Significant**' as it falls below the duration criteria of 10 in any 15 consecutive days or 40 days in any six-month period. Table 13.14 summarizes the significant impact assessment after duration of exposure has been accounted for in relation to R5A, R9 and R10.

Table 13.14: Summary of significant impact assessment after accounting for work duration

Receptor ID	Name	Distance where noise levels fall below acoustic threshold, m	Number of days above acoustic threshold, Day(s)	Final significant impact assessment
R5A	Carlton Hotel Dublin Airport North Façade	25	5	Not significant after accounting for duration

Receptor ID	Name	Distance where noise levels fall below acoustic threshold, m	Number of days above acoustic threshold, Day(s)	Final significant impact assessment
R9	Residential properties at St. Dominic's Park (and along R139)	27	5	Not significant after accounting for duration
R10	Representative of residential properties at Belmayne area	27	5	Not significant after accounting for duration

Construction vibration

It is expected that the construction vibration impacts would not significantly differ from what was anticipated for the duct installation works. Thus, the vibration impact arising from the works are predicted to be **'Not Significant'** as the closest receptors to the joint bay installation works are at distances >15m.

13.5.1.4 Cable Installation works

The cables will be delivered to site on drums, in lengths of approximately 750m to 1,000m. The cable drum will be set up and pulled through the duct using a cable winch. When necessary, hauling machines will be used to reduce cable pulling tension. Across the period of construction, a progress of between 150m per day is considered a representative average for the proposed works.

Construction Noise

Table 13.15: Summary of the predicted noise levels for cable installation works

Receptor ID	Name	Assessment threshold value L_{Day}, dB(A)*	Site noise level at receptor, dB(A)	Initial significant impact assessment
R1	Residential properties along Cooks Road	65	50	Not Significant
R2	Saint Margaret's School, representative of residential properties of St. Margaret's area	65	60	Not Significant
R3	Residential properties at Harristown Lane	75	65	Not Significant
R4	Residential properties along Old Airport Road	75	58	Not Significant
R5A	Carlton Hotel Dublin Airport North Façade	65	66	Significant depending on duration
R5B	Carlton Hotel Dublin Airport East Façade	70	64	Not Significant
R6	18, Turnapin Coattage, representative of residential properties at Turnapin	70	63	Not Significant
R7	30, Woodlawn Park, representative of residential properties at Woodlawn	65	56	Not Significant
R8	78, Clonshaugh Road, representative of residential properties at Newburys	65	48	Not Significant

Receptor ID	Name	Assessment threshold value L_{Day}, dB(A)*	Site noise level at receptor, dB(A)	Initial significant impact assessment
R9	Residential properties at St. Dominic's Park (and along R139)	70	70	Not Significant
R10	Representative of residential properties at Belmayne area	70	70	Not Significant
R11	St. Doolagh's Nursing Home, representative of residential properties in St. Doolagh's area	65	49	Not Significant
R12	St. Doolagh's Church	70	62	Not Significant
R13	St. Nicholas of Myra National School Kinsealy	65	63	Not Significant
R14	St. Nicholas of Myra Church, representative of receptors at Chapel Road	70	50	Not Significant
R15	11, Baskin Cottage, Representative of receptors along Baskin Lane	65	71	Significant depending on duration
R16	10, Baskin Park, Representative of receptors along Stockhole Lane	65	70	Significant depending on duration
R17	Edenville Lodge, Representative of receptors along Clonshaugh Road	65	69	Significant depending on duration

*Based on ambient sound levels in Table 13.7

The results show that the noise levels at R5A, R15, R16 and R17 could potentially be significant as they could exceed the applicable noise level thresholds. BS 5228 states that the assessment for a significant effect at a receptor will also depend on the duration of work.

As the representative average of the cable installation progress 150m per day, each receptor is expected to be exposed to noise levels above the applicable threshold by 1-2 days. The noise impact is therefore considered **'Not Significant'** as it falls below the duration criteria of 10 in any 15 consecutive days or 40 days in any 6-month period. Table 13.16 summarises the significant impact assessment after the duration of exposure has been accounted for in relation to R5A, R15, R16 and R17.

Table 13.16: Summary of significant impact assessment after accounting for work duration

Receptor ID	Name	Distance where noise levels fall below acoustic threshold, m	Number of days above acoustic threshold, Day(s)	Final significant impact assessment
R5A	Carlton Hotel Dublin Airport North Façade	21	1	Not significant after accounting for duration
R15	11, Baskin Cottage, representative of receptors along Baskin Lane	29	1	Not significant after accounting for duration
R16	10, Baskin Park, Representative of receptors along Stockhole Lane	28	1	Not significant after accounting for duration

Receptor ID	Name	Distance where noise levels fall below acoustic threshold, m	Number of days above acoustic threshold, Day(s)	Final significant impact assessment
R17	Edenville Lodge, Representative of receptors along Clonshaugh Road	26	1	Not significant after accounting for duration

Construction vibration

No vibration intensive equipment is expected to be used during cable installation works. Therefore, the vibration impacts arising from the works is considered **'Not Significant'**.

13.5.1.5 Construction compounds and laydown areas

The construction compound will not be located within close proximity of any noise sensitive receptors. The main noise sources within the construction compound will be generators for lighting and office, HGV movements, material stockpiling and haulage. Following best practice and the implementation of standard mitigation, the associated noise and vibration impacts are considered **'Not Significant'**.

Due to space constraints within the road networks, temporary laydown areas will be required along the route. Activities within construction laydown areas are expected to be relatively limited and intermittent. Following site set up, activities within the laydown areas will mainly comprise the occasional movement of HGVs and the moving and storage of materials and equipment. Therefore, the associated noise and vibration impacts are considered **'Not Significant'**.

13.5.1.6 Construction traffic noise assessment

As the UGC cable routing will be running adjacent to roads and bridge crossings, the duct and joint bay installation will cause possible temporary road and lane closures. Temporary road and lane closures could cause traffic diversions and increase the traffic flow in surrounding road networks, leading to increase in road traffic noise at receptor locations. A Construction Traffic Management Plan (CTMP) has been developed (Appendix D) and this will be a live document which will be updated by the Contractor in consultation with the local authorities. Typically, a 25% increase in traffic flow is equivalent to a 1 dB increase in noise level, the minimum noticeable change[11]. As none of the diversions are anticipated to result in more than 25% increase in traffic flow, it is unlikely that the road diversions will result in a significant adverse effect for noise.

Therefore, the construction traffic noise assessment will focus on the increase in traffic flow due to the introduction of construction workers and Heavy Goods Vehicle (HGV) associated with the Project. Annual Average Weekday Traffic 18hr (AAWT 18hr) between 06:00 – 00:00 of relevant roads along the proposed development were obtained from a traffic data survey conducted in September 2022. The predicted number of HGVs and construction workers for the site is detailed in Chapter 6. The predicted Basic Noise Level (BNL) change is summarized in Table 13.17.

[11] Design Manual for Roads and Bridges (DMRB) LA 111 Noise and Vibration, 2020

Table 13.17: Predicted BNL change with the introduction of Project related traffic flows

Road	Site no. reference	Baseline AAWT 18 hr flow	Base line HGV %	Initial BNL, L_{A10}, dB	New AAWT 18 hr flow	New baseline HGV %	Predicted BNL, L_{A10}, dB	BNL change, dB
R122	NDC Site 3	13,641	13.55	73.7	13,698	13.79	73.7	0.1
Stockhole Lane	NDC Site 6	8,544	3.37	67.8	8,601	3.83	68.0	0.2
Baskin Lane	NDC Site 7	7,554	7.84	68.4	7,639	8.67	68.6	0.2
Malahide Road R107	NDC Site 8	13,127	9.30	70.3	13,212	9.77	70.5	0.1
R139	NDC Site 10	34,505	12.81	76.0	34,590	12.96	76.0	0.0
Clonshaugh Industrial Estate, 250 metres North of R104	NDC Site 11	1,828	20.35	63.7	1,873	21.48	64.0	0.3
Old Airport Road	NDC Site 13	15,491	14.93	72.9	15,536	15.08	72.9	0.0
R132	NDC Site 14	22,633	14.50	74.4	22,678	14.58	74.5	0.0
Clonshaugh / Stockhole Road	NDC Site 15	8,037	6.82	68.5	8,082	7.15	68.6	0.1
Turnapin Lane	NDC Site 20	5,314	25.26	69.0	5,359	25.59	69.0	0.0

Source: Metrolink Automatic Traffic Count September 2022, Nationwide Data Collection (NDC), ref: 13047

Based on the criteria set out in DMRB LA111, the construction traffic noise impact arising from HGV and site personnel commutes are expected to be '**Negligible'**. Therefore, it is predicted that there will be no significant adverse effect arising from construction traffic noise.

Table 13.18 presents the likely significant effects identified by the assessment during construction phase.

Table 13.18: Summary of significant effects for construction works

Construction Works	Construction Phase Impacts
Duct Installation Works	**Noise:** 'Not Significant' as affected receptors are only exposed to construction noise level above applicable threshold for 1-2 days. **Vibration:** Human perception effects are predicted as likely to be 'Significant' at occupied buildings within 12m of the vibratory compaction works and cosmetic damage to light-framed structures (e.g. dwellings) may arise within 1.5m of vibratory compaction works. There are no known receptors that are <15m from construction works hence the vibration impact is considered to be 'Not Significant'.
Horizontal Directional Drilling Works	**Noise:** 'Not Significant' as predicted construction noise level did not exceed applicable threshold at receptors. **Vibration:** 'Not Significant' as closest receptor to the works is expected to be >200m away
Joint Bay Installation Works	**Noise:** 'Not Significant' as affected receptors are only exposed to construction noise level above applicable threshold for 1-2 days. **Vibration:** Human perception effects are predicted as likely to be 'Significant' at occupied buildings within 12m of the vibratory compaction works and cosmetic damage to light-framed structures (e.g. dwellings) may arise within 1.5m of vibratory compaction works. There are no known receptors that are <15m from construction works hence the vibration impact is considered to be 'Not Significant'.
Cable Installation Works	**Noise:** 'Not Significant' as affected receptors are only exposed to construction noise level above applicable threshold for 1-2 days. **Vibration:** 'Not Significant' as works are not vibration intensive
Construction Laydown Areas and Passing Bays	**Noise:** 'Not Significant' **Vibration:** 'Not Significant'

13.5.2 Decommissioning phase

It is not envisaged that the proposed underground cables will be decommissioned. It is likely that the cables will be replaced in the future. In the unlikely event of decommissioning, the activities associated with the decommissioning phase will be similar to the construction phase works. Therefore, provided that appropriate mitigation is used, the impacts of the decommissioning phase should be, as a worst-case scenario, similar to those at construction phase.

13.5.3 Operational phase

It is anticipated that the proposed underground cables will not produce any significant noise and vibration levels during operation. Therefore, the operational noise impact arising from the operational phase is considered '**Not Significant**'.

13.5.4 Cumulative effects

13.5.4.1 Intra-Project

Intra-Project noise impacts relate to the operational noise from existing substations (Newbury and Belcamp) and construction noise from proposed new substations (Ballystruan and Forest Little) in addition to the MetroLink rail project. Due to the temporary nature of the construction noise, it is expected that the cumulative noise impact arising from the substation operational noise and the construction noise will be '**Not Significant**'.

Metrolink Railway Order

Railway construction works related to the Metrolink Railway Order[12], particularly along the railway sections between Fosterstown station and Dardistown station are within close proximity to the proposed development. The identified receptors along Old Airport Road will be subjected to construction noise levels from the Metrolink Railway Order development and the proposed development. It is anticipated that construction noise levels from the proposed development will remain the dominant noise source as it is closer to the identified receptors. The cumulative noise impact arising is expected to be '**Minor'**.

13.5.4.2 Other Development

Dublin Airport and associated facilities

The proposed development route is within close proximity to the Dublin Airport. The existing ambient noise levels have considered the noise associated with aircraft movements. Thus, noise arising from Dublin Airport is expected to be 'Not Significant'.

There are several committed developments located within the compounds of Dublin airfield , this includes the North Apron extension[13] and a free-standing substation[14] construction. Both of these developments are relatively far away (>300m) from the identified receptors. It is expected that the noise levels at receptors will be dominated by local ambient conditions and the proposed development. Hence, it is predicted that the cumulative noise impacts from these developments will be **'Not Significant'**.

East Meath-North Dublin Grid Upgrade

A similar UGC construction was planned by EirGrid with project timelines for submission unconfirmed[15]. The route option A (emerging preferred best performing option) will overlap with identified receptors along R108, R122, Stockhole and Baskin Lane. The initial socio-economic assessment conducted by EirGrid anticipates 'low to moderate' impact arising from the project. Thus, the cumulative noise impact arising from both projects is predicted to be '**Minor**'.

13.6 Mitigation and monitoring measures

13.6.1 Construction phase

A Construction Environmental Management Plan (CEMP) that includes noise and vibration mitigation is included in Appendix D.

The impact of noise and vibration on nearby sensitive receptors within the vicinity of the proposed development will be controlled by implementation of the principal of Best Practicable Means (BPM). This will be achieved by undertaking construction activities in accordance with good practice set out in BS 5228-1/2:2009+A1:2014. The preferred approach for controlling construction noise is to reduce source levels where possible but with due regard to practicality.

Measures that will be implemented include the following:

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[12] Metrolink Environmental Impact Assessment Report, Chapter 13: Airborne Noise and Vibration, Transport Infrastructure Ireland, 2022

[13] Fingal County Council Planning and Strategic Infrastructure Department, Planning reference: F20A/0550

[14] Fingal County Council Planning and Strategic Infrastructure Department, Planning reference: F20A/0295

[15] East Meath-North Dublin Grid Upgrade, Capital Project CP1021, Step 4 Consultation, EirGrid 2022

- selecting quiet equipment;
- ensure equipment is maintained, in good working order, and is used in accordance with the manufacturer's instructions;
- members of the construction team will be trained and advised during toolbox briefings on quiet working methods;
- equipment shall not be left running unnecessarily;
- equipment shall be fitted with silencers or mufflers where possible;
- use plant enclosures whenever feasible;
- materials shall be lowered instead of dropped from height;
- inform nearby sensitive receptors in advance of construction activities and keep them up to date with progress and changes;
- give nearby sensitive receptors a point of contact from the contractor; the contact will liaise with residents and maintain good communication between nearby residents and the contractor; and
- utilising low vibration working methods.

At construction compounds, the following mitigation measures will be implemented:

- manage deliveries to prevent queuing of traffic at access points;
- use of adjustable or directional audible vehicle-reversing alarms and/or alternative warning systems (i.e. white noise alarms);
- imposition of suitable speed limit at construction compound to minimize noise from vehicle movements; and
- implementation of site hoarding.

Night works are not recommended at areas with high residential density. Where night working is unavoidable, in addition to mitigation proposed above, the following mitigation measures will be implemented:

- details of night working, including likely duration, start and completion dates, be clearly communicated to nearby noise sensitive receptors;
- avoid or limit the use of particularly noisy plants during these periods;
- temporary noise screens will be used at construction areas close to noise sensitive receptors to reduce noise disturbance.

Good public relations are invaluable in securing public acceptance of construction noise. People are more tolerant of noise if they understand the reason behind it, the likely duration, start and completion dates, and mitigation measures used to minimise noise levels. Letter box drops explaining the proposed works will be implemented. A dedicated site contact will be nominated to liaise with residents and establish good rapport. A complaint handling procedure will also be put in place.

13.6.2 Operational phase

There are no anticipated noise and vibration impacts associated with the operational phase of the proposed development and therefore no mitigation is required.

13.7 Residual impacts

There are no significant residual noise and vibration impacts predicted for the construction works with the successful incorporation of the specific mitigation measures described in Section 13.6.

Metrolink 110kV Underground Cables

Volume 2 Environmental Impact Assessment Report
Chapter 14 - The Landscape

June 2023

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14 The Landscape

14.1 Introduction

This Landscape and Visual Impact Assessment describes the landscape context of the proposed development, as described in Chapter 6, and assesses the likely landscape and visual impacts of the proposed development on the receiving environment. Although closely linked, landscape and visual impacts are assessed separately.

Landscape Impact Assessment (LIA) relates to assessing effects of a development on the landscape as a resource in its own right and is concerned with how the proposal will affect the elements that make up the landscape, the aesthetic and perceptual aspects of the landscape and its distinctive character.

Visual Impact Assessment (VIA) relates to assessing effects of a development on specific views and on the general visual amenity experienced by people. This deals with how the surroundings of individuals or groups of people may be specifically affected by changes in the content and character of views as a result of the change or loss of existing elements of the landscape and/or introduction of new elements. Visual impacts may occur from; Visual Obstruction (blocking of a view, be it full, partial or intermittent) or Visual Intrusion (interruption of a view without blocking).

14.2 Methodology and Limitations

14.2.1 Guidance

The assessment was carried out in line with the Landscape Institute and the Institute of Environmental Management and Assessment (eds.) (2013) Guidelines for Landscape and Visual Impact Assessment. Routledge, Oxon. and in line with the Environmental Protection Agency (EPA), Guidelines on the Information to be Contained in Environmental Impact Assessment Reports, 2022.

Production of this Landscape and Visual Impact Assessment involved:

- A desktop study to establish an appropriate study area, relevant landscape and visual designations in the County Development Plans (CDPs) as well as other sensitive visual receptors;
- Assessment of the significance of the landscape impact of the proposed development as a function of landscape sensitivity weighed against the magnitude of the landscape impact; and
- Assessment of the significance of the visual impact of the proposed development as a function of visual receptor sensitivity weighed against the magnitude of the visual impact.

14.2.2 Desktop Studies

This desk study involved a review of project documents (including the project description as detailed in Chapter 6 of this EIAR) and Geographical Information System files for the proposed development. These were read against a backdrop of aerial photography and topographical information. Geographical Information System datasets included highly sensitive landscape areas scenic designations, and these were cross-checked against the relevant CDPs, in the interests of thoroughness. The National Inventory of Architectural Inventory's datasets were also reviewed in relation to the landscape and visual desk study.

14.2.2.1 Data Sources

Data to inform the assessment was extracted from the following data sources:

- Fingal Development Plan 2023-2029[1];
- Dublin City Council Development Plan 2022-2028[2];
- National Parks and Wildlife Service;
- The Heritage Council – HeritageMaps.ie;
- Ordnance Survey maps;
- Discover Ireland – DiscoverIreland.ie; and
- Google Maps.

14.3 Methodology for Assessment of Effects

The following criteria are used for the assessment of landscape impacts and visual impacts.

14.3.1.1 Landscape Impact Assessment Criteria

When assessing the potential impacts on the landscape resulting from a proposed development, the following criteria are considered:

- Landscape character, value and sensitivity;
- Magnitude of likely impacts; and,
- Significance of landscape effects.

The sensitivity of the landscape to change is the degree to which a particular landscape receptor, Landscape Character Area (LCA) or landscape feature can accommodate changes or new elements, without unacceptable detrimental effects to its essential characteristics. Landscape Value and Sensitivity is classified using the following criteria set out in Table 14.1: Landscape Value and SensitivityTable 14.1.

Table 14.1: Landscape Value and Sensitivity

Sensitivity	Description
Very High	Areas where the landscape character exhibits a very low capacity for change in the form of development. Examples of which are high value landscapes, protected at an international or national level (World Heritage Site / National Park), where the principal management objectives are likely to be protection of the existing character.
High	Areas where the landscape character exhibits a low capacity for change in the form of development. Examples of which are high value landscapes, protected at a national or regional level (Area of Outstanding Natural Beauty), where the principal management objectives are likely to be considered conservation of the existing character.
Medium	Areas where the landscape character exhibits some capacity and scope for development. Examples of which are landscapes, which have a designation of protection at a county level or at non-designated local level where there is evidence of local value and use.
Low	Areas where the landscape character exhibits a higher capacity for change from development. Typically this would include lower value, non-designated landscapes that may also have some elements or features of recognisable quality, where landscape management objectives include, enhancement, repair and restoration.
Negligible	Areas of landscape character that include derelict, mining, industrial land or are part of the urban fringe where there would be a reasonable capacity to embrace change or the capacity to include the development proposals. Management objectives in such areas could be focused on change, creation of landscape improvements and / or restoration to realise a higher landscape value.

[1] https://www.fingal.ie/development-plan-2023-2029

[2] https://www.dublincity.ie/residential/planning/strategic-planning/dublin-city-development-plan/development-plan-2022-2028

The magnitude of a predicted landscape impact is a product of the scale, extent or degree of change that is likely to be experienced as a result of the proposed development. The magnitude takes into account whether there is a direct physical impact resulting from the loss of landscape components and / or a change that extends beyond the physical works that may have an effect on the landscape character of the area. Table 14.2 refers.

Table 14.2: Magnitude of Landscape Impacts

Magnitude of Impact	Description
Very High	Change that would be large in extent and scale with the loss of critically important landscape elements and features, that may also involve the introduction of new uncharacteristic elements or features that contribute to an overall change of the landscape in terms of character, value and quality.
High	Change that would be more limited in extent and scale with the loss of important landscape elements and features, that may also involve the introduction of new uncharacteristic elements or features that contribute to an overall change of the landscape in terms of character, value and quality.
Medium	Changes that are modest in extent and scale involving the loss of landscape characteristics or elements that may also involve the introduction of new uncharacteristic elements or features that would lead to changes in landscape character, and quality.
Low	Changes affecting small areas of landscape character and quality, together with the loss of some less characteristic landscape elements or the addition of new features or elements.
Negligible	Changes affecting small or very restricted areas of landscape character. This may include the limited loss of some elements or the addition of some new features or elements that are characteristic of the existing landscape or are hardly perceivable.

The significance of a landscape impact is based on a balance between the sensitivity of the landscape receptor and the magnitude of the impact. The significance of landscape impacts is arrived at using the following matrix set out in Table 14.3.

Table 14.3: Impact Significance Matrix

	Sensitivity of Receptor				
Scale/ Magnitude	***Very High***	***High***	***Medium***	***Low***	***Negligible***
Very High	Profound	Profound-substantial	Substantial	Moderate	Slight
High	Profound-substantial	Substantial	Substantial-moderate	Moderate-slight	Slight-imperceptible
Medium	Substantial	Substantial-moderate	Moderate	Slight	Imperceptible
Low	Moderate	Moderate-slight	Slight	Slight-imperceptible	Imperceptible
Negligible	Slight	Slight-imperceptible	Imperceptible	Imperceptible	Imperceptible

Note: The significance matrix provides an indicative framework from which the significance of impact is derived. The significance judgement is ultimately determined by the assessor using professional judgement. Due to nuances within the constituent sensitivity and magnitude judgements, this may be up to one category higher or lower than indicated by the matrix. For the purpose of this LVIA and in accordance with GLVIA-2013, judgements of 'Substantial' and above are considered to be 'significant impacts' in EIA terms.

14.3.1.2 Visual Impact Assessment Criteria

As with the landscape impact, the visual impact of the proposed development will be assessed as a function of sensitivity versus magnitude. In this instance the sensitivity of the visual receptor, weighed against the magnitude of the visual effect.

14.3.1.3 Sensitivity of Visual Receptors

Unlike landscape sensitivity, the sensitivity of visual receptors has an anthropocentric basis. It considers factors such as the perceived quality and values associated with the view, the landscape context of the viewer, the likely activity they are engaged in and whether this heightens their awareness of the surrounding landscape.

14.3.1.4 Visual Impact Magnitude

The magnitude of visual effects is determined on the basis of two factors; the visual presence (relative visual dominance) of the proposal and its effect on visual amenity. The magnitude of visual impacts is classified in Table 14.4.

Table 14.4: Magnitude of Visual Impact

Criteria	Description
Very High	The proposal intrudes into a large proportion or critical part of the available vista and is without question the most noticeable element. A high degree of visual clutter or disharmony is also generated, strongly reducing the visual amenity of the scene
High	The proposal intrudes into a significant proportion or important part of the available vista and is one of the most noticeable elements. A considerable degree of visual clutter or disharmony is also likely to be generated, appreciably reducing the visual amenity of the scene
Medium	The proposal represents a moderate intrusion into the available vista, is a readily noticeable element and / or it may generate a degree of visual clutter or disharmony, thereby reducing the visual amenity of the scene. Alternatively, it may represent a balance of higher and lower order estimates in relation to visual presence and visual amenity
Low	The proposal intrudes to a minor extent into the available vista and may not be noticed by a casual observer and / or the proposal would not have a marked effect on the visual amenity of the scene
Negligible	The proposal would be barely discernible within the available vista and / or it would not detract from, and may even enhance, the visual amenity of the scene

14.3.1.5 Visual Impact Significance

As stated above, the significance of visual impacts is a function of visual receptor sensitivity and visual impact magnitude. This relationship is expressed in the same significance matrix and applies the same EPA definitions of significance as used in respect of landscape impacts (Figure 14.1).

14.3.2 Quality and Timescale of Effects

In addition to assessing the significance of landscape effects and visual effects, the EPA Guidelines (2022) requires that the quality of the effects is also determined. This could be negative/adverse, neutral, or positive/beneficial.

Landscape and Visual effects are also categorised according to their duration:

- Temporary – Lasting for one year or less;
- Short Term – Lasting one to seven years;
- Medium Term – Lasting seven to fifteen years;
- Long Term – Lasting fifteen years to sixty years; and

- Permanent – Lasting over sixty years.

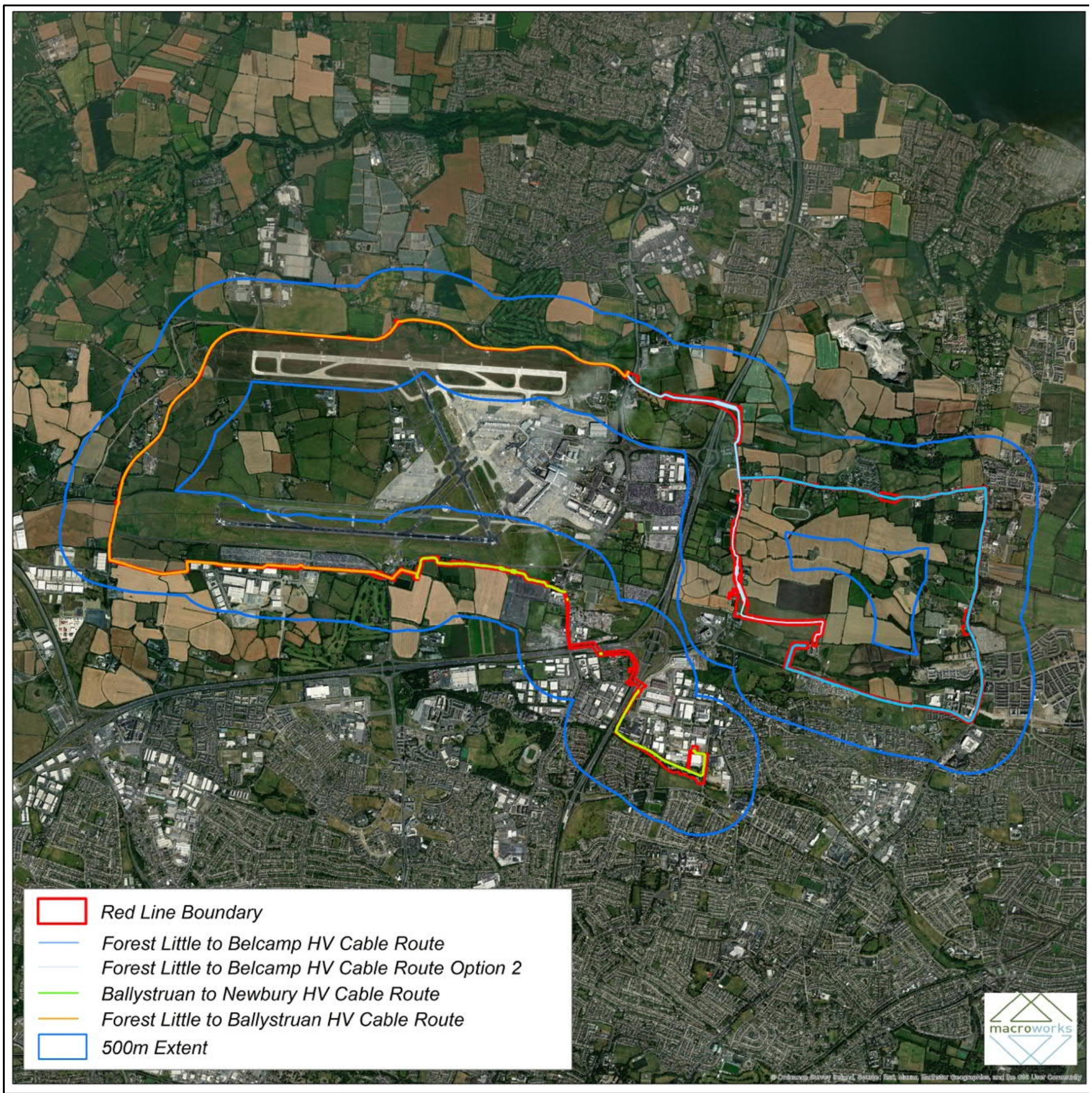
14.3.3 Limitations of this Chapter

There are not considered to be any particular limitations to this LVIA.

14.3.4 Extent of Study Area

According to Guidelines for Landscape and Visual Impact Assessment 2013 (GLVIA), the first step in the process of LVIA is to determine a bespoke study area which is appropriate to the combination of the development type and the receiving landscape and visual context. In terms of the landscape, the proposed development pertains to the installation of three new underground HV circuits, which relate to the Metrolink rail project from Swords to Charlemont. In terms of visual considerations, the development is only likely to involve new visual intrusions predominantly during the construction phase, rather than creating new, permanent visual intrusion or obstruction. Considering the underground nature of the project and similar studies, it is anticipated that the proposed works relating to the development of three new underground cables are likely to be difficult to discern beyond approximately 500m and are not likely to give rise to significant landscape or visual impacts beyond this distance. For these reasons a 500m radius study area was selected (Figure 14.1). This study area will focus the assessment within the area where impacts may actually occur.

Figure 14.1: Study Area (blue lines)



Source: Macro Works Ltd. 2023 / Google Earth

14.4 Receiving Environment

The landscape is the visible environment in its entirety, comprised of both natural and built elements including topography, water bodies, vegetation, wildlife habitats, open spaces, buildings and structures. Landscape and visual sensitivities considered include statutory and non-statutory landscape designations, natural features, landscape character areas, notable deciduous trees of woodland, amenities and historic landscapes.

At a macro level, the study area is located to the north of Dublin City, and is proposed to stretch from Forest Little to Belcamp, Newbury to Ballystruan and Ballystruan to Forest Little. Notably, Dublin Airport is situated at the centre of the study area. Outside of the clear airport land-use, the area has mixed landcover, ranging from farmed open fields to built-up industrial and commercial with clusters of residential. The area is predominantly low-lying, with elevation decreasing slightly toward the south and east.

14.4.1.1 Landform and Drainage

The study area has a gently undulating topography that is slightly more elevated to the west of Dublin Airport. Watercourses in the area generally drain in an easterly direction. The most notable watercourse in the study area is the Santry River which flow to the south of Dublin Airport, through the settlements of Coolock and Raheny in a west-to-east direction.

14.4.1.2 Vegetation and Land Use

A large proportion of the study area is occupied by agricultural fields. Field patterns are generally composed of small to medium sized fields demarcated by mature hedgerows. Outside of agricultural land use, the predominant land use is urban, in the form of built-up residential and industrial and commercial premises including several business and industrial parks surrounding Dublin Airport, namely; Dublin Airport Logistics Park, Williamsville Industrial Estate, Collinstown Cross Industrial Estate, Airways Industrial Estate and Clonshaugh Business and Technology Park.

14.4.1.3 Centres of Population and Houses

The greatest population densities in the area are in the settlements of Coolock, Northern Cross, The Baskins and Kinsealy but there are also one-off houses throughout the study area, dispersed along the local roads. It is also of note that there are numerous planning applications in the vicinity of the proposed development, as detailed in Chapter 2.

14.4.1.4 Transport Routes

The M1 and M50 motorways are the most significant transport routes within the study area. Several regional routes also fall within the study area - namely the R108, R122, R132, R139 and R107 regional roads. The proposed underground cable has varying levels of interaction with each of these transport routes.

14.4.1.5 Tourism, Heritage and Public Amenities

There are no notable landscape related tourism or heritage amenities within the study area. There are several public amenities, in the form of golf clubs and other sports recreation areas. The Forrest Little Golf Club is located along the R108 to the north of Dublin Airport and the Silloge Park Golf Club is located along the R108 to the south of Dublin Airport. Additionally, there are several sports recreation grounds to the south of the study area, which play host to the Ballymun Kickhams GAA Club, Starlights GFC and Na Fianna GAA Club.

14.4.1.6 Landscape Policy Context and Designations

Fingal Development Plan 2023-2029

According to Fingal County Council's CDP Land Use Zoning (Interactive Map Viewer[3]) the proposed development is spread across a variation of land designations. The zone types within which the development falls in, alongside the development objective and vision for each zone type are outlined in Table 14.5 below.

[3] Fingal Development Plan 2023 – 2029 – Interactive Map Viewer. https://eur04.safelinks.protection.outlook.com/?url=https%3A%2F%2Ffingalcoco.maps.arcgis.com%2Fapps%2Fwebappviewer%2Findex.html%3Fid%3Db97f2adda903489cadb77378565df29b&data=05%7C01%7CWebContent%40fingal.ie%7C75fae9ce65bb4a9e336708db3526af05%7C72dcfc23757145948154afe2c0bdea98%7C0%7C0%7C638162212481482484%7CUnknown%7CTWFpbGZsb3d8eyJWIjoiMC4wLjAwMDAiLCJQIjoiV2luMzIiLCJBTiI6Ik1haWwiLCJXVCI6Mn0%3D%7C3000%7C%7C%7C&sdata=j4r4fmtflOrvoNrn8CNQ83CFurRFkuEiJno%2BugYceeM%3D&reserved=0 [Date accessed 5th May 2023]

Table 14.5 Fingal County Council Land Zones within the study area.

Zone	Objective	Vision
Open Space (OS)	Preserve and provide for open space and recreational amenities.	Provide recreational and amenity resources for urban and rural populations subject to strict development controls. Only community facilities and other recreational uses will be considered and encouraged by the Planning Authority.
Residential Area (RA)	Provide for new residential communities subject to the provision of the necessary social and physical infrastructure.	Ensure the provision of high quality new residential environments with good layout and design, with adequate public transport and cycle links and within walking distance of community facilities. Provide an appropriate mix of house sizes, types and tenures in order to meet household needs and to promote balanced communities.
Green Belt (GB)	Protect and provide for a Greenbelt.	Create a rural/urban Greenbelt zone that permanently demarcates the boundary (i) between the rural and urban areas, or (ii) between urban and urban areas.
Rural Village (RV)	Protect and promote the character of the Rural Village and promote a vibrant community in accordance with an approved Local Area Plan, and the availability of physical and community infrastructure.	Protect and promote established villages within the rural landscape where people can settle and have access to community services. The villages are areas within the rural landscape where housing needs can be satisfied with minimal harm to the countryside and surrounding environment.
General Employment (GE)	Provide opportunities for general enterprise and employment.	Facilitate opportunities for compatible industry and general employment uses, logistics and warehousing activity in a good quality physical environment. General Employment areas should be highly accessible, well designed, permeable and legible.
Dublin Airport (DA)	Ensure the efficient and effective operation and development of the airport in accordance with an approved Local Area Plan.	Facilitate air transport infrastructure and airport related activity/uses only (i.e. those uses that need to be located at or near the airport). All development within the Airport Area should be of a high standard reflecting the status of an international airport and its role as a gateway to the country and region.

The Fingal CDP (2023-2029) incorporates a Landscape Character Assessment for Fingal as part of Chapter 9 – Green Infrastructure and Natural Heritage, which identifies a range of six landscape character types. Each landscape type is assigned a 'value' through the consideration of such elements as aesthetics, ecology, historical, cultural, religious or mythological. Value categories range from low to exceptional. Following the assessment of value, the sensitivity of each character type is defined. This is considered to be its overall ability to sustain its character in the face of change. Sensitivity is evaluated using criteria ranging from high to low.

The proposed development is located in the Landscape Character Type 'Low Lying Type'. According to the Fingal CDP, the 'Low Lying' character type is categorised as having a modest value. The landscape is also characterised as having 'low' landscape sensitivity. The county development plan notes the following in relation to the 'Low Lying Character Type':

> *'Low Lying Character Type has an open character combined with large field patterns, few tree belts and low roadside hedges. The main settlements located within the area include Oldtown, Ballyboghil and Lusk and parts of Malahide and Donabate. Dublin Airport is located in this area. This low-lying area is dominated by agriculture and a number of settlements. The area is categorised as having a modest value. It contains pockets of important value areas requiring particular attention such as important archaeological monuments and demesnes and also the Feltrim Hill and Santry Demesne proposed Natural Heritage Areas.'*

Objectives and policies relating to the landscape are also outlined in section 9.6.14 of the county development plan. The most relevant of these are included below:

'Policy GINHP25 *- Ensure the preservation of the uniqueness of a landscape character type by having regard to the character, value and sensitivity of a landscape when determining a planning application.*

Objective GINHO57 *- Ensure development reflects and, where possible, reinforces the distinctiveness and sense of place of the landscape character types, including the retention of important features or characteristics, taking into account the various elements which contribute to their distinctiveness such as geology and landform, habitats, scenic quality, settlement pattern, historic heritage, local vernacular heritage, land-use and tranquillity.*

Objective GINHO58 *- Resist development such as houses, forestry, masts, extractive operations, landfills, caravan parks and large agricultural/horticulture units which would interfere with the character of highly sensitive areas or with a view or prospect of special amenity value, which it is necessary to preserve.*

Objective GINHO59 *- Ensure that new development does not impinge in any significant way on the character, integrity and distinctiveness of highly sensitive areas and does not detract from the scenic value of the area. New development in highly sensitive areas shall not be permitted if it:*

- Causes unacceptable visual harm
- Introduces incongruous landscape elements
- Cause disturbance of loss of (i) landscape elements that contribute to local distinctiveness, (ii) historic elements that contribute significantly to landscape character and quality such as field or road patterns, (iii) vegetation which is a characteristic of that landscape type and (iv) the visual condition of landscape elements.

Objective GINHO55 *- Protect skylines and ridgelines from development.*

Objective GINHO56 *- Require any necessary assessments, including visual impact assessments, to be prepared prior to approving development in highly sensitive areas.'*

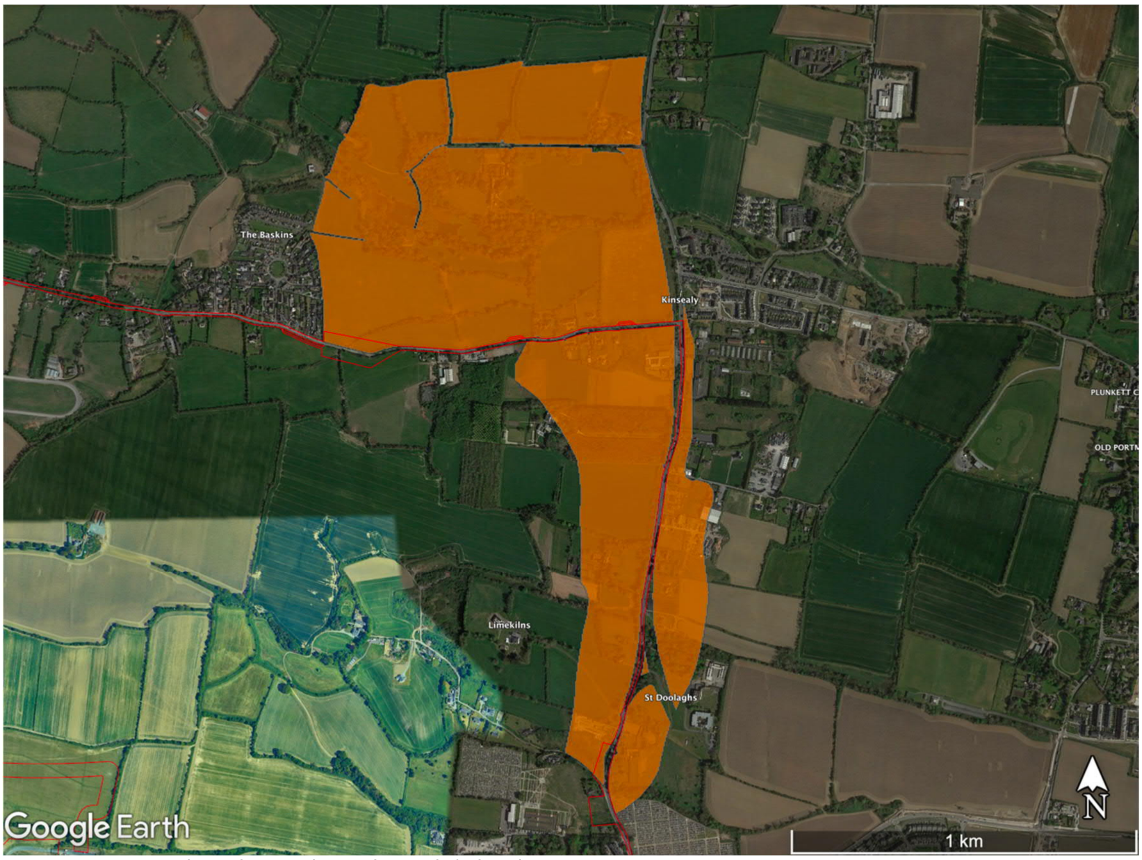
Views of Recognised Scenic Value

Views of recognised scenic value are primarily indicated within county development plans in the context of scenic views/routes designations, but they might also be indicated on touring maps, websites, guidebooks, roadside rest stops or on post cards that represent the area. There are no recorded designated views within the study area. There are however two locations around Dublin Airport used as viewing points to watch aircraft take off and land. They are in the form of laybys along the R108. One location is unnamed but located to the north of the Airport. The second location is known as 'RWY 10R Spotting' and is located to the south of the airport, also along the R108. Another locally important view exists in the vicinity, from a rooftop bar - 'runway 28 rooftop terrace and bar' located in the Carlton Hotel Dublin Airport.

Further information on designated 'views to be preserved' near the study area are shown on '*Interactive Map Viewer'* of the current Fingal Development Plan, however none of these are located within the 500m study area.

As shown in the *Interactive Map Viewer* of the Fingal CDP, a section of the proposed development along the R108 to the north of Dublin airport runs along the border of a 'historic landscape characterisation area' (HLC) in Swords. Similarly, a section of the cable route goes through the settlement of Kinsealy. At Kinsealy there is an area identified as a '*highly sensitive landscape*' (Figure 14.2 refers). Vegetation subject to a '*Protect & Preserve Trees, Woodlands and Hedgerows*' objective occurs within a '*Nature Development Area*' at St. Doolagh's Church. The route also adjoins a '*Nature Development Area*' at Belcamp College c.530m to the south of St. Doolagh's Church.

Figure 14.2: Showing the Highly Sensitive Landscape (orange area) at Kinsealy relative to the proposed Metrolink 110kV UGC Route (red line).



Source: Macro Works Ltd. 2022 / Google Earth / Fingal CDP

Dublin City Development Plan 2022-2028

A very small section of the proposed underground cable route falls within Dublin City Council jurisdiction. In terms of land use zoning (Mapset B of the Dublin CDP) the proposed development falls within two 'Primary Land Use Zoning Categories' – Zone Z6 ('*Employment/Enterprise*') and Zone Z9 ('*Amenity/Open Space Lands/Green Networks'* at Santry River). The 'Primary Land Use Zoning Categories' are described in Chapter 14 of the Dublin City Development Plan and are outlined below:

Zone Z6: *relates to areas used mainly for commerce and industry and has the objective 'to provide for the creation and protection of enterprise and facilitate opportunities for employment creation'.*

Zone Z9: *relates to open areas which have the objective 'to preserve, provide and improve recreational amenity and open space green networks'.*

Policies for Dublin city are outlined within Chapter 4 of the development plan and include;

- SC8: To support the development of the inner suburbs and outer city in accordance with the strategic development areas and corridors set out under the Dublin Metropolitan Area Strategic Plan and fully maximise opportunities for intensification of infill, brownfield and underutilised land where it aligns with existing and pipeline public transport services and enhanced walking and cycling infrastructure.

- SC13: To recognise and promote Green Infrastructure and landscape as a key mechanism to address climate change and as an integral part of the form and structure of the city, including streets and public spaces.'

A portion of the planning application boundary passes within a part of the 'Primary Land Use Zoning Categories' that occurs along Santry River which is identified on Mapset B as subject to a 'Conservation Area strategic Objective.'

14.5 Description of the proposed development pertinent to landscape and visual effects

The following descriptions focus on those aspects of the proposed development that are most relevant to landscape and visual effects and should be read in conjunction with Chapter 6 *Description of the Proposed Development*.

The proposed underground HV cables will run within the existing road network and occasionally underground through private farmland on their journey from Forest Little to Belcamp, Newbury to Ballystruan and Ballystruan to Forest Little. Open cut trenching will be required to lay the cables during the construction phase generating temporary and transient effects. The prevailing surface (generally road) will be fully reinstated following construction.

There will be no material surface expression of the cables during the operational phase even at the sub-surface concrete joint bays, which will be covered in with dry fill and the prevailing surface reinstated. Stream crossings will be achieved using both open cut trenching and Horizontal Directional Drilling (HDD) options and neither will result in permanent surface expression during the operational phase, other than C2 chambers and link box covers. Therefore, it was deemed unnecessary to prepare photomontages as part of this assessment.

It is not considered that construction or operational stage effects are likely to be significant beyond 500m of the proposed underground cables and thus, a 500m buffer either side of the cable route will define its LVIA Study Area.

14.6 Likely Significant Impacts of the proposed development

The only potential for significant landscape or visual effects to occur in relation to the Metrolink 110kV Underground Cable is during the construction stage, because there will only be very minor surface expression of the development during the operational stage (joint bay covers). However, because the construction stage is temporary at any one location, its effects are transient along the cable route and almost fully reversible through reinstatement of the prevailing land cover, significant impacts are not likely to occur.

14.6.1 Construction Phase

The construction method for the UGC's will primarily involve trenching of existing road surfaces to lay the ducting system for the cables and construction of periodic concrete joint bays. As a second stage, the cables will be installed into the ducting system using pulling equipment. There will be associated machinery and worker activity at the section of cable route being installed as well as site fencing, temporary storage of excavated material and laydown areas for construction materials. The progress of the works will be reasonably rapid thus, the nature of the work is reasonably intensive, but transient (continually moving). Because the work is transient the effects will be dispersed and temporary. In terms of sensitivity, road corridors themselves are not considered to be a sensitive landscape receptor as they are a highly modified transport route that can be readily reinstated. As visual receptors, road users are susceptible to the changes in the landscape they pass through and views from the road, particularly in scenic areas. However, they are not susceptible to temporary visual change within the road corridor itself. Local residents who view the road corridor from their dwellings are also susceptible to visual change, but generally beyond or away from the road corridor and not when the visual change relates to brief periods of road works. For these reasons, for the vast majority of the UGC route being laid under existing road surfaces the sensitivity of the receiving landscape is deemed to be **Low**. For those infrequent sections of the route within open ground toward the north of the airport, the slightly more rural landscape and those that enjoy views across it are more susceptible to construction stage impacts. However, this is still a productive and populated area and therefore landscape sensitivity is deemed to be **Medium-low**. All visual receptors in the study area are deemed to have a Medium-low sensitivity to both the construction activity and the proposed UGC.

Given the transient and temporary nature of the proposed UGC construction works, the magnitude of impact is deemed to be **Low**. Thus, the highest level combination of impact magnitude and receptor sensitivity is Low and Medium respectively resulting in significance of no greater than **Slight** in open countryside areas and **Slight-imperceptible** within road corridors.

During the construction phase, the addition of HGV and other construction vehicles to the road network may have a slight impact, however, the movement of HGVs along the surrounding road network travelling to and from the site is typical in this part of the study area, as Dublin Airport and the surrounding commercial and industrial parks currently generate a high degree of HGV traffic. It will also include temporary site lighting and the temporary storage of construction materials and excavated ground. Construction phase impacts on the landscape are considered to be 'short-term' as the construction stage is likely to take less than 7 years to complete. A summary of construction activities within the site are included below:

- HGVs transporting materials to and from the site of works;
- Movement of heavy earth-moving machinery on-site;
- Temporary storage of excavated materials and construction materials on-site;
- Trenching, laying of cable and backfilling, and associated works;
- Security hoarding and site lighting.

Whilst the physical construction stage works will have a notable impact on the landscape in the immediate context of the proposed development, they are viewed in the context of the busy road networks, commercial and industrial land uses and Dublin Airport. Furthermore, construction related activity and its effect on landscape character will be temporary in duration. Removal of vegetation within the periphery of the '*highly sensitive landscape*' at Kineasly, immediately to the north of Baskin Lane and Limekiln Land (at junction with the R107 regional road/Malahide Road), will be required in relation to the Forest Little to Belcamp HV Cable Route (Option 1) but will be highly localised.

Hedgerows within passing bays will be fully reinstated and where possible mature vegetation will be retained or will be reinstated as close as possible to their original condition as is feasible thus, the permanent physical impact on the landscape and the impact on landscape character within the '*highly sensitive landscape*' will be limited. HV cables and Construction Compounds will not occur within / involve the removal of vegetation within the '*Nature Development Areas*' at St. Doolagh's Church or Belcamp College. Along the Ballystruan to Newbury HV Cable Route, within the area zoned as 'Amenity/Open Space Lands/Green Networks' adjoining Santry River, the proposed underground cable route and joint bays will occur within the existing road and will not involve vegetation removal within the area that is the subject of the 'Conservation Area strategic Objective' at Santry River. For these reasons, the magnitude of landscape impacts during the construction stage is deemed to be **Medium-low** within the immediate surrounds of the site, however, this quickly reduces to **Low-negligible** in the wider surrounds of the study area where visibility of construction activity is likely to be very limited. In combination with the **Low** landscape sensitivity designation outlined above, the significance of construction stage impacts is deemed to be **Slight** within the immediate surrounds of the site, however this quickly reduces to **Slight-imperceptible** and **Imperceptible** within the wider study area.

14.7 Operational Phase

Once the construction phase is complete, and the road surface / agricultural grassland reinstated along the UGC routes, there will be no material surface expression of these underground elements. Consequently, operational stage impacts relate to the maintenance of the underground cable, which will occur rarely and will be brief in nature. Maintenance operations will be less intensive than the works at the construction stage. Once maintenance works are complete, the land will be reinstated, therefore there will be no material alteration to the landscape. As a result, the UGC will have **Negligible** magnitude of impact and on visual receptors and landscape character resulting in an **Imperceptible** significance overall.

14.7.1 Do Nothing

The do-nothing scenario will consider the likely future changes to the receiving environment in respect of each of the development features if the proposed development does not proceed. In this instance there will be no change to the receiving context of predominantly road corridors.

14.7.2 Decommissioning Phase

It is not intended to decommission the proposed electricity infrastructure. Equipment will be replaced but decommissioning is not intended. In the highly unlikely event that decommissioning is required, the effects would be similar but less than those assessed during construction of the underground cables. The magnitude of any landscape and visual impacts **Negligible** hence their significance will be **Imperceptible**.

14.7.3 Cumulative Effects

It is assumed that the relevant sections of the construction phase of the East Meath - North Dublin Grid Upgrade and the MetroLink Rail RO would not coincide with that of the Metrolink 110kV Underground Cable. However, if either were to coincide with the proposed development, there may be a brief and marginal intensification of construction works at some intersecting locations. As construction phase impacts of the proposed development are deemed to be no greater than **Slight-imperceptible**, significant cumulative effects are not anticipated to occur. Operational phase effects are deemed to be **Imperceptible** thus significant cumulative effects will cannot occur. Consideration of potential cumulative intra-project effects included the proposed substations at Forest Little and Ballystruan; however, on the basis that there are no predicted residual operational impacts as a result of the proposed development, there will be no material cumulative landscape and visual impacts with any other development.

14.8 Mitigation and Monitoring Measures

Landscape and visual mitigation measures are not considered necessary in relation to the UGC routes as there will be no material effects from the operational stage underground elements. Likewise, for temporary / short term elements of the project, including the visual elements required during the construction stage, specific landscape and visual mitigation measures are not considered necessary.

14.9 Residual Impacts

No residual impacts to landscape and visual are predicted as a result of the proposed development.

Metrolink 110kV Underground Cables

Volume 2: Environmental Impact Assessment Report
Chapter 15 - Archaeology, Architectural and Cultural Heritage

June 2023

Contents

15 Archaeology, Architectural and Cultural Heritage

15.1 Introduction

This chapter of the EIAR, details the archaeological, architectural and cultural heritage issues that need to be addressed in respect of the Metrolink 110kV Underground Cable Project, hereafter referred to as the proposed development.

This study aims to assess the baseline archaeology and cultural heritage environment, to evaluate the likely significant impacts that the proposed development will have on this environment, and to provide mitigation measures to ameliorate these impacts in accordance with the policies of the Department of Housing, Local Government and Heritage (DHLGH), The Dublin City Development Plan (2022-2028), The Fingal County Council Development Plan (2023-2029), the National Monuments Acts 1930-2004, and best practice guidelines.

15.2 Study Area

The study area has been defined in respect of two factors:

- The ability of sites/information sources to provide information pertaining to the archaeological potential of the proposed development site, and
- The potential physical impact, as well as impact on setting, that the proposed scheme may have on sites of cultural heritage significance.

Taking these factors into account the study area has been defined as follows:

Table 15.1: Dimensions of the study area

Subject	Study Area
National Monuments and Recorded archaeological monuments (RMPs)	Within 250 m of the proposed development
Protected Structures and/or their curtilage	Within 250 m of the proposed development
Architectural Conservation Areas (ACAS)	Within 250 m of the proposed development
Structures recorded in the NIAH	Within 250 m of the proposed development
Unregistered features of cultural heritage	Within 50 m of the proposed development
Townland boundaries	Traversed by the proposed development
Areas of archaeological potential	Within 50 m of the proposed development
Previous excavations	Within any townland traversed by the proposed development
Topographical files	Within any townland traversed by the proposed development

15.3 Methodology

This section presents the methodology used in assessing the baseline cultural heritage environment. The scope and methodology for the baseline assessment has been devised in consideration of the following guidelines:

- Environmental Protection Agency (2022) ‘Guidelines on the information to be contained in Environmental Impact Assessment Reports (EIAR)’
- Department of Arts, Heritage, Gaeltacht and the Islands (DAHGI) (1999) ‘Frameworks and Principles for the Protection of the Archaeological Heritage’

- Department of the Environment, Heritage and Local Government (2011) 'Architectural Heritage Protection Guidelines for Planning Authorities'
- National Roads Authority (2005) 'Guidelines for the Assessment of Architectural Heritage Impacts of National Road Schemes'
- National Roads Authority (2005) 'Guidelines for the Assessment of Archaeological Heritage Impacts of National Road Schemes'

15.3.1 Desktop Study

This assessment of the archaeological, architectural and cultural heritage of the proposed development area is based on a desktop study of a number of documentary and cartographic sources. The desktop study was further augmented by an examination of aerial photography as well as a field survey. The main sources consulted in completing the desktop study are listed here.

- Sites and Monuments Record (SMR) and Record of Monuments and Places (RMP) for County Dublin
- Various editions of the Ordnance Survey of Ireland maps
- National Inventory of Architectural Heritage
- Excavation Bulletins Database
- Dublin Airport Local Area Plan, Fingal County Council (2020-2026)
- Dublin City Development Plan (20220-2028)
- Fingal County Council Development Plan (2023-2029)
- Various published sources for local history
- Ordnance Survey Name books and Letters
- Excavations Bulletin
- Aerial Photographs
- Cartographic Sources

15.3.2 Field Inspection

A field inspection of the proposed route was undertaken on 31 May 2022 by James Hession of Rubicon Heritage Services Ltd. The Forrest Little to Belcamp Option 2 route was inspected by Ivan Pawle of Rubicon Heritage Services on 22 November 2022.

The primary purpose of a field inspection is to assess local topography in order to identify any potential low-visibility archaeological and/or historical sites that are not currently recorded and which may be impacted upon negatively by the proposed development. It is also the purpose of the field inspection to survey any known monuments or sites and to consider the relationship between them and the surrounding landscape, all of which need to be considered during the assessment process.

The methodology used during the field inspection involved recording the present land use as well as the existing topography for the entire area comprising the proposed development. A photographic record and written description were compiled for any known and / or potential sites of archaeological, architectural and / or cultural significance. In addition, a Global Positioning System (GPS) waypoint was taken for each identified site of said significance.

15.3.3 Methodology used for assessing baseline value of sites

In order to categorise the baseline environment in a systemised manner, 'baseline values' have been assigned to each identified site of cultural heritage significance and / or potential within the study area. The baseline value of a site is determined with reference to the 'importance' and 'sensitivity' of the site.

In accordance with TII Guidelines, (NRA 2005) the importance of a site is determined based on the following criteria: legal status, condition, historical associations, amenity value, ritual value, specimen value, group value and rarity. The sensitivity of a site is determined based on its susceptibility to physical impact, as well as susceptibility to impact on setting.

It should be noted that the National Monuments Act 1930-2004 does not differentiate between recorded archaeological sites on the basis of relative importance or sensitivity. In addition, the Planning and Development Act 2000 (as amended) does not differentiate between Protected Structures or Areas of Architectural Conservation on the basis of relative importance or sensitivity either. Consequently, professional judgement has been exercised to rate these features based on their perceived importance and sensitivity in relation to physical impacts and impacts on setting.

Taking the above factors into consideration, the criteria that have been defined are provided in Table 15.2 below.

Table 15.2: Baseline values of sites

Subject	Baseline Value
• Recorded Archaeological Monuments • Protected Structures • Architectural Conservation Areas (ACAs) • Shipwrecks known to be more than 100 years old or whose date is uncertain	Very High
• Sites listed in the NIAH that are not Protected Structures • Shipwrecks that are known to be less than 100 years old. • Unregistered built heritage sites that comprise extant remains which are in good condition and/or which are regarded as constituting significant cultural heritage features • Unrecorded features of archaeological potential	High
• Unregistered built heritage sites that comprise extant remains which are in poor condition • Unregistered cultural heritage sites (not including built heritage sites) that comprise extant remains • Townland boundaries that comprise extant remains • Marshy/wetland areas	Medium/High
• Unregistered cultural heritage sites for which there are no extant remains but where there is potential for associated subsurface evidence • Townland boundaries for which there are no extant remains	Medium/Low
• Unregistered cultural heritage sites for which there are no extant remains and where there is little or no potential for associated subsurface evidence	Low

Note: ‘All other areas’ collectively refers to the areas within the proposed development site that do not contain or comprise features of cultural heritage significance.

15.3.4 Type of impact

The following table 15.3 lists the type of impacts that a proposed development may have on the cultural heritage resource:

Table 15.3: Types of Impact

Types of Impact	Definition
Direct	Direct impacts arise where an archaeological, architectural and/or cultural heritage feature or site is physically located within the footprint of the proposed development, or its associated physical impact zone, whereby the removal of part, or all of the feature or site is thus required.
Indirect	Indirect impacts arise when an archaeological, architectural or cultural heritage feature is not located within the footprint of the proposed development, or its associated physical impact zone, and thus is not impacted directly. Such an impact could include impact on setting or impact on the zone of archaeological potential of site whereby the actual site itself is not physically affected.
Cumulative	The addition of many impacts to create a large, significant impact.

Types of Impact	Definition
Undeterminable	Whereby the full consequence that the proposed development may have on the cultural heritage resource is not known
Residual	The degree of environmental change that will occur after the proposed mitigation measures have taken effect.

15.3.5 Assessing physical impacts

The methodology used to assess the magnitude of potential pre-mitigation impacts, as well as residual impacts, of the proposed development on the baseline environment is presented in Table 15.4 below:

Table 15.4: Criteria used for rating magnitude of impacts

Impact Magnitude	Criteria
Severe	• Applies where mitigation would be unlikely to remove adverse effects. Reserved for adverse, negative effects only. These effects arise where an archaeology site is completely and irreversibly destroyed. • An impact that obliterates the architectural heritage of a structure or feature of national or international importance. These effects arise where an architectural structure or feature is completely and irreversibly destroyed by the proposed development. Mitigation is unlikely to remove adverse effects.
Major	• An impact which, by its magnitude, duration or intensity, alters an important aspect of the environment. An impact like this would be where part of a site would be permanently impacted upon, leading to a loss of character, integrity and data about an archaeological feature/site. • An impact that by its magnitude, duration or intensity alters the character and/or the setting of the architectural heritage. These effects arise where an aspect or aspects of the architectural heritage is/are permanently impacted upon leading to a loss of character and integrity in the architectural structure or feature. Appropriate mitigate is likely to reduce the impact • A beneficial or positive effect that permanently enhances or restores the character and/or setting of a feature of archaeological or cultural heritage significance in a clearly noticeable manner.
Moderate	• A medium impact arises where a change to a site/monument is proposed which though noticeable, is not such that the archaeological integrity of the site is compromised, and which is reversible. This arises where an archaeological feature can be incorporated into a modern-day development without damage and that all procedures used to facilitate this are reversible. • A medium impact to a site/monument may also arise when a site is fully or partly excavated under license and all recovered data is preserved by record. • An impact that results in a change to the architectural heritage which, although noticeable is not such that alters the integrity of the heritage. The change is likely to be consistent with existing and emerging trends. Impacts are probably reversible and may be of relatively short duration. Appropriate mitigation is very likely to reduce the impact. • A beneficial or positive effect that results in partial or temporary enhancement of the character and/or setting of a feature of archaeological or cultural heritage significance in a clearly noticeable manner.
Minor	• An impact which causes changes in the character of the environment, such as visual impact, which are not high or very high and do not directly impact or affect an archaeological feature or monument. • An impact that causes some minor change in the character of architectural heritage of local or regional importance without affecting its integrity or sensitivities. Although noticeable, the effects do not directly impact on the architectural structure or feature. Impacts are reversible and of relatively short duration. Appropriate mitigation will reduce the impact. • A beneficial or positive effect that causes some minor or temporary enhancement of the character of an architectural heritage significance which, although positive, is unlikely to be readily noticeable.
Negligible	• An impact on archaeological features or monument capable of measurement but without noticeable consequences. • An impact on architectural heritage of local importance that is capable of measure merit but without noticeable consequences. • A beneficial or positive effect on architectural heritage of local importance that is capable of measurement but without noticeable consequences.

15.3.6 Assessing impacts on setting

The definition of setting follows the guidance set by English Heritage as they have developed a range of comprehensive guidance on this subject specific to heritage assets (English Heritage 2005; 2008). Hence setting is not simply the visual envelope of the asset in question. Rather, it is those parts of the asset's surroundings that are relevant to the significance of the asset and the appreciation thereof, and in which a heritage asset is experienced.

In most instances setting will relate to the historical value of the asset, where an appreciable relationship between the asset and an element of its surroundings helps the visitor understand and appreciate the asset. This may be in terms of a physical relationship, such as between a castle and the natural rise that it occupies, or a more distant visual relationship, such as a designed vista or the view from, for example, one ringfort to another. The former is referred to as immediate setting and the latter as landscape setting. Many assets will only have an immediate setting. Some assets will have aesthetic value that relates to the surrounding landscape, such as in the case of a designed view incorporating a distant hill, or that relates to the contribution the asset makes to the local landscape, for example a church spire providing a focal point in a view down a valley.

English Heritage has provided a list of factors to be considered when assessing impacts upon setting. These are broad factors and have been taken into consideration when assessing magnitude of impact and sensitivity. They are summarised in Table 15.5.

Table 15.5: Factors to be considered when assessing impacts upon setting (after English Heritage 2005)

Factor	Discussion
Visual dominance	Where an historic feature (such as a hilltop monument or fortification, a church spire, or a plantation belonging to a designed landscape) is the most visually dominant feature in the surrounding landscape, adjacent construction of the proposed development may be inappropriate.
Scale	The extent of a proposed development and the number, density and disposition of its associated elements will also contribute to its visual impact.
Intervisibility	Certain archaeological or historic landscape features were intended to be seen from other historic sites. Construction of a proposed development should respect this intervisibility.
Vistas and sight-lines	Designed landscapes invariably involve key vistas, prospects, panoramas and sight-lines, or the use of topography to add drama. Location of a proposed development within key views, which may often extend beyond any designated area, should be avoided.
Movement, sound or light impacts	The movement associated with a proposed development may be a significant issue in certain historic settings. Adequate distance should always be provided between important historic sites and proposed developments to avoid the site being overshadowed or affected by noise.
Unaltered settings	The setting of some historic sites may be little changed from the period when the site was first constructed, used or abandoned. Largely unaltered settings for certain types of sites, particularly more ancient sites, may be rare survivals and especially vulnerable to modern intrusions such as wind turbines. This may be a particular issue in certain upland areas.

The following are guides to the assessment of magnitude of impact on setting:

- *Obstruction of or distraction from key views*. Some assets have been sited or designed with specific views in mind, such as the view from a country house with designed vistas. The obstruction or cluttering of such views would reduce the extent to which the asset could be understood and appreciated by the visitor. Developments outside key views may distract from them and make them difficult to appreciate on account of their prominence and movement. In such instances the magnitude is likely to be greatest where views have a particular focus or a strong aesthetic character. Sympathetic development may improve key views by removing features that obstruct or distract from key views and hence preserve or enhance the importance of the asset.
- *Changes in prominence*. Some assets are deliberately placed in prominent locations in order to be prominent in the surrounding landscape, for example prehistoric cairns are often placed to be silhouetted against the sky and churches in some areas are deliberately placed on ridges in order

to be highly visible. Developments can reduce such prominence and therefore reduce the extent to which such sites can be appreciated or the contribution that they make to the local landscape. Similarly, sympathetic development can enhance the setting of such sites by, for example, removing modern forestry that would otherwise compromise the setting of a cairn that had been placed on a skyline.

- *Changes in landscape character*. A particular land use regime may be essential to the appreciation of an asset's function, for instance the fields surrounding an Improvement period farmstead are inextricably linked to its appreciation. Changes in land use can leave the asset isolated and reduce its value. In some instances, assets will have aesthetic value or a sense of place that is tied to the surrounding landscape character. Conversely, sympathetic development may restore or preserve the relevant land use and hence preserve or enhance the relevant value of the asset.
- *Duration of impact*. Impacts that are long term or permanent are generally of greater magnitude than those that are short term.

Readily reversible impacts are generally of lesser magnitude than those that cannot be reversed. Impacts upon the defined setting will be of greater magnitude than those that affect unrelated elements of the asset's surroundings or incidental views to or from an asset that are unrelated to the appreciation of its value. The magnitude of impacts can be rated from Negligible to Major using a similar scale to that for physical impacts.

15.3.7 Methodology used for assessing significance level of impacts

The significance level of a construction or operation impact on a feature is assessed by combining the magnitude of the impact and baseline value of the feature. The matrix in Table 15.6 provides a guide to decision-making, but it is not a substitute for professional judgement and interpretation, particularly where the baseline value or impact magnitude levels are not clear or are borderline between categories. The permanence of the effects are also taken into account, with irreversible effects being more significant while temporary or reversible changes are likely to be less significant.

Table 15.6: Criteria for assessing significance level of impacts

Magnitude of Impact	Baseline Value				
	Very High	High	Medium / High	Medium / Low	Low
Severe	Very significant	Very significant	Significant	Moderate	Slight
Major	Significant	Significant	Moderate	Slight	Slight
Moderate	Moderate	Moderate	Slight	Slight	Negligible
Minor	Moderate	Slight	Slight	Negligible	Negligible
Negligible	Slight	Slight	Negligible	Negligible	Negligible

15.3.8 Limitations of this EIAR

There were no significant limitations or restrictions encountered during the compilation of this EIAR. All third-party reports, data and mapping are assumed to be correct for the purposes of this EIAR.

15.4 Receiving Environment

The Metrolink 110kV Underground Cable project requires the installation of new 110 kV cables through parts of 36 townlands in northwest County Dublin, primarily in the vicinity of Dublin Airport, along with supporting works including construction of joint bays landscaping and ancillary works (temporary compounds). The project crosses both the Fingal County Council, and Dublin City Council administrative areas. The proposed development comprises three cable routes:

- Newbury to Ballystruan
- Ballystruan to Forrest Little

- Forrest Little to Belcamp (Option 1) or
- Forrest Little to Belcamp (Option 2) Stockhole to Belcamp (*via* Stockhole Lane and Clonshagh Road L2051)

Table 15.7 outlines the nature of the receiving environment in each of the 36 townlands for the proposed developments within this area.

Table 15.7: Overview of the scheme landscape

Proposed Development	Administrative jurisdiction and Townland	Receiving Environment
Newbury to Ballystruan proposed 110 kV cable route	Dublin City Council, Shrubs townland	• Modern industrial park
Newbury to Ballystruan proposed 110 kV cable route	Dublin City Council, Kilmore Big townland	• Modern industrial park
Newbury to Ballystruan proposed 110 kV cable route	Dublin City Council, Willsborough townland	• Modern industrial park
Newbury to Ballystruan proposed 110 kV cable route	Dublin City Council and Fingal County Council, Santry townland	• Brownfield site to the west of M1, disturbed by adjacent roadway.
Newbury to Ballystruan proposed 110 kV cable route	Dublin City Council and Fingal County Council, Clonshagh townland	• Modern motorway carriageway
Newbury to Ballystruan proposed 110 kV cable route	Fingal County Council, Turnapin Little townland	• Modern motorway carriageway.
Newbury to Ballystruan proposed 110 kV cable route	Fingal County Council, Turnapin Great townland	• Modern Swords Road.
Newbury to Ballystruan proposed 110 kV cable route	Fingal County Council, Dardistown townland	• Modern Swords Road.
Newbury to Ballystruan proposed 110 kV cable route	Fingal County Council, Ballystruan townland	• Modern Swords Road.
Newbury to Ballystruan proposed 110 kV cable route	Fingal County Council, Coultry townland	• Modern Old Airport Road.
Newbury to Ballystruan proposed 110 kV cable route	Fingal County Council, Ballymun townland	• Partially greenfield area with dwelling house to the west.
Ballystruan to Forrest Little proposed 110 kV cable route	Fingal County Council, Silloge townland	• Modern roadway associated with Dublin Airport.
Ballystruan to Forrest Little proposed 110 kV cable route	Fingal County Council,Harristown townland	• Modern roadway associated with Dublin Airport.
Ballystruan to Forrest Little proposed 110 kV cable route	Fingal County Council, Merryfalls townland	• Modern local roadway to the south of Dublin Airport.
Ballystruan to Forrest Little proposed 110 kV cable route	Fingal County Council, Dubber townland	• Modern local roadway to the south of Dublin Airport.
Ballystruan to Forrest Little proposed 110 kV cable route	Fingal County Council, Shanganhill townland	• Modern roadway R108
Ballystruan to Forrest Little proposed 110 kV cable route	Fingal County Council, Newtown townland	• Modern roadway R122 and R108
Ballystruan to Forrest Little proposed 110 kV cable route	Fingal County Council, Saint Margarets townland	• Modern roadway R122
Ballystruan to Forrest Little proposed 110 kV cable route	Fingal County Council, Sandyhill townland	• Modern roadway R122
Ballystruan to Forrest Little proposed 110 kV cable route	Fingal County Council, Millhead townland	• Modern roadway R108
Ballystruan to Forrest Little proposed 110 kV cable route	Fingal County Council, Kingstown townland	• Modern roadway R108

Proposed Development	Administrative jurisdiction and Townland	Receiving Environment
Ballystruan to Forrest Little proposed 110 kV cable route	Fingal County Council, Barberstown townland	• Modern roadway R108
Ballystruan to Forrest Little proposed 110 kV cable route	Fingal County Council, Pickardstown townland	• Modern roadway R108
Ballystruan to Forrest Little proposed 110 kV cable route	Fingal County Council, Forrest Great townland	• Modern roadway R108 and Naul Road
Ballystruan to Forrest Little proposed 110 kV cable route	Fingal County Council, Forrest Little townland	• Modern roadway Naul Road
Forrest Little to Belcamp proposed 110 kV cable route	Fingal County Council, Cloghran townland	• Modern roadway Stockhole Lane
Forrest Little to Belcamp proposed 110 kV cable route	Fingal County Council, Glebe townland	• Modern roadway Stockhole Lane
Forrest Little to Belcamp proposed 110 kV cable route	Fingal County Council, Stockhole townland	• Modern roadway Stockhole Lane and Baskin Lane
Forrest Little to Belcamp proposed 110 kV cable route	Fingal County Council, Baskin townland	• Modern roadway Baskin Lane
Forrest Little to Belcamp proposed 110 kV cable route	Fingal County Council, Ballymacartle townland	• Modern roadway Baskin Lane
Forrest Little to Belcamp proposed 110 kV cable route	Fingal County Council, Bohammer townland	• Modern roadway Baskin Lane and R107
Forrest Little to Belcamp proposed 110 kV cable route	Fingal County Council, Kinsaley townland	• Modern roadway R107
Forrest Little to Belcamp proposed 110 kV cable route	Fingal County Council, Saint Doolaghs townland	• Modern roadway R107 with St. Doolagh's Ecclesiastical settlement to the west
Forrest Little to Belcamp proposed 110 kV cable route	Fingal County Council, Burgage townland	• Modern roadway R107
Forrest Little to Belcamp proposed 110 kV cable route	Dublin City Council, Balgriffin townland	• Modern roadway R107 and R139
Forrest Little to Belcamp proposed 110 kV cable route	Dublin City Council and Fingal County Council, Belcamp townland	• Modern roadway R139 and former Belcamp Demesne
Forrest Little to Belcamp Option 2 (*via* Stockhole Lane) proposed 110 kV cable route	Fingal County Council, Stockhole townland	• Suburban lands and farmland adjacent to Stockhole Lane and Clonshagh Road L2051
Forrest Little to Belcamp Option 2 (*via* Stockhole Lane) proposed 110 kV cable route	Dublin City Council and Fingal County Council, Clonshagh townland	• Suburban lands and farmland adjacent to Stockhole Lane and Clonshagh Road L2051, crossing eastwards to Belcamp through farmland

15.4.1 Topography, Route and Locational Detail

The proposed cable routes are located in north Co. Dublin, crossing 36 townlands in the parishes of Coolock, Santry, St. Margaret's, Cloghran, Kinsaley, Balgriffin and Swords. The environment generally comprises, low-lying flat lands with no notable prominences or significant landscape features, and with the landscape falling gently to the east toward Portmarnock and the North Dublin coast. There are no significant rivers within the study area and surrounding landscape, with the Sluice River, (which forms the townland boundary between St. Doolaghs and Burgage), being the only water course of note.

The proposed routes cross a variety of landscapes ranging from industrial, urban and suburban lands, to grazing and tillage lands. The lands in the vicinity of the M50 and Clonshaugh Business and Technological Park, southeast of Dublin Airport could be considered an industrial and commercial area. Immediately south of Dublin Airport in the vicinity of Ballystruan, Harristown and Shanganhill, the landscape is less developed, with the Dublin Airport runway layout dominating the environment to the north. The lands in this area generally comprise a mixture of some commercial properties, a large carpark, occasional single dwellings, and some grazing lands. The lands to the west of Dublin Airport are noticeably more rural in character than those to the south, as are the lands to the north of the airport. Northeast of Dublin Airport and in the vicinity of Stockhole there are occasional residential developments punctuating a largely rural landscape. Modern residential development continues to be predominantly ribbon development and along former local routes. East of Stockhole and in the vicinity of Kinsaley and St. Doolaghs, there is a noticeable increase in settlement density, with the lands immediately to the south comprising the suburban landscapes of Darndale and Donaghmede.

The farmlands surrounding the proposed development are generally enclosed by earthen banks with post and wire fencing. In general, these field boundaries reflect the local topography and watersheds, with some land striping of smaller parcels reflecting likely late-19th and early 20th century land reorganisation. Early cartographic sources show numerous large, landed estates and their associated houses in the area during the mid-19th century. The landscape was entirely rural in character at this time.

The bedrock geology surrounding the proposed development comprises entirely sedimentary limestones (Lucan Formation dark limestone and shale) and shales (Tober Colleen Formation Calcareous shale, limestone conglomerate). The overlying soil cover is a fine loamy drift with limestones. The farmlands in the area are considered to be productive and of good quality.

15.4.2 Archaeological and historic context

The proposed development crosses 36 townlands in a mixture of urban and rural landscapes in north County Dublin. In the barony of Coolock (to the south and comprising the majority of the proposed development), the cable route passes through the parishes of Coolock, Santry, St. Margaret's, Cloghran, Kinsaley and Balgriffin. To the north, the eastern part of the Ballystruan to Forrest Little cable route passes through the parish of Swords in the barony of Nethercross.

Prehistoric period

The coastal area of north County Dublin has produced relatively large quantities of flints, many of which may date to the Mesolithic Period, (c. 7000–5000 BC). Within the wider landscape of the proposed development, Mesolithic and Neolithic activity has been noted at the raised beaches at Sutton (Mitchell 1990; Stout & Stout 1992) and Portmarnock Football Club in Robswall townland (Keeling & Keeley 1994). Further north, systematic field walking at a proposed site for Malahide Football Club in 1999 revealed lithic material (Keeling & Keeley 1994; Purcell 1999). Other evidence for Mesolithic activity along the coast derives from fishing, such as fish traps. Wooden fish traps were recently discovered on the Mesolithic shoreline 5m below current ground level in the Spencer Dock area of Dublin City (McQuade 2008). The fish traps were constructed almost exclusively of hazel, with evidence of tool marks, and dated between 6100–5720BC. There are no recorded Mesolithic sites within the study area of the proposed development.

There is some evidence for activity within the wider north County Dublin area during the Neolithic period (c. 4,000BC– c 2,300 BC). Evidence includes a large, well preserved portal tomb at Howth Demesne, while excavations at Feltrim Hill revealed Neolithic ceramics and worked lithics, though no apparent remains of structures. Recent excavations on Lambay Island revealed areas of Neolithic activity associated with stone axe and flint tool manufacturing, some of which was of extremely high quality (Cooney 2000). The highest points of Lambay Island also have at least two cairns, mounds of stone that often cover burials, which may also date to the Neolithic. Stray finds of stone axeheads are common with examples recorded throughout Fingal.

Records held by the National Museum of Ireland indicate the presence of a Neolithic population in Fingal due to the discovery of stray artefacts dating to this period. Flint scatters dating to the Neolithic Period are commonly found along the north Dublin coastline, the largest of which is located at Paddy's Hill, Robswalls, south-east of Malahide and approximately 3.4 km northeast of the proposed development. Nearly 3,000 stone tools, including axeheads, flint scrapers, blades, knives and arrowheads, were recovered from this area.

The archaeological evidence within and surrounding the study area point to activity here during the Bronze Age. Two ring ditches (a funerary monument) are noted in the townlands Shanganhill (CH035; DU03905) and St. Doolagh's (CH167; DU00725). Barrows are burial monuments of the Bronze Age and Iron Age and usually consist of a circular central area, which may be flat or slightly dished (a ring-ditch) or domed (a ring-barrow), enclosed by a ditch and occasionally by an external bank. In the Belcamp Hall development, on the eastern side of the proposed route, a circular crop-mark that was thought to represent a possible ploughed-out barrow (SMR DU015-116), was subsequently identified by archaeological testing as an early modern designed landscape feature.

Although the most common archaeological site throughout Ireland with over 7000 known sites (Waddell 2010), no *fulachtaí fia*/burnt mounds have been identified within the study area, with only two examples known in close proximity to the proposed development in the townlands of Fosterstown South (DU11151) and Ballymun (DU141119). *Fulachtaí Fia* consist of a low mound of burnt stone commonly in horseshoe shape and are found in low-lying marshy areas or close to streams. The presence of fulachta fia is often indicative of Bronze Age seasonal communal activity in river valleys, lakeshores and boggy ground; scientific dating of a randomly excavated sample has shown a predominance of second millennium BC dates for their use (Brindley & Lanting 1990). There is no agreement that burnt mounds were cooking places, although it does seem that they were used to prepare large quantities of boiling water and that they were repeatedly used, resulting in a large mound of heat shattered stones accumulating. Other theories for the use of these sites include bathing, saunas or sweathouses, washing or dyeing large quantities of cloth, the preparation of leather and brewing.

Early Medieval Period

The early medieval period saw the development of a mixed-farming economy managed by kings, nobles and free farmers. There was an increase in settlement during the early medieval period (c. AD 500–AD 1200), and the ringfort, otherwise known as the 'rath' or 'fairy fort', is the best-known native monument of this period (Stout 1997).

Ringforts are essentially enclosed farmsteads dating to the early medieval period. The majority of these sites are univallate, surrounded by one ditch and bank, but some are surrounded by two and, to a lesser extent, three enclosing ditches and banks (known as bivallate and trivallate raths respectively). Although ringforts are the most common archaeological site in the country, they are a site type that is relatively scarce in the archaeological record for County Dublin. This is partly because of the urban or suburban nature of much of the county, but also because of the intensive agricultural practices carried out in north County Dublin, which has destroyed surface traces of these sites. The survival of destroyed ringforts or enclosures sub-surface has been demonstrated in the surrounding townlands, where geophysical survey and testing have identified the remains of several possible early medieval enclosed settlements, some of which are quite substantial in size (e.g. SMR sites DU015-117 & DU015-134 in Drumnigh townland). In addition, cropmarks have been recorded in Saint Doolaghs townland which may represent the remains of a ringfort and associated field system (DU015-123 & 124). In total there are seven enclosure sites within the study area (CH037; CH047; CH066, CH079; CH080; CH124 and CH173). CH066 (DU00427) in the townland of Forrest Great is located immediately north of Berberstown Road and the proposed cable route; Situated on level grassland, this site was formerly a platform type ringfort (diam*. c.* 50m) with a waterlogged external fosse (Healy 1975, 23). Its south-eastern quadrant has been truncated by works associated with Dublin Airport but the majority of the ringfort is visible as a crop mark.

There are two significant ecclesiastical sites of possible early medieval foundation located within the study area. Early Medieval monastic settlements are often defined by a large curvilinear bank and ditch or stone enclosure (topography permitting), enclosing an area circa 90-120m in diameter, often preserved in the line of townland or field boundaries and roads (Swan 1998). The majority of ecclesiastical settlements had one or more concentric curvilinear enclosures, with the church placed at the centre, in the inner sanctum (frequently preserved in the surviving graveyard boundary), with more secular activities (domestic, commercial and industrial) reserved for the outer enclosures. They usually had a network of radiating roads, with the principal approach road (often from the east) terminating in a triangular marketplace.

One such example is the ecclesiastical settlement associated with St Doolagh's Church (CH179; RMP DU00722) located immediately west of the proposed cable route. Not much is known about the founder of the church, St Doolagh; the earliest reference to him is found in the 9th century Martyrology of Oengus where he is referred to as 'Duilech of Clochar', though he probably lived in the early 7th century (Appleyard 1985). The church itself was constructed in the same style as Cormac's Chapel at Cashel and St Kevin's at Glendalough. The site incorporates most of the other features commonly associated with an ecclesiastical settlement including a burial ground (CH174), a Holy Well (CH171), a cross (CH169), and an enclosure (CH179). There may have been occupation of the site from the 6th or 7th century (Moss 2003, 124). A geophysical survey (Nichols 2009) identified several gullies, pits and possible kiln locations which points to human industry having taken place there. To the South of the church is a sub-rectangular network of ditches (DU015-009008-) which are likely enclosure remains contemporary with early settlement at St Doulaghs. West of the church is the possible remains of a sub-circular enclosure (DU015-009009-) which is not contemporary with the current settlement location of St Doolagh's.

To the west of the proposed cable route in the townland of St. Margaret's there is another ecclesiastical settlement of possible early foundation; CH048-CH50 and CH053 represent the remains of the medieval parish church (DU00578/PS02) and associated features which lie in the western end of a graveyard (CH048; DU00579/11348001) north of St. Margaret's village. This site has been described as the 'old church' in the Civil survey (1654-6) Simington 1945, 209; Tutty 1979, 155-157). The church was originally called Donaghmore and probably fell into ruin between 1630 and 1650.

The northernmost sections of the proposed cable route are located within the bounds of Fingal, the regional name applied to the northern half of County Dublin and although there is no direct evidence for Viking settlement within the study area, the Fingal area has strong Viking connections. According to Ball (1920), the name Fingal is used to denote the district into which predatory excursions were made by the Vikings. In the 9th century, a colony of Ostmen, or Northmen, was established in Dublin, ultimately settling in the tract lying northwards along the coast, which became known as Fine Gall or 'the territory of the strangers.' Bradley suggests Viking Dublin should be looked at as part of 'the rurally settled area of the Dublin Scandinavians' rather than as a number of successful trading settlements strategically located along the coast (in Simms & Fagan 1992). It is known that the Vikings used Baldoyle (to the east of the proposed cable route) as a harbour base and the placename probably derives from this settlement (baile dubh gaill or 'place of the dark stranger' is likely to be a reference to the Vikings of Danish origin, as they were darker-haired than the Norwegians. The early Viking settlement was located further inland than the present-day village, as the seashore was at a higher level than it is today (Hurley 1983).

Later Medieval Periods

From the 12th century, the Anglo-Normans, with a keen eye for good agricultural land, superimposed the manorial system of landholding they had acquired from England and the Welsh borderlands onto their newly conquered territory in Fingal. The majority of Anglo-Norman manors were on, or close to, rivers, and they often preferred established sites with an existing infrastructure (whether secular or ecclesiastical). The manor of Balgriffin was founded on land granted to a Welsh man by the name of Griffin at the end of the 12th century (it was originally known as Baile Hamund, becoming Baile Grifín – Balgriffin – after the new landowner; Walsh 1888). The manorial castle and church (DU015062 and DU015012) were erected in the lands of the present Balgriffin Park, which is located on the opposite side of the R107 road. It was a strategic location, on the north bank of the River Mayne and close to the established ecclesiastical settlement of St Doolagh.

Toponomy of Townlands

The Irish landscape is divided into approximately 60,000 townlands and the system of landholding is unique in Western Europe for its scale and antiquity. Research into the names (toponomy) of these land units frequently provides information relating to the townland's archaeology, history, folklore, ownership, topography or land use. Most placenames (including townland names) were anglicised by the time the Ordnance Survey began in the 1830s. However, despite some inaccuracies in translation, the Gaelic, Viking, Anglo-Norman and English origins of place names are generally recognisable. A study of the townland names can provide information on aspects of cultural heritage including descriptions of the use of the landscape by man and the potential presence of archaeological or cultural heritage sites or features.

The proposed development extends through or impacts on 36 townlands.

Table 15.8: Townlands traversed by the scheme

English Name	Irish Name	Glossary
Shrubs	*Fearann na dTor*[1]	Land; tall rock, steep rocky height; bush, clump
Kilmore Big	*An Choill Mhó*[2]*r*	Great, big; Wood
Santry	*Sheantraibh*[3]	Old tribe
Clonshagh	*Chluain Seach*[4]	Meadow, pasture
Turnapin Little	*Turnapain Beag*[5]	Tor na binne tower of the pinnacle or peak
Turnapin Great	*Turnapain Mór*[6]	Tor na binne tower of the pinnacle or peak
Dardistown	*Baile an Dairdisigh*[7]	Townland, town, homestead
Ballystruan	*Baile Sruáin*[8]	town of the streamlet
Coultry	*Choltraí*[9]	Hazel-land
Silloge	*Saileog*[10]	A sallow or land bearing swallows
Harristown	*Baile Anraí*[11]	Direct Gaeilge-English translation
Merryfalls	*NA*	NA
Dubber	*Dúbóthar*[12]	The black road
Shanganhill	*Cnoc na Seangán*[13]	Pismire or Ant Hill
Newtown	*An Baile Nua*[14]	Direct Gaeilge-English translation
Coldwinters	*Buaile an Gheimhridh*[15]	Direct Gaeilge-English translation

[1] https://www.logainm.ie/17291.aspx
[2] https://www.logainm.ie/17286.aspx
[3] https://www.logainm.ie/17290.aspx
[4] https://www.logainm.ie/16945.aspx
[5] https://www.logainm.ie/17312.aspx
[6] https://www.logainm.ie/17311.aspx
[7] https://www.logainm.ie/17304.aspx
[8] https://www.logainm.ie/17300.aspx
[9] https://www.logainm.ie/17303.aspx
[10] https://www.logainm.ie/17309.aspx
[11] https://www.logainm.ie/17340.aspx
[12] https://www.logainm.ie/17333.aspx
[13] https://www.logainm.ie/17348.aspx
[14] https://www.logainm.ie/17344.aspx
[15] https://www.logainm.ie/16975.aspx

English Name	Irish Name	Glossary
Saint Margaret's	*Teampall Mhaighréide*[16]	Church of St. Margaret
Sandyhill	*Cnoc an Ghainimh*[17]	Direct Gaeilge-English translation
Millhead	*Ceann an Mhuilinn*[18]	Mill - from having a windmill in it.
Kingstown	*Baile an Rí*[19]	Sr. Robt. King, Finglas
Barberstown	*Baile an Bhearbóraigh*[20]	1326 - Barbedoveston
Pickardstown	*Baile an Phiocóidigh*[21]	1444 Pycoteston
Forrest Great	*An Fhoraois Mhór*[22]	1256 -71 Werhewel (in the manor of Swords
Forrest Little	*An Fhoraois Bheag*[23]	1256 -71 Werhewel (in the manor of Swords
Cloghran (Coolock By.)	*Chlochráin*[24]	Stone
Fosterstown South	*Baile an Fhoraistéaraigh Theas*[25]	1326 Foresterestown
Glebe (Part of Portmarnock)	*An Ghléib*[26]	Church lands
Stockhole	*Steach Comhaill*[27]	Teach Comhghaill, Comhgall's house
Baskin	*Baiscín*[28]	Baiscinn, this denotes trees or land of trees
Ballymacartle	*Baile Mhic Thorcail*[29]	Mac Cartle's town
Bohammer	*Both Umair*[30]	Hut or booth of the trough
Saint Doolaghs	*Clochar Dúiligh*[31]	Saint Doolaghs
Kinsaley	*Cionn Sáile*[32]	Headland of the brine
Burgage	*Burgáiste*[33]	1735 Bargeage
Balgriffin	*Baile Ghrífín*[34]	Townland, town, homestea
Belcamp	*Belcamp*[35]	'a fancy name'

Recent Excavations

The Excavations Bulletin is an annual account of all excavations carried out under license. The database is available online at www.excavations.ie and includes excavations from 1985 to 2021. This database was consulted as part of the desktop research for this report to establish if any archaeological investigations had been carried out within the townlands traversed by the scheme route. The database produced 21 examples of licensed archaeological investigations undertaken within the townlands

[16] https://www.logainm.ie/895.aspx
[17] https://www.logainm.ie/17347.aspx
[18] https://www.logainm.ie/17343.aspx
[19] https://www.logainm.ie/17341.aspx
[20] https://www.logainm.ie/17336.aspx
[21] https://www.logainm.ie/17345.aspx
[22] https://www.logainm.ie/17070.aspx
[23] https://www.logainm.ie/17071.aspx
[24] https://www.logainm.ie/1412111.aspx
[25] https://www.logainm.ie/17074.aspx
[26] https://www.logainm.ie/16962.aspx
[27] https://www.logainm.ie/16949.aspx
[28] https://www.logainm.ie/16943.aspx
[29] https://www.logainm.ie/17278.aspx
[30] https://www.logainm.ie/17280.aspx
[31] https://www.logainm.ie/1391910.aspx
[32] https://www.logainm.ie/16957.aspx
[33] https://www.logainm.ie/17281.aspx
[34] https://www.logainm.ie/1372565.aspx
[35] https://www.logainm.ie/17279.aspx

incorporated by the study area (see also EIAR Volume 3 Appendix I - Drawing RH0485_Metrolink North Graphics). Of these 18 investigations, 12 sites did not identify any archaeological deposits. The remaining archaeological investigations comprised four excavations:

- Coldwinters/Newtown townland - *Prehistoric/medieval activity* (05E0236)
- Barberstown townland - Multi-phase occupation (17E0282)
- Barberstown townland - Medieval ditch and kiln (17E0090)
- Stockhole townland - Spread of charcoal-enriched soil (00E0951)
- Stockhole townland - Spread of charcoal-enriched soil (00E0950)
- Streamstown to St Doolagh's townlands - Multi-phase occupation (12E0185)
- St Doulagh's townland - Ecclesiastical enclosure (15E0329)
- St Doulagh's townland - Early Christian site with medieval and modern church, baptistry and holy well (No Excavation number recorded)
- St Doulagh's townland - Rath (No Excavation number recorded)

At Coldwinters in 2005 a levelled site (SMR 14:6) and two further sites (14:16 and 14:53) which were recorded from aerial photography were tested in as part of a planning application for Logistic warehousing units. The site had been used as a golf course in the recent past. Site 14:6 was located and found to exhibit significant subsurface archaeological features. Whilst the monument displays characteristics of an early medieval multivallate ringfort, a feature within the monument complex has yielded a sherd of pottery of probable prehistoric date. Site 14:16 was not located, and testing did not reveal anything of archaeological significance. It is likely, therefore, that landscaping undertaken during construction of the golf course has removed any traces of the monument. Site 14:53 was not located during the testing. The many features such as bunkers and tees in the vicinity of the monument site, and the landscaping required to create the golf course, may have served to remove all traces of the monument.

At Barberstown in 2017 Site D was located within the proposed development area of the North Runway Project at Dublin Airport in the townland of Barberstown. The site was identified during advance archaeological investigations which included non-invasive geophysical survey by Target Geophysics (16R0097) and archaeological test-trenching (16E0335) by Courtney Deery Heritage Consultancy. Again at Barberstown in 2017 a total of 38,419.6 linear metres of test trench was excavated in the greenfield areas of the scheme which made up a total of 31 fields. Eleven possible sites (Sites 1-11) were identified during the assessment phases of works consisting of isolated possible pits, post-holes and ditches. The excavation of these sites was undertaken under an extension to Licence No: 17E0282 beginning on 22 July 2017 until 2 November 2017. Of the eleven sites that were identified during the testing phase seven proved to be of archaeological significance upon further investigation.

At Stockhole townland in 2000 a small site was identified in the course of monitoring of topsoil-stripping prior to the construction of Phase 1 of the Airport–Balbriggan bypass. The site was identified as a small, oval area that contained charcoal-enriched soil and a small area of burnt topsoil to the east. It was 0.7m long, 0.62m wide and 0.05m deep. The charcoal-enriched soil lay directly on top of the subsoil. The site was probably a small pit that had been ploughed through. It is considered to be of no archaeological significance.

In the vicinity of St. Doolaghs previous excavations in 1989 and 1990 as part of a conservation and restoration project were undertaken within the church, adjacent to the baptistery, diagonally across one section of the site, and within the present graveyard. Whilst investigations adjacent to the baptistery revealed only 13/14th century sherds and slag, works within the church, diagonal trench and graveyard revealed significant remains, including numerous burials, slag, stratified occupation debris, and enclosure ditches (Swan,1989 & 1990). In July 2015 a trench (1.5m wide by 10m, 15m^2) was excavated to investigate and to characterise the anomaly identified by geophysical survey in 2009, thought to be an enclosure ditch and to attempt to retrieve cultural artefacts and datable material from the feature.

15.4.3 Designated archaeological and architectural sites

Record of Monuments and Places (RMPs)

Section 12 (1) of the National Monuments Act 1994 made provision for the establishment and maintenance of a Record of Monuments and Places (RMP). Under this Act, each site recorded in the Record of Monuments and Places is granted statutory protection. When the owner or occupier of a property, or any other person proposes to carry out, or to cause, or to permit the carrying out of any work at or in relation to a recorded archaeological monument they are required to give notice in writing to the Minister for Housing, Local Government and Heritage 2 months before commencing that work.

There are 27 RMPs located within the study area:

Table 15.9: RMPs located within the study area

CH Number	Type	Number	Townland
CH066	Ringfort	DU00427/PS04	Forrest Great
CH070	House - 16th/17th century	DU00428	Forrest Great
CH079	Ringfort	DU00430/PS06	Cloghran
CH049	Church	DU00578/PS02	St. Margarets
CH048	Graveyard/cemetery	DU00579/11348001	St. Margarets
CH050	Chapel	DU00580	St. Margarets
CH043	Ritual site - holy well	DU00582/Protected Structure	St. Margarets
CH112	Ritual site - holy well	DU00597/PS09	Cloghran (Coolock By.)
CH120	Mound	DU00702/PS11	Cloghran (Coolock By.)
CH177	Church	DU00718	Saint Doolaghs
CH169	Cross	DU00719	Saint Doolaghs
CH171	Ritual site - holy well	DU00721/11350017	Saint Doolaghs
CH179	Ecclesiastical enclosure	DU00722	Saint Doolaghs
CH174	Graveyard	DU00723	Saint Doolaghs
CH167	Ringditch	DU00725	Saint Doolaghs
CH044	Building	DU03345	St. Margarets
CH035	Ringditch	DU03905	Shanganhill
CH037	Ringfort - unclassified	DU03906	Shanganhill
CH104	Graveyard	DU03915/PS08	Cloghran (Coolock By.)
CH178	Architectural fragment	DU04182	Saint Doolaghs
CH080	Enclosure	DU04364	Forrestown South
CH047	Enclosure	DU04466	Sandyhill
CH124	Enclosure	DU04505	Stockhole
CH125	Field system	DU04506	Stockhole
CH180	Field system	DU04757	Saint Doolaghs
CH173	Enclosure	DU04758	Saint Doolaghs
CH273	Enclosure	DU04425	Dubber

Of the 27 RMP sites identified within the study area, seven are also registered as Protected Structures by Dublin City Council or Fingal County Council (CH043; CH049; CH066; CH079; CH104; CH112 and CH120). Two RMPs (CH048 and CH171) are also recorded in the National Inventory of Architectural Heritage. The RMPs are generally reflective of the archaeological evidence for settlement across the wider landscape. There are two notable RMP clusters in the vicinity of St Margaret's and St. Doolaghs. Both are associated with ecclesiastical settlement.

CH169 (DU00719) represents a stone cross located at the entrance to St. Doolaghs church and graveyard and immediately adjacent to the redline boundary (< 3m) for the proposed route. CH066 (DU00427) represents the site of a platform-type ringfort located adjacent to the proposed redline boundary for the route. Its south-eastern quadrant has been truncated by works associated with Dublin airport but the majority of the ringfort is visible as a crop mark.

National Monuments

National monuments are broken into two categories; National Monuments in the ownership or guardianship of the state and National Monuments in the ownership or guardianship of a local authority. Section 8 of the National Monuments (Amendment) Act 1954 provides for the publication of a list of monuments, the preservation, of which, are considered to be of national importance. Two months' notice must be given to the Minister for Housing, Local Government and Heritage where work is proposed to be carried out at, or in relation to, any National Monument.

There are no National Monuments incorporated by the study area.

Sites with Preservation Orders

The National Monuments Act 1930-2004 provide for the making of Preservation Orders and Temporary Preservation Orders in respect of National Monuments. Under Section 8 of the National Monument Act 1930 (as amended) the Minister for Housing, Local Government and Heritage, can place a Preservation Order on a monument if, in the Ministers' opinion, it is a National Monument in danger of being or is actually being destroyed, injured or removed or is falling into decay through neglect. The Preservation Order ensures that the monument shall be safeguarded from destruction, alteration, injury, or removal, by any person or persons without the written consent of the Minister.

There are no sites with preservation orders incorporated by the study area.

Protected Structures

The Dublin City Development Plan (2022-2028) and Fingal County Council Development Plan (2023-2029) was consulted for schedules of Protected Structures. These are buildings that a planning authority considers to be of special interest from an architectural, historical, archaeological, artistic, cultural, scientific, social, and/or technical point of view. Protected Structures receive statutory protection from injury or demolition under Section 57 (1) of the Planning and Development Act 2000 (as amended). Protected structure status does not exclude development or alteration but requires the developer to consult with the relevant planning authority to ensure that elements which make the structure significant are not lost during development.

There are 18 Protected Structures incorporated by the study area.

Table 15.10: Protected Structures incorporated by the study area

CH Number	Type	Number	Townland
CH043	Ritual site - holy well	DU00582/PS17	St. Margarets
CH046	Protected Structure	PS01	St. Margarets
CH049	Church	DU00578/PS02	St. Margarets
CH052	Windmill (in ruins)	PS03	Millhead
CH066	Ringfort	DU00427/PS04	Forrest Great
CH069	Dwelling/Building	PS05	Forrest Great
CH079	Ringfort	DU00430/PS06	Cloghran
CH101	Building	PS07	Cloghran (Swords)

CH Number	Type	Number	Townland
CH104	Graveyard	DU03915/PS08	Cloghran (Coolock By.)
CH111	Holy Well	PS09	Cloghran (Coolock By.)
CH112	Ritual site - holy well	DU00597/PS09	Cloghran (Coolock By.)
CH113	Farm House	PS10	Cloghran (Coolock By.)
CH120	Mound	DU00702/PS11	Cloghran (Coolock By.)
CH150	Building	11350010/PS12	Bohammer
CH164	Building (Gate Lodge)	11350018/PS13	Saint Doolaghs
CH166	Building (House)	11350019/PS14	Saint Doolaghs
CH186	Milestone	11350029/PS15	Saint Doolaghs
CH187	Building (Estate House)	11350021/PS16	Saint Doolaghs

Of the 18 protected structures located within the study area, seven are also recorded as RMPs (CH043; CH049; CH066; CH079; CH104; CH112 and CH120). In addition to this, five of these Protected Structures are recorded in the National Inventory of Architectural Heritage (CH120; CH150; CH164; CH166; CH186 and CH187).

CH111 represents a holy well situated adjacent to the proposed redline boundary for the cable route.

Architectural Conservation Areas

The Dublin City Development Plan (2022-2028) and Fingal County Council Development Plan (2023-2029) was consulted for records relating to Architectural Conservation Areas (hereinafter ‘ACAs’). The stated objective of ACAs is to conserve and enhance the special character of the area, including traditional building stock and material finishes, spaces, streetscapes, landscape and setting.

There are no areas listed as ACAs incorporated by the study area.

National Inventory of Architectural Heritage (NIAH)

The National Inventory of Architectural Heritage (hereinafter the 'NIAH') is a state initiative under the administration of the DHLGH and was established on a statutory basis under the provisions of the Architectural Heritage (National Inventory) and Historic Monuments (Miscellaneous Provisions) Act 1999. Its purpose is to identify, record and evaluate the post-1700 architectural heritage of Ireland, uniformly and consistently, as an aid in the protection and conservation of the built heritage. NIAH surveys provide the basis for the recommendations of the Minister for Housing, Local Government and Heritage to the planning authorities for the inclusion of particular structures in their Record of Protected Structures (RPS).

There are 13 structures listed in the NIAH incorporated by the study area:

Table 15.11: Structures listed in the NIAH incorporated by the study area

CH Number	Type	Number	Townland
CH048	Graveyard/cemetery	DU00579/11348001	St. Margarets
CH150	Building	11350010/PS12	Bohammer
CH151	Postbox	11350005	Kinsaley
CH152	Church	11350003	Kinsaley
CH160	Building (Gate Lodge)	11350012	Bohammer
CH161	Building (Estate House)	11350011	Bohammer
CH164	Building (Gate Lodge)	11350018/PS13	Saint Doolaghs
CH166	Building (House)	11350019/PS14	Saint Doolaghs
CH171	Ritual site - holy well	DU00721/11350017	Saint Doolaghs
CH185	Building (Gate Lodge)	11350027	Saint Doolaghs

CH Number	Type	Number	Townland
CH186	Milestone	11350029/PS15	Saint Doolaghs
CH187	Building (Estate House)	11350021/PS16	Saint Doolaghs
CH211	Building (Estate House)	11349005	Belcamp

Of the 13 NIAH sites located within the study area, two are also recorded as RMPs (CH048 and CH171), while five are also recorded as Protected Structures (CH150; CH164; CH166; CH186 and CH187).

15.4.4 Undesignated cultural heritage sites

This section deals with sites that are considered to be of cultural heritage value but which do not fall within the above categories as they are not registered. Such sites may include lime kilns, dwellings / outhouses, trackways or townland boundaries etc. identifiable on the 1st edition 6-inch/25-inch OS maps. Aerial photography from the 1995, 2000, and 2005 fly-overs was inspected, as well as the latest OSI images, Google Earth and Bing Maps satellite imagery. In addition, publicly available LiDAR data published by TII and OPW was also consulted.

Undesignated cultural heritage sites that comprise extant remains

Undesignated cultural heritage sites which comprise extant remains are typically, though not always, post-1700 in date. The majority of these sites are represented on the 6" and/or 25" Ordnance Survey maps. Many constitute country houses and associated lodges, while others may be bridges or industrial features, hollow-ways, mass rocks etc.

There are 40 undesignated cultural heritage site that comprises extant remains within the study area:

Table 15.12: Undesignated cultural heritage site that comprises extant remains within the study area

CH Number	Type	Number	Townland
CH008	Bridge	UCH01	Turnapin Little
CH016	Building	UCH04	Ballystruan
CH020	Building	UCH08	Turnapin Great
CH089	Drain/Leat	UCH39	Kingstown
CH094	Building	UCH43	St. Margarets
CH097	Laneyway with adjacent drain	UCH46	Barberstown
CH106	Buildings (Post Office)	UCH51	Cloghran (Coolock By.)
CH107	Quarry/Lead Mine	UCH52	Cloghran (Coolock By.)
CH114	Laneway	UCH56	Cloghran (Coolock By.)
CH121	Building/Glebe House	UCH59	Glebe (Part of Portmarnock)
CH129	Building	UCH63	Stockhole
CH131	Buildings	UCH64	Baskin
CH132	Building	UCH65	Baskin
CH145	Bridge	UCH80	Ballymacartle/Bohammer
CH146	Buildings	UCH81	Bohammer
CH153	Buildings	UCH84	Kinsaley
CH156	Buildings	UCH86	Kinsaley
CH157	Building	UCH87	Kinsaley
CH183	Buildings (School)	UCH92	Saint Doolaghs
CH184	Building	UCH93	Saint Doolaghs
CH191	Bridge	UCH95	Saint Doolaghs/Burgage/Balgriffin
CH192	Weir	UCH96	Saint Doolaghs

CH Number	Type	Number	Townland
CH196	Cemetery	UCH98/1990:031	Balgriffin
CH197	Building	UCH99	Belcamp
CH201	Bridge/Culvert	UCH102	Belcamp
CH222	Buildings	UCH114	Stockhole
CH231	Pump	UCH123	Bohammer
CH237	Building complex	UCH129	Bohammer
CH238	Building	UCH130	Saint Doolaghs
CH239	Building (Gate Lodge)	UCH131	Balgriffin
CH240	Buildings (Terrace)	UCH132	Belcamp
CH241	Buildings (Terrace)	UCH133	Balgriffin
CH243	Buildings	UCH135	Balgriffin
CH244	Building (Lodge)	UCH136	Belcamp
CH245	Building (Hall)	UCH137	Belcamp
CH247	Buildings	UCH139	Baskin/Ballymacartle
CH250	Buildings (Housing Estate)	UCH140	Turnapin Little
CH268	Buildings	UCH151	Clonshagh

Of the 40 undesignated cultural heritage site that comprises extant remains, one (CH196; a cemetery) has also undergone archaeological investigations in 1990.

Of these 40 undesignated cultural heritage sites, 6 are located within or partially within the proposed redline boundary for the cable route; (CH097; CH145; CH191; CH231; CH244; CH250).

Undesignated cultural heritage sites that do not comprise extant remains

Undesignated cultural heritage features which do comprise extant remains typically include features such as lime kilns, dwellings, outhouses, trackways, etc. which are identifiable on maps such as the 6" and / or 25" Ordnance Surveys but which no longer have an above-ground presence.

Table 15.13: Undesignated cultural heritage sites that do not comprise extant remains located within the study area

There are 114 undesignated cultural heritage site that do not comprise extant remains within the study area:

CH Number	Type	Number	Townland	Located within Red Line Boundary?
CH014	Pump	UCH02	Turnapin Great	No
CH015	Building	UCH03	Ballystruan	Yes
CH017	Pump	UCH05	Turnapin Great	No
CH018	Buildings	UCH06	Turnapin Little	No
CH019	Buildings	UCH07	Dardistown	No
CH021	Building	UCH09	Turnapin Great	Yes
CH022	Building	UCH10	Dardistown	Yes
CH023	Building	UCH11	Dardistown	No
CH024	Building	UCH012	Turnapin Great	No
CH025	Demesne Landscape	UCH013	Santry	Yes
CH026	Demesne Landscape	UCH014	Kilmore Big	Yes
CH030	Demesne Landscape	UCH015	Harristown	No

CH Number	Type	Number	Townland	Located within Red Line Boundary?
CH031	Building	UCH016	Harristown	No
CH034	Buildings	UCH017	Shanganhill	No
CH038	Buildings	UCH018	Shanganhill	No
CH041	Possible Culvert	UCH019	Newtown	Yes
CH053	Well	UCH20	Millhead	No
CH054	Buildings	UCH21	Millhead	No
CH056	Roadway	UCH22	Millhead/Kingstown	No
CH057	Laneway	UCH23	Kingstown	No
CH061	Building	UCH24	Barberstown	Yes
CH063	Building	UCH25	Barberstown	Yes
CH067	Building	UCH26	Forrest Great	No
CH068	Lime Kiln	UCH27	Forrest Great	Yes
CH071	Building complex	UCH28	Forrest Great	Yes
CH072	Drain/Leat	UCH29	Forrest Great	Yes
CH074	Buildings	UCH30	Forrest Little	No
CH075	Laneway	UCH31	Forrest Little	No
CH077	Building	UCH32	Forrest Little	No
CH078	Building	UCH33	Forrest Little	No
CH084	Well	UCH34	Harristown	No
CH085	Bridge	UCH35	Harristown	No
CH086	Gravel Pit	UCH36	Shanganhill	No
CH087	Building	UCH37	Sandyhill	No
CH088	Footpath	UCH38	Sandyhill	No
CH090	Drain/Leat	UCH40	Forrest Great	Yes
CH092	Building	UCH41	Harristown	No
CH093	Possible Lime Kin	UCH42	Harristown	No
CH095	Laneway	UCH44	Sandyhill	Yes
CH096	Bridge and Leat/drain	UCH45	Barberstown	No
CH098	Possible Orchard	UCH47	Forrest Great	Yes
CH099	Possible Pond	UCH48	Forrest Great	Yes
CH100	Drain/Leat	UCH49	Forrest Little	No
CH105	Building	UCH50	Cloghran (Coolock By.)	No
CH108	Building	UCH53	Cloghran (Coolock By.)	No
CH109	Possible Well	UCH54	Cloghran (Coolock By.)	Yes
CH110	Laneway	UCH55	Cloghran (Coolock By.)	Yes
CH117	Leat/Drain	UCH57	Cloghran (Coolock By.)	Yes
CH119	Building	UCH58	Cloghran (Coolock By.)	No
CH126	Buildings	UCH60	Stockhole	No
CH127	Building	UCH61	Stockhole	No
CH128	Building	UCH62	Stockhole	No
CH133	Building	UCH66	Baskin	No
CH134	Building	UCH67	Baskin	No
CH135	Building	UCH68	Baskin	No
CH136	Building	UCH69	Baskin	Yes

CH Number	Type	Number	Townland	Located within Red Line Boundary?
CH137	Pigeon House	UCH70	Baskin	No
CH138	Building	UCH71	Baskin	No
CH139	Building	UCH72	Baskin	No
CH140	Building	UCH73	Baskin	No
CH141	Building	UCH74	Baskin	No
CH143	Building	UCH75	Baskin	No
CH147	Building	UCH82	Bohammer	No
CH148	Building	UCH83	Bohammer	No
CH155	Building	UCH85	Bohammer	No
CH158	Building	UCH88	Kinsaley	Yes
CH159	Building (Gate Lodge)	UCH89	Bohammer	No
CH181	Building	UCH90	Saint Doolaghs	No
CH182	Buildings (Terrace)	UCH91	Saint Doolaghs	No
CH188	Building	UCH94	Saint Doolaghs	Yes
CH193	Building	UCH97	Burgage	No
CH199	Building	UCH100	Balgriffin	No
CH200	Building (Gate Lodge)	UCH101	Belcamp	No
CH202	Building	UCH103	Balgriffin	No
CH204	Building	UCH104	Balgriffin	No
CH205	Walled Garden	UCH105	Balgriffin	No
CH208	Building	UCH106	Belcamp	No
CH209	Building (Gate Lodge)	UCH107	Belcamp	Yes
CH216	Well	UCH108	Cloghran	No
CH217	Building (structure)	UCH109	Cloghran	No
CH218	Building	UCH110	Cloghran	No
CH219	Building	UCH111	Cloghran	No
CH220	Building	UCH112	Glebe (Part of Portmarnock)	Yes
CH221	Building	UCH113	Cloghran	No
CH223	Buildings	UCH115	Baskin	No
CH224	Building	UCH116	Baskin	No
CH225	Well	UCH117	Baskin	Yes
CH226	Well	UCH118	Baskin	No
CH227	Building	UCH119	Ballymacartle	Yes
CH228	Bridge/Culvert	UCH120	Bohammer	Yes
CH229	Building	UCH121	Kinsaley	No
CH230	Buildings	UCH122	Kinsaley	No
CH232	Pump	UCH124	Baskin	No
CH233	Pump	UCH125	Stockhole	No
CH234	Smithy/Dispensary	UCH126	Cloghran	No
CH235	Buildings (Terrace)	UCH127	Bohammer	No
CH236	Building	UCH128	Bohammer	No
CH242	Roadside Structures	UCH134	Balgriffin	No
CH246	Building	UCH138	Bohammer	No
CH253	Buildings	UCH140	Stockhole	No

CH Number	Type	Number	Townland	Located within Red Line Boundary?
CH254	Building	UCH141	Stockhole	No
CH255	Building	UCH142	Stockhole	No
CH256	Buildings	UCH143	Stockhole	Yes
CH257	Building	UCH144	Stockhole	No
CH259	Buildings	UCH145	Stockhole	Yes
CH260	Building	UCH146	Stockhole	Yes
CH264	Gate Lodge	UCH147	Clonshagh	Yes
CH265	Gate Lodge	UCH148	Upper Middletown	No
CH266	Buildings	UCH149	Clonshagh	No
CH267	Building	UCH150	Clonshagh	Yes
CH269	Building	UCH152	Clonshagh	No
CH270	Building	UCH153	Clonshagh	Yes
CH271	Building	UCH154	Clonshagh	Yes
CH272	Well	UCH155	Clonshagh	Yes

There are 114 undesignated cultural heritage sites that do not comprise extant remains located within the study area. Of these 114 undesignated cultural heritage sites, 31 are located within or partially within the proposed redline boundary for the cable route.

Townland boundaries

A townland is the smallest official land unit in the country. Ireland is made up of approximately 60,000 townlands. As a result, townland boundaries are ubiquitous in the Irish countryside, and have been incorporated into the modern agricultural landscape. Many townlands predate the arrival of the Anglo Normans, and Irish historical documents consistently use townland names throughout the historic period to describe areas and locate events accurately in their geographical context. This suggests that many the boundaries of many of these territorial units preserve landscape divisions from the medieval period and perhaps earlier. The townland names and boundaries were standardised in the nineteenth century when the Ordnance Survey began to produce large-scale maps of the country. Research into the name of these land units frequently provides information relating to its archaeology, history, folklore, ownership, topography or land use.

Although the proposed development crosses 41 townland boundaries, in all but one case the boundaries have been broken by the modern road network, with the exception of CH261 Stockhole/Clonshagh townland boundary, which may potentially be crossed off-road.

Table 15.14: Townland boundaries intersected by the scheme

CH No	Location	Summary
CH001	Kilmore Big/Shrubs	Modern roadway within an industrial estate.
CH003	Kilmore Big/Santry	Modern roadway within an industrial estate.
CH006	Santry/Clonshagh	Brownfield site to the west of M1. No longer extant.
CH007	Clonshagh/Turnapin Little	Part of modern carriageway. Possibly some remnants of boundary to the southwest of roadway.
CH010	Turnapin Great/Dardistown	Modern Swords Road.
CH011	Ballystruan/Turnapin Great	Modern Old Airport Road.
CH012	Coultry/Ballystruan	Laneway to the south of old airport road.

CH No	Location	Summary
CH013	Coultry/Ballymun	Field Boundary. Possibly some remnants of this boundary to the south of roadway
CH027	Silloge/Ballymun	Modern roadway associated with Dublin Airport. Part of townland boundary may survive to the south.
CH028	Harristown/Silloge	Modern roadway associated with Dublin Airport. Part of townland boundary may survive to the south.
CH032	Shanganhill/Harristown	Part of modern R108 roadway.
CH036	Newtown/Shanganhill	Modern R108 roadway.
CH040	St. Margarets/Shanganhill	Part of R122 roadway
CH042	St. Margarets/Shanganhill	Part of R122 roadway.
CH051	Sandyhill/Millhead	Part of L3132 roadway.
CH055	Millhead/Kingstown	Part of R108 roadway, but still extant to the northwest of roadway.
CH058	Kingstown/Barberstown	Part of R108 roadway, but still extant to the northwest of roadway.
CH064	Barberstown/Pickardstown	Part of R108 roadway.
CH065	Pickardstown/Forrest Great	Part of R108 roadway but survives to the north of roadway.
CH073	Forrest Great/Forrest Little	Part of Naul Road but may survive to the north of the roadway.
CH076	Forrest Little/Cloghran	Part of Naul Road but may survive to the north of the roadway.
CH118	Cloghran (Coolock By.)/Glebe (Part of Portmarnock)	Part of Stockhole Lane roadway, possibly still extant to the east of roadway.
CH122	Stockhole/Glebe (Part of Portmarnock)	Broken by modern roadway, but possibly maintained in the property boundary of adjacent property to the east
CH123	Cloghran (Coolock By.)/Stockhole	Broken by modern roadway, but possibly maintained in the property boundary of adjacent property to the west
CH130	Stockhole/Baskin	Part of Baskin Lane roadway, possibly surviving to the north and south of roadway.
CH142	Baskin/Ballymacartle	Now a street following the line of the townland boundary at this location
CH144	Baskin/Bohammer	No longer extant at this location
CH149	Bohammer/Kinsaley	Survives in field boundary to the north of the roadway - Cut by roadway
CH154	Kinsaley/Bohammer	Now cut by modern roadway
CH162	Bohammer/Saint Doolaghs	Part of R107 roadway.
CH163	Kinsaley/Saint Doolaghs	Possible remains of walling located adjacent and to east of modern roadway
CH189	Saint Doolaghs/Burgage	Part of Limekiln Lane. Saint Doolaghs/Burgage townland Boundary - formed by roadway/Limekiln lane
CH190	Saint Doolaghs/Balgriffin	Formed by stream
CH194	Burgage/Balgriffin	Formed partially by property boundary/Car's Lane
CH198	Belcamp/Balgriffin	Part of roundabout at junction of R107 and R139 roadway.
CH206	Balgriffin/Newtown	Part of R139 roadway. No Longer extant
CH207	Belcamp/Balgriffin	Part of R139 roadway and cut by modern roadway. May survive to the north and south of roadway.
CH261	Stockhole/Clonshagh	Stockhole/Clonshagh townland boundary formed by roadway
CH262	Stockhole/Middletown	Stockhole/Middletown townland boundary formed by roadway
CH274	Dubber/Shanganhill	Dubber/Shanganhill townland boundary (modern roadway to the south of Dublin Airport)
CH275	Merryfalls/Shanganhill	Merryfalls/Shanganhill townland boundary (modern roadway to the south of Dublin Airport)

The proposed cable route crosses 41 townland boundaries.

15.4.5 Areas of Archaeological Potential

Areas of archaeological potential (AAPs) are areas or locations whose characteristics present a higher potential for unknown archaeological features to be present. Nine AAPs were identified;

CH No	Location	Summary
CH002	Kilmore Big/Shrubs	Santry River forming Kilmore Big/Shrubs townland boundary
CH009	Turnapin Little/Turnapin Great	Unnamed Stream marked on the 1st Edition Ordnance Survey Sheet- crossed by Turnapin Bridge
CH091	Forrest Little	A Spring marked on the 1st Edition 25-inch Ordnance Survey Sheet
CH210	Belcamp	Small stream marked on 1st Edition Ordnance Survey Sheet
CH212	Belcamp/Balgriffin	Small stream marked on 1st Edition Ordnance Survey Sheet
CH213	Belcamp/Saint Doolaghs	Small stream marked on 1st Edition Ordnance Survey Sheet
CH214	Ballymacartle/Bohammer	Small stream marked on 1st Edition Ordnance Survey Sheet
CH215	Cloghran	Small stream marked on 1st Edition Ordnance Survey Sheet
CH258	Stockhole	A spring or pool marked as 'Shanes Ford' on the 1st Edition Ordnance Survey Sheet located to the east of roadway

All nine of the Ares of Archaeological Potential identified in this report are associated with minor watercourses and springs. Watercourses are considered to be of high archaeological potential, often associated with fulachta fiadh or burnt mounds in rural settings and more commonly, fords, ancient bridging sites, mills, quays and harbours in urban locations. As a result, the CH sites listed above and all contained within EIAR Volume 3: Appendices – Appendix I – Archaeology CH Sites are considered to be Areas of Archaeological Potential

15.5 Likely Significant Impacts of the Proposed Development

15.5.1 Construction Phase

Direct Impacts: Most impacts during construction phase are likely to be direct impacts as a result of sub-surface disturbance or construction works. All impacts at this phase are considered to be negative and permanent. These are summarised in Table 15.15.

Note it is considered that the in- route options will not have an impact on townland boundaries where the townland boundary has already been transected by the existing roadway (and the scheme route of the proposed development will be within that existing break) or where the existing roadway demarcates the current townland boundary. Direct impacts to townland boundaries have only been identified where the proposed scheme development requires a new break or the removal of a section of extant townland boundary.

Table 15.15:Summary of CH Sites subject to Direct Impacts at Construction Phase

Proposed Development	Descriptor (and Townland)	Construction Phase Impacts
Open-trench excavation and subsurface Cable installation	(CH002) AAP01 Santry River forming Kilmore Big/Shrubs townland boundary	Potential for direct impact to the Area of Archaeological Potential which falls within the Redline Boundary for the proposed development.
Open-trench excavation and subsurface Cable installation	(CH009) AAP02 Unnamed Stream marked on the 1st Edition 6-inch Ordnance Survey Sheet- crossed by Turnapin Bridge	Potential for direct impact to the Area of Archaeological Potential which falls within the Redline Boundary for the proposed development.
Open-trench excavation and	(CH066) Ringfort DU00427/PS04 located immediately to the north of roadway. The	Due to proximity of development, there is potential for direct impact to previously

Proposed Development	Descriptor (and Townland)	Construction Phase Impacts
subsurface Cable installation	development redline boundary crosses the Zone of Notification for this monument.	unknown archaeological deposits associated with this RMP.
Open-trench excavation and subsurface Cable installation	(CH111) PS09 Holy Well - Enclosed stone well at base of steps under tree in field off Stockhole Lane	Due to proximity of development, there is potential for direct impact to this adjacent Protected Structure.
Open-trench excavation and subsurface Cable installation	(CH145) Bridge shown crossing a small stream on the 1st Edition 6-inch Ordnance Survey Sheet - Modern bridge railings are now at this location, though some elements of the bridge may survive under the roadway	Potential for direct impact to bridge of unknown date.
Open-trench excavation and subsurface Cable installation	(CH191) St. Doolaghs Bridge marked on the 1st Edition 6-inch Ordnance Survey Sheet	Potential for direct impact to bridge of unknown date.
Open-trench excavation and subsurface Cable installation	(CH210) AAP05 Small stream marked on 1st Edition 6-inch Ordnance Survey Sheet	Potential for direct impact to the Area of Archaeological Potential which falls within the Redline Boundary for the proposed development.
Open-trench excavation and subsurface Cable installation	(CH212) AAP06 Small stream marked on 1st Edition 6-inch Ordnance Survey Sheet	Potential for direct impact to the Area of Archaeological Potential which falls within the Redline Boundary for the proposed development.
Open-trench excavation and subsurface Cable installation	(CH213) AAP07 Small stream marked on 1st Edition 6-inch Ordnance Survey Sheet	Potential for direct impact to the Area of Archaeological Potential which falls within the Redline Boundary for the proposed development.
Open-trench excavation and subsurface Cable installation	(CH214) AAP08 Small stream marked on 1st Edition 6-inch Ordnance Survey Sheet	Potential for direct impact to the Area of Archaeological Potential which falls within the Redline Boundary for the proposed development.
Open-trench excavation and subsurface Cable installation	(CH215) AAP09 Small stream marked on 1st Edition 6-inch Ordnance Survey Sheet	Potential for direct impact to the Area of Archaeological Potential which falls within the Redline Boundary for the proposed development.
Open-trench excavation and subsurface Cable installation	(CH231) Roadside Pump marked on 1st Edition 25-inch Ordnance Survey Sheet - It remains *in situ*	Located within the proposed development Redline Boundary. There is potential for direct impact to this Roadside Pump.
Open-trench excavation and subsurface Cable installation	(CH244) A building marked as 'Lodge' associated with the Belcamp Estate. Located to the north of roadway and marked on the 1st Edition 25-inch Ordnance Survey Sheet.	Located partially within the proposed development Redline Boundary. There is potential for direct impact associated walling
Open-trench excavation and subsurface Cable installation	(CH258) A spring or pool marked as 'Shanes Ford' on the First Edition Ordnance Survey Sheet located to the east of roadway	Potential for direct impact to the Area of Archaeological Potential which falls within the Redline Boundary for the proposed development.
Open-trench excavation and subsurface Cable installation	(CH259) A group of buildings arranged around a yard marked on the First Edition 6-inch Ordnance Survey Sheet to the west of roadway	Located within the proposed development Redline Boundary. Potential direct impact on subsurface remains
Open-trench excavation and subsurface Cable installation	(CH261) Stockhole/Clonshagh townland boundary formed by roadway	Located within the proposed development Redline Boundary. Potential direct impact on this townland boundary
Open-trench excavation and	St. Doolaghs Ecclesiastical Site (CH170-CH182) 99E 0470; DU00721/11350017;	Due to proximity of development, there is potential for direct impact to previously

Proposed Development	Descriptor (and Townland)	Construction Phase Impacts
subsurface Cable installation	15E0329; DU04758; DU00723; E000508; 99E0470; DU00718; DU04182; DU00722; DU04757. The development redline boundary crosses numerous Zones of Notification at the St. Doolaghs complex.	unknown archaeological deposits associated with these RMPs

Table 15.16 Description of Impacts to CH sites at Construction Phase

CH No	Summary	Description of Impact	Magnitude of Impact prior to implementation of mitigation measures	Baseline Value	Significance of Impact before implementation of mitigation measures
(CH002)	AAP01 Santry River forming Kilmore Big/Shrubs townland boundary	Open-trench excavation would impact on this river channel, which represents an area of archaeological potential. Note, where an HDD methodology is proposed to facilitate a crossing, this will avoid any direct impact on the subject river or water course at that location.	Moderate	Medium/High	Moderate
(CH009)	AAP02 Unnamed Stream marked on the 1st Edition Ordnance Survey Sheet- crossed by Turnapin Bridge	Open-trench would impact on this river channel, which represents an area of archaeological potential. Note, where an HDD methodology is proposed to facilitate a crossing, this will avoid any direct impact on the subject river or water course at that location.	Moderate	Medium/High	Moderate
(CH066)	Ringfort DU00427/PS04 located immediately to the north of roadway	This site lies immediately adjacent to the redline boundary of the proposed route, although not in the line of the proposed cable trench. It is noted that the portion of the monument, which is located closest to the redline boundary, has previously be disturbed by the installation of runway lighting for Dublin airport. The monument does not appear to have been excavated at this time. The Zone of Notification for this RMP is crossed by the cable route. Facilitating works, or variation of the cable trench route within the redline boundary will have a potential to impact on this CH site.	Major	Very High	Very Significant
(CH111)	PS09 Holy Well - Enclosed stone well at base of steps under tree in field off Stockhole Lane	This site lies adjacent to the redline boundary of the proposed route, but not in the line of the proposed cable trench route. Facilitating works, or variation of the cable route within the redline boundary have the potential to impact on this CH site.	Major	Very High	Very Significant

CH No	Summary	Description of Impact	Magnitude of Impact prior to implementation of mitigation measures	Baseline Value	Significance of Impact before implementation of mitigation measures
(CH145)	Bridge shown crossing a small stream on the 1st Edition 6-inch Ordnance Survey Sheet - Modern bridge railings are now at this location, though some elements of the bridge may survive under the roadway	Open-trench excavation or other works to facilitate the proposed cable route would impact on this bridge. Note, where an HDD methodology is proposed to facilitate a crossing, this will avoid any direct impact on the subject river or water course at that location.	Moderate	Medium/High	Moderate
(CH191)	St. Doolaghs Bridge marked on the 1st Edition Ordnance Survey Sheet	Open-trench excavation or other works to facilitate the proposed cable route would impact on this bridge. Note, where an HDD methodology is proposed to facilitate a crossing, this will avoid any direct impact on the subject river or water course at that location.	Moderate	Medium/High	Moderate
(CH210)	AAP05 Small stream marked on 1st Edition 6-inch Ordnance Survey Sheet	Excavation of Cable Trench would impact on this river channel, which is an area of archaeological potential. Note, where an HDD methodology is proposed to facilitate a crossing, this will avoid any direct impact on the subject river or water course at that location.	Moderate	Medium/High	Moderate
(CH212)	AAP06 Small stream marked on 1st Edition 6-inch Ordnance Survey Sheet	Excavation of Cable Trench would impact on this river channel, which is an area of archaeological potential. Note, where an HDD methodology is proposed to facilitate a crossing, this will avoid any direct impact on the subject river or water course at that location.	Moderate	Medium/High	Moderate
(CH213)	AAP07 Small stream marked on 1st Edition 6-inch Ordnance Survey Sheet	Excavation of Cable Trench would impact on this river channel, which is an area of archaeological potential. Note, where an HDD methodology is proposed to facilitate a crossing, this will avoid any direct impact on the subject river or water course at that location.	Moderate	Medium/High	Moderate
(CH214)	AAP08 Small stream marked on 1st Edition 6-inch Ordnance Survey Sheet	Excavation of Cable Trench would impact on this river channel, which is an area of archaeological potential. Note, where an HDD methodology is proposed to facilitate a crossing, this will avoid any direct impact on the subject river or water course at that location.	Moderate	Medium/High	Moderate

CH No	Summary	Description of Impact	Magnitude of Impact prior to implementation of mitigation measures	Baseline Value	Significance of Impact before implementation of mitigation measures
(CH215)	AAP09 Small stream marked on 1st Edition 6-inch Ordnance Survey Sheet	Excavation of Cable Trench would impact on this river channel, which is an area of archaeological potential. Note, where an HDD methodology is proposed to facilitate a crossing, this will avoid any direct impact on the subject river or water course at that location.	Moderate	Medium/High	Moderate
(CH231)	Roadside Pump marked on 1st Edition 25-inch Ordnance Survey Sheet - It remains in situ	This CH site lies within the redline boundary of the proposed route, but not in the line of the proposed cable trench route. Facilitating works, or variation of the cable route within the redline boundary have the potential to impact on this CH site	Major	Medium/High	Significant
(CH244)	A building marked as 'Lodge' associated with the Belcamp Estate. Located to the north of roadway and marked on the 1st Edition 25-inch Ordnance Survey Sheet.	The marked location of these building lie within the proposed redline boundary for the cable route. Open-trench excavation would impact on any subsurface remains of these buildings	Moderate	Medium/High	Moderate
(CH258)	A spring or pool marked as 'Shanes Ford' on the 1st Edition Ordnance Survey Sheet located to the east of roadway	Open-trench would impact on this channel, which represents an area of archaeological potential. Note, where an HDD methodology is proposed to facilitate a crossing, this will avoid any direct impact on the subject river or water course at that location.	Moderate	Medium/High	Moderate
(CH259)	A group of buildings arranged around a yard marked on the 1st edition Ordnance Survey Sheet to the west of roadway	The marked location of these building lie within the proposed redline boundary for the cable route. Open-trench excavation would impact on any subsurface remains of these buildings	Moderate	Medium / Low	Moderate
(CH261)	Stockhole/Clonshagh townland boundary formed by roadway	The current redline boundary and cable trench route may potentially cross this townland boundary off—road. The Cable Route would transect the extant field boundary hedgerow that demarcates this townland boundary. Townland boundary will remain readable within the landscape despite this additional break in its circuit.	Moderate	Medium / Low	Moderate

CH No	Summary	Description of Impact	Magnitude of Impact prior to implementation of mitigation measures	Baseline Value	Significance of Impact before implementation of mitigation measures
St. Doolaghs Ecclesiastical Site (CH170-CH182)	St. Doolaghs Ecclesiastical Site (CH170-CH182) 99E 0470; DU00721/11350017; 15E0329; DU04758; DU00723; E000508; 99E0470; DU00718; DU04182; DU00722; DU04757; DU00719	The St. Doolaghs Ecclesiastical site is located immediately adjacent and to the west of the proposed cable route. It includes eight RMPs, One NIAH site, One Protected Structure, and has been the site of three archaeological excavations. The proposed redline boundary crosses both the Zone of Notification, and the marked location for DU00719 (a cross), and also crosses the Zone of Notification for all other RMPs associated with the St. Doolaghs site. The line of the proposed cable trench does not cross any RMPs, but is less than 4 m from the site of DU00719. St. Doolaghs represents an ecclesiastical site of early foundation, and the full extents of the original settlement are not known. It is likely that the original settlement site extended well beyond the present bounds, with potential for deposits to have remained *in situ* underneath the modern road surface.	Major	Very High	Very Significant

Indirect Impacts: It is not proposed to consider any impacts on setting for any sites either within the development site or the wider study area during the construction phase, as construction works constitute a short-term alteration to the landscape.

15.5.2 Operational Phase

Direct Impacts: There will be no direct impacts on archaeological, architectural or cultural heritage sites at operational phase.

Indirect Impacts: Indirect impacts at operation stage would largely occur as a result of impacts on the setting of site (notably visual impacts) and on the integrity and character. The proposed cable route infrastructure will be sub-surface with limited potential for visual impacts. As a result, no indirect impacts or impacts on setting have been identified at operational phase.

15.5.3 Do Nothing

The 'do-nothing' scenario will have no impact on archaeological, architectural or cultural heritage.

15.5.4 Decommissioning Phase

Direct Impacts: There will be no direct impacts on archaeological, architectural or cultural heritage sites at decommissioning phase.

Indirect Impacts: There will be no indirect impacts on archaeological, architectural or cultural heritage sites at decommissioning phase.

15.5.5 Cumulative Effects

Effects to archaeology and cultural heritage as a result of the proposed development are direct effects limited to its boundaries so any potential for cumulative impact is restricted to developments whose boundary overlap with the proposed development or with receptors that will be affected by the proposed development. The proposed cable route infrastructure will be largely sub-surface, and no cumulative impacts are foreseen.

15.6 Mitigation and Monitoring Measures

The mitigation strategies outlined in this section detail the techniques to be adopted to ameliorate the impacts that the proposed development may have on features of archaeological, architectural and / or cultural heritage within the study area during both the construction and operation phases of the proposed development.

The following proposed mitigation measures are subject to approval by the relevant planning authorities and the National Monuments Service of DHLGH.

- As part of an advance works programme prior to the commencement of construction, a suitably qualified project archaeologist will be appointed for the purpose of managing the progress of archaeological works, and ensuring that all archaeological works are carried out in accordance with the terms of any directions.
- As part of an advance works programme prior to construction, an underwater archaeological survey will be undertaken for all watercourses, where damming and trenching will be undertaken, along the cable route. This survey and evaluation will
  - Be carried out by a suitably qualified and suitably experienced underwater archaeologist under licence
  - Incorporate appropriate dive and wade survey as well as metal detection survey

  - Result in a detailed report setting out any findings and outlining any further mitigation measures that will be employed in relation to the proposed development. This report will be submitted to the National Monuments Service (DHLGH).

  Note, where an HDD methodology is proposed to facilitate a crossing, this will avoid any direct impact on the subject river or water course at that location.
- As part of an advance works programme prior to construction, a combination of advance confirmatory geophysical survey and advance confirmatory archaeological test trenching will be carried out, where feasible, for all off-road sections of the cable routes as well as the proposed Laydown Areas, compounds and passing bays, should any groundworks be required in these locations. This advance prospection will:
  - Be carried out by a suitably qualified archaeologist under licence
  - Result in a detailed report setting out any findings and outlining any further mitigation measures that will be employed in relation to the proposed development. This report will be submitted to the National Monuments Service (DHLGH).
- It is recommended that buffer zones be established for all RMPs/Protected Structures which are adjacent to the redline boundary so as be excluded from areas where any construction works will take place
  - Buffer zone to be informed by preceding geophysical survey at CH066 (enclosure DU00427/PS04);
  - 5 m buffer zone around CH111 (Holy Well PS09) where no works shall take place. Protective hoarding will also be put in place for the duration of works in the vicinity of the Holy Well;
  - 5 m buffer zone around CH169 (DU00719; a roadside cross) where no works shall take place. Protective hoarding will also be put in place for the duration of works in the vicinity of the cross
- It is recommended that temporary hoarding be established for CH231 (an *in situ* roadside pump located within the redline boundary) to protect it
- As part of an advance works programme prior to construction, a condition survey will be undertaken of CH111 (Holy Well PS09); CH145 (Bridge); CH191 (St. Doolaghs Bridge); and CH231 (an *in situ* pump located within the redline boundary). These condition surveys will inform the requirement for any additional mitigation measures as determined by the project archaeologist in consultation with the National Monuments Service (DHLGH).
- Where a section of an upstanding townland boundary must be removed (CH261) then:
  - A representative cross-section of the townland boundary will be investigated and recorded by a suitably qualified archaeologist prior to removal.
- All sub-surface groundworks associated with the proposed development works will be subject to a programme of archaeological monitoring.
  - This will be carried out by a suitably qualified archaeologist under license and in accordance with the provisions of the National Monuments Acts 1930-2004.
  - If significant archaeological material is encountered during the course of archaeological monitoring, then resolution of any such significant material will be determined in consultation with the National Monuments Service (DHLGH).
  - Where possible, every reasonable effort will be made to preserve *in situ* or reduce the impact on any identified archaeological material. Where preservation in situ cannot be achieved, either in whole or in part, then a programme of full archaeological excavation will be implemented to ensure the preservation by record of the portion of the site that will be directly impacted upon. This work will be carried out by a suitably qualified archaeologist under license and in accordance with the provisions of the National Monuments Acts 1930-2004.

– A written report will be prepared detailing the results of all archaeological work undertaken.

15.7 Residual Impacts

Table 15.17: Residual Impacts to CH sites once mitigation measures have been implemented

Ch. No	Phase	Impact Type	Mitigation Measures	Magnitude of Impact after implementation of mitigation measures	Significance of Impact after implementation of mitigation measures
CH002	Construction	Direct	A pre-construction underwater archaeological survey will be undertaken for this and all watercourses along the route of the proposed development. This survey and evaluation will: • Be carried out by a suitably qualified and suitably experienced underwater archaeologist under licence • Incorporate appropriate dive and wade survey as well as metal detection survey • Result in a detailed report setting out any findings and outlining any further mitigation measures that will be employed in relation to the proposed development. This report will be submitted to the National Monuments Service (DHLGH). Note, where an HDD methodology is proposed to facilitate a crossing, this will avoid any direct impact on the subject river or water course at that location	Minor	Slight
CH009	Construction	Direct	A pre-construction underwater archaeological survey will be undertaken for this and all watercourses along the route of the proposed development. This survey and evaluation will: • Be carried out by a suitably qualified and suitably experienced underwater archaeologist under licence • Incorporate appropriate dive and wade survey as well as metal detection survey • Result in a detailed report setting out any findings and outlining any further mitigation measures that will be employed in relation to the proposed development. This report will be submitted to the National Monuments Service (DHLGH).	Minor	Slight
CH066	Construction	Direct	• As part of an advance works programme prior to construction, a combination of advance geophysical survey and advance archaeological test trenching will be carried out to determine the extents of this RMP. It is recommended that a buffer zone then be established so as to exclude the monument from areas where any construction works will take place Buffer zone to be informed by preceding geophysical survey at CH066 (enclosure DU00427/PS04);	Moderate	Moderate

Ch. No	Phase	Impact Type	Mitigation Measures	Magnitude of Impact after implementation of mitigation measures	Significance of Impact after implementation of mitigation measures
			• All sub-surface groundworks associated with the proposed development works shall be subject to a programme of archaeological monitoring. If significant archaeological material is encountered during the course of archaeological monitoring, then resolution of any such significant material will be determined in consultation with the National Monuments Service (DHLGH).		
CH111	Construction	Direct	• It is recommended that a 5 m buffer zone around CH111 (Holy Well PS09) where no works shall take place. Protective hoarding will also be put in place for the duration of works in the vicinity of the Holy Well • As part of an advance works programme prior to construction, a condition survey shall be undertaken of CH111 (Holy Well PS09). This condition survey shall inform the requirement for any additional mitigation measures as determined by the project archaeologist in consultation with the National Monuments Service (DHLGH).	Minor	Slight
CH145	Construction	Direct	• As part of an advance works programme prior to construction, a condition survey shall be undertaken of CH145 (Bridge). This condition survey shall inform the requirement for any additional mitigation measures as determined by the project archaeologist in consultation with the National Monuments Service (DHLGH).	Minor	Slight
CH191	Construction	Direct	• As part of an advance works programme prior to construction, a condition survey shall be undertaken of CH191 (St. Doolaghs Bridge). This condition survey shall inform the requirement for any additional mitigation measures as determined by the project archaeologist in consultation with the National Monuments Service (DHLGH).	Minor	Slight
CH210	Construction	Direct	A pre-construction underwater archaeological survey will be undertaken for this and all watercourses along the route of the proposed development. This survey and evaluation will: • Be carried out by a suitably qualified and suitably experienced underwater archaeologist under licence • Incorporate appropriate dive and wade survey as well as metal detection survey • Result in a detailed report setting out any findings and outlining any further mitigation measures that will be employed in relation to the proposed development. This report will be	Minor	Slight

Ch. No	Phase	Impact Type	Mitigation Measures	Magnitude of Impact after implementation of mitigation measures	Significance of Impact after implementation of mitigation measures
			submitted to the National Monuments Service (DHLGH). Note, where an HDD methodology is proposed to facilitate a crossing, this will avoid any direct impact on the subject river or water course at that location		
CH212	Construction	Direct	A pre-construction underwater archaeological survey will be undertaken for this and all watercourses along the route of the proposed development. This survey and evaluation will: • Be carried out by a suitably qualified and suitably experienced underwater archaeologist under licence • Incorporate appropriate dive and wade survey as well as metal detection survey • Result in a detailed report setting out any findings and outlining any further mitigation measures that will be employed in relation to the proposed development. This report will be submitted to the National Monuments Service (DHLGH). Note, where an HDD methodology is proposed to facilitate a crossing, this will avoid any direct impact on the subject river or water course at that location	Minor	Slight
CH213	Construction	Direct	A pre-construction underwater archaeological survey will be undertaken for this and all watercourses along the route of the proposed development. This survey and evaluation will: • Be carried out by a suitably qualified and suitably experienced underwater archaeologist under licence • Incorporate appropriate dive and wade survey as well as metal detection survey • Result in a detailed report setting out any findings and outlining any further mitigation measures that will be employed in relation to the proposed development. This report will be submitted to the National Monuments Service (DHLGH). Note, where an HDD methodology is proposed to facilitate a crossing, this will avoid any direct impact on the subject river or water course at that location	Minor	Slight
CH214	Construction	Direct	A pre-construction underwater archaeological survey will be undertaken for this and all watercourses along the route of the proposed development. This survey and evaluation will: • Be carried out by a suitably qualified and suitably experienced underwater archaeologist under licence • Incorporate appropriate dive and wade survey as well as metal detection survey	Minor	Slight

Ch. No	Phase	Impact Type	Mitigation Measures	Magnitude of Impact after implementation of mitigation measures	Significance of Impact after implementation of mitigation measures
			• Result in a detailed report setting out any findings and outlining any further mitigation measures that will be employed in relation to the proposed development. This report will be submitted to the National Monuments Service (DHLGH). Note, where an HDD methodology is proposed to facilitate a crossing, this will avoid any direct impact on the subject river or water course at that location		
CH215	Construction	Direct	A pre-construction underwater archaeological survey will be undertaken for this and all watercourses along the route of the proposed development. This survey and evaluation will: • Be carried out by a suitably qualified and suitably experienced underwater archaeologist under licence • Incorporate appropriate dive and wade survey as well as metal detection survey • Result in a detailed report setting out any findings and outlining any further mitigation measures that will be employed in relation to the proposed development. This report will be submitted to the National Monuments Service (DHLGH). Note, where an HDD methodology is proposed to facilitate a crossing, this will avoid any direct impact on the subject river or water course at that location	Minor	Slight
CH231	Construction		• It is recommended that temporary hoarding be established for CH231 (an in situ roadside pump located within the redline boundary) to protect it • As part of an advance works programme prior to construction, a condition survey shall be undertaken of CH231 (*in situ* pump). This condition survey shall inform the requirement for any additional mitigation measures as determined by the project archaeologist in consultation with the National Monuments Service (DHLGH).	Minor	Negligible
CH244	Construction		All sub-surface groundworks associated with the proposed development works, including in the vicinity of CH244 shall be subject to a programme of archaeological monitoring. If significant archaeological material is encountered during the course of archaeological monitoring, then resolution of any such significant material will be determined in consultation with the National Monuments Service (DHLGH).	Minor	Slight
CH258	Construction		All sub-surface groundworks associated with the proposed development works, including in the vicinity of CH258 shall be subject to a programme of archaeological monitoring. If significant	Minor	Slight

Ch. No	Phase	Impact Type	Mitigation Measures	Magnitude of Impact after implementation of mitigation measures	Significance of Impact after implementation of mitigation measures
			archaeological material is encountered during the course of archaeological monitoring, then resolution of any such significant material will be determined in consultation with the National Monuments Service (DHLGH).		
CH259	Construction	Direct	All sub-surface groundworks associated with the proposed development works, including in the vicinity of CH259 shall be subject to a programme of archaeological monitoring. If significant archaeological material is encountered during the course of archaeological monitoring, then resolution of any such significant material will be determined in consultation with the National Monuments Service (DHLGH).	Minor	Slight
CH261	Construction	Direct	A representative cross-section of the townland boundary will be investigated and recorded by a suitably qualified archaeologist prior to removal	Minor	Slight
St. Doolaghs Ecclesiastical Site; (CH170-CH182; DU00721/11350017; DU04758; DU00723; DU00718; DU04182; DU00722; DU04757; DU00719)	Construction	Direct	It is recommended that – 5 m buffer zone around CH169 (DU00719; a roadside cross) where no works shall take place. Protective hoarding will also be put in place for the duration of works in the vicinity of the cross All sub-surface groundworks associated with the proposed development works, including in the vicinity of the St. Doolagh's complex, shall be subject to a programme of archaeological monitoring. If significant archaeological material is encountered during the course of archaeological monitoring, then resolution of any such significant material will be determined in consultation with the National Monuments Service (DHLGH).	Moderate	Moderate

MetroLink 110kV Underground Cables

Volume 2: Environmental Impact Assessment Report
Chapter 16 - Material Assets

June 2023

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16 Material Assets

16.1 Introduction

This chapter considers the likely significant impacts on built services and infrastructure and is based on the information contained in Chapter 6, Description of the Proposed Development. This chapter considers utility use and waste management. Likely significant impacts on roads and traffic are discussed in Chapter 17 Roads and Traffic. A Construction Resource Waste Management Plan (CRWMP) is provided as part of the Construction Environmental Management Plan (CEMP) included within this EIAR in Appendix D.

16.2 Methodology and Limitations

16.2.1 Methodology

This chapter has been prepared in accordance with the methodology described in Chapter 2 Methodology and is based on Chapter 6 - Description of the Proposed Development

16.2.2 Limitations

Identification of utility services has been based on publicly available datasets and mapping and consultation with utility providers and was undertaken by ESBN.

It is possible that some utility services located in proximity to the works may not be identified in this EIAR, however the embedded and additional mitigation detailed and proposed as part of this EIAR will be implemented when dealing with any such features to ensure that the proposed development will not result in impacts beyond the parameters assessed in this EIAR.

16.3 Receiving Environment

16.3.1 Utility Services

Existing utility services of varying diameters and depths are located along the routes and some will be required to be crossed. These crossings will be facilitated by either open cut trenching or by use of Horizontal Directional Drilling (HDD).

Service records were obtained by ESBN from the following utility providers and considered within route selection:

- Gas Networks Ireland
- Irish Water
- Eir
- Virgin Media
- BT
- Enet
- T50 network (from Zayo)
- DAA Aviation Fuel Line (planning drawings only)
- ESB records were obtained from ESB Networks Central Site.

Where existing utilities / services are found, the works will be diverted around the service / utility or below them depending on the degree of complexity found.

Where existing utilities or other obstacles (e.g. culverts) need to be crossed the depth to the top of the power ducts can be reduced or, alternatively, the cable can be buried below the service.

In the case of shallow burial, steel plates will be installed above the ducts and the ducts will be encased in concrete.

In some cases, an existing utility service may be relocated to facilitate the installation of the cable. The works required to do so will be coordinated with the service / utility provider and a complete coordinated methodology will be mutually agreed between all parties prior to commencement of any diversions taking place. All proposed work methodologies will aim to prevent any outages or loss of service. If the risk cannot be avoided, prearranged agreements on outages will be set in place prior to works commencement.

Any proposed cable routes, which may come in close proximity or cross existing HV cables, will be subject to a series of HV cable rating calculations, with the aim to avoid any de-rating of either HV cable. These HV cable rating calculations will be undertaken at the detailed design stage of the project. The majority of the cable routes follow existing road infrastructure.

Known utilities along each of the cable routes are detailed in Table 16.1.

Table 16.1: Known Utilities

Cable	Utilities
Forest Little to Belcamp – Option 1 and Option 2	Gas, water, sewer, electricity, telecoms, GDD project, storm water, 220kV Finglas – Belcamp cable; 110kV Belcamp – Darndale 1 & 3 cable; future 220kV Belcamp – Shellybanks cable; 110kV Belcamp – Newbury 1 & 2 cables (future); North Irish Sea Array cable (future),
Newbury to Ballystruan	Floodlighting (Starlights GAA and Na Fianna GAA pitches); airport landing light, GDD project, telecoms, gas mains, comms ducts, gas, Eir, sewer, water. This route runs parallel / adjacent to the following HV cables: 110kV Finglas – Dardistown 110kV cable 110kV Dardistown – Kilmore cables, as a double circuit 110kV double circuit Kilmore – Baskin 38kV Finglas – Clonshaugh and Collinstown – Clonshaugh 220kV Belcamp – Finglas cable 110kV Kilmore – Poppintree cable 110kV Finglas – Grange cable
Ballystruan to Forest Little	Fibre optic, water, telecoms, 110kV Finglas – Dardistown (existing); 220kV Belcamp – Shellybanks (future)

16.3.2 Waste Management

The Waste Framework Directive 2008/98/EC defines waste as *"any substance or object that the holder discards or intends to or is required to discard".*

The Waste Hierarchy described in the framework prioritises prevention over re-use, recycling recovery and disposal, as illustrated in Figure 16.1.

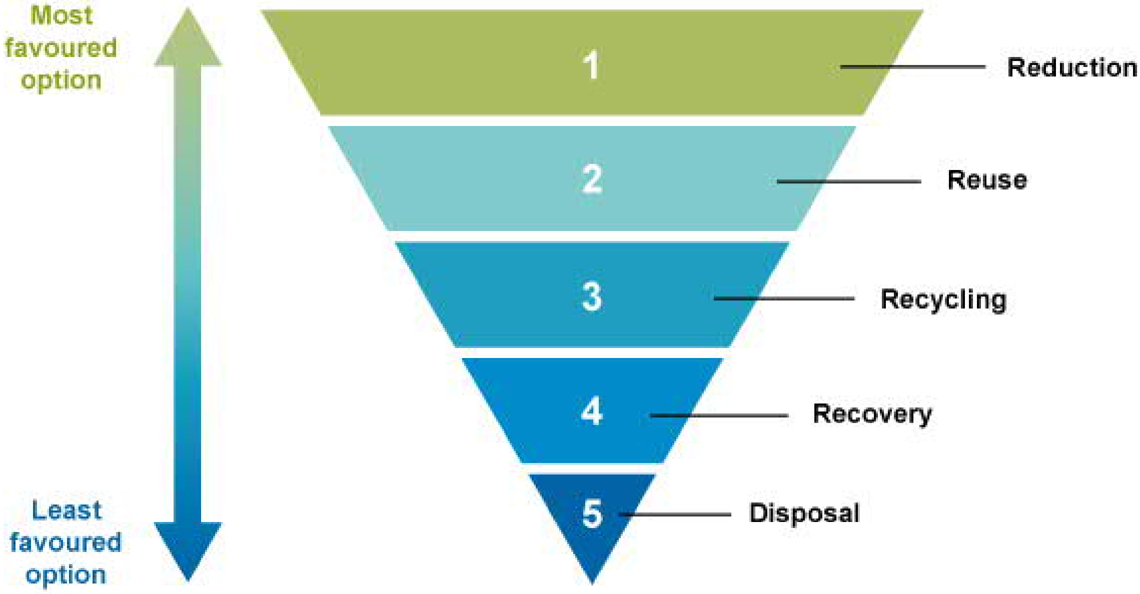
The framework also provides a target of 70% of non-hazardous, non-soil and stone construction and demolition (C&D) waste to be recovered, reused or recycled. According to the EPA [1]press release in October 2022 (reference year 2020), Ireland achieved 78% material recovery in 2020,

95% of C&D waste underwent final treatment in Ireland in 2020; only 5% was exported abroad for final treatment. Most of the C&D waste finally treated in Ireland (82%) was backfilled in 2020,

[1] Construction & Demolition | Environmental Protection Agency (epa.ie)

while only 8% of all C&D waste was recycled. Recycling was the main treatment operation for the smaller fractions of metal, plastic, glass and wood.

Figure 16.1: Waste Framework Directive



Source: OLCreate: UrbanSanWaste_1.0 Study Session 1 Introduction to Sanitation and Waste Management: Figure 1.4 The waste hierarchy. (open.edu)

16.4 Likely Effects of the Proposed Development

16.4.1 Construction Phase

16.4.1.1 Utility Services

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.

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. Consultation with relevant neighbouring parties will be undertaken prior to any proposed disruptions.

There is potential for disruption to services during construction works. Impacts will be localised and temporary in duration, however, the measures detailed above will ensure that this will not result in significant impacts in the receiving environment. The effects are likely to be temporary and **imperceptible – slight**.

16.4.1.2 Utility Use

During the construction phase temporary construction compounds will be required along the underground cable route. Welfare facilities will be provided at these locations and any discharges will be connected to a sealed holding tank to be emptied and disposed of off-site by a licenced contractor to an approved licenced facility. Water will be tankered onto site as required. Consequently, significant adverse effects on utility services during the construction phase are not likely.

16.4.1.3 Waste Management

Waste will be managed in accordance with the Waste Management Hierarchy and *Guidance on Waste Acceptance Criteria at Authorised Soil Recovery Facilities* (EPA. 2020) and the Waste Management Act 1996, as amended and associated Regulations. Consequently, significant adverse effects associated with waste management are not anticipated. Further detail on waste management is provided in the Construction Resource Waste Management Plan (CWRMP) which forms part of the Construction and Environmental Management Plan (CEMP), presented in Appendix D. All operations will be managed and programmed in such a manner as to prevent/minimise waste production and maximise upper tier waste management (i.e. re-use, recycle, and recovery).

Waste sent off site for recovery or disposal will only be conveyed by an authorised waste contractor and transported from the proposed development site to an authorised site of recovery/disposal in a manner which will not adversely affect the environment. All employees will be required to comply with the obligations under the Plan.

The main waste stream arisings (including surplus materials) which are likely to be generated during the construction phase, are anticipated to be as included within Table 16.2.

In accordance with EU targets under the Waste Framework Directive (2008/98/EC). Waste management targets for anticipated waste arisings regarding reuse / recycling / recovery and disposal rates are to be agreed by the appointed Contractor.

Table 16.2: Main Waste Types and Associated EWC codes

Waste Type	European Waste Classification (EWC) Code[2]	Waste Classification
Soil and Stones	17 05 04	Non-hazardous
Nominally Empty Containers containing residues of or contaminated by dangerous substances	15 01 10*	Hazardous
Waste Diesel and Oil	13 07 01*	Hazardous
Waste Fuels (Miscellaneous)	13 07 03*	Hazardous
Scrap Metal	17 04 07	Non-hazardous
Bitumen / Tarmacadam	17 03 02	Non-hazardous
Surplus Bitumen / Tarmacadam	17 03 02	Non-hazardous
Gypsum-based construction material	17 08 02	Non-hazardous
Mixed construction and demolition waste	17 09 04	Non-hazardous
Surplus Cabling	17 04 11	Non-hazardous
Plastic Pipe Cut-offs	17 02 03	Non-hazardous
Plastic Packaging	15 01 02	Non-hazardous
Paper and Cardboard Packaging	15 01 01	Non-hazardous

The appointed Contractors will dispose of all debris, surplus material (including surplus excavated material) and all other waste materials arising from or connected with the proposed development to an appropriate licensed waste disposal site/facility, fully in accordance with the requirements of waste management legislation the Waste Management Acts 1996 (as

[2] The selected European Waste Classification (EWC) codes provided are provisional only. In a number of instances more than one EWC may be considered appropriate. Care should be taken to ensure that the waste collectors permit includes all EWC codes specified in the appropriate documentation.

amended) and associated Regulations and to the satisfaction of the Engineer and relevant local authorities.

Waste management during the construction works will be required. Impacts will be temporary in duration, however, the measures detailed above will ensure that this will not result in significant impacts in the receiving environment. The effects are likely to be **temporary** and **slight**.

16.4.2 Operational and Maintenance Phase

16.4.2.1 Utility Services and Utility Use

No significant adverse operational phase impacts on utilities services or utility use are anticipated.

Should maintenance measures necessitate it, 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. Consultation with relevant neighbouring parties will be undertaken prior to any proposed disruptions.

16.4.2.2 Waste Management

All waste generated during the operational phase, 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 appropriately authorised destinations for waste materials.

It is anticipated that there will be minimal waste arisings during the operational phase, potentially associated with specific repairs (PPE), other waste materials will be dealt with as per the construction phase.

16.4.3 Decommissioning Phase

It is not intended to decommission the proposed electricity infrastructure. Equipment will be replaced but decommissioning is not intended. In the highly unlikely event that decommissioning is required, the effects would be similar but less than those assessed during construction of the underground cables.

16.4.4 Cumulative Effects

16.4.4.1 Intra-Project Effects - MetroLink

There is potential that the construction phase of the MetroLink Rail project and the proposed development may coincide at the interface between the UCG and the proposed new substations, depending on the construction timetable. Impacts will be localised and temporary in duration, the effects are likely to be **slight** in the absence of mitigation, with consultation between the contractors required.

16.4.4.2 Other Developments

There is a risk of cumulative construction phase impacts associated with the construction phases of the proposed development occurring at the same time as the construction phases of other developments in the area. Consequently, there will be a need to ensure that where works are occurring in parallel that appropriate mitigation measures are considered within the parameters assessed in this EIAR, including the scheduling of works, regular liaison meetings between project teams to ensure plans are co-ordinated and impacts are minimised.

With the implementation of these measures, and the subsequently identified mitigation measures, the cumulative impacts associated with the construction phase will be **slight**.

16.5 Mitigation and Monitoring Measures

16.5.1 Construction Phase

16.5.1.1 Utilities

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.

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. Consultation with relevant neighbouring parties will be undertaken prior to any proposed disruptions. At this stage disruption is anticipated to be minimal as the works will be carried out within the existing road network.

16.5.1.2 Waste Management

A Construction Resource Waste Management Plan (as part of the CEMP) is appended to this EIAR (Appendix D). Waste arisings will be handled, stored, managed and re-used or recycled as close as practicable to the point of origin.

Wastes will be sent off site for recovery or disposal will only be conveyed by an authorised waste contractor and transported from the proposed development site to an authorised site of recovery / disposal in accordance with the Waste Management Act 1996 and associated amendments and regulations and in a manner which will not adversely affect the environment. All employees will be made aware of their obligations under the CEMP and CRWMP.

The CEMP and CRWMP will be available for inspection at all reasonable times for examination by the Local Authority.

16.5.2 Operational Phase

16.5.2.1 Utilities

As no adverse operational phase impacts on utilities are anticipated, no specific mitigation measures are proposed.

16.5.2.2 Waste Management

All waste generated during the operational phase 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 appropriately authorised destinations for waste materials.

16.6 Residual Impacts

Once construction is complete significant adverse residual impacts associated with the proposed development on built services, waste management and natural assets are unlikely.

The implementation of the mitigation measures detailed above, including the CEMP will reduce the environmental impact of the proposed development. Certain brief and temporary slight impacts such as relocation of utilities may be unavoidable but no significant impacts are anticipated provided the mitigation described herein is implemented.

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Volume 2: Environmental Impact Assessment Report - Chapter 17 Roads & Traffic

June 2023

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17 Roads and Traffic

17.1 Introduction

This chapter of the EIAR presents an assessment of the likely Roads and Traffic effects on public roads impacted by the construction of the proposed MetroLink Underground Cable development (hereafter referred to as 'the Proposed Development').

Cumulative effects associated with committed developments which are likely to generate traffic utilising the same public roads within the Proposed Development Study Area, at the same time as traffic generated by the Proposed Development, have also been assessed.

This chapter sets out the existing conditions of the receiving environment and details the traffic that is likely to be generated during the construction phase of the Proposed Development, assessing the effect upon the local, regional and national road network, and identifies measures to reduce network disruption.

Consistent with advice set out in the *TII Traffic and Transport Assessment Guidelines* (May 2014), a full Traffic and Transport Assessment (TTA) is not warranted in respect of the operational phase given the negligible volume of road traffic that will be generated by the Proposed Development when in operation and similarly potential Roads and Traffic-related environmental impacts during the operational phase have accordingly been scoped out.

This EIAR chapter does assess the construction phase in a manner that takes accord of the TII Guidelines, in respect that it fully details the levels of traffic generated and the routes likely to be subject to traffic impacts and is coherently supported by a Construction Traffic Management Plan (CTMP) which is included as **Appendix D**.

Due to the relatively low number of construction phase workers (expected to peak at approximately 15 persons per cable route) to the area that the Proposed Development covers, and the distribution of those workers to worksites at several dispersed geographical locations, a Workplace Travel Plan is not considered necessary, based on professional judgement.

A detailed description of the development is provided in **Chapter 6**. Air Quality and Noise matters pertaining to Roads and Traffic are discussed in **Chapters 11** and **Chapter 13** respectively.

17.2 Methodology and Limitations

17.2.1 Policy and Guidance

The purpose of this section is to set out transport policies and guidance that are specifically relevant to the assessment of Roads and Traffic effects of the Proposed Development.

17.2.1.1 Policy

Table 17.1 provides a summary of the policies relevant to Roads and Traffic. The policy aspects listed are considered integrally relevant to the assessment process.

Table 17.1: Policy Summary

Document Title	Source and Year	Policy Detail
Draft Transport Strategy for the Greater Dublin Area 2022 - 2042	National Transport Authority, 2022	MetroLink is a key rail project identified in the Strategy, accounted for in their Regional Policy Objectives: *"RPO 4.31: Support Swords-Dublin Airport as a key location for airport-related economic development and employment provision linked to the protection and enhancement of access to Dublin Airport lands including the delivery of MetroLink"*
Transport Strategy for the Greater Dublin Area 2016 – 2035	National Transport Authority website, 2016	This strategy provides transport planning policy and offers a framework for the delivery of transport infrastructure and services in the Greater Dublin Area (GDA). - The strategy infrastructure proposals for heavy rail infrastructure intend to "implement a programme of station upgrades and enhancement; and ensure an appropriate level of train fleet, of an appropriate standard, to operate on the rail network". - Other rail investments include *"renewal, replacement, upgrading of ticketing systems; platform changes / additions at stations; additional track works to enhance service efficiency; rail safety systems; and passenger information systems"*. - It is further intended to develop the light rail in the GDA through projects such as the New Metro North, Metro South, and the Luas Red Line extension to Poolbeg. - There is a vision to develop an efficient and integrated transport network specifically focusing on public transport which: provides appropriate coverage of the region; increases opportunities to transfer between modes and services; provides fast and convenient access to major travel destinations throughout the region; is easily understood to both local and visiting passengers; delivers reliable and predictable journey times; charge simple, affordable fares which enable transfers between services without unnecessary penalty; provides easy-to-use cashless payment systems, where feasible; be accompanied by comprehensive information, both during and prior to the journey; and provides comfortable and convenient journeys to the maximum number of passengers.

Document Title	Source and Year	Policy Detail
Project Ireland 2040	Government of Ireland website, 2019	The National Development Plan 2021-2030, which makes up part of Project Ireland 2040, includes the Irish Government's strategy for sustainable mobility.
Fingal County Development Plan 2023 – 2029	Fingal County Council website, 2023	This is a follow-on to Fingal County Council's 2017 – 2023 publication, and details several strategy objectives relevant to the proposed development, including: Policy CMP1: *"Support the decarbonisation of motorised transport and facilitate modal shift to walking, cycling and public transport and taking account of National and Regional policy and guidance, while supporting an efficient and effective transport system"* Objective CMO2: "Work with the NTA to develop mode share targets for the County to achieve and monitor a transition to more sustainable modes including walking, cycling and public transport, during the lifetime of this Plan. This includes providing targeted infrastructure in the most appropriate locations and prioritising development at the most accessible locations in order to achieve the appropriate levels of integration and sustainable transport provision." Policy CMP3: *"Provide for an integrated approach to land-use and transportation aimed at minimising the demand for travel and prioritising sustainable modes of transport including walking, cycling and public transport."*
Dublin City Development Plan 2022-2028	DCC website, 2022	This draft contains an overview of the existing transport policy context and outlines areas where the existing DCDP transport policies need to be reviewed or updated. Some of the key and relevant sustainable movement and transport policy objectives are as follows: - SMT22: *"To support the expeditious delivery of key sustainable transport projects so as to provide an integrated public transport network with efficient interchange between transport modes… in particular the following projects subject to environmental requirements and appropriate planning consents being obtained: … Metrolink from Charlemount to Swords".*

Source: Varies by policy document

17.2.1.2 Guidance

This assessment has been carried out in accordance with the principles contained within the following key documents:

- *Guidelines for Classification and Scheduling of Roads in Ireland*
- *UK DMRB Guidance Volume 5, Part 3 TA 79/99*;
- *Guidelines on the Information to be Contained in Environmental Impact Reports, Environmental Protection Agency (EPA) (2022);*
- *Advice Notes on Current Practice (in the preparation of Environmental Impact Statements), Environmental Protection Agency (EPA) (Draft 2015)*
- *Traffic and Transport Assessment Guidelines, Transport Infrastructure Ireland (TII) (2014);*
- *The Institute of Environmental Management and Assessment Guidelines for the Environmental Assessment of Road Traffic, The Institute of Environmental Management and Assessment (IEMA) (1993)*
- *National Transport Model (NToM) Update, Travel Demand Forecasting Report, NToM Volume 3, December 2019, TII, AECOM.*
- *Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment*
- *Environmental Impact Assessment of Projects Guidance on the preparation of the Environmental Impact Assessment Report (Directive 2011/92/EU as amended by 2014/52/EU)*
- *Project Appraisal Guidelines for National Roads Unit 5.3, TII, October 2021;*
- *Temporary Traffic Management Design Guidance*

The *IEMA Guidelines* are intended for the assessment of the effect of road traffic associated with new developments. It is common and established practice that they are applied to energy-related developments and, as such, these guidelines are defined as suitable to assess the construction phase of the Proposed Development.

Core guidance is summarised in Table 17.2.

Table 17.2: Core Guidance Summary

Document Title	Source and Year	Guidance Detail
Guidelines on the Information to be Contained in Environmental Impact Reports	Environmental Protection Agency (EPA) (2022)	These guidelines provide advice of best practice, principles and practice of developing an EIAR. Specific reference to transport assessment includes: "*Material assets can now be taken to mean built services and infrastructure. Traffic is included because in effect traffic consumes roads infrastructure*." and "*The provision of new access facilities (e.g., access roads) or the upgrading of existing facilities (e.g., road widths, bridges and junctions) carried out by other parties can give rise to significant environmental effects*"
Advice notes on current practice (in the preparation of Environmental Impact Statements)	Environmental Protection Agency (EPA) (DRAFT 2015)	These notes provide general guidance on assessment practice. Defined environmental topics; 'human beings' and 'material assets' have relevance to transport assessment
Traffic and Transport Assessment Guidelines	Transport Infrastructure Ireland (TII) (2014)	The guidelines provide guidance for scoping and developing Roads and Transport assessment requirements to support development proposals. The guidelines outline the need for assessment of public transport, walking and cycling networks, rather than singularly focussing on the road network. The focus of these guidelines relates to operational traffic aspects.
The Institute of Environmental Management and Assessment Guidelines for the Environmental Assessment of Road Traffic	The Institute of Environmental Management and Assessment (IEMA) (1993)	The guidelines provide internationally referable guidance specific to best practice in transport EIA process and practice.
The UK Design Manual for Roads and Bridges (DMRB)	The UK Design Manual for Roads and Bridges (DMRB) (various dates)	The UK DMRB document set details requirements for appraisal, design, maintenance, operation and disposal of UK motorway and all-purpose trunk roads. DMRB may also be applied to other roads with local authority approval.
Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment	Department of Housing, Planning and Local Government (2018)	Outlines the requirement to assess the potential of the proposed development to cause accidents and/or disasters, including implications for human health, cultural heritage, and the environment. It also highlights consultation; details of consultation undertaken for this EIAR is covered in the headline chapters.
Environmental Impact Assessment of Projects Guidance on the preparation of the Environmental Impact Assessment Report	European Commission (2017)	This guidance sets out what should be covered in logical sections of an EIA. With particular reference to Roads and Transport, enclosed in

Document Title	Source and Year	Guidance Detail
(Directive 2011/92/EU as amended by 2014/52/EU)		the guidance is a checklist, including the following: • Description of traffic flows, type, volume, temporal pattern and geographical distributed generated or diverted resulting from the proposed development; • Description of resources and raw materials to the proposed development site and the associated traffic movements; • Description of project risks, including mention of the risk of traffic accidents; Description of the effects on the environment caused by activities ancillary to the main proposed development.
Guidelines for Classification and Scheduling of Roads in Ireland	Department of Transport Tourism and Sport (2013)	This document provides guidance on the classification of Irish Roads, specifically national and regional roads.
Temporary Traffic Management Design Guidance	Department of Transport Tourism and Sport (2019)	This document provides design level guidance for Temporary Traffic Management (TTM) for urban and low speed roads, rural single carriageway roads, and dual carriageways and motorways.

Source: Varies by guidance document

17.2.2 Consultation

Consultation was undertaken with Fingal County Council (FCC), Dublin City Council (DCC) and the Dublin Airport Authority (DAA) (as managers for sections of the local road network which will be subject to construction works and/or to be utilised by construction traffic associated with the Proposed Development) to ascertain their views on the assessment methodology, environmental effects relating to Roads and Traffic, any particular concerns they may have, and any planned road works which might materially affect road sections proposed to be utilised during the construction of the Proposed Development.

A summary of the consultation is provided in Table 17.3.

Table 17.3: Consultation Summary

Consultee and Date	Consultation Summary/Issues Raised	Response/Action Taken
Fingal County Council (FCC) 10 November 2022 & 12 December 2022	**10 November 2022** Stockhole Lane – no major projects planned. Unlikely to be any significant traffic issues if Stockhole Lane was required to be closed. R107 Malahide Road – note that there is a proposed new school close to the junction with Baskin Lane – due to open 2024. FCC have no further information regarding the new school.	All points noted. This EIAR chapters sets out a review of Roads and Traffic impacts from construction generated traffic and construction activities that interface with the public road network. Cumulative assessment considers increase in traffic from committed developments in the Study Area. Aligned mitigation proposals are set out in **Section 17.7**.

Consultee and Date	Consultation Summary/Issues Raised	Response/Action Taken
	Significant housing development in Balgriffin area which could increase traffic on R107. R107 Malahide Road / R123 Balgriffin Road junction already at/close to capacity in peak hours and any planned works would likely require to be undertaken off-peak/at night or could significantly affect the junction's operation **12 December 2022** FCC soon to be adopting roads currently under management of DAA. DAA would still own/maintain verges on airport boundary. FCC not aware of any active travel works when cabling programmed. FCC informed Mott MacDonald/ESB that any issues on the M50 (e.g., traffic incidents) the R108 would be used as a diversion route. Full lane reinstatement should be assumed.	
Dublin City Council (DCC) 16 November 2022	DCC aware of other works planned on roads in the DCC part of the Study Area including ESB and Dublin Water projects. There is an abnormal load route on R139 to R107 (23:00 to 07:00) and no open trenches are permitted between this period. Abnormal loads would need at least 4.2m of road width. Traffic concerns with works on R139. R139 very busy and likely more traffic in the future as there are new developments planned in the area. Concern that cable routes on major roads could disrupt traffic movements. Where possible permanent reinstatement preferred to temporary reinstatement.	EIAR will review Roads and Traffic impacts from construction traffic and construction works. Cumulative assessment considers increase in traffic from committed developments in the Study Area. Aligned mitigation proposals are set out in **Section 17.7**.
Dublin Airport Authority (DAA) 8 December 2022	DAA requested further information regarding the Proposed Development (drawings, timelines, etc).	Requested information shared with DAA in the form of a data pack from ESB. Further meeting between ESB & DAA in January 2023.

Source: Mott MacDonald

17.2.3 Study Area

The Study Area for the Roads and Traffic Chapter is the public road network associated with the construction of three high voltage (HV) cable routes.

The three proposed HV cable routes are:

- 110 kV Newbury – Ballystruan;
- 110 kV Ballystruan – Forest Little; and
- 110 kV / 220 kV Forest Little – Belcamp (Option 1 or Option 2).

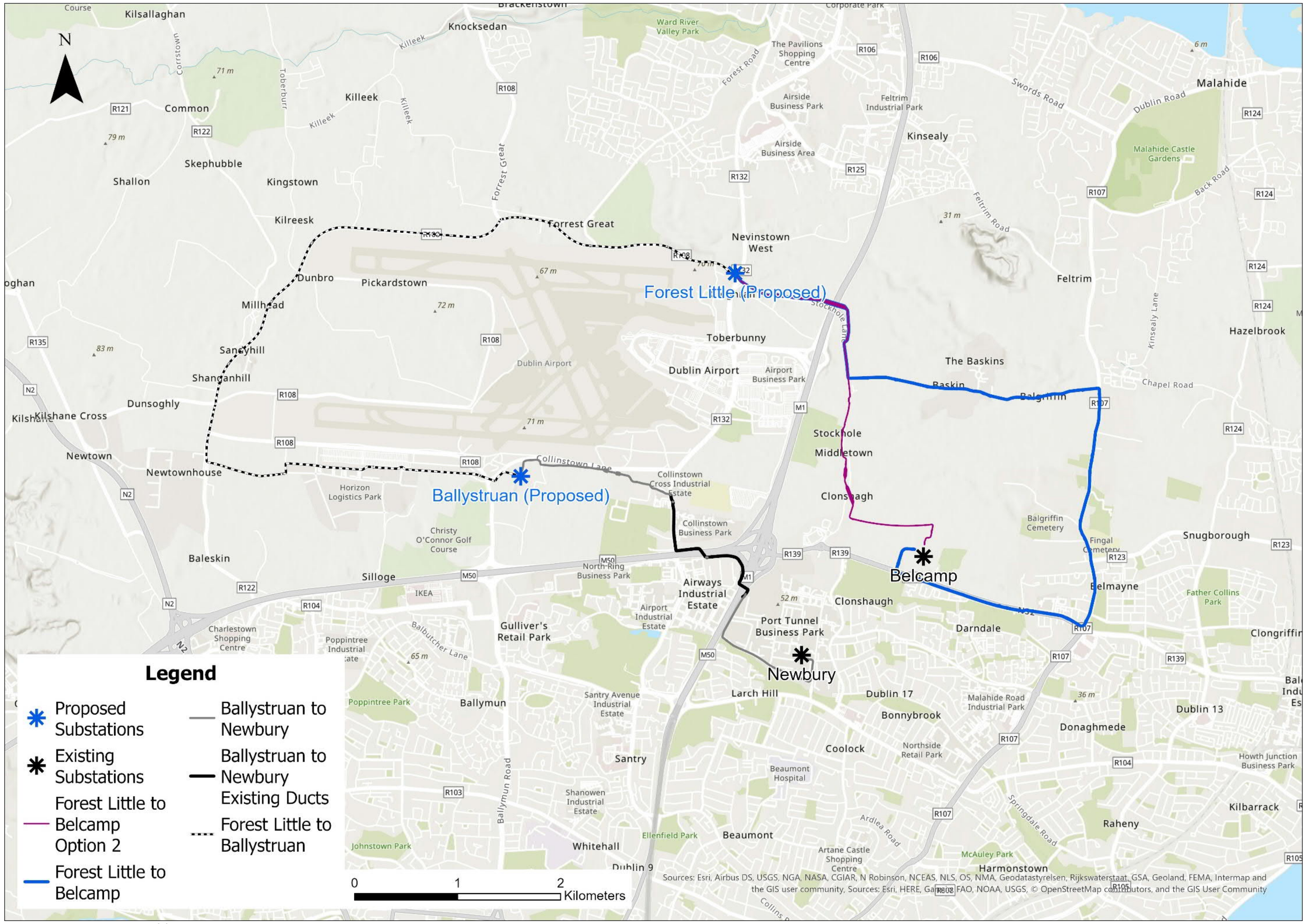
Construction of the Proposed Development will necessitate several temporary construction compounds. These construction compounds will accommodate temporary storage, contractor offices, etc. Exact locations of the construction compounds will be established when contractors are appointed, and consent is granted. For the purposes of this Roads and Traffic assessment, indicative compound locations have been identified at or in the vicinity of the four substations and are discussed in Section 17.5.2.

Further information regarding the HV cable routes and associated construction compounds can be found in **Chapter 6 – Description of the Proposed Development**.

The construction programme also includes a period where L2055 Baskin Lane will be closed to through traffic. Diversions routes will be in place for this period and are detailed in Section 17.5.6.

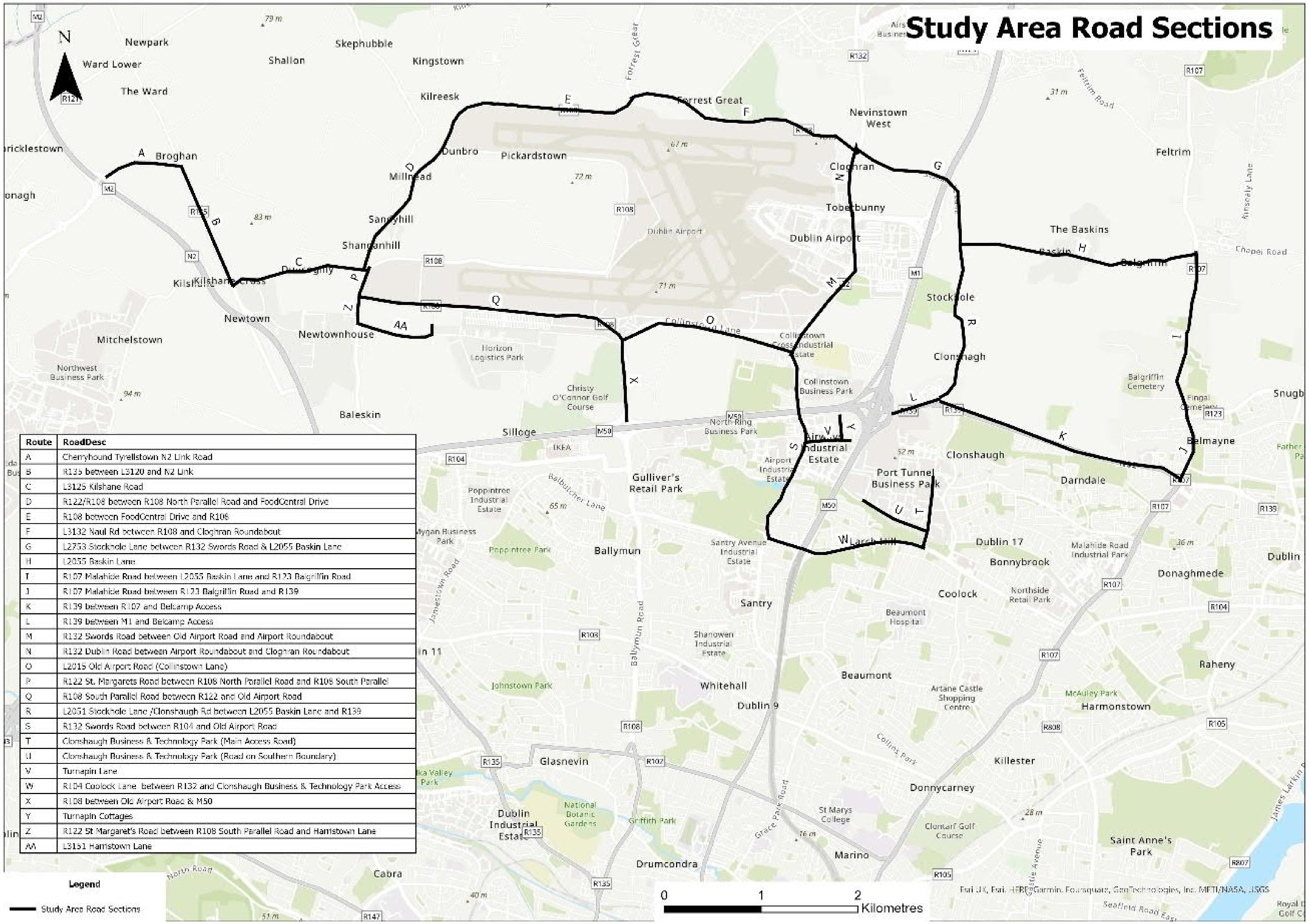
Figure 17.1 and Figure 17.2 provide an overview of the HV cable routes and Proposed Development Study Area for the purposes of this Roads and Traffic Chapter. Larger versions of the HV Cable Routes plan and the Study Area figures are provided in **EIAR Volume 3 – Appendices - Appendix J-Drawings.**

Figure 17.1: Proposed Cable Route Overview



Source: Mott MacDonald

Figure 17.2: Study Area



Route	RoadDesc
A	Cherryhound Tyrellstown N2 Link Road
B	R135 between L3120 and N2 Link
C	L3125 Kilshane Road
D	R122/R108 between R108 North Parallel Road and FoodCentral Drive
E	R108 between FoodCentral Drive and R106
F	L3132 Naul Rd between R108 and Cloghran Roundabout
G	L2753 Stockhole Lane between R132 Swords Road & L2055 Baskin Lane
H	L2055 Baskin Lane
I	R107 Malahide Road between L2055 Baskin Lane and R123 Balgriffin Road
J	R107 Malahide Road between R123 Balgriffin Road and R139
K	R139 between R107 and Belcamp Access
L	R139 between M1 and Belcamp Access
M	R132 Swords Road between Old Airport Road and Airport Roundabout
N	R132 Dublin Road between Airport Roundabout and Cloghran Roundabout
O	L2015 Old Airport Road (Collinstown Lane)
P	R122 St. Margarets Road between R108 North Parallel Road and R108 South Parallel
Q	R108 South Parallel Road between R122 and Old Airport Road
R	L2051 Stockhole Lane /Clonshaugh Rd between L2055 Baskin Lane and R139
S	R132 Swords Road between R104 and Old Airport Road
T	Clonshaugh Business & Technology Park (Main Access Road)
U	Clonshaugh Business & Technology Park (Road on Southern Boundary)
V	Turnapin Lane
W	R104 Coolock Lane between R132 and Clonshaugh Business & Technology Park Access
X	R108 between Old Airport Road & M50
Y	Turnapin Cottages
Z	R122 St Margaret's Road between R108 South Parallel Road and Harristown Lane
AA	L3151 Harristown Lane

Source: Mott MacDonald

Local public road sections included in the Study Area which are proposed to be utilised during construction of the three HV cable routes are listed in Table 17.4.

Table 17.4: Public Road Sections in Study Area

Road Section Accommodating HV Cable Works and/or Utilised by Construction Traffic for Access	HV Cable Route				HV Cable Route on Road Section	L2055 Baskin Lane Temporary Road Closure - Diversion
	110kV/220kV Forest Little - Belcamp		110kv Newbury - Ballystruan	110kV Ballystruan – Forest Little		
	Option 1	Option 2				
L2753 Stockhole Lane between R132 Swords Road & L2055 Baskin Lane	✓	✓			✓	
L2051 Stockhole Lane /Clonshaugh Rd between L2055 Baskin Lane and R139	✓	✓			✓	✓
L2055 Baskin Lane	✓				✓	✓
R107 Malahide Road between L2055 Baskin Lane and R123 Balgriffin Road	✓				✓	✓
R107 Malahide Road between R123 Balgriffin Road and R139	✓				✓	✓
R139 between R107 and Belcamp Access	✓				✓	✓
R139 between M1 and Belcamp Access	✓	✓				✓
R108 between Old Airport Road & M50			✓	✓		
R108 South Parallel Road between R122 and Old Airport Road				✓		
L3151 Harristown Lane				✓	✓	
R122 St Margaret's Road between R108 South Parallel Road and L3151 Harristown Lane				✓	✓	
R122 St. Margaret's Road between R108 North Parallel Road and R108 South Parallel Road				✓	✓	
R122/R108 between R108 North Parallel Road and FoodCentral Drive				✓	✓	
R108 between FoodCentral Drive and R108	✓	✓		✓	✓	
L3132 Naul Rd between R108 and Cloghran Roundabout				✓	✓	
Clonshaugh Business & Technology Park (Road on Southern Boundary)			✓		✓	
Clonshaugh Business & Technology Park (Main Access Road)			✓			
L2015 Old Airport Road (Collinstown Lane)			✓	✓		
R132 Swords Road between Old Airport Road and Airport Roundabout			✓	✓		
R132 Swords Road between R104 and Old Airport Road			✓		✓	
R132 Dublin Road between Airport Roundabout and Cloghran Roundabout	✓	✓		✓		
R104 Coolock Lane between R132 and Clonshaugh Business & Technology Park Access			✓			
L3125 Kilshane Road				✓		
R135 between L3120 and N2 Link				✓		
Turnapin Lane			✓			
Turnapin Cottages			✓			
Cherryhound Tyrellstown N2 Link Road				✓		

Source: Mott MacDonald

National Roads

The primary traffic routes in the local area include the following roads:

- M1 motorway which links north Dublin, Dublin Airport and the M50 motorway with Drogheda, Dundalk and Northern Ireland.
- M50 motorway which is a radial road which links Dublin city centre with north, west and south Dublin.
- M2/N2 motorway/national road which links north Dublin and the M50 motorway with Ashbourne and Northern Ireland.

The M1, M50 and M2/N2 national roads have been scoped out of this Roads and Traffic assessment due to their residual capacity and the strategic nature of these routes. This aspect is further detailed in Section 17.4.1.

Regional Roads

Notable traffic routes in the local area include the following roads:

- R132 – which links Dublin city centre with Dublin Airport and also links to the M1 motorway and the R104 and the R139;
- R107 – which links Malahide and north-east Dublin with the Dublin city centre and the R139 and R104;
- R139 – which links north-east Dublin with the M1 and M50 motorways, and the R107;
- R104 – which links north Dublin with the M50 motorway, and the R132 and the R107.

Beyond the Study Area traffic will subdivide into smaller volumes and professional judgement therefore suggests that effects relating to Roads and Traffic across the wider road network beyond the Study Area (shown in Figure 17.2) are unlikely to be significant, and therefore not reviewed further in this chapter.

17.2.4 Data Sources

A desktop study and site visits to the Study Area (undertaken on 27 June 2022 and 26 October 2022) were undertaken to review likely construction traffic routes and to identify constraints and for any potentially sensitive locations i.e., locations which are likely to be more vulnerable to change in traffic flow or profile, e.g., collision clusters, high footfall areas, and/or areas in close proximity to a school.

Data sources for the desktop study include:

- Automatic Traffic Counts (ATC) commissioned by Mott MacDonald and undertaken by Nationwide Data Collection in August and September 2022;
- *National Transport Model (NToM) Update, Travel Demand Forecasting Report, NToM Volume 3, December 2019, TII, AECOM*; and
- *TII Traffic Count Data website (www.trafficdata.tii.ie).*

Data relating to Personal Injury Collisions (PIC) was sought from the Road Safety Authority (RSA) website. However, it is understood that the RSA is in the process of reviewing its collision data sharing policies and procedure and therefore data cannot be shared until this review is complete.

Information in relation to existing traffic volumes within the Study Area was obtained from traffic surveys undertaken in August to September 2022, by Nationwide Data Collection. Nineteen 7-day ATCs provided information including total number of vehicles in both directions, of the specified road, broken down into twelve standard vehicle classifications.

17.3 Methodology and Approach

The assessment detailed in this chapter has been undertaken combining desktop study, site observations and reference to current policy advice and best practice in line with consultation with statutory agencies. Predicted construction vehicle movement volumes have been compared to baseline traffic flows to identify if there are likely to be periods where the increase in traffic, either all traffic or specifically Heavy Goods Vehicle (HGV) traffic, exceeds standard thresholds. Such additional traffic has potential to cause detrimental effects, for example, on driver delay, road safety or community (pedestrian delay, pedestrian amenity / fear and intimidation).

17.3.1.1 Significance

The *IEMA Guidelines (1993*) infer two-fold rules that can be used to determine both the scale and extent of the assessment of road traffic as a screening process:

- Rule 1 - Include highway links whereby traffic flows would increase by more than 30% (or the number of Heavy Goods Vehicles (HGVs) that would increase by more than 30%).
- Rule 2 - Include any other specifically sensitive areas whereby traffic flows would increase by 10% or more.

It is acknowledged by the *IEMA guidelines* that daily variation can vary +/- 10%. As such, it is assumed that projected changes in traffic below 10% would mean no discernible environmental impact.

Where the predicted increase in traffic volume (whether general or HGV) falls short of these thresholds, the significance of the effects can be termed as **not significant**. This means that further assessment is not warranted. Consequently, where the predicted traffic flow increase exceeds thresholds, the effects are considered to be potentially **significant** and accordingly, are assessed in greater detail.

The assessment has clearly identified transport routes which are to be used in connection with the proposed development. Quantitative assessments have been undertaken alongside the application of professional judgement to determine whether or not the effects are considered to be of significance. Based on Rules 1 and 2 of the *IEMA Guidelines*, the predicted significance of the effect was determined considering both the sensitivity of the receiving environment and the magnitude of change against the baseline. As a guide to inform the assessment, but not as a substitute for professional judgement, criteria for determining the significance of traffic related effects are set out in Table 17.5. It should be noted that the assessment considers the effects of the percentage increase in **general traffic, HGV + Light Goods Vehicles and cars (LGV)** and also percentage increase in **HGV traffic only** based on related baseline traffic flows e.g., percentage increase in HGVs from existing HGV baseline flows.

The Study Area encompasses both an urban (commercial, industrial and residential) and a rural area; as such, the majority of routes have been treated as **not sensitive** and therefore the 30% significance threshold has been applied in view of Rule 1 of the *IEMA Guidelines*.

A small number of routes have been treated as **sensitive** and therefore the 10% significance threshold has been applied in view of Rule 2 of the *IEMA Guidelines*. These are detailed in Table 17.6 including the area, thereby facilitating a robust assessment.

Table 17.5: Effect Significance Matrix

Significance of Effect	% Increase in general traffic (HGV + LGV) volume % Increase in HGV traffic volume	
	Rule 1 (Majority of Route sections)	**Rule 2 (Route sections in Table 17.6)**
Major (Significant)	Greater than or equal to 60%	Greater than or equal to 60%
Moderate (Significant)	Greater than or equal to 30% and less than 60%	Greater than or equal to 10% and less than 60%
Minor (Not Significant)	Greater than or equal to 5% and less than 30%	Greater than or equal to 5% and less than 10%
None (Not Significant)	Less than 5%	Less than 5%

Source: IEMA (1993)

Table 17.6: Road Sections Considered Sensitive as Part of Assessment

Road Section	Reasoning for 'Sensitive' Assignment
R107 Malahide Road between L2055 Baskin Lane and R123 Balgriffin Rd	Existing schools (Malahide/Portmarnock Educate Together National School and St. Nicolas of Myra National School of Kinsealy) accessed from road and another school (proposed to open in 2024).
R107 Malahide Road between R123 Balgriffin Rd and R139	Likely notable footfall in area due to high density residential dwelling and commercial properties (Clarehall Shopping Centre).
R139 between R107 and Belcamp Access	Leisure centre (St. Michael's House Leisure Centre and Swimming Pool) on road section.
R122/R108 between R108 North Parallel Road and FoodCentral Dr	School (St. Margaret's National School), accessed from <120m from road section.
R104 Coolock Rd between R132 and Clonshaugh Business & Technology Park Access	School (Scoil Fhursha, Scoil Ide GNS, Cromvcastle Green Boys National School) and leisure facilities (Oscar Traynor Coaching & Development Centre) on/accessed from road section
R132 Swords Rd between R104 and Old Airport Road	Stadium (Morton Stadium) and Santry Park on road section.
Turnapin Lane	Residential cul-de-sac on road section.
Turnapin Cottages	Small residential cul-de-sac.

Source: Mott MacDonald

The thresholds shown in have been developed based upon the Rule 2 criteria above as well as the consideration that **Major** and **Moderate** effects are **significant** in the context of Environmental Protection Agency (EPA) Guidelines.

The guidance above does not define thresholds to determine significance associated with driver delay and as such, professional judgement has been applied. For driver delay, using terminology outlined for effect significance in Table 17.5, a similar approach has been used, with thresholds having been determined and applied as shown in Table 17.7.

Table 17.7: Driver Delay Effect Significance Matrix

Significance of Effect	Increase in Journey Time
Major (Significant)	16 – 20 minutes
Moderate (Significant)	11 – 15 minutes
Minor (Not Significant)	6 – 10 minutes
None (Not Significant)	0 – 5 minutes

Source: Mott MacDonald

The significance of all effects under consideration is linked to the volume of traffic generated by the proposed development and therefore, it is deemed appropriate to link significance criteria with the scale of the forecasted traffic increase. However, the *IEMA Guidelines* (IEMA, 1993), also state that:

"For many effects there are no simple rules or formulae which define the thresholds of significance and there is, therefore, a need for interpretation and judgement on the part of the assessor, backed-up by data or quantified information wherever possible."

As such, professional judgement (led by good practice guidance and technical advice from experienced engineers) has also been applied in the assessment of effects so as to provide more meaningful conclusions, in particular where it is not quantifiable by set rules or formulae, particularly in relation to driver delay caused by full or partial road closure and resultant traffic diversion, the assessment of community (pedestrian delay, pedestrian amenity / fear and intimidation) and road safety effects (accidents and safety).

Furthermore, where baseline traffic flows are very low, it is possible to derive unrealistic determinations of significance when considered against purely numerical assessment criteria. For example, when traffic flow is very low, it is possible to show relatively large traffic increases and for the road to operate well below capacity. Under the numerical criteria defined above, a 60% increase in traffic volume would represent a major effect, but in reality, the effect is likely to be less significant, given the residual capacity of the road.

Effects associated with works which may physically restrict usable road space, thus resulting in localised road or lane closure, have also been assessed, considering requirements for diversion and/or journey time delay to traffic by road section.

The following effect classifications are considered having regard to *IEMA Guidelines* (1993);

- Driver delay;
- Road safety (i.e., accidents and safety); and
- Community effects (pedestrian delay, severance, pedestrian and cycle amenity; and fear and intimidation).

The *IEMA Guidelines* also necessitate the consideration of Noise, Visual Impact, Air Pollution and Dust and Dirt associated with development generated traffic; these topics are addressed in other chapters of this EIAR.

The predicted significance of any potential Roads and Traffic-related environmental impacts has been determined by considering both the sensitivity of the receiving environment and the magnitude of change against the baseline.

The likely duration of an effect is also a relevant consideration and the Environmental Protection Agency have categorised duration of effects in their *2022 Guidelines.* Potentially of relevance, in respect of the proposed development, the categories include:

- **Brief Effects** = Effects lasting less than a day

- **Temporary Effects** = Effects lasting less than a year
- **Short-term Effects** = Effects lasting one to seven years

17.3.2 Sensitivity

Subject to guidelines from the IEMA, road links may be highlighted as 'specifically sensitive'. In other words, these portions of road are considered to be more vulnerable to changes in either the profile or volume of flows of traffic.

Within the context of this study and using the *IEMA Guidelines* for reference, professional judgement was used to develop a classification of receptor sensitivity for road users. These have been defined in Table 17.8 for various road links.

Table 17.8: Receptor Sensitivity

Receptor Sensitivity / Importance	Description
High	• Urban/residential roads without pedestrian / cycle facilities that are used by pedestrians
Medium	• Main vehicular route with pedestrian/cycle facilities provided in a built-up area • Congested Junctions, roads with degree of active frontage
Low	• National roads or 'N' class roads constructed to accommodate significant HGV volumes • Strategic vehicular route, such as Regional Roads, in a rural setting with pedestrian/cycle facilities provided • Urban road with limited active frontage and pedestrian/cycle facilities provided
Negligible	• Roads with no significant settlements including new strategic national roads or motorways • Rural road with no/pedestrian cycle facilities provided

Source: Mott MacDonald

17.3.3 Magnitude

The magnitude of change has been calculated as the proportional change in traffic flow anticipated on each public road section within the Study Area. This calculation compares the forecast development traffic generation against the baseline traffic during the construction phase. It is crucial to ensure that professional judgment is applied in tandem with the criteria stated above; particularly when considering numerical changes in traffic volume.

Additional qualitative criteria have also been employed when assessing magnitude, details of which are provided in Table 17.9. This is of particular importance when considering community effects.

Table 17.9: Magnitude Criteria

Magnitude	Impact
High / Major (Significant)	Where the proposed development could be expected to have a considerable effect (either positive or negative) on receptors
Medium / Moderate (Significant)	Where the proposed development could be expected to have a noticeable effect (either positive or negative) on receptors
Low / Minor (Not Significant)	Where the proposed development could be expected to result in a small, barely noticeable effect (either positive or negative) on receptors
Negligible (Not Significant)	Where no discernible effect is expected as a result of the proposed development on receptors (i.e., the effect is insignificant)

Source: Mott MacDonald

As a guide to inform the assessment, but not as a substitute for professional judgement, criteria for determining the significance of traffic-related effects are set out in Table 17.10 and are based on combining the magnitude of the effect with the receptor sensitivity.

Table 17.10: Significance Assessment Matrix

Magnitude of Change	Sensitivity of Receptor			
	High	**Medium**	**Low**	**Negligible**
High / Major (Significant)	Substantial Adverse	Moderate Adverse	Minor Adverse	Minor Adverse
Medium / Moderate (Significant)	Moderate Adverse	Minor Adverse	Minor Adverse	Minor Adverse
Low / Minor (Not Significant)	Minor Adverse	Minor Adverse	Negligible	Negligible
Negligible (Not Significant)	Minor Adverse	Negligible	Negligible	Negligible

Source: Mott MacDonald

Significance is categorised as **Substantial Adverse**, **Moderate Adverse**, **Minor Adverse** or **Negligible**. Effects deemed to be Substantial Adverse or Moderate Adverse are considered to be **significant** and effects that are judged to be **minor adverse** or **negligible** are considered **not significant**. The same criteria also apply to positive/beneficial impacts.

17.3.4 Traffic Forecasting

Information in relation to existing traffic volumes within the Study Area was obtained from traffic surveys undertaken in August and September 2022, and data available from the TII traffic count data website, as detailed in Section 17.2.4.

17.4.1 In addition to the traffic data road capacities relating to national, regional, and local roads have been determined using a combination of data sources as presented in Section 17.2.4.

For road sections in the Study Area, professional judgement has been applied in determining vehicles per hour (vph) by reviewing road characteristics on site visits (undertaken on 27 June 2022 and 26 October 2022) alongside using Google Street View and referring to road classification descriptors provided in *UK DMRB Guidance Volume 5, Part 3 TA 79/99*.

It has been necessary to make a number of assumptions to enable the Roads and Traffic assessment to be undertaken. During the COVID pandemic there was a general trend of reduced motorised traffic, as more people worked from home, travelled on foot or cycled, travel shorter distances and the operating hours of some shops and services were impacted. Whilst restrictions have been lifted and travel patterns adjust, it is difficult to predict when 'normal' travel patterns will resume again and/or how patterns of work and domestic travel will change. Pragmatically, it is considered robust and reasonable to proceed on the basis of the pre-COVID traffic growth factor applied to future baseline flows.

17.4 Receiving Environment

17.4.1 Roads Scoped Out

Based on professional judgement and experience in the assessment of roads and traffic effects associated with major development projects, effects on the M1 (AADT = c.132,000)[1], M50 (AADT = c.126,000)[2] and M2/N2 (AADT = c.40,000)[3] have been scoped out. This is due to the residual capacity and strategic nature of these roads and recognising that the Proposed Development is unlikely to result in an intensification of use exceeding 30% of the existing Annual Average Daily Traffic (AADT) on any such road section.

17.4.2 Road Network and Route Profiles

The road network included in the Study Area was determined on the basis of likely construction access routes and the location of physical construction works (which are defined in Section 17.4.3).

The key characteristics of the defined public road sections in the Study Area have been appraised through desktop study and site visits and are set out below in Table 17.11. Receptor sensitivity has been outlined using the criteria detailed in Table 17.8.

[1] https://trafficdata.tii.ie/publicmultinodemap.asp - site id - TMU M01 000.0 N (year 2022)
[2] https://trafficdata.tii.ie/publicmultinodemap.asp - site id - TMU M50 001.7N (year 2022)
[3] https://trafficdata.tii.ie/publicmultinodemap.asp - site id TMU M02 000.0 N (year 2022)

Table 17.11: Road Network and Road Section Profiles

Road Section	Speed Limit	Description	Receptor Sensitivity
L2753 Stockhole Lane between R132 Swords Road & L2055 Baskin Lane	60km/h	Two-way single carriageway. Surroundings predominantly rural featuring access to a small number of residential and agricultural properties. Road section features a cycleway on the south side of the carriageway and a footway on the north side of the carriageway.	Low
L2051 Stockhole Lane /Clonshaugh Rd between L2055 Baskin Lane and R139	60km/h	Two-way single carriageway. Road features street lighting on both sides of the carriageway in residential areas. Road section surroundings predominantly rural featuring access to a small number of residential, commercial and agricultural properties.	Negligible
L2055 Baskin Lane	50km/h in residential area 60km/h in rural area	Two-way single carriageway linking Stockhole Lane/Baskin Lane junction and R107 Malahide Road/Baskin Lane junction. Road features intermittent street lighting along the road section. Surrounding area is predominantly rural with access to residential, commercial and agricultural properties. Road features footways on the north side of the carriageway between Greenwood and the R107 Malahide Road/Baskin Lane junction.	Low
R107 Malahide Road between L2055 Baskin Lane and R123 Balgriffin Road	60km/h majority of road section 50km/h in vicinity of R107 Mallahide Road/L2055 Baskin Lane junction	Two-way single carriageway. 'Major traffic artery'. Road features street lighting on both sides of the carriageway. Road surroundings a mixture between residential, commercial and educational properties. Road is a bus corridor and features a number of bus stops. Road features active travel in the form of footways for the majority of the road section.	Medium
R107 Malahide Road between R123 Balgriffin Road and R139	60km/h majority of road section 50km/h in vicinity of R139/R107 Mallahide Road junction	Road section a mixture of dual carriageway, two lanes (both directions) and two-way single carriageway. 'Major traffic artery'. Road section between R107/Belmayne signalised junction and R139/R107 Malahide Road signalised junction. Road features street lighting on both sides of the carriageway. Road surroundings a mixture between residential and commercial properties. Road is a bus corridor and features a number of bus stops. Road features active travel in the form of footways for the majority of the road section and cycleways between R107/Belmayne signalised junction and R139/R107 Malahide Road signalised junction.	Medium
R139 between R107 and Belcamp Access	60km/h	Dual carriageway with two lanes (both directions). 'Major traffic artery'. Road section between R139/R107 Malahide Road signalised junction and R139/Belcamp Substation access junction. Road section features street lighting on both sides of the carriageway. R139 surroundings predominantly rural with access to residential and commercial properties. Road section features footways on both sides of the carriageway.	Low
R139 between M1 and Belcamp Access	60km/h	Dual carriageway with two lanes (both directions). 'Major traffic artery'. Road section between M1 junction 3 and R139/Belcamp Substation access junction. Road section features street lighting on both sides of the carriageway. R139 surroundings predominantly rural with access to commercial properties. Road features footways on both sides of the carriageway between Clonshaugh Roundabout (junction with L2051) and Belcamp Access.	Low
R108 between Old Airport Road & M50	60km/h	Two-way single carriageway linking R108/Old Airport Road/Private Access ('Horizon Logistic Park') signalised junction with the M50 motorway Junction 4. Road section features street lighting on both sides of the carriageway. Surroundings predominantly rural with access to industrial, recreational (golf club) and commercial properties. Road section features bus stops and active travel in the form on footway for majority of road section and cycleway in close vicinity to M50 Junction 4.	Low
R108 South Parallel Road between R122 and Old Airport Road	80km/h majority of road 60km/h speed limit in vicinity of R108/Old Airport Road junction	Two-way single carriageway linking R122/R108 junction and R108/Old Airport Road/Private Access ('Horizon Logistic Park') signalised junction. Road section features street lighting. R108 road section surroundings predominantly rural with access to industrial ('Horizon Logistics Park') and Dublin Airport long-term car parking.	Negligible
R122 St. Margaret's Road between R108 North Parallel Road and R108 South Parallel Road	80km/h	Two-way single carriageway linking the R122/R108/L3125 roundabout and the R122/R108 junction. R122 surroundings predominantly rural with Dublin Airport boundary fence on the east side of the carriageway. Road section features street lighting on the west side of the carriageway. Active travel provision in the form of footway on the east side of the carriageway. No bus stops on road section however bus services operate on road.	Low
L3151 Harristown Lane	80km/h	Single lane carriageway. Forms a junction with R122 St Margaret's Road at its west end. Cul-de-sac with accesses to <10 dwellings.	Negligible
R122 St Margaret's Road between R108 South Parallel Road and L3151 Harristown Lane	80km/h	Two-way single carriageway between L3151 Harristown Lane and the R122/R108 junction. R122 surroundings predominantly rural. Active travel provision in the form of footway on the east side of the carriageway. No bus stops on road section however bus services operate on road.	Low
R122/R108 between R108 North Parallel Road and FoodCentral Drive	80km/h	Two-way single carriageway. Surroundings predominantly rural with Dublin Airport boundary fence on the south/east side of the carriageway. Near the civil parish of St. Margaret's, the road features footway on west side of carriageway.	Low
R108 between FoodCentral Drive and R108	80km/h 60km/h in advance of R108/Naul Road roundabout junction	Two-way single lane carriageway. Road features street lighting on approach to the R108/Naul Road roundabout junction. Surroundings predominantly rural with Dublin Airport boundary fence on the south side of the carriageway. Road section includes a parking layby on the north side of the carriageway.	Negligible
L3132 Naul Rd between R108 and Cloghran Roundabout	80km/h 60km/h in advance of Cloghran Roundabout	Two-way single carriageway. Surroundings predominantly rural with Dublin Airport boundary fence on the south side of the carriageway. Road section includes a parking layby on the north side of the carriageway.	Negligible

Road Section	Speed Limit	Description	Receptor Sensitivity
Clonshaugh Business & Technology Park (Road on Southern Boundary)	25km/h	Two-way single carriageway. Forms internal access road providing access to a number of industrial properties. Road section features street lighting. Road section features traffic calming in the form of speed tables. Bus stop on road section. Active travel provision in the form of a footway on the east side of the carriageway.	Low
Clonshaugh Business & Technology Park (Main Access Road)	40km/h	Two-way single carriageway providing access to internal access roads in Clonshaugh Business & Technology Park. Road features street lighting. Road section features traffic calming in the form of speed tables. Bus stop on road section. Active travel provision in the form of footways on both sides on the carriageway.	Low
L2015 Old Airport Road (Collinstown Lane)	60km/h	Two-way single carriageway linking the R108/Old Airport Road/Private Access signalised junction and R132 Swords Road/Old Airport Road/Cemetery Access signalised junction. Road surroundings predominantly rural with Dublin Airport boundary fence on north side of carriageway. Also includes access to industrial, commercial, agricultural and recreational property. Road features street lighting and active travel provision in the form of footway in the vicinity of the R108/Old Airport Road/Private Access signalised junction and R132 Swords Road/Old Airport Road/Cemetery Access signalised junction. Road includes laybys/parking areas utilised by airport taxis on the south side of the carriageway.	Negligible
R132 Swords Road between Old Airport Road and Airport Roundabout	60km/h	Dual carriageway with two lanes (both directions). 'Major traffic artery'. Road section is a bus corridor and features a bus lane in each direction (restrictions between Monday and Saturday 07:00-19:00). There are various bus stops on the road section. Road section features street lighting on both sides of the carriageway. R132 Swords Road section predominantly industrial/commercial area including access to Dublin Airport. Road section features active travel in the form of footways and cycleways and shared paths.	Low
R132 Swords Road between R104 and Old Airport Road	60km/h	Two-way single carriageway with two lanes (both directions). 'Major traffic artery'. Road section is an established bus corridor. For parts of the road one of the lanes in each direction is subject to bus lane restrictions (varies locally, either 24 hours or 07:00-19:00 Monday – Saturday). Surrounding areas predominantly urban including access to industrial, commercial, recreational and residential properties. Road section features street lighting on both sides of the carriageway. Active travel provision in the form of footways and cycleways on both sides of the carriageway.	Low
R132 Dublin Road between Airport Roundabout and Cloghran Roundabout	60 km/h	Dual carriageway with up to three lanes (both directions).'Major traffic artery'. Road section is an established bus corridor and features a bus lane in each direction (restricted Monday to Saturday between 07:00-19:00). There are bus stops on the road section. Road section features street lighting on both sides of the carriageway. R132 Swords Road section predominantly industrial/commercial area including access to Dublin Airport. Road section features active travel in the form of footways and cycleways and shared paths.	Low
R104 Coolock Lane between R132 and Clonshaugh Business & Technology Park Access	50km/h majority of road section 60km/h between Coolock Labe Park and R104 Coolock Lane/ Clonshaugh Business & Technology Park access signalised junction.	Two-way single carriageway with two lanes, (both directions). 'Major traffic artery'. Road section is between R132 Swords Road/R104 signalised junction and R104 Coolock Lane/ Clonshaugh Business & Technology Park access signalised junction. Road section is a bus corridor. For parts of the road one of the lanes in each direction is subject to bus lane restrictions (07:00-19:00 Monday – Saturday). Road section features street lighting on both sides of the carriageway. Road section features access to residential properties as well as educational and recreational facilities and Clonshaugh Business & Technology Park. Road section features active travel infrastructure in the form of footways and cycleways on both sides of the carriageway.	Low
L3125 Kilshane Road	80km/h majority of road 60km/h c. 260 m from R135/L3125 junction.	Two-way single carriageway linking R135/L3125 Kilshane Road signalised junction and the R122/R108/L3125 roundabout. Surroundings predominantly rural with access to residential, industrial and agricultural properties. Road features a mixture of active travel provision including footways/cycleways and shared paths (some of which was under construction at time of June 2022 site visit) on both sides of the carriageway. Road features street lighting on north side carriageway in vicinity of the R135/L3125 junction and on both sides of the carriageway in the vicinity if the R122/R108/L3125 roundabout.	Low
R135 between L3120 and N2 Link	60km/h	Two-way single carriageway, linking the R125 roundabout ('Broughan Roundabout') and the R135/L3125 Kilshane Road signalised junction. Surrounding environment predominantly rural with access to residential, industrial agricultural and commercial properties. Road features intermittent street lighting. Road includes bus stops.	Negligible
Turnapin Lane	50km/h	Two-way predominantly single carriageway partly dualled with two lanes (both directions) between R132 Swords Road/Turnapin Lane signalised junction and Turnapin Lane/Woodfield Business Park Access/Airways Industrial Estate Access junction and one lane (both directions) east of Turnapin Lane/Woodfield Business Park Access/Airways Industrial Estate Access junction. Surrounding environment industrial/commercial to the west and residential to the east. Road features street lighting on both sides of carriageway. Traffic calming in form of speed table between industrial/commercial area and residential area. Road features active travel provision in the form of footways on both sides of the carriageway in the industrial/commercial area and on the north side in the residential area.	Low
Turnapin Cottages	50km/h	Two-way single carriageway. Road is a residential cul-de-sac and forms a junction with Turnapin Lane to the south. Road features streets lighting on the west side of the carriageway. Road also features active travel provision in the form of footways on both sides of the carriageway. On the June 2022 site visit, parked vehicles were observed on both sides of the carriageway.	Low

Road Section	Speed Limit	Description	Receptor Sensitivity
Cherryhound Tyrellstown N2 Link Road	100km/h majority of road. 60km/h c. 100m from R135 roundabout junction.	Dual carriageway, two-lanes (both directions) linking N2/M2 national road with the R135. Surroundings rural in nature with agricultural land on either side of the road. Road features street lighting on both sides of the carriageway, uncontrolled pedestrian crossing in form of dropped kerbs at R135 roundabout (‘Broughan Roundabout’).	Negligible

Source: Mott MacDonald Site Visits (June and October 2022) & Google Maps/Streetview

17.4.3 Public Transport

Several existing bus services utilise road sections in the Study Area as summarised in Table 17.12.

Table 17.12: Local Bus Routes

Route Number	Operator	HV Cable Route/Construction Traffic	Detail	Frequency (during normal construction hours)
2**	Expressway	110 kV Newbury – Ballystruan	**On Construction Road Section** R132 Dublin Road between Airport Roundabout and Cloghran Roundabout R104 Cooloch Lane between R132 and Clonshaugh Business & Technology Park Access	7 days a week: 06:00 – 22:00 (every 60 mins). 1 service at 00:00.
4**	Dublin Bus	110 kV Ballystruan – Forest Little	**On Construction Road Section** R108 between Old Airport Road and M50	Mon – Fri: 05:30 – 07:00 (every 15 minutes). 07:00 – 19:00 (every 12 minutes). 19:00 – 23:20 (every 20 minutes). Sat: 06:00, 06:30, 07:00, 07:15. 07:15 – 19:00 (every 15 minutes). 19:00 – 23:20 (every 20 minutes). Sun: 08:00 – 11:30 (every 30 minutes). 11:30 – 19:00 (every 15 minutes). 19:00 – 23:30 (every 30 minutes).
13**	Dublin Bus	110 kV Ballystruan – Forest Little	**On Construction Road Section** R108 between Old Airport Road and M50	Mon – Fri: 05:30 – 23:30. (approximately every.15 minutes) Sat: 06:10 – 08:30 (every 20 minutes). 08:30 – 23:30 (every 15 minutes). Sun: 07:00 – 11:00 (every 30 minutes). 11:00 – 23:30 (every 15 minutes).
15**	Dublin Bus	110 kV / 220 kV Forest Little – Belcamp Option 1	Travels through R107 Mallahide Road/R139 signalised junction	Mon-Fri: 04:00-06:00 (every 30 minutes). 06:00-17:00 (approximately every 10 minutes). Sat: 04:00-05:30 (every 30 minutes). 06:00-23:30 (every 15 minutes)
16**	Dublin Bus	110 kV Newbury – Ballystruan	**On Cable Route** R132 Swords Road between R104 and Old Airport Road **On Construction Road Section** R132 Swords Road between Old Airport Road and Airport Roundabout and Dublin Airport	Mon – Fri: 06:00 – 23:30. (approximately every 15 minutes). Sat: 06:00 – 23:30. (approximately every 15 minutes). Sun: 08:00 – 23:30 (every 15 minutes).
22**	Expressway	110 kV Newbury – Ballystruan	**On Construction Road Section** R104 Cooloch Lane between R132 and Clonshaugh Business & Technology Park Access R12 Swords Road between Old Airport Road and Airport Roundabout R139 between M1 and Belcamp Access	7 days a week: 3 services per day. 06:30, 09:30, 12:30.
23**	Expressway	110 kV Newbury – Ballystruan 110 kV Ballystruan – Forest Little	**On Construction Road Section** R132 Dublin Road between Airport Roundabout and Cloghran Roundabout R104 Cooloch Lane between R132 and Clonshaugh Business & Technology Park Access R108 between Old Airport Road and M50 R12 Swords Road between Old Airport Road and Airport Roundabout R139 between M1 and Belcamp Access L2015 Old Airport Road	Mon – Wed: 4 services per day. 01:00, 06:30, 12:15, 15:30. Thurs: 4 services per day. 06:30, 08:00, 12:15, 15:30 Fri – Sat: 5 services per day. 01:00, 06:30, 08:00, 12:15, 15:30 Sun: 4 services per day. 01:00, 06:30, 12:15, 15:30
27**	Dublin Bus	110 kV / 220 kV Forest Little – Belcamp Option 1	Travels through R107 Mallahide Road/R139 signalised junction	Mon-Fri 05:15-06:50 (approximately every 15 minutes) 06:50 – 19:30 (every 10 minutes). Sat- 08:00 – 11:00 (approximately every 20-30 minutes). 11:00- 19:00 (every 15 minutes).
27b**	Dublin Bus	110 kV Newbury – Ballystruan 110 kV Ballystruan – Forest Little	**On Cable Route** R132 Swords Road between R104 and Old Airport Road **On Construction Road Section** R104 Coolock Lane between R132 and Clonshaugh Business & Technology Park Access	Mon – Fri: 06:40 – 23:30. (approximately every 30 minutes). Sat: 07:15 – 23:30. (approximately every 25 minutes). Sun: 09:35 – 23:30. 3 services between 09:35 – 11:50. 11:50 – 23:30 (approximately every 30 minutes).
N6	Go Ahead Ireland	110 kV Ballystruan – Forest Little	**On Construction Road Section** R104 Coolock Lane between R132 and Clonshaugh Business & Technology Park Access	Mon – Fri: 05:20 – 23:16. (approximately every 15 minutes) Sat: 05:20 – 23:20 (approximately every 15 minutes) Sun: 07:20 – 23:20 (approximately every 20-30 minutes)
27X**	Dublin Bus	110 kV / 220 kV Forest Little – Belcamp Option 1	Travels through R107 Mallahide Road/R139 signalised junction	Mon-Fri only: 1 – 2 services per day.
30**	Expressway	110 kV Newbury – Ballystruan	**On Construction Road Section** R132 Dublin Road between Airport Roundabout and Cloghran Roundabout R104 Cooloch Lane between R132 and Clonshaugh Business & Technology Park Access R108 between Old Airport Road and M50 R12 Swords Road between Old Airport Road and Airport Roundabout L2015 Old Airport Road	7 days a week. 7 services per day. 00:30, 06:30, 09:30, 12:30, 15:30, 18:30, 21:30.
32**	Expressway	110 kV / 220 kV Forest Little – Belcamp Option 1 110 kV Newbury – Ballystruan	**On Cable Route** L2753 Stockhole Lane between R132 Swords Road and L2055 Baskin Lane **On Construction Road Section**	7 days a week. 06:15 - 22:45 (services approximately every 2 hours).

Route Number	Operator	HV Cable Route/Construction Traffic	Detail	Frequency (during normal construction hours)
			R132 Dublin Road between Airport Roundabout and Cloghran Roundabout R104 Cooloch Lane between R132 and Clonshaugh Business & Technology Park Access	
33**	Dublin Bus	110 kV / 220 kV Forest Little – Belcamp Option 1 or Option 2 110 kV Newbury – Ballystruan	**On Cable Route** R132 Swords Road between R104 and Old Airport Road **On Construction Road Section** R132 Swords Road between Old Airport Road and Airport Roundabout R132 Dublin Road between Airport Roundabout and Cloghran Roundabout	Mon- Fri: 06:30 – 13:20. 1 to 2 services per hour. Sat: 8 services throughout day.
33e**	Northcliffe Heights	110 kV / 220 kV Forest Little – Belcamp Option 1 110 kV Ballystruan – Forest Little 110 kV Newbury – Ballystruan	**On Cable Route** R132 Swords Road between R104 and Old Airport Road **On Construction Road Section** R132 Dublin Road between Airport Roundabout and Cloghran Roundabout R12 Swords Road between Old Airport Road and Airport Roundabout	Fri only: 1 service at 07:00.
33N**	Nitelink, Dublin Bus	110 kV / 220 kV Forest Little – Belcamp Option 1 110 kV Ballystruan – Forest Little 110 kV Newbury – Ballystruan	**On Cable Route** R132 Swords Road between R104 and Old Airport Road **On Construction Road Section** R132 Dublin Road between Airport Roundabout and Cloghran Roundabout R12 Swords Road between Old Airport Road and Airport Roundabout	Mon: Thurs: No service. Fri: Sat: 4 services per day. 00:00, 01:30, 02:30, 04:00 Sun: No service.
40b**	Dublin Bus	110 kV Ballystruan – Forest Little	**On Cable Route** R122 St. Margaret's Road between R108 North Parallel Road and R108 South Parallel Road	Mon-Fri: 6 services per day. 07:05, 12:20, 15:45, 17:25, 18:20, 23:30 Sat: 5 services per day. 06;55, 12:35, 15:15, 17:35, 23:30 Sun: 4 services per day. 12:30, 15:30, 18:00, 23:30
41**	Dublin Bus	110 kV / 220 kV Forest Little – Belcamp Option 1 or Option 2 110 kV Newbury – Ballystruan	**On Cable Route** R132 Swords Road between R104 and Old Airport Road **On Construction Road Section** R132 Swords Road between Old Airport Road and Airport Roundabout R132 Dublin Road between Airport Roundabout and Cloghran Roundabout	Mon-Fri: 04:00 to 18:30 2 to 4 services an hour. Sat: 04:00-09:00 service every 30 minutes. 09:00-19:00 approximately every 20 minutes.
41b**	Dublin Bus	110 kV / 220 kV Forest Little – Belcamp Option 1 or Option 2 110 kV Newbury – Ballystruan	**On Cable Route** R132 Swords Road between R104 and Old Airport Road **On Construction Road Section** R132 Swords Road between Old Airport Road and Airport Roundabout R132 Dublin Road between Airport Roundabout and Cloghran Roundabout	Mon-Fri: 4 services per day. 06:20, 11:35, 16:25 18:35 Sat: 3 services per day. 08:20, 11:20, 17:00
41c**	Dublin Bus	110 kV / 220 kV Forest Little – Belcamp Option 1 or Option 2 110 kV Newbury – Ballystruan	**On Cable Route** R132 Swords Road between R104 and Old Airport Road **On Construction Road Section** R132 Swords Road between Old Airport Road and Airport Roundabout R132 Dublin Road between Airport Roundabout and Cloghran Roundabout	Mon-Fri: 07:00-09:40 – 2 services per hour. 10:00-18:45 – 3 services per hour Sat: 07:15-08:45- 2 services per hour. 09:15-18:45- 3 services per hour.
41d**	Dublin Bus	110 kV / 220 kV Forest Little – Belcamp Option 1 or Option 2 110 kV Newbury – Ballystruan	**On Cable Route** R132 Swords Road between R104 and Old Airport Road **On Construction Road Section** R132 Swords Road between Old Airport Road and Airport Roundabout R132 Dublin Road between Airport Roundabout and Cloghran Roundabout	Mon-Fri: 2 services per day at 07:30 and 07:40 Sat: no service
42**	Dublin Bus	110 kV / 220 kV Forest Little – Belcamp Option 1	**On Cable Route** R107 Malahide Road between L2055 Baskin Lane and R123 Balgriffin Road R107 Malahide Road between R123 Balgriffin Road and R139	Mon-Fri: 2 to 3 services an hour between 06:45 and approximately 19:00.
43**	Dublin Bus	110 kV / 220 kV Forest Little – Belcamp Option 1	**On Cable Route** R107 Malahide Road between L2055 Baskin Lane and R123 Balgriffin Road R107 Malahide Road between R123 Balgriffin Road and R139	Mon- Fri: 6:20-07:20- every 30 minutes. 07:35-08:55 every 15 minutes. 09:10-10:10 – 1 per hour. 11:05 – 2 per hour, 12:45-14:20- 1 per hour. 15:10 -15:40 – 2 per hour, 16:00- 17:40 – 3 per hour and following on 1 per hour until 23:00
83**	Dublin Bus	110 kV Ballystruan – Forest Little	**On Construction Road Section** R108 and R122	Mon – Fri: 05:45 – 23:20. 3 services per hour. Sat: 06:00 – 23:20. 3 services per hour. Sun: 07:20 – 23:20. 4 services per hour.

Route Number	Operator	HV Cable Route/Construction Traffic	Detail	Frequency (during normal construction hours)
83A	Dublin Bus	110 kV Ballystruan – Forest Little	**On Construction Road Section** R108 and R122	Mon – Fri: 09:20 – 22:40. Hourly. Sat: 09:30 – 22:20. Hourly. Sun: 09:40 – 22:40. Hourly.
101**	Bus Éireann	110 kV / 220 kV Forest Little – Belcamp Option 1 110 kV Ballystruan – Forest Little 110 kV Newbury – Ballystruan	**On Construction Road Section** Dublin Airport and R132 and R104 Swords Road	Daily: 00:30 – 05:30. 4 services,. 05:30 – 23:30 (every 60 minutes).
102**	Go Ahead	110 kV / 220 kV Forest Little – Belcamp Option 1 or Option 2 110 kV Ballystruan – Forest Little	**On Cable Route** L3132 Naul Road between R108 and Cloghran Roundabout **On Construction Road Section** R132 Dublin Road between Airport Roundabout and Cloghran Roundabout	Weekdays: 05:45 – 23:45 (every 30 minutes).
102c**	GoAheadIreland	110 kV / 220 kV Forest Little – Belcamp Option 1	**On Cable Route** R107 Malahide Road between L2055 Baskin Lane and R123 Balgriffin Road	Two services (Tuesday only).
103**	Bus Éireann	-	**On Construction Road Section** R135	Daily services, approximately 2-3 services per hour.
196**	Local Link Louth Meath Fingal	-	**On Construction Road Section** R108 Naul Road and L2030 Brackenstown Road	Mon – Sat: 9 services per day. Sun: No services.
717**	Avalen	110 kV Newbury – Ballystruan	**On Construction Road Section** M1 Junction 1 to Dublin Airport R132 Dublin Road between Airport Roundabout and Cloghran Roundabout R104 Cooloch Lane between R132 and Clonshaugh Business & Technology Park Access	Mon/Tue/Wed/Fri/Sat/Sun: 01:30 - 18:00 service at least every two hours. Thurs: 05:00 – 18:00 service at least every two hours.
760**	Citylink	110 kV Ballystruan – Forest Little 110 kV Newbury – Ballystruan	**On Construction Road Section** R132, Old Airport Road and R108	Daily. Service runs between 01:15 – 04:15 and 05:30 – 14:30 approximately every 60 minutes.
X30**	Expressway	110 kV Ballystruan – Forest Little 110 kV Newbury – Ballystruan	**On Construction Road Section** M1 to Dublin Airport, R132, Old Airport Way, R108	Fri only: 4 services per day. 06:45, 07:30, 07:50, 08:10.

Source: Dublinbus.ie, Moovit.app, Google Maps. Note: Normal construction hours refers to Monday to Friday 07:00 to 19:00 and Saturdays 08:00 to 17:00.

17.4.4 Walking and Cycling

Site visits (in June and October 2022) and an associated desktop study identified pedestrian and cycling infrastructure in the Study Area. Pedestrian and cycle infrastructure present on each road section is as set out in Table 17.13.

Table 17.13: Active Travel Infrastructure

Road Section	Active Travel Infrastructure	Detail	Road Section on Cable Route?
L2753 Stockhole Lane between R132 Swords Road & L2055 Baskin Lane	Pedestrian & Cycle	Footways on north sides of carriageway north of nursing home. Cycleway on south side of carriageway north of nursing home.	✓
L2051 Stockhole Lane /Clonshaugh Rd between L2055 Baskin Lane and R139	Pedestrian	Intermittent footway.	✓
L2055 Baskin Lane	Pedestrian	Footways on north side of carriageway between Greenwood and R107 junctions.	✓
R107 Malahide Road between L2055 Baskin Lane and R123 Balgriffin Road	Pedestrian & Cycle	Footways on both sides of carriageway majority of road section Primary radial cycle route on the Cycle Network Plan for the Greater Dublin Area (NTA, 2021)	✓
R107 Malahide Road between R123 Balgriffin Road and R139	Pedestrian & Cycle	Footways on both sides of carriageway majority of road section. Cycleway on both sides of the carriageway between R107/Belmayne signalised junction and R107/R139 signalised junction. Primary radial cycle route on the Cycle Network Plan for the Greater Dublin Area (NTA, 2021)	✓
R139 between R107 and Belcamp Access	Pedestrian	Footways on both sides of carriageway.	✓
R139 between M1 and Belcamp Access	Pedestrian	Footways on both sides of the carriageway between Clonshaugh Roundabout (junction with L2051) and Belcamp Access.	
R108 between Old Airport Road & M50	Pedestrian & Cycle	Footway on west side of carriageway majority of road section. Cycleway on both sides of carriageway between Silloge Green and M50.	
R108 South Parallel Road between R122 and Old Airport Road	None	N/A	
R122 St. Margaret's Road between R108 North Parallel Road and R108 South Parallel Road	Pedestrian	Footway on east side of carriageway.	✓
L3151 Harristown Lane	None	N/A	✓
R122 St Margaret's Road between R108 South Parallel Road and L3151 Harristown Lane	Pedestrian	Footway on east side of carriageway.	✓
R122/R108 between R108 North Parallel Road and FoodCentral Drive	Pedestrian	Near the civil parish of St. Margaret's, the road features footway on west side of carriageway.	✓
R108 between FoodCentral Drive and R108	None	N/A	✓
L3132 Naul Rd between R108 and Cloghran Roundabout	None	N/A	✓
Clonshaugh Business & Technology Park (Road on Southern Boundary)	Pedestrian	Footways on both sides of carriageway.	✓
Clonshaugh Business & Technology Park (Main Access Road)	Pedestrian	Footways on east side of carriageway.	
L2015 Old Airport Road (Collinstown Lane)	Pedestrian	Footway on south side of carriageway between R108/Old Airport Road/Private Access signalised junction and 'Starlights GFC' access and on both sides of carriageway at R132 Swords Road/Old Airport Road/ Cemetery Access signalised junction.	
R132 Swords Road between Old Airport Road and Airport Roundabout	Pedestrian & Cycle	Footways on both sides of carriageway. Cycleway on both sides of the carriageway. In form of on-road cycle lanes and shared-use path. Primary radial cycle route on the Cycle Network Plan for the Greater Dublin Area (NTA, 2021)	
R132 Swords Road between R104 and Old Airport Road	Pedestrian & Cycle	Footways on both sides of carriageway. Cycleway on both sides of the carriageway. In form of on-road cycle lanes and shared-use path. Includes access to Santry Park (walking and cycling routes). Primary radial cycle route on the Cycle Network Plan for the Greater Dublin Area (NTA, 2021)	✓
R132 Dublin Road between Airport Roundabout and Cloghran Roundabout	Pedestrian & Cycle	Footways on both sides of carriageway. Cycleway on both sides of the carriageway. In form of on-road cycle lanes and shared-use path Primary radial cycle route on the Cycle Network Plan for the Greater Dublin Area (NTA, 2021)	
R104 Coolock Lane between R132 and Clonshaugh Business & Technology Park Access	Pedestrian & Cycle	Footways on both sides of carriageway Cycleway on both sides of the carriageway.	
L3125 Kilshane Road	Pedestrian & Cycle	Road features a mixture of active travel provision including footways/cycleways and shared paths (some of which was under construction at time of June 2022 site visit) on both sides of the carriageway	
R135 between L3120 and N2 Link	None	N/A	
Turnapin Lane	Pedestrian	Footways on both sides of the carriageway in the industrial/commercial area and on the north side in the residential area.	
Turnapin Cottages	Pedestrian	Footways on both sides of the carriageway	
Cherryhound Tyrellstown N2 Link Road	Pedestrian	Uncontrolled pedestrian crossing in from of dropped kerbs on all arms of R135 roundabout ('Broughan Roundabout') linking footway on both sides of the R135.	

Source: Mott MacDonald Site Visits, Cycle Network Plan for Greater Dublin Area, National Transport Authority

17.4.5 Existing Traffic Flows

Table 17.14 details the existing traffic flows and capacities on the road sections within the Study Area considered in the assessment. Existing traffic flows have been quoted as Average Annual Daily Traffic (AADT).

Unless otherwise referenced all traffic flow data has been obtained from traffic surveys commissioned by Mott MacDonald and undertaken by Nationwide Data Collection between 29th August and 8th September 2022.

Capacities for a variety of road types have been determined through a review of the *UK Design Manual for Roads and Bridges Guidance Volume 5, Part 3*. These capacities are quoted as two-way flows in vehicles per hour (vph).

Where traffic flow data has not been obtained a reasonable assumption has been applied using professional judgement based on knowledge of traffic volumes on the adjacent roads.

Table 17.14: Road Capacities and Existing Traffic Data

Study Area Road Section	Road Capacity (vph)	Peak Hour Traffic Volume (two-way) [TIME]	Existing AADT (two-way) (year 2022)	Existing HGV (%)
L2753 Stockhole Lane between R132 Swords Road & L2055 Baskin Lane	2450	688 [16:00-17:00]	8295	3%
L2051 Stockhole Lane /Clonshaugh Rd between L2055 Baskin Lane and R139	1700	642 [17:00-18:00]	7916	6%
L2055 Baskin Lane	1700	623 [16:00-17:00]	7660	8%
R107 Malahide Road between L2055 Baskin Lane and R123 Balgriffin Road	2167	993 [16:00-17:00]	12,771	8%
R107 Malahide Road between R123 Balgriffin Road and R139	3500	1724 [16:00-17:00]	23,794	9%
R139 between R107 and Belcamp Access	5083	2521 [16:00-17:00]	34,354	11%
R139 between M1 and Belcamp Access	5083	2521 [16:00-17:00]	34,354	11%
R108 between Old Airport Road & M50	2450	984** [15:00-16:00]	16,634**	7%**
R108 South Parallel Road between R122 and Old Airport Road	2650	944 [16:00-17:00]	11,874	12%
R122 St. Margaret’s Road between R108 North Parallel Road and R108 South Parallel Road	2650	944 [16:00-17:00]	11,874	12%
L3151 Harristown Lane	625	<20*	<20*	<1%*
R122 St Margaret’s Road between R108 South Parallel Road and L3151 Harristown Lane	2650	944 [16:00-17:00]	11,874	12%
R122/R108 between R108 North Parallel Road and Food Central Drive	2650	1078 [17:00-18:00]	12,544	13%
R108 between FoodCentral Drive and R108	2650	1078 [17:00-18:00]	12,544	13%
L3132 Naul Rd between R108 and Cloghran Roundabout	2650	1078 [17:00-18:00]	12,544	13%
Clonshaugh Business & Technology Park (Road on Southern Boundary)	2167	152 [07:00-08:00]	1461	20%
Clonshaugh Business & Technology Park (Main Access Road)	2167	414 [09:00-10:00]	4543	16%
L2015 Old Airport Road (Collinstown Lane)	2450	1045 [15:00-16:00]	15,930	14%
R132 Swords Road between Old Airport Road and Airport Roundabout	3500	1633 [13:00-14:00]	24,066	13%
R132 Swords Road between R104 and Old Airport Road	3500	1084 [13:00-14:00]	14,621	12%
R132 Dublin Road between Airport Roundabout and Cloghran Roundabout	4500	1826 [16:00-17:00]	25,566	11%
R104 Coolock Lane between R132 and Clonshaugh Business & Technology Park Access	3500	2038 [16:00-17:00]	28,865	7%
L3125 Kilshane Road	2650	776 [17:00-18:00]	9089	20%
R135 between L3120 and N2 Link	2450	434	6107	20%

Study Area Road Section	Road Capacity (vph)	Peak Hour Traffic Volume (two-way) [TIME]	Existing AADT (two-way) (year 2022)	Existing HGV (%)
		[16:00-17:00]		
Turnapin Lane	1500	418 [13:00-14:00]	4785	22%
Turnapin Cottages	1250	<50*	250*	<1%*
Cherryhound Tyrellstown N2 Link Road	4500	472 [17:00-18:00]	6134	24%

Source: ***** Mott MacDonald estimated traffic flows. ****** TII traffic data website (2022). All other traffic flow data from Mott MacDonald commissioned traffic survey undertaken by Nationwide Data Collection (August / September 2022).

17.4.6 Collision Data

No assessment of road safety was undertaken as recorded as Personal Injury Collision (PIC) data was unavailable at the time of assessment.

17.5 Key Elements of the Proposed Development

The assessment of the likely Roads and Traffic effects of the Proposed Development are presented in Section 17.6 is based on the detail set out in Chapter 6 and other assumptions which are detailed in this section.

17.5.1 Construction Programme and Workers

The information and detail in Chapter 6 has been summarised in Table 17.15. The indicative construction programmes for both the Civil and Electrical works are outlined in Table 17.16 and Table 17.17.

Table 17.15: Construction Detail Summary

HV Cable Route	Dates	Workers	Working Hours
110 kV Newbury – Ballystruan Cable	Subject to the grant of statutory approval, it is anticipated that the construction phase will commence in Q2 of 2030 and the construction works (civil) will be complete in Q1 of 2031.	The total number of construction workers on-site will vary during the construction phase of the works but are expected to peak at approximately fifteen (15) persons.	In general, it is anticipated that construction will occur during normal working hours i.e., Monday to Friday 07:00 to 19:00 hours and 08.00 to 17.00 on Saturday. However, the working hours may be dictated by either the granted planning conditions or conditions contained within the road opening licenses. Night working may also be a requirement in highly congested areas and these works will be completed in full compliance with the local authorities' requirements. There may be instances where extended hours / days are required however should working outside these hours / days be required they will only be undertaken with prior agreement with all relevant statutory authorities.
110 kV Ballystruan – Forest Little Cable	Subject to the grant of statutory approval, it is anticipated that the construction phase (civil works only) will commence in Q3 of 2026 and the construction works (civil) will be complete in Q4 of 2027.	The total number of construction workers on-site will vary during the construction phase of the works but are expected to peak at approximately fifteen (15) persons.	In general, it is anticipated that construction will occur during normal working hours i.e., Monday to Friday 07:00 to 19:00 hours and 08.00 to 17.00 on Saturday. However, the working hours may be dictated by either the granted planning conditions or conditions contained within the road opening licenses. Night working may also be a requirement in highly congested areas and these works will be completed in full compliance with the local

HV Cable Route	Dates	Workers	Working Hours
			authorities' requirements. There may be instances where extended hours / days are required however should working outside these hours / days be required they will only be undertaken with prior agreement with all relevant statutory authorities.
110 kV/220 kV Forest Little – Belcamp Cable – Option 1 and Option 2	Subject to the grant of statutory approval, it is anticipated that the construction phase (civil works only) will commence in Q3 of 2027 and the construction works (civil) will be complete in Q1 of 2029.	The total number of construction workers on-site will vary during the construction phase of the works but are expected to peak at approximately fifteen (15) persons.	In general, it is anticipated that construction will occur during normal working hours i.e., Monday to Friday 07:00 to 19:00 hours and 08.00 to 17.00 on Saturday. However, the working hours may be dictated by either the granted planning conditions or conditions contained within the road opening licenses. Night working may also be a requirement in highly congested areas and these works will be completed in full compliance with the local authorities' requirements. There may be instances where extended hours / days are required however should working outside these hours / days be required they will only be undertaken with prior agreement with all relevant statutory authorities.

Source: Mott MacDonald

Table 17.16: Construction Programme (Civils)

Phase	Duration			
HV Cable Route	**110 kV Newbury - Ballystruan Cable**	**110 kV Ballystruan – Forest Little Cable**	**110 kV/220 kV Forest Little – Belcamp Cable – Option 1**	**110 kV/220 kV Forest Little – Belcamp Cable – Option 2**
Pre-construction works	6 weeks	6 weeks	6 weeks	6 weeks
Trenching and ducting works and temporary reinstatement (based on two crews)	16 weeks	40 weeks	48 weeks	24 weeks
Joint Bay Installation & temporary reinstatement	7 weeks	9 weeks	18 weeks	9 weeks
Permanent Reinstatement of trench	3 weeks	8 weeks	7 weeks	4 weeks
Total	**32 weeks**	**63 weeks**	**79 weeks**	**43 weeks**

Source: Mott MacDonald

Table 17.17: Construction Programme (Electrical)

Phase	Duration			
HV Cable Route	**110 kV Newbury - Ballystruan Cable**	**110 kV Ballystruan – Forest Little Cable**	**110 kV/220 kV Forest Little – Belcamp Cable – Option 1**	**110 kV/220 kV Forest Little – Belcamp Cable – Option 2**
Pre-construction works	3 weeks	3 weeks	3 weeks	3 weeks
HV cable joint bay re-excavation (min 3 max 5 at time) – based on 12 Joint Bays	7 weeks (jointing works in parallel after initial 5 JBs open)	7 weeks (jointing works in parallel after initial 5 JBs open)	10 weeks (jointing works in parallel after initial 5 JBs open)	5 weeks (jointing works in parallel after initial 5 JBs open)
Proving of ducting / HV cable installation	7 weeks	8 weeks	14 weeks	7 weeks

Phase	Duration			
HV Cable Route	**110 kV Newbury - Ballystruan Cable**	**110 kV Ballystruan – Forest Little Cable**	**110 kV/220 kV Forest Little – Belcamp Cable – Option 1**	**110 kV/220 kV Forest Little – Belcamp Cable – Option 2**
HV cable jointing	6 weeks	9 weeks	17 weeks	8 weeks
HV cable commissioning (sheath test, cross bonding and HV/AC testing)	3 weeks	3 weeks	3 weeks	3 weeks
Permanent Reinstatement of Joint Bays (Civil Contractor)	6 weeks	6 weeks	11 weeks	5 weeks
Total	**32 weeks**	**36 weeks**	**58 weeks**	**31 weeks**

Source: Mott MacDonald

17.5.2 Construction Compounds

For the purposes of a robust assessment, it has been assumed that there would be construction compounds at or in the vicinity of each of the four substations (Belcamp, Ballystruan, Newbury and Forest Little). It has been assumed that each compound would feature adequate parking for construction workers.

For the 110 kV Ballystruan – Newbury HV cable route one joint bay (located south of the M50) would be accessed from Turnapin Lane and Turnapin Cottages. It has also been assumed that for this joint bay there would be a smaller compound area in the field adjacent to the joint bay location.

17.5.3 HV Cabling

It is assumed that the Contractor will use two crews per cable route.

For HV cable trenching, based upon ESB's previous experience of similar projects in predominantly urban environments, it is estimated that a single crew could install between 30m and 50m length of cable trenching per day. It has therefore been assumed that an average of 40m length of cable trenching would be installed per day for the purpose of this assessment.

17.5.4 Joint Bays and Passings Bays

All joint bays for 110kV HV cable routes are c. 6m in length and all joint bays for 220kV HV cable routes are c. 8m in length.

Passing bays are assumed to be c. 10m wide. All passing bays are assumed to be temporary.

The 110 kV / 220 kV Forest Little – Belcamp - Option 1 HV cable route will include six passing bays on L2055 Baskin Lane. These passing bays will allow local, emergency and construction access to the properties on L2055 Baskin Lane and the road itself.

The 110 kV Newbury to Ballystruan HV cable route includes a joint bay which would be located on-road but on private land (at the former Dublin Airport Quick Park facility, accessed from R132 Swords Road). It is not anticipated that construction activity associated with the installation of this joint bay would impact the operation of the adjacent public road network.

Table 17.18 summaries the total number of joint bays on the carriageway per road section as well as passing bays per road section.

The duration of construction related activities associated with joint bays on the carriageway for the Civils works will be up to eight days at each location. The Electrical works would be of lesser duration.

Table 17.18: Joint Bays on Carriageway and Passing Bays

Road Section	HV Cable Route	No. of Joint Bays on Carriageway	No. of Passing Bays
L2055 Baskin Lane	110 kV / 220 kV Forest Little – Belcamp - Option 1	7	6
R107 Malahide Road between L2055 Baskin Lane and R123 Balgriffin Road	110 kV / 220 kV Forest Little – Belcamp - Option 1	5	0
R107 Malahide Road between R123 Balgriffin Road and R139	110 kV / 220 kV Forest Little – Belcamp - Option 1	2	0
R139 between R107 and Belcamp Access	110 kV / 220 kV Forest Little – Belcamp - Option 1	5	0
R122/R108 between R108 North Parallel Road and FoodCentral Drive	110 kV Ballystruan – Forest Little	3	0
R122 St Margaret's Road between R108 South Parallel Road and L3151 Harristown Lane	110 kV Ballystruan – Forest Little	1	0
L3151 Harristown Lane	110 kV Ballystruan – Forest Little	1	0
R108 between FoodCentral Drive and R108	110 kV Ballystruan – Forest Little	2	0
L3132 Naul Rd between R108 and Cloghran Roundabout	110 kV Ballystruan – Forest Little	3	0
Clonshaugh Business & Technology Park (Road on Southern Boundary)	110 kV Newbury – Ballystruan	3	0

Source: Mott MacDonald

17.5.5 Construction Traffic

As detailed in Chapter 6, the construction phase will include deliveries of construction material such as ducting, cabling, and bulk material like concrete or pre-cast joint bay materials.

Excavated material (from any carriageway works) will be disposed of offsite to suitably licenced waste facilities during the construction phase.

A number of assumptions have been made to enable a robust estimate of the number of HGV construction vehicles per HV cable route. These include:

General

- No abnormal loads will be generated;
- HGVs include four-axle tipper truck with load capacity of $10m^3$.

Materials

- Wider/deeper trenches crossing utilities/bridges/etc have not been considered, only standard trenches;

- All excavated material from the cable trenching on carriageway is assumed to be removed from site;
- All excavated material from off-road trenching and joint bays is assumed to be retained on site and reused locally; and
- Excavated material removed from the 10m wide passing bays and off-road cable routes will be retained on site.

17.5.5.1 HGVs

The estimated average daily HGV traffic generation by number of vehicles and movements (one vehicle generates one inbound journey + one return journey) per HV cable section are detailed in **Table 17.19**.

Table 17.19: Average Daily HGVs

	Civil		Electrical	
HV Cable Route	**No. of HGVs**	**HGV Movements**	**No. of HGVs**	**HGV Movements**
110 kV Newbury – Ballystruan	26	52	3	6
110 kV Ballystruan – Forest Little	26	52	3	6
110 kV / 220 kV Forest Little – Belcamp Option 1	42	84	7	14
110 kV / 220 kV Forest Little – Belcamp Option 2	29	58	0*	0*

Source: Mott MacDonald

*The joint bays are off road, resulting in a 0 daily average

17.5.5.2 Private Vehicles (Construction Workers)

As described in Section 17.5.1 the total number of construction workers on site will vary during the construction phase but is expected to peak at fifteen persons (per HV cable route).

For the purposes of a robust assessment, it has been assumed that all workers will individually drive to and from compound car parks. This would mean a maximum of 30 movements per HV cable route. However, it is expected that some workers will vehicle share or use public transport if conveniently available.

17.5.5.3 All Vehicles

For the purposes of a robust assessment, it has been assumed that for each of the HV cable routes, all construction generated traffic (i.e. HGVs and light good vehicles and cars) utilise every road section assigned to each cable route in Table 17.4. For HGVs the average number of daily vehicle movements from the Civil works have been referenced in this assessment (as these exceed the daily vehicle movements that will be generated by the Electrical works).

17.5.6 Road Closures

Road sections which are anticipated to require temporary closure due to construction works are described in this section. This includes lane closures. Similar mitigation would be adopted if any other road sections not described in this section, are identified following further assessment to require temporary road/lane closures.

17.5.6.1 L2055 Baskin Lane Road Closure

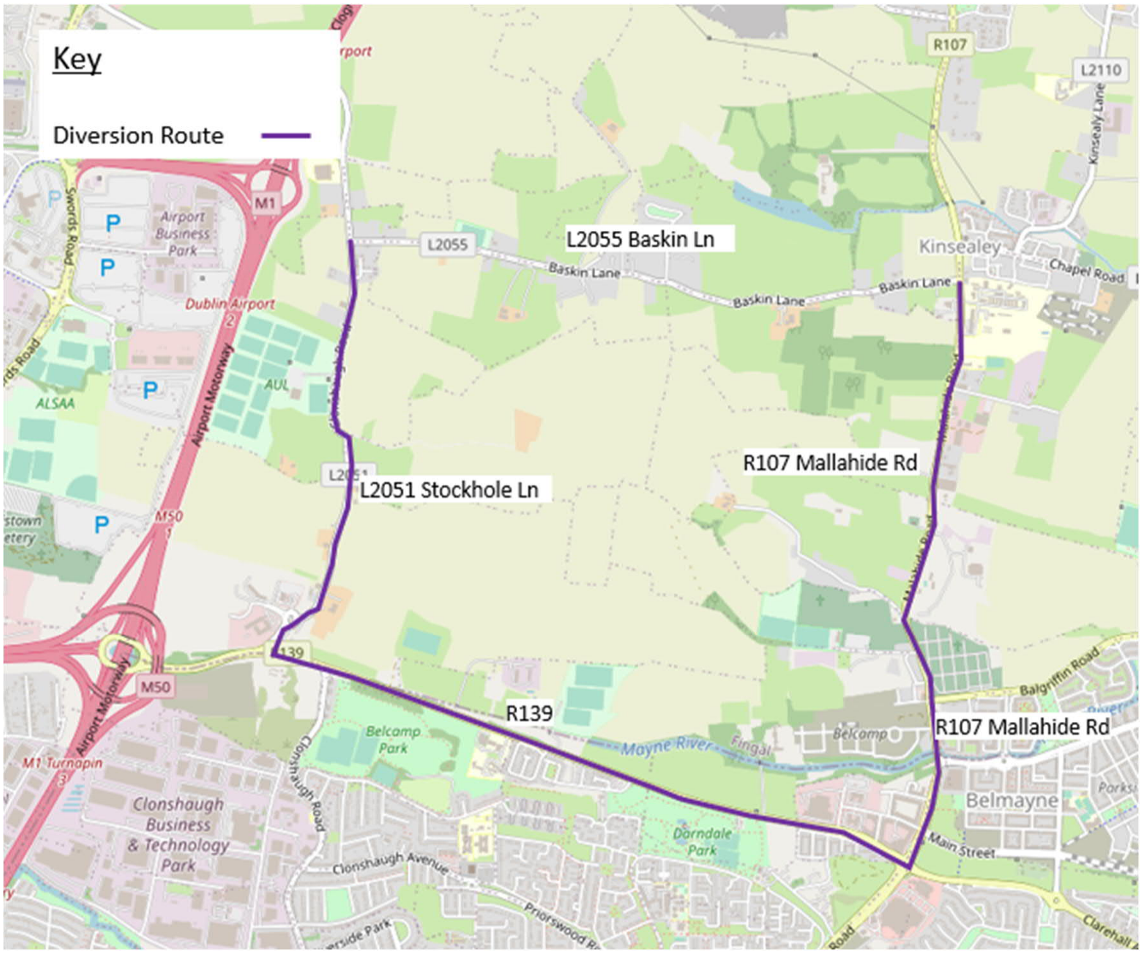
L2055 Baskin Lane will be locally closed (with a rolling road closure) to through traffic for a period unlikely to exceed eight weeks during the Civil works. It would remain open for local or emergency access. Baskin Lane may be subject to a shorter duration closure during the Electrical works. Some level of driver delay and inconvenience will arise as a result of the road closure of L2055 Baskin Lane.

Although not currently envisaged, there remains some potential of localised underground obstruction (e.g., existing infrastructure apparatus) which may necessitate localised cable route realignment and the associated temporary closure of Baskin Lane, and if such a scenario were to occur then the appointed contractor would agree appropriate and safe working arrangements in consultation with the reviewing authority.

Figure 17.3 shows planned diversion routes due to the temporary closure of L2055 Baskin Lane. Whilst it is assumed some vehicles may use this diversion route it is likely that many drivers will utilise other routes.

The additional length of the diversion route would be up to 4.3kms and would add six to ten minutes travel time onto journeys previously utilising the L2055 Baskin Lane.

Figure 17.3: L2055 Baskin Lane Diversion Route (Both Directions)



Source: Mott MacDonald, OpenStreetMap.org

17.5.6.2 Lane Closures

Road sections which will be subject to a localised lane closures and the durations of the closures are detailed in Table 17.20.

Table 17.20: Duration of Lane Closures During Civil Works

Road Section	Expected No. of Lanes Closed	HV Cabling Works Expected Duration of Closure	Joint Bay Works Expected Duration of Closure
110 kV Newbury – Ballystruan			
Clonshaugh Business & Technology Park (Road on Southern Boundary)	1 lane	5 weeks	4 weeks
R132 Swords Road between R104 and Old Airport Road	1-2 lanes	1 day	No joint bays on road section
110 kV Ballystruan – Forest Little			
R122 St. Margaret's Road between R108 North Parallel Road and R108 South Parallel Road	1 lane	1 week	No joint bays on road section
R122/R108 between R108 North Parallel Road and FoodCentral Drive	1 lane	9 weeks	3 weeks
R122 St Margaret's Road between R108 South Parallel Road and L3151 Harristown Lane	1 lane	1 week	1 week
R108 between FoodCentral Drive and R108	1 lane	6 weeks	3 weeks
L3132 Naul Rd between R108 and Cloghran Roundabout	1 lane	9 weeks	4 weeks
110 kV / 220 kV Forest Little – Belcamp Option 1			
L2753 Stockhole Lane between R132 Swords Road & L2055 Baskin Lane	1 lane	6 weeks	No joint bays on road section
L2051 Stockhole Lane /Clonshaugh Rd between L2055 Baskin Lane	1 lane	6 weeks	No joint bays on road section
L2055 Baskin Lane	1 lane	9 weeks	See Section 17.5.6.1
R107 Malahide Road between L2055 Baskin Lane and R123 Balgriffin Road	1 lane	6 weeks	6 weeks
R107 Malahide Road between R123 Balgriffin Road and R139	1-2 lanes	2 weeks	3 weeks
R139 between R107 and Belcamp Access	1-2 lanes	7 weeks	6 weeks
R132 Dublin Road between Airport Roundabout and Cloghran Roundabout	1-2 lanes	2 days	No joint bays on road section
110 kV / 220 kV Forest Little – Belcamp Option 2			
L2753 Stockhole Lane between R132 Swords Road & L2055 Baskin Lane	1 lane	6 weeks	No joint bays on road section
L2051 Stockhole Lane /Clonshaugh Rd between L2055 Baskin Lane	1 lane	7 weeks	No joint bays on road section
R132 Dublin Road between Airport Roundabout and Cloghran Roundabout	1-2 lanes	2 days	No joint bays on road section

Source: Mott MacDonald

17.5.6.3 L3151 Harristown Lane

L3151 Harristown Lane is approximately 3m wide and experiences very low levels of traffic (likely to be fewer than 20 movements per day). This road will be subject to both cable and joint bay installation works (one joint bay) which would occupy the full road carriageway width.

In order that Harristown Lane can continue to accommodate local vehicular access, local traffic management arrangements will be implemented as necessary (e.g., temporary steel plates may be placed over open excavations).

17.5.7 Overlapping Construction Periods

The proposed construction programme indicates that there would be a period of up to six months where the construction activities associated with the 110 kV Forest Little – Ballystruan cable route and the 110 kV/220 kV Forest Little – Belcamp Cable (Option 1 or Option 2) HV cable route overlap. In this scenario, the following road sections would feature construction works and/or construction traffic from associated with both HV cable routes concurrently:

- L3132 Naul Road between R108 and Cloghran Roundabout
- R132 Dublin Road between Airport Roundabout and Cloghran Roundabout

17.5.8 Future Baseline Traffic Flow

The *Project Appraisal Guidelines for National Roads Unit 5.3, TII, October 2021* has been used to predict local road network traffic flows in the absence of the Proposed Development.

Low growth of traffic has been assumed given that the Study Area of the Proposed Development is sparsely populated. The likelihood of high or medium levels of traffic growth would be used were there to be a drastic increase in car ownership and population in the area during or prior to the construction of the proposed development, which is not foreseen. Table 17.21 summarises future year traffic growth scenarios without the proposed development.

Table 17.21: Future Year Scenario Growth Rates

Future Year Scenario	Light Vehicle (Cars/LGV) Growth Rate from 2022	Heavy Vehicle (HGV/Bus) Growth Rate from 2022
2026	5.97%	11.68%
2027	7.52%	14.81%
2028	9.09%	18.02%
2029	10.68/%	21.33%
2030	12.29%	24.72%
2031	12.68%	26.17%

Source: TII Publications, Project Appraisal Guidelines for National Roads Unit 5.3 – Travel Demand Projections, Table 6.1 – Dublin Metropolitan Area, October 2021

Table 17.22 lists forecast future baseline traffic flows factored upwards in accordance with the rates indicated in **Table 17.21**.

Table 17.22: Future Baseline Traffic Flow Data

	2026 Average Daily Traffic Flow		2027 Average Daily Traffic Flow		2028 Average Daily Traffic Flow		2029 Average Daily Traffic Flow		2030 Average Daily Traffic Flow		2031 Average Daily Traffic Flow	
Road Section	**All Vehicles (Two-way Flow)**	**HGV Only (Two-way Flow)**	**All Vehicles (Two-way Flow)**	**HGV Only (Two-way Flow)**	**All Vehicles (Two-way Flow)**	**HGV Only (Two-way Flow)**	**All Vehicles (Two-way Flow)**	**HGV Only (Two-way Flow)**	**All Vehicles (Two-way Flow)**	**HGV Only (Two-way Flow)**	**All Vehicles (Two-way Flow)**	**HGV Only (Two-way Flow)**
L2753 Stockhole Lane between R132 Swords Road & L2055 Baskin Lane	8790	260	8919	267	9049	274	9181	282	9315	290	9347	293
L2051 Stockhole Lane /Clonshaugh Rd between L2055 Baskin Lane and R139	8389	522	8511	536	8635	551	8761	567	8889	582	8919	589
L2055 Baskin Lane	8117	683	8236	703	8356	722	8478	743	8602	763	8631	772
R107 Malahide Road between L2055 Baskin Lane and R123 Balgriffin Road	13533	1131	13731	1163	13931	1196	14135	1229	14341	1263	14390	1278
R107 Malahide Road between R123 Balgriffin Road and R139	25214	2275	25582	2339	25956	2404	26335	2471	26719	2541	26810	2570
R139 between R107 and Belcamp Access	36405	4328	36936	4449	37475	4573	38023	4701	38578	4833	38709	4889
R139 between M1 and Belcamp Access	36405	4328	36936	4449	37475	4573	38023	4701	38578	4833	38709	4889
R108 between Old Airport Road & M50	17627	1338	17884	1375	18145	1413	18410	1453	18679	1494	18743	1511
R108 South Parallel Road between R122 and Old Airport Road	12583	1575	12766	1619	12953	1664	13142	1711	13334	1759	13379	1779
R122 St. Margaret's Road between R108 North Parallel Road and R108 South Parallel Road	12583	1575	12766	1619	12953	1664	13142	1711	13334	1759	13379	1779
R122 St Margaret's Road between R108 South Parallel Road and L3151 Harristown Lane	20	0	20	0	20	0	20	0	20	0	20	0
L3151 Harristown Lane	12583	1575	12766	1619	12953	1664	13142	1711	13334	1759	13379	1779
R122/R108 between R108 North Parallel Road and FoodCentral Drive	13293	1799	13487	1849	13684	1901	13884	1954	14086	2009	14134	2032
R108 between FoodCentral Drive and R108	13293	1799	13487	1849	13684	1901	13884	1954	14086	2009	14134	2032
L3132 Naul Rd between R108 and Cloghran Roundabout	13293	1799	13487	1849	13684	1901	13884	1954	14086	2009	14134	2032
Clonshaugh Business & Technology Park (Road on Southern Boundary)	1548	322	1571	331	1594	340	1617	349	1641	359	1646	363
Clonshaugh Business & Technology Park (Main Access Road)	4814	805	4884	828	4956	851	5028	875	5102	899	5119	910
L2015 Old Airport Road (Collinstown Lane)	16881	2409	17127	2476	17377	2546	17631	2617	17889	2690	17949	2721
R132 Swords Road between Old Airport Road and Airport Roundabout	25503	3493	25875	3591	26253	3692	26636	3795	27025	3901	27117	3947
R132 Swords Road between R104 and Old Airport Road	15494	2008	15720	2064	15949	2122	16182	2181	16419	2243	16474	2269
R132 Dublin Road between Airport Roundabout and Cloghran Roundabout	27092	3013	27488	3097	27889	3184	28296	3273	28709	3365	28807	3404

	2026 Average Daily Traffic Flow		2027 Average Daily Traffic Flow		2028 Average Daily Traffic Flow		2029 Average Daily Traffic Flow		2030 Average Daily Traffic Flow		2031 Average Daily Traffic Flow	
R104 Coolock Lane between R132 and Clonshaugh Business & Technology Park Access	30588	2264	31035	2327	31488	2392	31947	2459	32414	2528	32524	2557
L3125 Kilshane Road	9632	2000	9772	2056	9915	2114	10060	2173	10206	2234	10241	2260
R135 between L3120 and N2 Link	6472	1383	6566	1421	6662	1461	6759	1502	6858	1544	6881	1562
Turnapin Lane	5071	1180	5145	1214	5220	1247	5296	1282	5373	1318	5392	1334
Turnapin Cottages	250	0	250	0	250	0	250	0	250	0	250	0
Cherryhound Tyrellstown N2 Link Road	6500	1632	6595	1677	6691	1724	6789	1773	6888	1822	6912	1843

Source: Mott MacDonald

17.6 Likely Effects of the Proposed Development

17.6.1 Predicted Construction Effects

It has been assumed that peak periods of Proposed Development traffic will occur during Year 1 of the construction phase for each Cable Route and accordingly the average daily traffic has been assessed. However, for Study Area road sections which are impacted by construction related activities for two cable routes, it has been assumed that peak conditions will occur during this overlap and accordingly combined daily averages have been considered for locations impacted as such.

Possible effects associated with the construction works are:

- Driver delay: (disruption and delay to users of roads from the road closures, construction works and construction traffic);
- Road safety; and
- Community effects (Pedestrian delay, severance, pedestrian and cyclist amenity; including fear and intimidation).

These effects have potential to be caused due to an increased volume of traffic on the construction vehicle routes, however as these vehicle movements will occur during construction operations only, they are categorised to be short term effects, given the construction period is between one and six years.

Table 17.23 outlines the significance, in terms of the IEMA thresholds, of the construction vehicle movements on the public road network within the Study Area and assesses the aligned effect significance, using the process set out in Section 17.3.

Table 17.23: IEMA Threshold Summary

Road Section	Capacity (vph)	Year Assessed	Baseline AADT - All Vehicles (Two-way Flow)	Baseline AADT - HGV only (Two-way Flow)	Daily Additional (Proposed Development Generated) Movements - All Vehicles	% Increase - All Vehicles	Additional Movements (Proposed Development Generated) - HGVs	% Increase - HGVs	Effect (Significance of Increase) - All Vehicles	Effect (Significance of Increase) - HGVs
L2753 Stockhole Lane between R132 Swords Road & L2055 Baskin Lane	2450	2027	8919	267	114	1.28%	84	31.48%	None (Not Significant)	Moderate (Significant)
L2051 Stockhole Lane /Clonshaugh Rd between L2055 Baskin Lane and R139	1700	2027	8511	536	114	1.34%	84	15.67%	None (Not Significant)	Minor (Not Significant)
L2055 Baskin Lane	1700	2027	8236	703	114	1.38%	84	11.96%	None (Not Significant)	Minor (Not Significant)
R107 Malahide Road between L2055 Baskin Lane and R123 Balgriffin Road	2167	2027	13731	1163	114	0.83%	84	7.22%	None (Not Significant)	Minor (Not Significant)
R107 Malahide Road between R123 Balgriffin Road and R139	3500	2027	25582	2339	114	0.45%	84	3.59%	None (Not Significant)	None (Not Significant)
R139 between R107 and Belcamp Access	5083	2027	36936	4449	114	0.31%	84	1.89%	None (Not Significant)	None (Not Significant)
R139 between M1 and Belcamp Access	5083	2027	36936	4449	114	0.31%	84	1.89%	None (Not Significant)	None (Not Significant)
R108 between Old Airport Road & M50	2450	2030	18679	1494	82	0.44%	52	3.48%	None (Not Significant)	None (Not Significant)
R108 South Parallel Road between R122 and Old Airport Road	2650	2026	12583	1575	82	0.65%	52	3.30%	None (Not Significant)	None (Not Significant)
R122 St. Margarets Road between R108 North Parallel Road and R108 South Parallel Road	2650	2026	12583	1575	82	0.65%	52	3.30%	None (Not Significant)	None (Not Significant)
L3151 Harristown Lane	625	2026	20	0	52	260.00%	52	>100%	Major (Significant)	Major (Significant)
R122 St Margaret's Road between R108 South Parallel Road and L3151 Harristown Lane	2650	2026	12583	1575	82	0.65%	52	3.30%	None (Not Significant)	None (Not Significant)
R122/R108 between R108 North Parallel Road and FoodCentral Drive	2650	2026	13293	1799	82	0.62%	52	2.89%	None (Not Significant)	None (Not Significant)
R108 between FoodCentral Drive and R108	2650	2026	13293	1799	82	0.62%	52	2.89%	None (Not Significant)	None (Not Significant)
L3132 Naul Rd between R108 and Cloghran Roundabout	2650	2027	13487	1849	196	1.45%	136	7.35%	None (Not Significant)	Minor (Not Significant)
Clonshaugh Business & Technology Park (Road on Southern Boundary)	2167	2030	1641	359	82	5.00%	52	14.48%	None (Not Significant)	Minor (Not Significant)
Clonshaugh Business & Technology Park (Main Access Road)	2167	2030	5102	899	82	1.61%	52	5.78%	None (Not Significant)	Minor (Not Significant)

Road Section	Capacity (vph)	Year Assessed	Baseline AADT - All Vehicles (Two-way Flow)	Baseline AADT - HGV only (Two-way Flow)	Daily Additional (Proposed Development Generated) Movements - All Vehicles	% Increase - All Vehicles	Additional Movements (Proposed Development Generated) - HGVs	% Increase - HGVs	Effect (Significance of Increase) - All Vehicles	Effect (Significance of Increase) - HGVs
L2015 Old Airport Road (Collinstown Lane)	2450	2030	17889	2690	82	0.46%	52	1.93%	None (Not Significant)	None (Not Significant)
R132 Swords Road between Old Airport Road and Airport Roundabout	3500	2030	27025	3901	82	0.32%	52	1.45%	None (Not Significant)	None (Not Significant)
R132 Swords Road between R104 and Old Airport Road	3500	2030	16419	2243	114	0.73%	84	4.07%	None (Not Significant)	None (Not Significant)
R132 Dublin Road between Airport Roundabout and Cloghran Roundabout	4500	2027	27488	3097	196	0.71%	136	4.39%	None (Not Significant)	None (Not Significant)
R104 Coolock Lane between R132 and Clonshaugh Business & Technology Park Access	3500	2030	32414	2528	82	0.25%	52	2.06%	None (Not Significant)	None (Not Significant)
L3125 Kilshane Road	2650	2026	9632	2000	82	0.85%	52	2.60%	None (Not Significant)	None (Not Significant)
R135 between L3120 and N2 Link	2450	2026	6472	1383	82	1.27%	52	3.76%	None (Not Significant)	None (Not Significant)
Turnapin Lane	1500	2030	5373	1318	82	1.53%	52	3.94%	None (Not Significant)	None (Not Significant)
Turnapin Cottages	1250	2030	250	0	6	2.40%	0	0.00%	None (Not Significant)	None (Not Significant)
Cherryhound Tyrellstown N2 Link Road	4500	2026	6500	1632	82	1.26%	52	3.19%	None (Not Significant)	None (Not Significant)

Source: Mott MacDonald

Two road sections have been identified from the quantitative assessment to feature a traffic or HGV traffic increase (exceeding IEMA threshold) resulting in **moderate** significant effects or **major** significant effects. These are summarised in Table 17.24.

Table 17.24: Road Sections Where All Vehicles or HGV % Increase is Significant

Road Section	Effect (Significance of Increase) - All Vehicles	Effect (Significance of Increase) - HGVs
L2753 Stockhole Lane between R132 Swords Road & L2055 Baskin Lane	None (Not Significant)	Moderate (Significant)
L3151 Harristown Lane	Major (Significant)	Major (Significant)

Source: Mot MacDonald

It should be noted that whilst construction traffic on these road sections is assessed to exceed the significance threshold, based on professional judgement, given that the total traffic volume assessed during construction, in all cases, will be at a level notably lower than the theoretical capacity the derived effect will be at worst **minor** and therefore not significant in terms of the *EIAR Guidelines*.

17.6.1.1 Driver Delay

All road sections in the Study Area where the significance threshold has assessed been met or to be exceeded operate notably below their theoretical capacity (which are shown in Table 17.23).

On this basis, the significance of effect of driver delay for all road users on these road sections is considered to be **minor** and accordingly **not significant** in the context of the *EIAR Guidelines*.

Driver journey times will be affected due to the temporary rolling road closure of L2055 Baskin Lane, as diversion routes will be required. Driver journey times would also be impacted by lane closures as well as construction works on L3151 Harristown Lane as described in Section 17.5.6.

Driver delay resultant from L2055 Baskin Lane closure would typically add six to ten minutes travel time onto journeys previously utilising the length of L2055 Baskin Lane.

For lane closures it is assessed that at worst, any of the lane closures would typically add a maximum of ten minutes onto journeys utilising each affected road section.

For construction works on L3151 Harristown Lane it is assessed that at worst this would add a maximum of ten minutes onto journeys.

Using the methodology outlined in Section 17.3 and Table 17.7 the driver delay effect significance would be classified at worst **minor** and therefore **not significant** in terms of the *EIAR Guidelines*.

17.6.1.2 Road Safety

Implementing professional judgement, given there is no significant Proposed Development related traffic increase for the majority of road sections and the assumption that road and lane closures will be effectively managed, road safety effects are assessed to be at worst **minor** and therefore **not significant** in terms of the *EIAR Guidelines*.

17.6.1.3 Community Effects

The *IEMA Guidelines (1993)* define severance as ‘the perceived division that can occur within a community when it becomes separated by a ‘major traffic artery’. Severance may result from a road carrying large traffic flows or a physical barrier created by the road itself, and the *IEMA Guidelines* suggest that consideration is given to the severity of existing severance and how this might be exacerbated by proposed construction traffic generated by a development. Although the Study Area does feature several routes which could be considered as 'major traffic arteries', as shown in Table 17.11,the roads within the Study Area will continue to operate notably below capacity, even with the addition of traffic generated during construction of the Proposed Development. Severance should not occur when there is such a notable level of residual road capacity.

Pedestrian amenity is broadly defined by the IEMA as the 'relative pleasantness of a journey', and this definition also takes into account 'fear and intimidation'. The *IEMA Guidelines* suggest that 'a tentative threshold for judging the significance of changes in pedestrian amenity would be where traffic flows (or its lorry component) are halved or doubled'. The construction of the Proposed Development is predicted to generate increased HGV flows on the roads within the Study Area, with an average of 52-84 HGV movements per day (varies by cable route and location) occurring during the peak construction period.

On this basis, the significance of the effect on pedestrian amenity, is considered to be at worst **minor** and accordingly considered to be **not significant** in terms of the *EIAR Guidelines*.

Cycling and walking infrastructure that is potentially affected by HV cable construction (i.e., on carriageway, footway or cycleway) whether on the road or in proximity, include the following shown in Table 17.25.

Table 17.25: Cycling and Walking Infrastructure Affected by HV Cable Installation

Road Section (On Cable Route)	Detail	Effect Significance (Professional Judgement)	Justification
L2753 Stockhole Lane between R132 Swords Road & L2055 Baskin Lane	Part of HV Cable Route on part of footway (localised closure for expected period of 1 week) and part of cycle cycleway (localised closure for expected period of 3 days).	Minor (Not Significant) Temporary	Footway likely to have low level of pedestrian use. Cyclists may have to utilise carriageway for a short section.
L2055 Baskin Lane	Part of HV cable route and joint bays on/adjacent to only footway. Rolling localised footway closures for expected period of 5 weeks (cabling works) and 5 weeks (joint bays)	Minor (Not Significant) Temporary	Footway likely to have low level of pedestrian use.
R107 Malahide Road between L2055 Baskin Lane and R123 Balgriffin Road	Part of HV cable route and joint bays on/adjacent to footway on one side of the carriageway. Rolling localised footway closures for expected period of 6 weeks (cabling works) and 6 weeks (joint bays).	Minor (Not Significant) Temporary	Pedestrians can be diverted to footway on other side of carriageway.
R107 Malahide Road between R123 Balgriffin Road and R139	Part of HV cable route and joint bays on/adjacent to footway/cycleway on one side of the carriageway. Rolling localised footway closures for expected period of 3 weeks (cabling works) and 3 weeks (joint bays).	Minor (Not Significant) Temporary	Pedestrians can be diverted to footway on other side of carriageway. Cyclists may have to utilise carriageway for a short section.
R139 between R107 and Belcamp Access	Part of HV cable route and joint bays on/adjacent to footway on one side of the carriageway. Rolling localised footway closures for expected period of 7 weeks (cabling works) and 6 weeks (joint bays).	Minor (Not Significant) Temporary	Pedestrians can be diverted to footway on other side of carriageway.

Road Section (On Cable Route)	Detail	Effect Significance (Professional Judgement)	Justification
R122 St. Margaret's Road between R108 North Parallel Road and R108 South Parallel Road	Part of HV cable route on/adjacent to only footway. Rolling localised footway closures for expected period of 1 week.	Minor (Not Significant) Temporary	Footway likely to have low level of pedestrian use.
R122 St Margaret's Road between R108 South Parallel Road and L3151 Harristown Lane	Part of HV cable route on/adjacent to only footway. Rolling localised footway closures for expected period of 1 week (cabling works) and 1 week (joint bay).	Minor (Not Significant) Temporary	Footway likely to have low level of pedestrian use.
R122/R108 between R108 North Parallel Road and FoodCentral Drive	Part of HV cable route and joint bays on/adjacent to only footway. Rolling localised footway closures for expected period of 2 weeks (cabling works) and 2 weeks (joint bays).	Minor (Not Significant) Temporary	Footway likely to have low level of pedestrian use.
Clonshaugh Business & Technology Park (Road on Southern Boundary)	Part of HV cable route and joint bay on/adjacent to footway on one side of the carriageway. Rolling localised footway closures for expected period of 3 weeks (cabling works) and 2 weeks (joint bays).	Minor (Not Significant) Temporary	Pedestrians can be diverted to footway on other side of carriageway.
R132 Swords Road between R104 and Old Airport Road	Part of HV cable route on/adjacent to footway on one side of the carriageway. Rolling localised footway closures for expected period of 1 day.	Minor (Not Significant) Temporary	Pedestrians can be diverted to footway on other side of carriageway.

Source: Mott MacDonald

Overall, based on professional judgement, the construction works and the generated construction traffic generated by proposed development Study Area will have a **minor** temporary effect upon community receptors and is therefore **not significant** in the context of the *EIAR Guidelines*.

17.6.2 Cumulative Effects

A number of developments are proposed within the immediate environs of the Proposed Development, as detailed in Chapter 6 of this EIAR. These developments are listed in Table 17.26 with comment on their inclusion in the cumulative assessment or otherwise.

Table 17.26: Proposed Developments within the Study Area

Proposed Development Detail	Reference	Location	Scoped In/Out	Justification
Extension of the North Apron in the Airfield at Dublin Airport, Co Dublin to facilitate the provision of twelve aircraft stands and a ground servicing equipment area on a site of 19.2ha.	FCC: F20A/0550	Airfield in the townlands of, Cloghran, Corballis, Forrest Great, Forrest Little, Collinstown & Rock, Dublin Airport, Co Dublin	Scoped Out	Construction programme's unlikely to overlap. Construction programme total of 22 months from Winter 2022 to Winter 2023.
A proposed development comprising the taking of a 'relevant action' only within the meaning of Section 34C of the Planning and Development Act 2000, as amended, which relates to the night-time use of the runway system at Dublin Airport.	FCC: F20A/0668 An Bord Pleanála (ABP): PL06F.314485	Dublin Airport, Co. Dublin.	**Scoped In**	Increased vehicle traffic from proposed development in 2025 in Study Area
Permission for a single-storey free standing c.5m tall substation (approximately 18m x 21m), within which will be enclosed; a medium voltage ring main unit room; a medium voltage switch gear distribution room; a communications room; a transformer room; a generator change over panel room; a generator room; a main distribution room; and an entrance lobby.	FCC: F20A/0295	Airfield, Dublin Airport, Townland of Collinstown, Co Dublin	Scoped Out	Construction Programme's unlikely to overlap and no construction and operation traffic due to these being scoped out of EIAR (at screening). Construction programmed Nov 2020 - Dec 2021.
The proposed development will consist of the construction of a subterranean Underpass of Runway 16/34, a critical airfield operational safety project, which will comprise: sites at the Airfield in the townlands of Collinstown, Coultry, and Huntstown, Co. Dublin.	FCC: F22A/0460	Sites at the Airfield in the townlands of Collinstown, Country, and Huntstown, Co. Dublin	Scoped Out	Construction Periods unlikely to overlap. Construction period - 2023 - 2025
Mayne Stability Limited intends to apply for permission for a period of 10 years for the development of access to the Synchronous Compensator Development (Grid Stabilisation Facility) at lands south of Belcamp 220KV substation	FCC: F21A/0681 DCC: 3041/22	Belcamp, Dublin 17.	Scoped Out	Construction Programme's unlikely to overlap. Facility will not have a significant operational phase.
Installation of electrical infrastructure between Finglas substation and Huntstown Power Station to facilitate the retirement of existing Electricity Supply Board overhead powerlines and facilitate site clearance for the future development of a data centre and substation.	FCC: FW21A/0143	Huntstown, Co. Dublin	Scoped Out	Construction Programme's unlikely to overlap and no construction and only ad-hoc traffic associated with operational stage. Expected to be operational by 2022. Only intermittent inspection and maintenance associated vehicle movements expected for operational stage.
Construction of three light industrial / warehouse (including wholesale use) / logistics buildings and all associated development.	FCC: FW22A/0079	Harristown, Silloge, and Ballymun, St. Margaret's, Swords, Co. Dublin	**Scoped In**	Proposed that development operational by Q1 2024. Proposed development will generate an additional 1199 vehicle movements per day between 0500 and 2200.
Construction of temporary emergency electricity generation.	ABP: SC06F.313117	Huntstown Power Station, Johnstown, Co. Dublin	Scoped Out	No traffic information available.
Greater Dublin Drainage (GDD) - new WWTP, sludge hub centre, orbital sewer, outfall pipeline and regional biosolids storage facility.	ABP SID Application: PA0055 & PA06F.312131	Newton, Dublin 11	**Scoped In**	Should be operational by 2025. Operational traffic would utilise R139.
10 yr permission for Ringsend Regional Biosolid Storage Facility (RBSF) & Ringsend Wastewater Treatment Plant (WwTP) upgrade.	ABP SID Application: PA0054 & PA29S.301798	Ringsend, Dublin & Newton, Dublin 11	Scoped Out	No Proposed Development roads in WwTP Study Area. RBSF all construction works to be completed by 2025. HGV route not in Study Area. Negligible worker movements (<20 movements per day) associated with development. Unlikely to affect Study Area roads.
Permanent continuance of use of the 8,840 space long-term car park known as Holiday Blue on a site at Harristown, Silloge and Ballymun Townlands, South Parallel Road, Dublin Airport, Co. Dublin, that is currently used for the same purpose under and in accordance with temporary planning permission reg. ref PL06F.PA0022, and the 2,040 space long-term car park known as Express Red Zones Y and Z (Express	ABP: PA06F.301458	Harristown, Silloge and Ballymun Townlands, South Parallel Road, Dublin Airport Co. Dublin and Stockhole, Cloghran, and Toberbunny Townlands, Dublin Airport, Co. Dublin.	Scoped Out	Car park is in use and traffic will be included in traffic surveys. Site operational

Proposed Development Detail	Reference	Location	Scoped In/Out	Justification
Red) on a site at Stockdale, Cloghran, and Toberbunny Townlands, Dublin Airport, Co. Dublin that is currently used for the same purpose under and in accordance with temporary planning permission reg. ref: PL06F.PA0030.				
Construction of a 2 storey 220Kv GIS substation known as 'Mooretown', 4 underground transmission cables and all associated and ancillary site development and construction works.	ABP: 311528	Huntstown, North Road, Finglas, Dublin 11	Scoped Out	No Proposed Development roads in application Study Area. Construction expected to be complete in 2023.
1,365 no. units (346 no. houses, 1,019 no. apartments), creche and associated site works.	ABP: TA06F.311059	Corballis East, Donabate, Co. Dublin	Scoped Out	No Proposed Development roads in application Study Area.
590 no. apartments, creche and associated site works.	ABP: TC06F.307248 SHDW/007/20	Charlestown Place, St. Margaret's Road, Charlestown, Co. Dublin.	Scoped Out	No Proposed Development roads in application Study Area. Site due to be constructed in 2021.
The East Meath-North Dublin Grid Upgrade will add a high-capacity 400 kV (kilovolt) underground cable electricity connection from Woodland substation near Batterstown in County Meath to Belcamp substation near Clonshaugh in north Dublin.	EirGrid (not in planning system, at Step 4)	Batterstown, Co. Meath to Belcamp, Dublin	Scoped Out	No traffic information available.
MetroLink Rail Project	ABP-302010-18	North Dublin to Dublin	**Scoped In**	Construction periods overlap.

Source: Varies by development

Committed developments with known information have been considered within the assessment, however, some developments do not at time of writing (May 2023), have full information per traffic generation or related construction information publicly available for review.

Based on a review of the information available and applied professional judgement, the following developments have been considered for cumulative assessment:

- Dublin Airport Section 34C (night-time runway use)
- Light industrial warehouses, Harristown
- GDD Project
- MetroLink Rail Project

The (considered cumulatively) developments project data has been reviewed and is summarised in Table 17.27Table 17.27: The Proposed Development and Cumulative Proposed Developments Effects. Only road sections which might reasonably and concurrently be utilised by the Proposed Development and respective proposed developments have been assessed.

For the MetroLink Rail Project associated traffic on each road section, approximate ranges were given, therefore an average was calculated.

Table 17.27: The Proposed Development and Cumulative Proposed Developments Effects

EIAR Road Section	Year	AADT (Two-Way)	AADT HGVs (Two-Way)	Prop Devs- All Traffic (Two-Way)	Prop Dev HGVs (Two-Way)	Cumulative Assessment Development Traffic (All Traffic)	Cumulative Assessment Development Traffic (HGVs)	Prop Dev + Cumulative Assessment - All Traffic	Prop Dev + Cumulative Assessment - HGVs	Impact All Traffic	Impact HGVs	Effect Significance of Increase - All Vehicles	Effect Significance of Increase - HGVs
R139 between R107 and Belcamp Access	2027	36936	4449	114	84	80	0	194	84	0.5%	1.9%	None (Not Significant)	None (Not Significant)
R139 between M1 and Belcamp Access	2027	36936	4449	114	84	80	0	194	84	0.5%	1.9%	None (Not Significant)	None (Not Significant)
L3132 Naul Rd between R108 and Cloghran Roundabout	2027	13487	1849	196	136	153	30	349	166	2.6%	9.0%	None (Not Significant)	Minor (Not Significant)
L2015 Old Airport Road (Collinstown Lane)	2030	17127	2476	82	52	931	113	1013	165	5.9%	6.7%	Minor (Not Significant)	Minor (Not Significant)
R132 Swords Road between Old Airport Road and Airport Roundabout	2030	25875	3591	82	52	757	57	839	109	3.2%	3.0%	None (Not Significant)	None (Not Significant)
R132 Dublin Road between Airport Roundabout and Cloghran Roundabout	2027	27488	3097	196	136	585	87	781	223	2.8%	7.2%	None (Not Significant)	Minor (Not Significant)
R108 between Old Airport Road & M50	2030	17884	1375	82	52	1880	257	1962	309	11.0%	22.4%	Minor (Not Significant)	Minor (Not Significant)

Source: Varies by development

From the quantitative assessment it is demonstrated that the effect of traffic increase will be at worst **minor** and therefore **not significant** in terms of the *EIAR Guidelines*.

17.7 Mitigation and Monitoring Measures

The temporary effects of construction, regardless of the assessed level of significance, will be mitigated through adoption of a regulated and approved Construction Traffic Management Plan (CTMP).

The general purpose of a CTMP is optimise the efficiency and safety of all traffic activities generated by the Proposed Development and thus maintain suitable amenity and safety for local communities and other roads users.

17.8 Construction Traffic Management Plan (CTMP)

A summary of key CTMP mitigation elements follow, however the CTMP is provided in full in Appendix D1.

The appointed contractor will agree temporary traffic management measures then adopt and monitor an appropriate way of working in consultation with FCC, DCC, DAA the appointed contractor, TII and/or their Agents and An Garda Síochána as appropriate.

The CTMP has been developed for the purposes of this assessment and will be further developed as necessary in consultation with FCC. DCC, DAA and the Gardai prior to construction commencing. The CTMP will document measures to promote the efficient transportation of components and materials to site, whilst reducing congestion and disruption which might impact negatively on local communities or general traffic and in particular the emergency services. The CTMP is a ‘live’ document and will be developed accordingly, within the parameters assessed in this EIAR.

Signed diversion routes will be provided to mitigate journey disruption. 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.

Furthermore, only vehicles essentially required to facilitate construction will be allowed to attend worksites. Car sharing will be promoted to construction workers by the contractor during the induction process.

To reduce the potential for debris being deposited onto the local road network in the construction site accesses and road sections of HV cable construction, the appointed contractor will ensure that public roads and footways are cleaned and swept during and after the works. This cleansing regime (to be agreed) will minimise the amount of deleterious material deposited on the road surface and the appointed contractor will ensure that the nearest public road will be kept clear of debris by monitoring and then utilising a road sweeper where necessary.

The appointed contractor could employ a number of sub-contractors, and all will fall under the umbrella of the CTMP and will have an obligation to adhere to the Plan; this obligation will form part of the procurement process and will be written into any contract of employment.

Compliance will be monitored by the Project Manager, on behalf of the appointed contractor, via spot checks to ensure that vehicles follow the measures set out in the CTMP and recording of any complaints. The appointed contractor will be required to stipulate that all contractors disseminate these rules to their sub-contractors.

In liaison with ESBN, the appointed contractors will be required to maintain close liaison with local community representatives, landowners and statutory consultees throughout the construction period. This will include circulation of information about ongoing activities; particularly those that could potentially cause disturbance, including due to traffic.

The appointed contractor will nominate a person to be responsible for the co-ordination of all elements of Roads and Traffic during the construction process (Liaison Officer). This person will liaise with the local community so that the community has a direct point of contact within the developer organisation who they could contact for information purposes or to discuss matters pertaining to traffic management or site operation.

If the construction phase of any notably sized development(s) appears likely to overlap with the proposed development, the appointed contractor will seek to liaise with the appropriate developer organisation regarding the scheduling of deliveries to identify potential means of reducing the effects of combined construction.

Prior to commencement of construction, and during the construction phase, engagement with the proponents of other developments will continue and where there is potential for works to be carried out in parallel, appropriate mitigation measures will be implemented including the scheduling of works and regular liaison meetings between project teams to ensure that plans are co-ordinated and impacts on population and human health are minimised. The specific detail will be developed by the appointed contractor within the parameters assessed in this EIAR.

17.8.1.1 Construction Access Arrangements

Transportation, including deliveries to and from the construction areas will be taken from the existing public road network. The local area road network is shown in Figure 17.2.

Given the nature of construction of the Proposed Development (including trenching, cabling, joint bays and passing bays), there will be multiple work sites along the HV cable routes throughout the construction programme.

The construction methodology is provided within Chapter 6. The proposed programme of worksite locations and temporary compounds (following future consent) will be confirmed by the appointed contractor as an integral part of their adopted CTMP provided as Appendix D1. All construction vehicle drivers will be instructed to access their destination worksite via an approved route; this is to be determined by the approved contractor in conjunction with the administering local authority.

17.9 Residual Impacts

The assessment of post-mitigation effects has been undertaken on the assumption that key measures set out in the CTMP will be developed as appropriate by the appointed contractor and be implemented during the Proposed Development construction phase.

In the context of the *IEMA Guidelines* there are no significant residual Roads and Traffic impacts predicted during the construction phase, and this will be assured through the incorporation of measures described within the CTMP; see Appendix D1 of the EIAR.

17.10 References

- *Guidelines on the Information to be Contained in Environmental Impact Reports, Environmental Protection Agency (EPA) (2022);*
- *ADVICE NOTES ON CURRENT PRACTICE (in the preparation of Environmental Impact Statements), Environmental Protection Agency (EPA) (2015)*

- *Traffic and Transport Assessment Guidelines, Transport Infrastructure Ireland (TII) (2014);*
- *Project Appraisal Guidelines for National Roads Unit 5.3, TII, October 2021*
- *The UK Design Manual for Roads and Bridges (DMRB Volume 5, Part 3 TA 79/99;*
- *The Institute of Environmental Management and Assessment Guidelines for the Environmental Assessment of Road Traffic, The Institute of Environmental Management and Assessment (IEMA) (1993)*
- *National Transport Model (NToM) Update, Travel Demand Forecasting Report, NToM Volume 3, December 2019, TII, AECOM.*
- *Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment*
- *Environmental Impact Assessment of Projects Guidance on the preparation of the Environmental Impact Assessment Report (Directive 2011/92/EU as amended by 2014/52/EU)*
- *Guidelines for Classification and Scheduling of Roads in Ireland*
- *Temporary Traffic Management Design Guidance*
- *Google Maps/Streetview*
- *Dublinbus.ie, Transport for Ireland*
- *Moovitapp.com*
- *www.bustimes.org*
- *Cycle Network Plan for Greater Dublin Area (2013), NTA, Rughan & O'Donovan, AECOM*
- *Openstreetmap.org*
- *Mott MacDonald-commissioned traffic surveys undertaken by NDC*
- *TII Traffic Count Data Website (trafficdata.tii.ie), TII*

Metrolink 110kV Underground Cables

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Chapter 18 - Major Accidents and Disasters

June 2023

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18 Major Accidents and/or Disasters

18.1 Introduction

This chapter considers the potential for significant adverse effects of the proposed development on the environment deriving from the vulnerability of the proposed development to risks of relevant major accidents and / or disasters and is based on the proposed development detailed in Chapter 6 Description of the Proposed Development.

18.2 Methodology and Limitations

18.2.1 Legislation

EIA Directive 2014/52/EC requires:

"A description of the expected significant adverse effects of the development on the environment deriving from the vulnerability of the development to risks of major accidents and / or disasters…

In order to avoid duplications, it should be possible to use any relevant information available and obtained through risk assessments carried out pursuant to Union legislation, such as Directive 2012/18/EU of the European Parliament and the Council (13) and Council Directive 2009/71/Euratom (14), or through relevant assessments carried out pursuant to national legislation provided that the requirements of this Directive are met".

18.2.2 Guidance

For the purpose of this assessment the following definitions, defined in the Institute of Environmental Management and Assessment (IEMA) document *Major Accidents and Disasters in EIA: A Primer* (September 2020), are used:

- Major Accidents: Events that threaten immediate or delayed serious environmental effects to human health, welfare and / or the environment and require the use of resources beyond those of the client or its appointed representatives to manage. Whilst malicious intent is not accidental, the outcome (e.g., train derailment) may be the same and therefore many mitigation measures will apply to both deliberate and accidental events.
- Disaster: May be a natural hazard (e.g., earthquake) or a man-made / external hazard (e.g. act of terrorism) with the potential to cause an event or situation that meets the definition of a major accident.
- Risk: For a risk to arise there must be hazard that consists of a 'source' (e.g. high rainfall); a 'receptor' (e.g. people, property, environment); and a pathway between the source and the receptor (e.g. flood routes).
- Vulnerability: Describes the potential for harm as a result of an event, for example due to sensitivity or value of receptors. In the context of the EIA Directive, the term refers to the 'exposure and resilience' of the development to the risk of a major accident and / or disaster. Vulnerability is influenced by sensitivity, adaptive capacity and magnitude of impact.

18.2.3 Methodology and Assessment of Effects

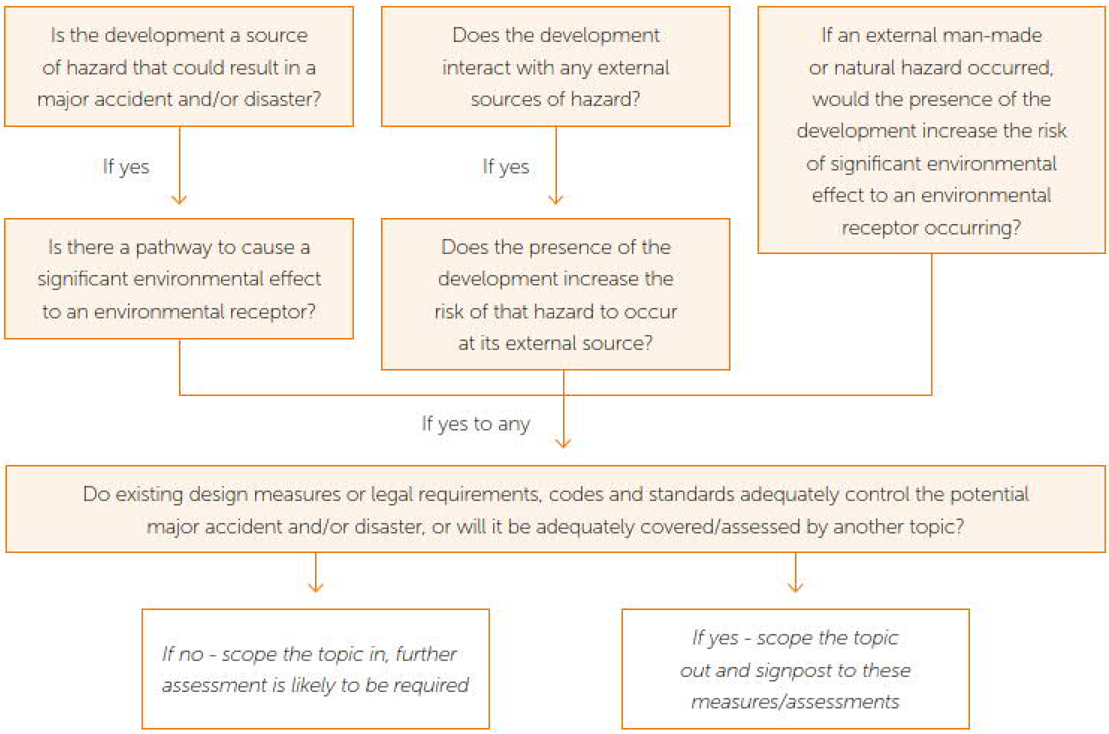
The methodology applied is based on the scoping decision process flow provided in Figure 18.1 *Scoping Decision Process Flow*.

The potential for source, pathway, receptor linkages is first established having regard to the location, type, context, existing and future constraints, and likely receptors relevant to the proposed development.

For established linkages, the risks of major accidents and / or disasters are low / unlikely where existing design measures or legal requirements, codes and standards adequately control the potential for major accident and / or disaster, or where such risks are adequately covered/assessed by another topic in this EIAR.

Where required, additional mitigation measures are proposed to manage the identified risks to the environment.

Figure 18.1: Scoping Decision Process Flow



Source: Major Accidents and Disasters in EIA: A Primer (IEMA, September 2020)

18.2.4 Limitations of this EIAR

There were no difficulties or limitations encountered gathering the information required to inform this Major Accidents and / or Disasters chapter of the EIAR.

18.3 Receiving Environment

Detail of the Description of the proposed development and the receiving environment is contained within Chapter 6.

18.4 Likely Significant Impacts of the Proposed Development

Table 18.1 considers the potential for significant adverse effects of the proposed development on the environment deriving from its vulnerability to risks of relevant major accidents and / or disasters.

Where sources / interactions and pathways have been established, an assessment is carried out as to whether or not embedded design measures, or legal requirements, codes and standards adequately control the potential major accident and / or disaster. Reference is made to other technical chapters of the EIAR as appropriate where further studies have been carried out, for example in the case of flood risk assessments.

Significant transboundary effects deriving from the vulnerability of the proposed development to risks of relevant major accidents and / or disasters are not likely and have therefore not been considered further.

Table 18.1: Likely Significant Impacts of the Proposed Development

Type / Location	Source and / or Pathway / Receptor	Reasonable Worst-Case Consequence	Embedded Mitigation	Could this result in a major accident and / or disaster with mitigation in place?	Is the reasonable worst consequence managed to an acceptable level with existing mitigation in place?	Likely Significant Adverse Effects
Flooding						
110kV Underground Cable Route Newbury - Ballystruan	Areas along the cable route are at risk of flooding. A desk-based study flood risk assessment was carried out, which concluded that the impact on flood risk during construction is considered to be small adverse.	Localised flooding could potentially occur within areas where there are water crossings. However, given the nature of the proposal's major accidents and / or disasters are unlikely.	The watercourses are minor and flood risk will be managed so as not to increase flood risk elsewhere. Works are of short duration and managed so that excavations would not occur during high flows/rainfall events.	No	Yes	Flood Risk is discussed in detail in Chapter 9 Surface Water and Flooding. No likely significant adverse effects.
110kV Underground Cable Route Ballystruan to Forest Little 110kV/220kV Underground Cable Route Forest Little – Belcamp Option 1	Watercourse crossings are required on the route. They will be constructed either In-Road, by Open Cut method or HDD.		Mitigation by avoidance and / or design has been implemented to avoid potential flood risk to link boxes. The cable joint is 100% waterproof and the joint bay and associated equipment.			
110kV/220kV Underground Cable Route - Forest Little – Belcamp Option 2	There are no significant risks of flooding identified along the route.	Given the nature of the proposal's major accidents and / or disasters are unlikely.	The watercourses are minor and flood risk will be managed so as not to increase flood risk elsewhere. Works are of short duration and managed so that excavations would not occur during high flows/rainfall events. Mitigation by avoidance and / or design has been implemented to avoid potential flood risk to link	No	Yes	Flood Risk is discussed in detail in Chapter 9 Surface Water and Flooding. No likely significant adverse effects.

Type / Location	Source and / or Pathway / Receptor	Reasonable Worst-Case Consequence	Embedded Mitigation	Could this result in a major accident and / or disaster with mitigation in place?	Is the reasonable worst consequence managed to an acceptable level with existing mitigation in place?	Likely Significant Adverse Effects
			boxes. The cable joint is 100% waterproof and the joint bay and associated equipment.			
Construction Compound/Laydown areas	Locations of Construction compounds and Laydown are to be confirmed and will avoid flood plains and flood risk areas.	Localised pluvial flooding could potentially occur where the Construction compound and Laydown areas are located. However, given the nature of the proposal's major accidents and / or disasters are unlikely.	Construction compound and Laydown areas will not be located in areas that are not prone to fluvial flood risk. Works excavations would not occur during high flows/rainfall events. Mitigation by avoidance and / or design will be implemented at detailed design stage to avoid potential flood risk.	No	Yes	Flood Risk is discussed in detail in Chapter 9 Surface Water and Flooding. No likely significant adverse effects.
Fire						
110kV Underground Cable Route Newbury - Ballystruan 110kV Underground Cable Route Ballystruan to Forest Little 110kV/220kV Underground Cable Route - Forest Little – Belcamp Option 1 110kV/220kV Underground Cable Route Forest Little – Belcamp Option 2	The cable and associated equipment are buried below ground and are therefore protected from fire. In the case of a cable fault, any combustion will be inherently suppressed.	None. Major accidents disasters are unlikely	Not applicable	Not applicable	Not applicable	No likely significant adverse effects.
Construction Compound/Laydown areas	Risk of fire at Construction Compound/Laydown areas	Fire ignites within the compound. Major	Construction Compound/Laydown areas	No	Not applicable	No likely significant

Type / Location	Source and / or Pathway / Receptor	Reasonable Worst-Case Consequence	Embedded Mitigation	Could this result in a major accident and / or disaster with mitigation in place?	Is the reasonable worst consequence managed to an acceptable level with existing mitigation in place?	Likely Significant Adverse Effects
	where equipment and materials are stored.	accidents disasters are unlikely	will follow all safety specifications and standards and those set out in the CEMP, including the storage of flammable materials.			adverse effects.
Electro Magnetic Fields (EMF)						
110kV Underground Cable Route Newbury - Ballystruan	Independent and authoritative international panels of scientific experts have reviewed studies on possible health effects from EMFs. These have concluded, based on the weight of the evidence available, that the power frequency electric and magnetic fields encountered in normal living and working conditions do not cause adverse health effects in humans when properly designed and constructed. These form the basis for guidelines published by the International Council on Non-Ionising Radiation Protection (ICNIRP) with regard to EMF, to which ESB Networks will comply in the design and operation of the underground cables	None. Major accidents disasters to cables are unlikely	Not applicable	Not applicable	Not applicable	EMF is discussed in Chapter 7 Population and Human Health. No likely significant adverse effects.
110kV Underground Cable Route Ballystruan to Forest Little						
110kV/220kV Underground Cable Route - Forest Little – Belcamp Option 1						
110kV/220kV Underground Cable Route Forest Little – Belcamp Option 2						
Electricity failure						

<table>
<tr><th>Type / Location</th><th>Source and / or Pathway / Receptor</th><th>Reasonable Worst-Case Consequence</th><th>Embedded Mitigation</th><th>Could this result in a major accident and / or disaster with mitigation in place?</th><th>Is the reasonable worst consequence managed to an acceptable level with existing mitigation in place?</th><th>Likely Significant Adverse Effects</th></tr>
<tr><td>110kV Underground Cable Route Newbury - Ballystruan</td><td rowspan="4">Electricity failure can be caused by several factors such as extreme weather conditions, failure at the sub-stations or damage to the underground cable along the route.</td><td rowspan="4">Loss of power supply could result in disruption to the operation of the MetroLink electrical supply.</td><td rowspan="4">The RO for the MetroLink Project states that Management Plans are required in the event of electrical failure</td><td rowspan="4">No</td><td rowspan="4">Yes</td><td rowspan="2">No likely significant adverse effects.</td></tr>
<tr><td>110kV Underground Cable Route Ballystruan to Forest Little</td></tr>
<tr><td>110kV/220kV Underground Cable Route - Forest Little – Belcamp Option 1</td><td rowspan="2">Loss of functionality to the proposed development only, there are no perceived environmental impacts.</td></tr>
<tr><td>110kV/220kV Underground Cable Route Forest Little – Belcamp Option 2</td></tr>
<tr><td colspan="7">Exposure to High Voltage</td></tr>
<tr><td>110kV Underground Cable Route Newbury - Ballystruan</td><td rowspan="4">Construction workers on utilities within the road networks or farmers for the route across agricultural lands, may come in contact with live cables while excavating.</td><td rowspan="4">Risk of damage or harm</td><td rowspan="4">Cables will be insulated and buried 1.2m approx. underground, encased in concrete duct banks. Warning tape will be laid in the trench over the ducts as a visual aid to those excavating in the area.</td><td rowspan="4">No</td><td rowspan="4">Yes</td><td rowspan="4">No likely significant adverse effects.</td></tr>
<tr><td>110kV Underground Cable Route Ballystruan to Forest Little</td></tr>
<tr><td>110kV/220kV Underground Cable Route - Forest Little – Belcamp Option 1</td></tr>
<tr><td>110kV/220kV Underground Cable Route Forest Little – Belcamp Option 2</td></tr>
</table>

Type / Location	Source and / or Pathway / Receptor	Reasonable Worst-Case Consequence	Embedded Mitigation	Could this result in a major accident and / or disaster with mitigation in place?	Is the reasonable worst consequence managed to an acceptable level with existing mitigation in place?	Likely Significant Adverse Effects
Ground collapse/instability /subsidence/landslide						
110kV Underground Cable Route Newbury - Ballystruan 110kV Underground Cable Route Ballystruan to Forest Little 110kV/220kV Underground Cable Route - Forest Little – Belcamp Option 1 110kV/220kV Underground Cable Route Forest Little – Belcamp Option 2	Due to the fact that the cables will be installed in a concrete duct bank with suitable compacted backfill and permanent reinstatement subsidence is unlikely.	None. Major accident / disaster unlikely	Not applicable	Not applicable	Not applicable	Land, Soils and Hydrogeology is discussed in detail in Chapter 8
Construction Compound/Laydown areas	Locations of construction compounds/laydown areas will be located in areas where Ground collapse/instability /subsidence/landslide is unlikely.	None. Major accident / disaster unlikely	Not applicable	Not applicable	Not applicable	Land, Soils Hydrogeology is discussed in detail in Chapter 8
Major road traffic accident						
110kV Underground Cable Route Newbury - Ballystruan 110kV Underground Cable Route Ballystruan to Forest Little	Working on or adjacent to public roads Movement of construction vehicles	Death and / or injury to a member of the public. Delays and congestion in surrounding area	Controls to be implemented through traffic management plan, construction planning, and method statements. Road reinstatement will be in accordance with design	No	Yes	Roads and Traffic are discussed in Chapter 17

Type / Location	Source and / or Pathway / Receptor	Reasonable Worst-Case Consequence	Embedded Mitigation	Could this result in a major accident and / or disaster with mitigation in place?	Is the reasonable worst consequence managed to an acceptable level with existing mitigation in place?	Likely Significant Adverse Effects
110kV/220kV Underground Cable Route - Forest Little – Belcamp Option 1 110kV/220kV Underground Cable Route Forest Little – Belcamp Option 2	Debris striking traffic / member of public		codes and in consultation with Transport Infrastructure Ireland (TII) and the Roads Design Office (RDO) and Fingal County Council/Dublin City Council.			
Industrial Accidents						
110kV Underground Cable Route Newbury - Ballystruan 110kV Underground Cable Route Ballystruan to Forest Little 110kV/220kV Underground Cable Route - Forest Little – Belcamp Option 1 110kV/220kV Underground Cable Route Forest Little – Belcamp – Option 2	The cables will be buried underground at a depth of 1.2m approx. They are also encased in concrete duct banks. The underground cables pass along roads that are through industrialised areas.	None. Major accident / disaster unlikely	Not applicable	Not applicable	Not applicable	No likely significant adverse effects
Construction Compound/Laydown areas	Construction Compound/Laydown areas will be located in areas and along roads that are located in a mix of urban/agricultural/rural areas, industrial accidents are unlikely.	None. Major accident / disaster unlikely	Not applicable	Not applicable	Not applicable	No likely significant adverse effects

Type / Location	Source and / or Pathway / Receptor	Reasonable Worst-Case Consequence	Embedded Mitigation	Could this result in a major accident and / or disaster with mitigation in place?	Is the reasonable worst consequence managed to an acceptable level with existing mitigation in place?	Likely Significant Adverse Effects
Earthquakes						
110kV Underground Cable Route Newbury - Ballystruan 110kV Underground Cable Route Ballystruan to Forest Little 110kV/220kV Underground Cable Route Forest Little – Belcamp Option 1 110kV/220kV Underground Cable Route Forest Little – Belcamp Option 2 Construction Compound/Laydown areas	An earthquake of sufficient intensity to inflict severe damage is unlikely	None. Major accident / disaster unlikely	Not applicable	Not applicable	Not applicable	No likely significant adverse effects
Biological hazard – epidemic, pandemic						
110kV Underground Cable Route Newbury - Ballystruan 110kV Underground Cable Route Ballystruan to Forest Little 110kV/220kV Underground Cable Route - Forest Little – Belcamp Option 1 110kV/220kV Underground Cable Route Forest Little – Belcamp Option 2	The proposed development is located within and adjacent to some densely populated areas, however apart from construction workers and maintenance staff the project does not generate human interaction. Construction phase activities will be carried out in accordance with Government guidelines	None. Major accident / disaster unlikely	Not applicable	Not applicable	Not applicable	No likely significant adverse effects

Type / Location	Source and / or Pathway / Receptor	Reasonable Worst-Case Consequence	Embedded Mitigation	Could this result in a major accident and / or disaster with mitigation in place?	Is the reasonable worst consequence managed to an acceptable level with existing mitigation in place?	Likely Significant Adverse Effects
Malicious attacks/cyber-attack						
110kV Underground Cable Route Newbury - Ballystruan 110kV Underground Cable Route Ballystruan to Forest Little 110kV/220kV Underground Cable Route - Forest Little – Belcamp Option 1 110kV/220kV Underground Cable Route Forest Little – Belcamp Option 2	The proposed development will be part of Ireland's electrical grid and could be subject to malicious physical or cyber-attacks.	Damage would likely be limited to disruption of the proposed development's ability to operate until the damage was repaired.	The new infrastructure will be designed to protect against malicious attack and will be in line with the latest standards for new grid infrastructure.	No	Yes	No likely significant adverse effects
Spillage or seepage of pollutants into watercourse/ground						
110kV Underground Cable Route Newbury - Ballystruan 110kV Underground Cable Route Ballystruan to Forest Little 110kV/220kV Underground Cable Route - Forest Little – Belcamp Option 1	During construction there is potential for spillages of pollutants in the absence of mitigation. Once operational, as the cables are buried, they will not offer a pathway to any receptors.	Accidental spillage. Major accident / disaster unlikely	A suite of mitigation measures to protect watercourses are detailed in Chapters 8 and 9 and within the CEMP.	No	Yes	No likely significant adverse effects. Land, Soils and Hydrogeology is discussed in detail in Chapter 8.

Type / Location	Source and / or Pathway / Receptor	Reasonable Worst-Case Consequence	Embedded Mitigation	Could this result in a major accident and / or disaster with mitigation in place?	Is the reasonable worst consequence managed to an acceptable level with existing mitigation in place?	Likely Significant Adverse Effects
110kV/220kV Underground Cable Route Forest Little – Belcamp Option 2						Surface Water and Flooding is discussed in Chapter 9
Construction Compound/Laydown areas	There is potential for Construction Compound/Laydown areas to accidentally release pollutants, which potentially could leak into water courses or ground. Water courses are hydrologically linked to downstream protected areas.	Pollution of downstream areas	The CEMP will provide robust mitigation to remove the risk of any potential pollutants entering water courses. Where there is linkage between a compound location and drains leading to rivers, bunding and silt fencing must be installed to prevent run off from entering downstream watercourses	No	Yes	Land, Soils and Hydrogeology is discussed in detail in Chapter 8. Surface Water and Flooding is discussed in Chapter 9

18.5 Mitigation and Monitoring Measures

ESB will continue to operate within a safety structure defined by:

- European Commission Directives and Regulations
- National Legislation
- Irish/European Standards
- ISO Standards
- ESB Standards.

  No additional mitigation measures to those specified elsewhere in this EIAR and in the CEMP appended to Appendix D of this EIAR in terms of the vulnerability of the proposed development to risks of relevant major accidents and / or disasters.

18.6 Residual Impacts

Significant adverse effects as a result of the proposed development on the environment deriving from the vulnerability of the proposed development to risks of major accidents and / or disasters are not likely.

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Chapter 19 - Interactions of the Foregoing

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19 Interactions of the Foregoing

19.1 Introduction

This chapter outlines the interactions between the impacts of the proposed development identified in this EIAR.

Aspects of the existing environment likely to be affected by the proposed development, during both the construction and operational phases, have been considered in detail in the relevant chapters of this EIAR.

19.2 Interaction of Effects and Indirect Effects

The matrix presented in Table 19.1 has been developed to identify interactions and indirect impacts between environmental topics. The nature of the environment is such that interactions between all environmental topics are potentially possible and / or may occur to a certain extent for most projects. The purpose of the matrices is therefore to highlight key interactions that are recognised to be specific to this proposed development and warranting special consideration. In the matrices, a grey or a white square indicates no interaction, while a turquoise square indicates that a key interaction exists.

Key environmental interactions that have been identified are discussed further in Table 19.2.

Table 19.1: Interaction of Effects

	Population and Human Health	Land, Soils & Hydrogeology	Surface Water & Flooding	Biodiversity	Air	Climate	Noise & Vibration	The Landscape	Archaeology, Architectural and Cultural Heritage	Material Assets	Roads and Traffic
Population and Human Health											
Land, Soils & Hydrogeology											
Surface Water & Flooding											
Biodiversity											
Air											
Climate											
Noise & Vibration											
The Landscape											
Archaeology, Architectural and Cultural Heritage											
Material Assets											
Roads and Traffic											

Table 19.2: Description of Interaction of Disciplines

Interaction	Description
Population and Human Health interactions with: Air, Climate, Noise & Vibration, Surface Water & Flooding, The Landscape, Archaeology, Architectural and Cultural Heritage, Roads and Traffic Transport, Land, Soils & Hydrogeology	**Air** changes on local community during the construction and operational phase of the project are anticipated to be negligible. Across the different construction activities, the effects of dust creating nuisance and/or loss of amenity leading to adverse health effects is predicted to range from 'low' to 'high' for Forest Little to Belcamp Option 1 and 'low' to 'medium' risk for all other routes. Particulate (PM_{10}) effects range from 'negligible' to 'low' for all routes apart from Forest Little to Belcamp Option 1, which ranges from 'low' to 'medium'. With the appropriate implementation of mitigation, the air quality impacts associated with dust and particulates are predicted to be not significant.
	Climate. During operation, rising temperatures could have significant risks when unmitigated. Implementation of proposed design measures and secondary mitigation measures will mitigate risks to an acceptable level of climate change resilience. Risks considered to be 'significant' may pose residual impacts following mitigation, however this is anticipated to be reduced to 'not significant' and should therefore not pose any notable impacts to the proposed development.
	Noise & Vibration: It is considered that there will be an increase in noise levels and impacts on the local community generated from construction activities. Following the implementation of the proposed mitigation measures, these effects will be minimised and are assessed as having an effect of being Not significant.
	Surface Water & Flooding, There is potential for slight, adverse effects during the construction phase, associated with flood risk, due to water crossings along the cable route. With the implementation of mitigation measures presented within this EIAR the impacts are likely to be minimised.
	The Landscape: Visual impacts associated with the proposed development have the potential to impact on population, for example, views of machinery and hoarding during construction. The significance of construction stage impacts is deemed to be Slight to Slight-imperceptible and Imperceptible within the wider study area, with the works being undertaken on existing roadways and in rural environments. Once reinstated, there will be no material alteration to the landscape. As a result, the UGC will have Negligible magnitude of impact and on visual receptors and landscape character resulting in an Imperceptible significance overall.
	Archaeology, Architectural and Cultural Heritage, Where the construction works are undertaken in roadways, no impacts are envisaged. In the off-road sections, during construction, there is the potential for impacts on previously unrecorded archaeology to be uncovered during excavation works. Any disturbance of ground and drainage patterns can also impact unrecorded archaeology and cultural heritage. Mitigation measures are detailed within Chapter 15 of this EIAR and the Construction Environmental Management Plan which will ensure that such impacts are minimised to negligible/moderate significance.

	Roads and Traffic: During construction there will be road closures which will have an adverse effect on population, as delays are likely, this will be temporary in nature. There will be an increase in construction traffic levels and potential impacts on the local community. The number of vehicles on roads associated with the proposed development is likely to increase during the construction phase due to the movement of construction staff to/from the works areas. During operation, there is no interactions anticipated.
	Land, Soils & Hydrogeology. There will be a loss of agricultural land, in some areas where the proposed development goes off road. As discussed within Chapter 8 – Land, Soils & Hydrogeology, this is considered to be negligible.
Air interactions with Climate, Biodiversity, Roads and Traffic	**Climate**, The proposed development has the potential for negative impacts on climate. However, air impacts associated with the proposed development are not considered to be significant and ambient pollutant concentrations are well below the relevant air quality standards, no exceedances of air quality standards are anticipated.
	Biodiversity, Air quality changes on flora and fauna such as dust during construction may affect flora and fauna. Run off from works areas can impact water quality and biodiversity, dust deposition and soiling can impact on biodiversity. Following the implementation of the mitigation measures dust impacts are not predicted to be significant. Consequently, no significant residual dust effects on surface water quality or biodiversity are predicted as discussed within Chapter 11 – Air.
	Roads and Traffic. During the construction phase, it is not expected that there will be any significant effects from construction road traffic on ambient air quality.
Climate interactions with: Surface Water & Flooding, Biodiversity, Roads and Traffic	**Surface Water & Flooding**: Key climate trends across Ireland and in Dublin show rising temperatures, wetter winters and drier summers with more frequent extreme weather events. These trends have the potential to lead to risks including exceedance of flooding. The latest climate change guidance has been considered when assessing the impact of the future climate change on flood risk and is included within Chapter 11 Surface Water and Flood Risk, of this EIAR.
	Biodiversity: The proposed development (along with other future developments) will potentially facilitate a reduction in emissions associated with the use of cars as there is a switch to use of the MetroLink metro line. This will reduce the effect of local emissions on habitats, flora and fauna.
	Roads and Traffic: During the operational phase, the proposed development, along with other future developments, will provide power for the MetroLink system which will in turn provide additional public transport. This is likely to encourage a move from dependency of car travel as there is a switch to the MetroLink metro line. This will have a positive impact on climate due to lower emissions.
Land, Soils & Hydrogeology interactions with: Surface Water and Flood Risk, Biodiversity, The	**Surface Water and Flooding**: The excavation of soils and rock for the proposed development, poses a potential risk to nearby watercourses as a result of sediment run off. Earthworks associated pose a risk to waterbody from sediment runoff. Best practice techniques, mitigation measures and guidelines have been outlined in Chapter 18 Land, Soils & Hydrogeology and Chapter 9 Surface Water and Flood Risk and the Construction Environmental Management Plan of this EIAR.

Landscape, Archaeology, Architectural and Cultural Heritage.	**Biodiversity**: Construction works at water crossings, during the construction phase have the potential to impact on downstream protected areas, should an accidental release occur. Impacts could potentially arise from soil excavation in off road sections and from water-crossing activities. A suite of best practice techniques, mitigation measures and guidelines have been outlined in Chapter 8 Land, Soils & Hydrogeology and Chapter 10 Biodiversity. All construction works involving the movement of soils will consider the identified locations of Invasive Alien Species. A confirmatory invasive species survey will be carried out during the appropriate growing season (May–October). The findings of this invasive species survey will be incorporated into an updated Invasive Species Management Plan by the Contractor's Ecological Clerk of Works (ECoW).
	The Landscape: The construction stage impacts are considered to have a significance of slight negative effects within the immediate surrounds of the site, however this quickly reduces to Slight-imperceptible and Imperceptible within the wider study area in the short term. The overall operational phase landscape impact has a significance deemed to be Imperceptible. Therefore, significant landscape impacts are not anticipated during the construction or operational phases. The impact is assessed fully in Chapter 14 The Landscape of this EIAR.
	Archaeology, Architectural and Cultural Heritage: The disturbance of soil during the construction phase of the proposed development has the potential to undercover archaeological finds. Mitigation is outlined within Chapter 15 - Archaeology, Architectural and Cultural Heritage and the CEMP.
Surface Water & Flooding interactions with: Biodiversity, Roads and Traffic,	**Biodiversity**. The risk that contaminants could be accidentally released into watercourses could potentially have impacts for local communities in terms of poor water quality, especially with the linkage to sensitive areas located downstream. Chapter 10 Biodiversity and the Construction Environmental Management Plan set out measures to prevent the runoff of contaminants during construction.
	Roads and Traffic: The proposed development has potential to impact on local roads during construction, including run off from local roads utilised during the construction phase. The implementation of the mitigation measures proposed within Chapter 9 Surface Water and Flood Risk, Chapter 17 Roads and Traffic and the Construction Environmental Management Plan should minimise any residual effects.
Biodiversity interactions with: Noise & Vibration	**Noise & Vibration**, Noise and vibration can cause disturbance of protected species from noise and vibration generated from construction activities. For activities which emit high levels of noise and for noise emitting works at night, sound reducing hoarding will be placed adjacent to works areas to protect fauna. Mitigation measures can include: the use of mufflers on pneumatic tools, effective exhaust silencers, sound reducing enclosures and machines in intermittent use shall be shut down during periods where they are not required. Further mitigation is included with the Chapter 10 Biodiversity, Chapter 13 Noise and Vibration and the Construction Environmental Management Plan.
Archaeology, Architectural and Cultural Heritage interactions with: Material Assets	**Material Assets**: As with any works of this nature, there is potential for previously unrecorded archaeology to be encountered during excavation works. Disturbance of ground within newly acquired lands may impact unrecorded archaeology and cultural heritage. The implementation of the measures described in Chapter 15 - Archaeology Architectural and Cultural Heritage and the CEMP will ensure that such impacts are minimised.

Roads and Traffic interactions with: Noise & Vibration, Material Assets	**Noise & Vibration**: Traffic noise is likely to arise from movement of construction traffic along the cable routes as the trenching progresses and reinstatement delivers materials to construction compounds. The noise and vibration impacts arising during the construction of the underground cable route are predicted to be low. The noise levels at receptors are expected to be above the associated acoustic thresholds for a short period of time. After factoring in the work duration, the predicted noise impacts are predicted to be 'Not Significant'. Chapter 13 Noise and Vibration and the Construction Environmental Management Plan of this EIAR set out measures to reduce the effect of noise from HGV movements on sensitive noise receptors.
	Material Assets: There is an interaction between resource and waste management and traffic and transport effects during the construction phase of the proposed development. The transportation of resources and waste to and from the cable route has the potential to affect local traffic and transport patterns during the construction phase. Materials will require transport from the construction compound areas, which are to be confirmed, to the various sections of the proposed development and there will also be material requiring transport for disposal, following the excavation of the trenches. A Construction Traffic Management Plan has been produced and will be updated by the appointed contractor. This is included as within Appendix D.

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Chapter 20 - Summary of Mitigation and Monitoring Measures

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20 Summary of Mitigation and Monitoring Measures

20.1 Introduction

The EIAR takes into account the available results of relevant assessments under European Union or national legislation with a view to avoiding duplication of assessments. The assessments contained in the EIAR have also been co-ordinated with the assessment under Council Directive 92/43/EEC of 21 May 1997 (The Habitats Directive) and Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 (Birds Directive) as transposed in the Planning and Development Act 2000 (as amended) and the NIS which has been prepared for this EIAR.

The following summary sets out the mitigation controls and other best practice measures identified in relation to the proposed development and identifies the means by which those controls and measures will be secured, as laid out in Annex IV(7) of Directive 2014/52/EU. The following are provided: a unique reference number for each item; the section of the EIAR where the mitigation measure is referenced; and the monitoring and mitigation measures, as set out in the EIAR.

A contractual obligation will be included within the tendering processes and implemented on appointment of the Contractor to ensure that the proposed works are developed in compliance with the requirements of the CEMP, and the methods, monitoring and mitigation included in this EIAR.

Table 20.1: Summary of Mitigation and Monitoring Measures

	Phase	Mitigation and Monitoring
Chapter 7 Population and Human Health		
7.1	Construction	Construction activities have the potential to create a nuisance and cause disruption. All work will be carried out having regard to international and national legislation, and best practice guidance, as detailed in the topic-specific chapters of this EIAR.
7.2		A CEMP is included in Appendix D of this EIAR. The CEMP will be implemented by the contractor in consultation with ESB to safeguard the environment, site personnel, and nearby sensitive receptors, i.e. occupiers of residential and commercial properties, from site activities that may cause harm or nuisance. ESB have engaged with landowners directly affected by the proposed development and will continue to liaise with landowners throughout the construction period.
7.3		The appointed contractor(s) (in collaboration with ESBN) will be required to maintain close liaison with local community representatives, landowners and statutory consultees throughout the construction period. This is likely to include the circulation of information about ongoing activities; particularly those that could potentially cause a disturbance, including due to traffic. A telephone number will be provided and persons with appropriate authority to respond to calls and resolve or escalate any problems arising will be available.
7.4		The appointed Contractor will also implement the Traffic Management Plan included as Appendix D1 of this EIAR, which will be finally agreed upon with Fingal County Council, Dublin City Council and ESB to mitigate any potential construction traffic impacts on the public road network. All construction activities, including construction traffic, will be managed through the site CEMP.
7.5		There are no specific mitigation measures required to ameliorate potential impacts on population and human health in addition to the measures specified in other chapters of this EIAR. Specific measures to mitigate likely significant impacts on human health during the construction phase (i.e. Noise and Vibration, Air and Climate, Water, The Landscape, Traffic and Major Accidents and/or Disasters) are dealt with separately in the relevant chapters in this EIAR.
7.6	Operational	The location and nature of the proposed development is not expected to have a permanent impact on the population of the area and wider environs. The 110 kV cable will not require specific or routine maintenance activities along the cable trench or joint bay locations. Access may be required on a rare occasion to facilitate cable replacement if a failure occurs. Annual access will be required to link boxes and communications chambers for inspection and maintenance. These works will be temporary and result in imperceptible effects due to nuisance in the event that traffic management is required.
7.7		It is clear from freely available scientific information that the maximum magnetic field generated from the HV UGC will be well below the ICNIRP guidance limit.
Chapter 8 – Land, Soils & Hydrogeology		
8.1	Construction	Design and construction best practice mitigation measures are specified in the Land, Soils & Hydrogeology chapter and include the following: During the construction phase, the Construction Environmental Management Plan (CEMP) specifies the range of measures to avoid and minimise impacts that may occur in construction. This requires the appointed contractor to have in place appropriate consents for works that could affect groundwater and to implement specific measures to protect groundwater dependant springs and boreholes, including control of silt-laden runoff.
		CEMP measures of relevance to soils geology and hydrogeology include:

	Phase	Mitigation and Monitoring
8.2		Soil management: Excavated soil material for reuse will be stored at least 15m from drains and watercourses with silt fencing to prevent contaminant runoff. The Construction Waste Management plan specifies that excavated soil material, if not being reused will be disposed of offsite to licenced waste facilities.
8.3		Dewatering: Ground water and surface water accumulating in the base of trenches will not be pumped directly to roadside drains or watercourses unless it is clean and free from solids. Trench and joint bay dewatering will be pumped through silt socks to percolation areas if the soil is not saturated. Otherwise a settlement tank will be used. Contaminated water will either be tankered off site for disposal in a licensed facility or pumped to a portable on-site settlement tank for treatment.
8.4		Bentonite injection: Bentonite grout injection will occur within a bunded pit inside the cable trench. Unused bentonite grout and any spillages within the pit will be removed off site for disposal under licence in an approved facility. The construction team undertaking this work will be made aware of the contaminant risks associated with the use of the material.
		Monitoring Measures:
8.5		The following pre-construction survey of wells, springs and groundwater abstractions will be undertaken.
8.6		Water level monitoring will be undertaken pre-construction, during construction and post-construction for wells and springs which may be impacted by dewatering, such as St Doolagh's Well and St Catherine's Pond.
8.7		Water quality and water level testing will be undertaken pre-construction, during construction and post-construction for identified drinking water abstraction sources which may be impacted by construction activities.
8.8		Bentonite grout injection will be carefully monitored during and post-construction.
Chapter 9 - Surface Water & Flooding		
		General
		The following mitigation measures will be implemented prior to commencement and throughout the duration of the proposed works.
9.1		• An on-site Environmental Clerk of Works (EnCoW) will be appointed prior to commencement of works.
9.2		• Confirmatory pre-construction surveys will be carried out and seasonal constraints will be confirmed in agreement with IFI and National Parks and Wildlife Service (NPWS) and Fingal/Dublin City Council, as appropriate.
9.3	**Construction**	• Works will be carried out in accordance with the guidelines set out by IFI in 'Guidelines on Protecting Fisheries During Construction Works in and Adjacent to Waters' (IFI, 2016).
9.4		• The IFI Biosecurity Protocol for Field Survey Works will be complied with.
9.5		• Works will not be carried out during extreme rainfall or high flow events and watercourse crossings managed to minimise impact on flood risk. . Plant and materials within the flood plain will be removed in the event of extreme rainfall or high flow events.
9.6		• The Contractor's EnCoW will monitor watercourse levels during construction, and if extreme watercourse levels are forecast then works will be programmed to avoid such times.

Phase	Mitigation and Monitoring
9.7	• In the case of a warning of a flood event, plant and materials vulnerable to flooding in 'at risk' construction compounds will be relocated to parts of the compound that are considered to be not at risk of flooding.
	Surface Water Quality Protection Measures
	The following water quality mitigation measures will be implemented prior to commencement and throughout the duration of the works:
9.8	• 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 i.e. 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.
9.9	• Tracking beside streams and tracks will be avoided to avoid damage to the bankside.
9.10	• A buffer zone of 15m will be maintained between storage and working areas and watercourses, taking account of the minimum working area required to facilitate the works. Laydown areas within flood risk zones will be minimised, but where necessary will be managed so that potential obstructions are removed in the event of an adverse weather warning
9.11	• The time period over which areas of clearance are left open will be reduced insofar as is reasonably practicable.
9.12	• Re-instatement method statements will be subject to approval by the EnCoW.
9.13	• Concrete will be brought to site by covered truck. Wet concrete operations adjacent to watercourses will be avoided where possible.
9.14	• The Contractor will ensure that all concrete truck wash watering / cleaning is undertaken offsite where possible and remote from watercourses.
9.15	• 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:
9.16	o All collected waste will be managed in accordance with the Waste Management Act 1996, and associated Regulations:
9.17	o Fuels, chemicals, liquid and solid waste will be stored on impermeable surfaces;
9.18	o Refuelling of plant, equipment and vehicles will be carried out on impermeable surfaces;
9.19	o All tanks and drums will be bunded in accordance with established best practice guidelines; and
9.20	o Spill kits will be provided at all compound locations and carried by all crews during underground cable installation works.
9.21	Temporary construction compounds shall not be located within a flood zone and will not be located within 25m of a watercourse. This is to minimise the impact on flood risk and reduce the flood risk to construction plant and materials.
9.22	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 to inform adaptive management as required. The locations of same will be determined by the EnCoW.
9.23	Site restoration post works will be carried out, in agreement with IFI. These works may include riverbank stabilisation, gravel replacements etc. In all cases, the site will be restored post installation.
	Silt Control Measures
9.24	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.

Phase	Mitigation and Monitoring
9.25	Silt control measures include silt traps which can be located in small drains where flow is small and silt fences where runoff from large areas needs to be controlled.
9.26	Silt fences must be installed in the working areas and not at the watercourse.
9.27	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.
9.28	Where distances between the works and watercourse allow, a minimum setback distance of 30m from the watercourse will be maintained.
9.29	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
9.30	Silt fences will be installed downslope of the area where silt is being generated on disturbed ground.
9.31	To be effective the silt curtain must contain the area where silt is generated and must terminate on high ground (i.e. an elevated area not in the watercourse).
9.32	Silt fences will be constructed using a permeable filter fabric (e.g. Hy Tex Terrastop Premium silt fence or similar) and not a mesh.
9.33	The base of the silt fence will be bedded at least 15-30 cm into the ground at two metre intervals.
9.34	Once installed the silt fence will be inspected regularly, daily during the proposed works, weekly on completion of the works for at least one month, but particularly after heavy rains.
9.35	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.
9.36	Two lines of silt curtain / fence will be installed, where considered necessary, by the EnCoW.
9.37	Any build-up of sediment along the fence boundary will be removed daily.
9.38	Silt fences will be maintained until vegetation on the disturbed ground has re-established. Re-instatement method statements will be subject to approval by the EnCoW.
9.39	The silt fencing must be left in place until the works are completed (which includes removal of any temporary ground treatment).
9.40	Silt fences will not be removed during heavy rainfall.
9.41	The silt fence will not be pulled from the ground but cutaway at ground level and posts removed.
9.42	A record of when it was installed, inspected and removed will be maintained by the EnCoW.
	Silt Traps:
9.43	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:
9.44	• Silt traps will only be placed in drains downstream of working areas where the volume of water flow is expected to be low.
9.45	• Silt traps will be made of terram or similar material, not mesh.

	Phase	Mitigation and Monitoring
9.46		• The trap will be staked into the banks of the drain / watercourse such that no water can flow around the sides.
9.47		• The material will be bedded into the drain bed/watercourse to prevent water flowing beneath it.
9.48		• 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.
9.49		• 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.
9.50		• Any build-up of solids will be carefully removed without removing any vegetation growing on the bottom.
9.51		• In sensitive areas a series of silt traps will be placed in the drain.
9.52		• The silt trap will not be pulled from the ground but cutaway at ground level and posts removed.
9.53		• A record of when it was installed, inspected and removed will be maintained by the EnCoW.
9.54	Operational	In terms of the operational and maintenance phase, this is likely to be limited and this will involve periodic inspection of key elements to confirm that these are operating as intended and whether any cleaning or remedial maintenance works are required.
9.55		Access to joint bays may be required on a rare occasion to facilitate cable replacement if a failure occurs, therefore effects on surface watercourses are not likely to occur.
9.56		For maintenance works in the vicinity of watercourses, the mitigation measures detailed for the construction phase will be implemented. There are no additional mitigation measures required for the operational and maintenance phase.

Chapter 10 Biodiversity		
		Mitigation and Monitoring Measures
10.1	Construction	Mitigation measures were designed having regard to the Mitigation Hierarchy. This is a sequential order of mitigation actions, whereby the preference for mitigation measures are as outlined below:
10.2		• Avoidance: Steps to avoid harm to biodiversity
10.3		• Minimisation: Where adverse effects cannot be avoided, action is taken to minimise these effects.
10.4		• Compensation: Only considered after all possibilities for avoidance and minimisation of effects have been implemented.
10.5		Careful consideration has been taken throughout the design process to use existing infrastructure (e.g. ducting) and to follow existing roadways which will ultimately minimise potential impacts to the surrounding habitats. As such, substantial mitigation through avoidance and minimisation has already been achieved. Additional mitigation measures to further avoid and/or minimise the potential impacts are outlined hereunder.
		Construction Phase
		Monitoring of Mitigation Measures
10.6		During construction, monitoring will be carried out, and reported by the Contractors' Ecological Clerk of Works (ECoW), in agreement with the Employer's Representative Team, with regard for relevant conditions and licenses where required.

	Phase	Mitigation and Monitoring
10.7		Monitoring will take place at river crossings where instream works, and river bankside disturbance works are to take place. Monitoring will also be required where works are necessary in close proximity to stands of Invasive Species, potential roost features, and at badger setts.
10.8		The specific intervals at which the monitoring will take place will be determined by the relevant ecologist, having regard for licenses, and planning conditions.
		Ecological Clerk of Works (ECoW)
10.9	Construction	An Ecologist/ Ecological Clerk of Works (ECoW) will be employed by the Contractor to oversee implementation of mitigation and deliver toolbox talks and preconstruction ecology surveys, as appropriate . This will include monitoring and auditing the works and contractor programmes and works method statements, to ensure mitigation is correctly implemented and impacts to KER habitats and other non-made ground habitats are minimise and avoided where practical.
10.10		The ECoW will be a full member of a relevant environmental institute, such as the Chartered Institute of Ecology and Environmental Management (CIEEM) and have demonstrable experience in ecological supervision and habitat restoration works.
10.11		The Contractor's ECoW will also ensure any disturbance licenses are arranged if any significant findings are determined from confirmatory pre-construction surveys outlined above. The Contractor's ECoW will advise on mitigation measures implementation including the scheduling of works and will be included in regular liaison meetings between project teams to ensure that plans are co-ordinated and effects are minimised.
10.12		Separate to the ECoW, or if the EcOW does not have appropriate experience, an Environmental clerk of works (EnCOW)/ Environmental Engineer, with appropriate experience of managing surface water runoff/ pollution control will be employed on the site. The EnCOW will have responsibility for ensuring water quality and other general environmental protection measures are suitable and appropriate, and that they are effectively monitored.
		Independent Environmental Clerk of Works (EnCoW)
10.13		An independent Environmental Clerk of Works (EnCoW) will be employed on behalf of the Employers Representative team, who will review and comment on the pre-construction survey reports, mitigation proposals, monitoring and compliance reports generated by the Contractor's ECoW.
		Pre-Construction Confirmation Surveys
10.14		Given the dynamic distribution of species and habitats over time, significant changes can arise between baseline surveys and construction. For example, invasive species distribution may change following treatment (such as sites observed under treatment along the Forrest Little – Belcamp route), or dispersal by humans, animals, or water.
10.15	Pre-Construction	In advance of enabling works, the Contractor will commission pre-construction confirmatory surveys of identified significant ecological receptors, to update the findings of the surveys completed in 2022 and 2023. Surveys will specifically confirm updated distribution of, and inform any revisions to proposed mitigation for: ● Demarcate Local Importance (Higher value) habitats and works areas for so to minimise impacts and monitor works ● Badger setts at off road sections that bisect hedgerows ● Potential bat roosts ● Potential for Smooth Brome (rare flora) where works offroad in grassland type habitats; ● Surface water flow and condition of watercourse crossings ● Invasive species within the ZoI of the proposed development; ● Amphibians ● Breeding birds

	Phase	Mitigation and Monitoring
10.16		Invasive species surveys will be carried out having regard to Guidance of Transport Infrastructure Ireland .
10.17		The Contractor's ECoW will conduct confirmatory badger surveys having regard to Surveying Badgers10 and record signs of badgers including tracks, hair, latrines and setts at locations where potentially active badger setts have been identified including;
10.18		Belcamp cable connection site and
10.19		South-West point on the boundary of the Dublin airport
10.20		The extent of survey area for badger surveys will be defined with regard to Guidelines for the Treatment of Badgers during the Construction of National Road Schemes11 as 150m beyond all works areas within suitable habitat.
10.21		Should works progress within habitat identified as suitable for amphibians during the breeding season (February and March), a pre-construction confirmatory survey for frogs will be undertaken.
10.22		All surveys will be undertaken by a suitably qualified ecologist (s) who may be the Contractors ECoW, but who will have demonstrable experience in the survey and assessment of the feature. The results of pre-construction confirmatory surveys will inform the refinement of mitigation measures (if required) in Contractor method statements, and all results will be incorporated into Contractor's constraint mapping.
		Mitigation for the Compensation and Retention of Habitats
10.23	Construction	There is potential for retention of key habitat features, such as drainage ditch, scrub, treeline and hedgerow, and replanting of woody vegetation species to mitigate for the loss of scrub and hedgerow
		Landscaping Mitigation for Habitat Key Ecological Receptor Loss:
10.24		No specific habitat loss mitigation is required for watercourses. Mitigation pertaining to water quality is outlined in Chapter 10 – Biodiversity, section 10.8.1.8.
10.25		Clearance within scrub habitat will be kept to the minimum required to facilitate the works. This will be monitored by the EcOW and topsoil reinstated post works and allowed to regrow with brambles, grass and forbs available in retained topsoil.
10.26		Scrub/Marsh will be avoided, demarcated (if required) and monitored during works by the site EcOW
10.27		Clearance within broadleaved woodland habitat will be avoided where possible and level of impacts outlined will not arise. This area will be avoided, demarcated (if required) and monitored during works by the site EcOW. Topsoil will reinstated post works and allowed to regrow with brambles, grass and forbs available in retained topsoil
10.28		Clearance of wet grassland will be avoided where possible and level of impacts outlined will not arise. This area impacted will be minimised and monitored during works by the site EcOW. Topsoil and turves will reinstated post works and regrow.
10.29		Clearance of treelines will be kept to the minimum required to facilitate works. Treelines on either side of areas removed for the cable route will be bolstered as outlined below to replace area lost.
10.30		Clearance of hedgerows will be kept to the minimum required to facilitate works. Hedgerows on either side of areas removed for the cable route will be bolstered as outlined below replace area lost. Hedgerows within passing bays (total of 165m) will be fully reinstated/ replanted with local hedgerow species e.g. hawthorn, blackthorn, hazel, holly and willow. These will be of native provenance.
		Reinstatement

	Phase	Mitigation and Monitoring
10.31	Construction	Where reinstatement is not possible (i.e. within the line of the cable itself) treelines and hedgerows will be bolstered either side of the cable route to compensate for the loss.
10.32		Unless otherwise agreed with the Employer's Representative, 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 suited to the locality. Reinstated hedgerows and treelines are to be protected from browsing damage by wildlife and livestock using tree guards and/or exclusion fencing, as appropriate.
10.33		The Contractor will seed all grassland verges with a native wildflower mix of Irish provenance (to specification of EC12 Wild Flora for Earth Banks, Bunds and Ditches).
10.34		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 ECoW. Plant species of native provenance will be used in all replanting of semi natural habitats. It is preferable from an ecology and pollinator perspective that no reseeding takes place and natural seedbank in reinstated topsoil regrow.
10.35	Operation	The Contractor will commit to a five year after-care plan for hedging, grassland, and agricultural reinstatement, or as otherwise agreed with the local authority.
10.36		The Contractor's agronomist will inspect, photograph and report in writing to the Employer's Representative on the establishment-phase of all vegetation.
10.37		The Contractor's agronomist will review, and advise on any corrective measures required to ensure good condition, immediately after reinstatement, and at least twice yearly thereafter for a five year period.
		Mitigation for the protection of Rare Plant Species
10.38		Prior to works commencing a confirmatory survey for Smooth brome within grassland type habitats, where direct impacts will arise, will be carried out by an experienced botanist during its flowering season (optimal survey season for grass is between May and July). The botanist, to be appointed by the Contractor, will coordinate with the Contractors ECoW and, report findings to the ENCoW within the Client's Representative Team. The botanist will be contracted for a period lasting at least one year following the cessation of potentially damaging construction works at the plant location(s) (see monitoring below).
10.39		In the event where one or more plants are identified at risk of impact, an assessment of risk of impact will be carried out by the appointed botanist, in consultation with a NPWS grassland. The assessment will be specific to the species which identify any additional measures required to protect the species by either avoiding and protecting the plant species in situ, or (only as a last resort) through the translocation of the plant species to new receptor locations nearby, under licence from the NPWS. Any additional measures as outlined under the terms of the license will also be included.
10.40		For a period lasting at least one year following the cessation of potentially damaging construction works at the plant location(s), the appointed botanist will undertake quarterly site visits to photograph and document the success of the mitigation measures, and discharge any conditions associated with any license(s). Where issues regarding the establishment are encountered, the botanist will consult with the NPWS, in agreement with the Contractor and the Ecologist within the Employer's Representative Team, to identify reasonable steps to improve the chances of re-establishment.
		Mitigation for the Protection of Mammals
		Mitigation for the Protection of Badger
10.41	Construction	As outlined previously, prior to works commencing a preconstruction survey for badgers will be undertaken. Where active badgers setts have been identified within the ZoI of the proposed development, the use of camera monitoring, setting of footprint traps, soft blocking of the sett entrance or similar will be required to confirm their presence.

	Phase	Mitigation and Monitoring
10.42		A description of the setts i.e. main sett, annex sett, or outlier sett will be provided by the ECoW along with the level of activity at the sett. This will allow for an understanding of the importance of the setts in the wider context of the local population. As per the Guidelines for the Treatment of Badgers during the Construction of National Road Schemes**Error! Bookmark not defined.**, where setts have been confirmed, no heavy machinery will be used within 30m of badger setts (unless carried out under licence from the NPWS).
10.43		Lighter machinery (generally wheeled vehicles) will not be used within 20m of a sett entrance; light work, such as digging by hand or scrub clearance will not take place within 10m of sett entrances.
10.44		None of the above works will be undertaken within 50m of active setts during the breeding season (December to June inclusive). An assumption that the sett is active will apply unless proven otherwise during the course of investigation. Where works may interfere with the badger sett directly, exclusion will take place as per NRA guidelines.
		Mitigation for the Protection of Bats
10.45	Construction	The design and construction of bat mitigation measures herein has had regard for relevant documents including the NRA's "Guidelines for the Treatment of Bats During the Construction of National Road Schemes"[1], the NPWS Bat Mitigation Guidelines for Ireland[2], and (with specific regard to roosts in trees), the Bat Tree Habitat Key [3].
10.46		Trees with suitability for roosting bats will not be felled in advance of surveying for bats, unless in agreement with the ECoW, and NPWS as relevant. Prior to felling of any trees, an initial bat survey of trees to be felled will be undertaken, by a licensed qualified specialist, to assess the suitability of the tree to contain bat roosts as per the documents cited.
10.47		Prior to construction, trees identified with potential roost features of a Moderate to High value will be thoroughly re-examined during confirmatory surveys, to ascertain the presence or absence of roosting bats. A licence will be sought from the NPWS, as required. Surveys will be conducted by an experienced bat ecologist. The trees will be examined for the presence or absence of bats / bat roosts immediately prior to felling. Features in trees identified from ground level as of medium or high suitability for, will be climbed and/or accessed by a Mobile Elevated Working Platform; and inspected using a digital endoscope to confirm the ground-level rating, and where possible identify presence of roosting bats. Where timing facilitates it (i.e. when felling is being undertaken during the active season for bats from May to September inclusive), emergence surveys may additionally be carried out to confirm presence or absence of roosting bats, subject to the advice of the bat ecologist, and any licence conditions. Where felling does not occur within one day of the examination, the trees will be re-assessed, unless otherwise agreed with the NPWS.
10.48		Where evidence of a roost, or roosting bats has been determined, a license for destruction of a roost and/or exclusion of bats will be required from the NPWS. The procedures for the exclusion of bats and destruction of roost as detailed in the license document will be obeyed, at all times, by the Contractor.
10.49		Where bat exclusions are required, they will be undertaken in accordance with the requirements of the bat specialist. They will not be carried out during the breeding season, between the months of June to August inclusive, or during hibernation in the months of November to March inclusive, unless under license from the NPWS. Where the felling of trees found to be suitable as bat roosts cannot be avoided, any mitigation conditioned by the NPWS (e.g. replacement bat roost features on public lands following consultation with the NPWS, and the local authority) will be and put in place at least one month in advance of any felling or disturbance.

[1] https://www.tii.ie/tii-library/environment/construction-guidelines/Guidelines-for-the-Treatment-of-Bats-during-the-Construction-of-National-Road-Schemes.pdf

[2] http://battreehabitatkey.co.uk/

[3] Marnell, F., Kelleher, C. & Mullen, E. (2022) Bat mitigation guidelines for Ireland v2. Irish Wildlife Manuals, No. 134. National Parks and Wildlife Service, Department of Housing, Local Government and Heritage, Ireland.

	Phase	Mitigation and Monitoring
		Mitigation for the Protection of Breeding Birds
10.50	**Construction**	The clearance of all vegetation (except vegetation with no nesting potential as determined by the ECoW), will take place outside of the breeding season for birds where possible or as determined by risk of disturbance to a nest site.
10.51		The ECoW or other suitably qualified ecologist will conduct further confirmatory pre-construction surveys to assess risk of disturbance to nesting birds to inform vegetation clearance activity. In the event where confirmatory pre-construction surveys confirm or presume nesting birds are present, an exclusion zone will be established around the nesting bird (to include the risk of abandonment due to indirect disturbance), and no vegetation clearance may proceed until young are presumed to have fledged, or nesting has failed. Confirmatory pre-construction surveys have a shelf life of 72 hours, after which repeat surveys will be required if vegetation has not been cleared.
		Mitigation for the Protection of Amphibians
10.52	**Construction**	As outlined previously, pre-construction confirmatory survey for frog will be undertaken prior to works commencing during the common frog breeding season (February and March), at potential suitable breeding habitat (drains impacted).
10.53		When surveying for the species biosecurity measures will be followed to ensure that there is no incidental spread of vector borne diseases between waterbodies. This includes the cleaning, disinfection and drying of all equipment and will have regard to guidelines from Inland Fisheries Ireland[4].
10.54		Should frogs be recorded, translocation of the species to suitable receptor sites will be undertaken, in consultation with the NPWS, and local authority where relevant. Any translocation of these species will be under licence by the NPWS.
10.55		Where common frog is recorded within the footprint of the works, spawn will be captured and removed from affected habitat by hand net and translocated to the nearest area of available suitable habitat. Adult and young frogs are likely to flee disturbance and will not require translocation.
		Mitigation for the Protection of Watercourses
10.56	**Construction**	Mitigation for the protection of water quality with regard to sediment control is outlined in Chapter 9.
10.57		Construction works should nevertheless be carried out in accordance with the guidelines set out by IFI in 'Guidelines on Protecting Fisheries During Construction Works in and Adjacent to Waters' (IFI, 2016) in areas where watercourses are encountered.
10.58		Additionally, the open season (July-September) restriction for any instream works will apply at watercourse crossings along the Ballystruan – Forrest Little cable route, which coincide with the upper reaches of the River Ward.
10.59		Works method statements will be agreed with IFI for all watercourse crossings, following Geotechnical Investigation data review.
10.60		The works method statement may include details on silt fencing, pH monitoring requirements, and handheld turbidity monitoring. Stop works authority escalation, including during Met Eireann (Red, Orange, Yellow) warnings will be informed by turbidity and pH monitoring, and require agreement of the Contractors ECoW and the Employers Rep ENCoW (i.e ESBN) if inspections indicate mitigation at risk of not performing effectively.
10.61		At a minimum, all pollution control measures will be designed, installed, and maintained in accordance with measures outlined below and under the supervision of the Contractor's Environmental Clerk of Works (EnCoW).
10.62		The pouring of concrete will be required during the construction phase. To prevent the runoff of concrete into nearby watercourses and drains, the following will be implemented.
10.63		No on-site batching will be permitted at the proposed works areas. Concrete will instead be transported to the site within a concrete truck.

[4] Inland Fisheries Ireland (2016) Guidelines on protection of Fisheries During Construction Works in and Adjacent to Waters.

	Phase	Mitigation and Monitoring
10.64		Quick setting concrete mixes will be used to reduce the risk of contaminated run-off to the nearby watercourses.
10.65		Concrete trucks will be washed down in a sealed mortar bin / skip which has been examined in advance for any defects. This requirement will be communicated to each concrete truck driver prior to entering into the works area.
10.66		Where concrete pours are to take place instream they will only take place within an isolated, dry, works area.
10.67		Where the isolated working area requires constant pumping to maintain a dry works area, pumps shall be turned off during the pour, and remain off until concrete has hardening negating a run-off risk; and such that the discharge will not result in a change in pH of +/-0.5 units.
10.68		Where concrete pours are required within a watercourse, the Contractors EnCoW will regularly monitor the pH of the watercourse during concrete works using a handheld pH meter. Should any change in pH +/-0.5 be detected concrete works shall immediately be ceased (handheld monitors will have maximum variance of +/- 0.1). The entry point to the watercourse will then be identified and implement appropriate measures to prevent further escape to the environment
10.69		The Contractor's EnCoW will ensure that covers are available for freshly poured concrete to avoid wash off in the event of rain.
10.70		Waste concrete slurry will be allowed to dry and taken to a licensed waste depot for disposal.
10.71		The Contractor will schedule concrete works during relatively dry weather conditions (i.e. when there are no active Met Eireann yellow, orange or red warnings) to reduce the elevated risk of runoff.
10.72		The Contractor's EnCoW will notify the Independent EnCoW employed within the Employer's Representative Team,. the NPWS and IFI immediately of any concrete spills into watercourses.
		Mitigation to Prevent the Spread of Invasive Species
10.73		Japanese knotweed has been recorded within the ZoI of the proposed development. There is potential for additional stands of invasive species to be present within or adjacent to the works areas following establishment of new populations between baseline surveys, and construction.
10.74		Prior to works commencing a full invasive species survey will be carried out. The pre-construction invasive species survey will be carried out within the works areas, including compound locations and laydown areas, and along proposed access routes to identify the presence of all invasive species within and adjacent to works areas.
10.75	**Construction**	The invasive species survey will be carried out during the appropriate growing season (May – October). The findings of this invasive species survey will be incorporated into the measures below, by the Contractor's EnCoW and any specialists.
10.76		Any stands of invasive species recorded within the ZoI will be clearly marked out as restricted areas. This exclusion zone will incorporate a buffer such that below ground growth is accounted for (4m for Japanese knotweed[5] buffer not required for other species). No works will be carried out within the exclusion zones unless approved by the Contractor's EnCoW.
10.77		The Contractor's EnCoW will carry out a toolbox talk for all construction personnel which will provide information on how to identify and manage invasive species. The toolbox talk will take place prior to works commencing in any areas where Invasive Species have been recorded.
10.78		All machinery will be steam-cleaned prior to entering and before leaving site
		Additional Mitigation Measures included within the NIS/AA

[5] Fennell, M., Wade, M., Bacon, K., (2018); Japanese knotweed (*Fallopia japonica*): An analysis of capacity to cause structural damage (compared to other plants) and typical rhizome extension

	Phase	Mitigation and Monitoring
10.79		**Ecological Supervision and Monitoring**
10.80		An ECoW will be employed by the Contractor to oversee implementation of mitigation and deliver toolbox talks, as appropriate . This will include monitoring and auditing the works and contractor programmes and works method statements, to ensure mitigation is correctly implemented.
10.81		The ECoW will be a full member of a relevant environmental institute, such as the Chartered Institute of Ecology and Environmental Management (CIEEM) and have demonstrable experience in ecological supervision and habitat restoration works.
10.82		The Contractor's ECoW will also ensure any disturbance licenses are arranged if any significant findings are determined from confirmatory pre-construction surveys outlined above. The Contractor's ECoW will advise on mitigation measures implementation including the scheduling of works and will be included in regular liaison meetings between project teams to ensure that plans are co-ordinated and effects are minimised.
10.83		An independent Environmental Clerk of Works (EnCoW) will be employed on behalf of the Employers Representative team, who will review and comment on the pre-construction survey reports, mitigation proposals, monitoring and compliance reports generated by the Contractor's ECoW. These monitoring and survey reports will also be provided to the local authority or other parties where required by condition.
Chapter 11 - Air		
	Construction	**Air quality mitigation**
11.1	Construction	Construction activities associated with the proposed development with no mitigation are predicted to have:
11.2	Construction	A 'low' to 'high' risk for construction for 110 kV / 220 kV Forest Little – Belcamp – Option 1
11.3	Construction	A 'negligible' to 'medium' risk for construction for 110 kV / 220 kV Forest Little – Belcamp – Option 2
11.4	Construction	A 'negligible' to 'medium' risk for construction for 110 kV Newbury to Ballystruan and
11.5	Construction	A 'negligible' to 'medium' risk for construction for 110 kV Ballystruan – Forest Little
11.6	Construction	Best practice mitigation measures adapted from the IAQM guidance are presented below. The potential dust risk of 110 kV / 220 kV Forest Little – Belcamp Option 1 are comparatively higher, therefore specific mitigation measures have been recommended for these two routes. These mitigation measures, or equivalent, will be incorporated into the proposed development's Construction Environment Management Plan (CEMP). The dust and emission control methods presented below will be agreed with the local authority and implemented effectively throughout the construction period.
	Construction	**For the 110 kV / 220 kV Forest Little – Belcamp Option 2, and 110 kV Ballystruan – Forest Little and 110 kV Newbury to Ballystruan**
	Construction	**Communication and Site Management**
11.7	Construction	Develop and implement a stakeholder communications plan that includes community engagement before work commences on site.
11.8	Construction	• 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.
11.9	Construction	• Display the head or regional office contact information.
11.10	Construction	• Develop and implement a dust management plan (DMP), which may include measures to control other emissions, approved by the Local Authority.

	Phase	Mitigation and Monitoring
11.11		• Record all dust and air quality complaints, identify causes and take appropriate measures to reduce emissions in a timely manner and record the measures taken.
11.12		• Make a complaint log available to the planning authority, when requested.
11.13		• 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
11.14		• Carry out regular site inspections, record inspection results and make an inspection log available to the planning authority, when requested.
		Preparing and maintaining the site:
11.15		• Avoid site runoff of water or mud.
11.16		• Erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles on site.
11.17		• Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site. If they are being re-used on-site cover with Hessian, mulches or trackifiers.
11.18		• Cover, seed or fence stockpiles to prevent wind whipping. •
		Operations vehicles / machinery and sustainable travel:
11.19		• Ensure all vehicles switch off engines when stationary – no idling vehicles.
11.20	**Construction**	• Avoid the use of diesel- or petrol-powered generators and use mains electricity or battery powered equipment, where practicable
11.21		• Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials.
		Operations
11.22		• Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction.
11.23		• Ensure an adequate water supply on the site for effective dust/ particulate matter suppression/ mitigation using non-potable water, where possible and appropriate.
		Mitigation specific to trackout:
11.24		• Use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any material tracked out of the site. Avoid dry sweeping of large areas.
11.25		• Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport.
11.26		• Inspect on-site haul routes for integrity and instigate necessary repairs to the surface as soon as reasonably practicable.
11.27		• Record all inspections of haul routes and any subsequent action in a site log book.

	Phase	Mitigation and Monitoring
11.28		• Install hard surfaced haul routes, which are regularly damped down with fixed or mobile sprinkler systems, or mobile water bowsers and regularly cleaned.
11.29		• Access gates to be located at least 10 m from receptors where possible.
	Construction	**For the 110 kV / 220 kV Forest Little – Belcamp Option 1:**
		Communication and Site Management
11.30		Develop and implement a stakeholder communications plan that includes community engagement before work commences on site.
11.31		Hold regular liaison meetings with other high risk construction sites within 500m of the site boundary, to ensure plans are co-ordinated and dust and particulate matter emissions are minimised. It is important to understand the interactions of the off-site transport/deliveries which might be using the same strategic road network routes.
		Monitoring:
11.32		Undertake daily on-site and off-site inspection, where receptors (including roads) are nearby, to monitor dust, record inspection results, and make the log available to the local authority when asked.
11.33		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.
11.34	Operation and Maintenance	During the operation phase of the proposed development, access may be required on rare occasion to facilitate cable replacement if failure occurs. Annual access to link boxes and communication chambers will be required for inspection and maintenance. Given the frequency of inspection and maintenance, the effects of operation road traffic contributions from the proposed development are considered negligible significance compared to the existing surrounding road traffic contributions on the local road network. There are no mitigation measures is required during operation phase of the proposed development.
Chapter 12 - Climate		
		Physical climate risks
12.1	Construction	Climate resilience during the construction phase of the proposed development has been scoped out of the assessment. Any risks arising due to extreme weather events during construction will be addressed by appropriate measures in the Construction Environmental Management Plan (CEMP). This may include:
12.2		Procedures and precautions will be implemented for areas that may experience flooding, including use of temporary flood defence barriers and preparation of temporary demobilisation plans. These procedures will consider prolonged and intense rainfall events that may lead to staff safety risks or pollution risks where construction materials (e.g. dust, contaminants, metals, or oils) have potential to runoff into watercourses. This will consider likely surface water runoff routes and plans for the protection of plant such as fuel storage and materials stockpiles, and the demobilisation of vehicles and items of mobile plant;

	Phase	Mitigation and Monitoring
12.3		Workforce health and safety plans and welfare management systems will be put in place by the contractor, including details to be outlined within works plans and task briefs as appropriate. This will consider periods of high temperatures that may lead to risks of heatstroke for construction staff and severe precipitation events that may lead to slips and falls;
12.4		Contingency plans will be in place for situations where flooding leads to restricted site access or key staff being unable to get to work, leading to construction delays;
12.5		Contingency plans will be in place for situations where storms, high winds or flooding lead to loss of mains power supply or communications, and the identification of safety critical risks and construction programme consequences; and
12.6		Include regular monitoring of flood alerts and weather warnings from Met Éireann
		GHG Assessment
		The following mitigation measures apply in relation to construction impacts on climate change:
12.7		Integrate GHG emissions reduction since the early design stage, promoting GHG saving opportunities when determining the definitive specifications of products, materials and layouts, and explore alternatives to achieve the desired development.
12.8		Take a planned approach focused on GHG emissions reduction, through the use of good construction practices and energy efficient processes and technologies, including the re-use or refurbishing of existing assets.
12.9	**Construction**	Promote fuel switching or substitution in transport of materials to site, as well as efficient route scheduling with suppliers.
12.10		Engagement with other stakeholders, to reduce resource and energy consumption and associated GHG emissions over the life cycle of this development.
12.11		Compensate unavoidable residual emissions.
		Physical Climate Risks
		The assessment identified no significant risks were identified due to the embedded mitigation of the proposed development. Therefore, additional design measures to enhance resilience is not required.
		GHG Assessment
		The following mitigation measures apply in relation to operational impacts on climate change:
12.12		As considered in Chapter 6, throughout the design and assessment process, all reasonable and practically achievable measures have been taken to minimise and avoid impacts, including design specifications and standards to minimise and avoid GHG emissions, as recommended IEMA and aligned with PAS 2080.
12.13	**Operation and Maintenance**	Implement the mitigation hierarchy recommended by IEMA, operating efficiently through the use of good practices and techniques that reduce resource and energy consumption.
12.14		Regular maintenance checks to ensure that the UGC are operating according to calculated efficiency rates and that best practice control measures will be implemented to mitigate against GHG emissions.

	Phase	Mitigation and Monitoring
12.15		Application of the circular economy hierarchy, in order to reduce, re-use, repair and recover when maintenance is undertaken, as well as use of good practices by value-chain members.
12.16		The annual GHG emissions will be driven by the operating profile of the proposed development. The total GHG emissions will therefore be minimised by increasing efficiency and reducing conductivity losses.
12.17		Engagement with other stakeholders, to avoid physical damages and losses, requiring additional repairs and materials.
12.18		Compensate unavoidable residual emissions
Chapter 13 - Noise and Vibration		
	Construction	A Construction Environmental Management Plan (CEMP) that includes noise and vibration mitigation is included in Appendix D.
13.1		The impact of noise and vibration on nearby sensitive receptors within the vicinity of the proposed development will be controlled by implementation of the principal of Best Practicable Means (BPM). This will be achieved by undertaking construction activities in accordance with good practice set out in BS 5228-1/2:2009+A1:2014. The preferred approach for controlling construction noise is to reduce source levels where possible but with due regard to practicality.
		Measures that will be implemented include the following:
13.2		• Selecting quiet equipment;
13.3		• Ensure equipment is maintained, in good working order, and is used in accordance with the manufacturer's instructions;
13.4		• Members of the construction team should be trained and advised during toolbox briefings on quiet working methods;
13.5		• Equipment shall not be left running unnecessarily;
13.6		• Equipment shall be fitted with silencers or mufflers where possible;
13.7		• Use plant enclosures whenever feasible;
13.8		• Materials shall be lowered instead of dropped from height;
13.9		• Inform nearby sensitive receptors in advance of construction activities and keep them up to date with progress and changes;
13.10		• Give nearby sensitive receptors a point of contact from the contractor; the contact should liaise with residents and maintain good communication between nearby residents and the contractor; and
13.11		• Utilising low vibration working methods.
		At construction compounds, the following mitigation measures will be implemented:
13.12		• Manage deliveries to prevent queuing of traffic at access points;
13.13		• Use of adjustable or directional audible vehicle-reversing alarms and/or alternative warning systems (i.e. white noise alarms);
13.14		• Imposition of suitable speed limit at construction compound to minimize noise from vehicle movements; and

	Phase	Mitigation and Monitoring
13.15		• Implementation of site hoarding.
13.16		Night works are not recommended at areas with high residential density. Where night working is unavoidable, in addition to mitigation proposed above, the following mitigation measures will be implemented:
13.17		• details of night working, including likely duration, start and completion dates, be clearly communicated to nearby noise sensitive receptors;
13.18		• avoid or limit the use of particularly noisy plants during these periods;
13.19		• temporary noise screens will be used at construction areas close to noise sensitive receptors to reduce noise disturbance.
13.20		Good public relations are invaluable in securing public acceptance of construction noise. People are more tolerant of noise if they understand the reason behind it, the likely duration, start and completion dates, and mitigation measures used to minimise noise levels. Letter box drops explaining the proposed works will be implemented. A dedicated site contact will be nominated to liaise with residents and establish good rapport. A complaint handling procedure will also be put in place.
13.21	**Operational**	There are no anticipated noise and vibration impacts associated with the operational phase of the proposed development and therefore no mitigation is required.
Chapter 14 – The Landscape		
14.1	**Construction & Operation**	Landscape and visual mitigation measures are not considered necessary in relation to the UGC routes as there will be no material effects from the operational stage underground elements. Likewise, for temporary / short term elements of the project, including the visual elements required during the construction stage, specific landscape and visual mitigation measures are not considered necessary
Chapter 15 - Archaeology Architectural Cultural Heritage		
15.1	**Construction**	The mitigation strategies outlined in this section detail the techniques to be adopted to ameliorate the impacts that the proposed development may have on features of archaeological, architectural and / or cultural heritage within the study area during both the construction and operation phases of the proposed development.
15.2		The following proposed mitigation measures are subject to approval by the relevant planning authorities and the National Monuments Service of DHLGH.
15.3		• As part of an advance works programme prior to the commencement of construction, a suitably qualified project archaeologist will be appointed for the purpose of managing the progress of archaeological works, and ensuring that all archaeological works are carried out in accordance with the terms of any directions.
15.4		• As part of an advance works programme prior to construction, an underwater archaeological survey will be undertaken for all watercourses, where damming and trenching will be undertaken, along the cable route. This survey and evaluation will:
15.5		o Be carried out by a suitably qualified and suitably experienced underwater archaeologist under licence

	Phase	Mitigation and Monitoring
15.6		o Incorporate appropriate dive and wade survey as well as metal detection survey
15.7		o Result in a detailed report setting out any findings and outlining any further mitigation measures that will be employed in relation to the proposed development. This report will be submitted to the National Monuments Service (DHLGH).
15.8		Note, where an HDD methodology is proposed to facilitate a crossing, this will avoid any direct impact on the subject river or water course at that location.
15.9		• As part of an advance works programme prior to construction, a combination of advance confirmatory geophysical survey and advance confirmatory archaeological test trenching will be carried out, where feasible, for all off-road sections of the cable routes as well as the proposed Laydown Areas, compounds and passing bays, should any groundworks be required in these locations. This advance prospection will:
15.10		o Be carried out by a suitably qualified archaeologist under licence
15.11		o Result in a detailed report setting out any findings and outlining any further mitigation measures that will be employed in relation to the proposed development. This report will be submitted to the National Monuments Service (DHLGH).
15.12		• It is recommended that buffer zones be established for all RMPs/Protected Structures which are adjacent to the redline boundary so as be excluded from areas where any construction works will take place)::
15.13		o CH066 (enclosure DU00427/PS04);
15.14		o CH111 (Holy Well PS09);
15.15		o St. Doolaghs Ecclesiastical Site; (CH170-CH182; DU00721/11350017; DU04758; DU00723; DU00718; DU04182; DU00722; DU04757; DU00719)
15.16		o CH231 (an *in situ* pump located within the redline boundary)
15.17		• It is recommended that a buffer zone be established for CH231 – an in situ pump located within the redline boundary so as be excluded from areas where any construction works will take place (buffer zone to be determined by the Planning Authority):
15.18		• As part of an advance works programme prior to construction, a condition survey shall be undertaken of CH111 (Holy Well PS09); CH145 (Bridge); CH191 (St. Doolaghs Bridge); and CH231 (an *in situ* pump located within the redline boundary). These condition surveys shall inform the requirement for any additional mitigation measures as determined by the project archaeologist in consultation with the National Monuments Service (DHLGH).
15.19		• Where a section of an upstanding townland boundary must be removed (CH261) then:
15.20		• A representative cross-section of the townland boundary will be investigated and recorded by a suitably qualified archaeologist prior to removal.
15.21		• All sub-surface groundworks associated with the proposed development works will be subject to a programme of archaeological monitoring.
15.22		• This will be carried out by a suitably qualified archaeologist under license and in accordance with the provisions of the National Monuments Acts 1930-2004.

	Phase	Mitigation and Monitoring
15.23		• If significant archaeological material is encountered during the course of archaeological monitoring, then resolution of any such significant material will be determined in consultation with the National Monuments Service (DHLGH).
15.24		• Where possible, every reasonable effort will be made to preserve *in situ* or reduce the impact on any identified archaeological material. Where preservation in situ cannot be achieved, either in whole or in part, then a programme of full archaeological excavation will be implemented to ensure the preservation by record of the portion of the site that will be directly impacted upon. This work will be carried out by a suitably qualified archaeologist under license and in accordance with the provisions of the National Monuments Acts 1930-2004.
15.25		• A written report will be prepared detailing the results of all archaeological work undertaken.
Chapter 16 - Material Assets		
		Utilities
16.1		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.
16.2		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. Consultation with relevant neighbouring parties will be undertaken prior to any proposed disruptions. At this stage disruption is anticipated to be minimal as the works will be carried out within the existing road network.
		Waste Management
16.3	**Construction**	A Construction Resource Waste Management Plan (as part of the CEMP) is included within Appendix D of this EIAR. This plan provides information on the segregation of all construction wastes to facilitate optimum levels of re-use, recovery, and recycling operations.
16.4		As per section 16.4 the operational/decommissioning phase are not anticipated to be significant and will be managed and programmed in such a manner as to prevent / minimise waste production and maximise upper tier waste management (i.e. re-use, recycle, and recovery) in line with the Waste Hierarchy where technically and economically feasible.
16.5		Waste arisings will be handled, stored, managed and re-used or recycled as close as practicable to the point of origin.
16.6		Wastes will be sent off site for recovery or disposal will only be conveyed by an authorised waste contractor and transported from the proposed development site to an authorised site of recovery / disposal in accordance with the Waste Management Act 1996 and associated amendments and regulations and in a manner which will not adversely affect the environment. All employees will be made aware of their obligations under the CEMP.
16.7		The CEMP will be available for inspection at all reasonable times for examination by the Local Authority.
		Utilities
16.8	**Operational**	As no adverse operational phase impacts on utilities are anticipated, no specific mitigation measures are proposed.
		Waste Management

Phase	Mitigation and Monitoring
16.9	All waste generated during the operational phase 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 appropriately authorised destinations for waste materials.
Chapter 17 – Roads and Traffic	
17.1	The appointed contractor will agree temporary traffic management measures then adopt and monitor an appropriate way of working in consultation with FCC, DCC, DAA the appointed contractor, TII and/or their Agents and An Garda Síochána as appropriate.
17.2	The CTMP has been developed for the purposes of this assessment and will be further developed as necessary in consultation with FCC. DCC, DAA and the Gardai prior to construction commencing. The CTMP will document measures to promote the efficient transportation of components and materials to site, whilst reducing congestion and disruption which might impact negatively on local communities or general traffic and in particular the emergency services. The CTMP will be considered a 'live' document and will be developed accordingly, within the parameters assessed in this EIAR.
17.3	Signed diversion routes will be provided to mitigate journey disruption. Where practically achievable, diversion routes will not apply outside of the worksite hours of operation.
17.4	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.
17.5	Furthermore, only vehicles essentially required to facilitate construction will be allowed to attend worksites. Car sharing will be promoted to construction workers by the contractor during the induction process.
17.6	To reduce the potential for debris being deposited onto the local road network in the construction site accesses and road sections of HV cable construction, the appointed contractor will ensure that public roads and footways are cleaned and swept during and after the works. This cleansing regime (to be agreed) will minimise the amount of deleterious material deposited on the road surface and the appointed contractor will ensure that the nearest public road will be kept clear of debris by monitoring and then utilising a road sweeper where necessary.
17.7	The appointed contractor could employ a number of sub-contractors, and all will fall under the umbrella of the CTMP and will have an obligation to adhere to the Plan; this obligation will form part of the procurement process and will be written into any contract of employment.
17.8	Compliance will be monitored by the Project Manager, on behalf of the appointed contractor, via spot checks to ensure that vehicles follow the measures set out in the CTMP and recording of any complaints. The appointed contractor will be required to stipulate that all contractors disseminate these rules to their sub-contractors.
17.9	In liaison with ESB, the appointed contractors will be required to maintain close liaison with local community representatives, landowners and statutory consultees throughout the construction period. This will include circulation of information about ongoing activities; particularly those that could potentially cause disturbance, including due to traffic.
17.10	The appointed contractor will nominate a person to be responsible for the co-ordination of all elements of Roads and Traffic during the construction process (Liaison Officer). This person will liaise with the local community so that the community has a direct point of contact within the developer organisation who they could contact for information purposes or to discuss matters pertaining to traffic management or site operation.
17.11	If the construction phase of any notably sized development(s) appears likely to overlap with the proposed development, the appointed contractor will seek to liaise with the appropriate developer organisation regarding the scheduling of deliveries to identify potential means of reducing the effects of combined construction.
17.12	Prior to commencement of construction, and during the construction phase, engagement with the proponents of other developments will continue and where there is potential for works to be carried out in parallel, appropriate mitigation measures will be implemented including the scheduling of

	Phase	Mitigation and Monitoring
		works and regular liaison meetings between project teams to ensure that plans are co-ordinated and impacts on population and human health are minimised. The specific detail will be developed by the appointed contractor within the parameters assessed in this EIAR.
		Construction Access Arrangements
17.12	Construction	Transportation, including deliveries to and from the construction areas will be taken from the existing public road network. The local area road network is shown in Figure 17.2 of the Roads and Traffic Chapter.
17.13		Given the nature of construction of the HV cabling (including joint bays and passing bays), there will be multiple work sites along the HV cable routes throughout the construction programme.
17.14		The construction methodology is provided within Chapter 6. The proposed programme of worksite locations and temporary compounds (following future consent) will be confirmed by the appointed contractor as an integral part of their adopted CTMP provided as an Appendix to the CEMP. All construction vehicle drivers will be instructed to access their destination worksite via an approved route; this is to be determined by the approved contractor in conjunction with the administering local authority.
		Measures identified to Minimise and Mitigate Traffic Impacts included within the CTMP
		General
17.15	Construction	Road sections in the Study Area have been reviewed with the principal aim being to minimise potential disruption to local communities, and general traffic. There are a range of traffic management measures proposed to minimise potentially disruptive impacts associated with construction works and construction traffic. These measures are hereafter described.
		Time Control
17.16	Construction	Construction working hours will be conditionally defined through planning agreement or road opening license. Normal working hours are expected to be Monday to Friday 07:00 to 19:00 and 08.00 to 17.00 on Saturday, but overnight working may also be a requirement in highly congested areas. In instances where extended hours / days are required works will only be undertaken with prior agreement with the relevant statutory authority.
17.17		The appointed contractor will plan and manage construction works activities to minimise potential disruption on the surrounding road network and any other detrimental impact to the local community.
17.18		The appointed contractor will liaise with Fingal County Council (FCC), Dublin City Council (DCC) and Dublin Airport Authority (DAA) upon finalisation of the construction programme to ensure (as far as is reasonably practicable) that no conflict with planned road works in the vicinity of any construction works occurs so as not to impact motorists further.
17.19		Deliveries will be scheduled, as far as is reasonably practicable, to avoid network peak hours and passing by schools around typical drop-off and pick-up times. Where practically achievable, diversion routes will not apply outside of the compound's hours of operation.
17.20		Accordingly, the appointed contractor will discuss and agree with FCC, DCC and DAA on times to be avoided at schools and other community receptors at peak periods of the construction programme to minimise disruption.
17.21		The appointed contractor will liaise with FCC, DCC and DAA regarding local events dates and seek to avoid traversing affected route sections at agreed times.
		Diversion Routes
17.22	Construction	Where practical, localised traffic management (e.g., single lane alternate working) or temporary passing bays will be implemented. However, at locations where local traffic management or passing bays are not practical then local road diversions will be implemented. In all cases all reasonable

	Phase	Mitigation and Monitoring
		and practically achievable measures, such as moving of equipment and placing steel plates over the trenches to allow essential access for vehicles, will be implemented to facilitate local access requirements for emergency services, residential and commercial purposes.
17.23		An indication of the location of and potential implications of diversions are set out in Section 2.3.2 of the CTMP, Appendix D of the EIAR. Confirmed diversion routes will be agreed before construction between the appointed contractor and relevant authorities.
17.24		Once the construction programme, construction methodologies and associated compound layout requirements are firmly established, there will be a process of approvals for signage and information provision regarding essential traffic diversions. These will be discussed and agreed upon with FCC, DCC, DAA and other authorities as required.
17.25		When a road closure is required, the procedure set out in Section 75 of the Roads Act 1993 will be followed and the proposed diversion route will be approved by the relevant Road Authority.
17.26		When a closure is required, there will be a provision for a diversion route suitable to accommodate the types and volumes of traffic. Diversion route signage will be clear and consistent, guiding the traffic through each decision point until it re-joins the route from which it was diverted.
17.27		Diversion routes will be maintained in a satisfactory condition throughout the period of the diversion.
		Transportation Protocol
17.28		All contractors will adhere to the agreed CTMP and any agreed conditions imposed by FCC, DCC and DAA.
17.29		All construction vehicles associated with the proposed development will:
17.30		• Display a unique identification number shown on a plate clearly visible.
17.31		• Be securely sealed.
17.32		• Record origin, destination, and route of the vehicle.
17.33		• Not leave in convoy.
17.34		• Ensure all vehicle identifications including registration plates on the vehicle are clearly visible.
17.35	**Construction**	En route to and from their destinations drivers of all construction vehicles will:
17.36		• Access their destination compound via an approved route; this is to be determined by the approved contractor in conjunction with the administering local authority.
17.37		• Strictly observe speed limits.
17.38		• Drive in a safe and courteous manner with due care and consideration for other road users both vehicular and pedestrian.
17.39		• Be aware and alert whilst driving through towns and villages particularly at school times.
17.40		• Strictly adhere to the hours of operation detailed by the TMP.
17.41		• Not deliberately wait or stack on any public road.
17.42		The appointed contractor will maintain a management system whereby the following records are kept and are available to FCC. DCC and DAA:

	Phase	Mitigation and Monitoring
17.43		• The number of vehicles arriving and leaving their destination.
17.44		• All complaints received regarding transport and resultant action taken.
17.45		• All instances where a protocol has been breached and resultant action taken.
17.46		The appointed contractor will supply the following information to FCC, DCC and DAA, which will be treated in confidence:
17.47		• Action to be taken when a protocol is breached; and
17.48		• A log of vehicle movements.
		Road Cleaning/Sweeping
17.49	Construction	To reduce the potential for debris being deposited onto the local road network in the road sections/compound areas of HV cable construction, the appointed contractor will ensure that public roads and footways are cleaned and swept during and after the works. This cleansing regime will minimise the amount of deleterious material deposited on the road surface and the appointed contractor will ensure that the nearest public road will be kept clear of debris by monitoring and then utilising a road sweeper where necessary.
		Speed Restrictions
17.50		All construction workers, including contractor managed HGV drivers, will be briefed on the absolute requirement to adhere to posted speed limits on public roads through induction sessions and through regular briefings (toolbox talks). Other parties responsible for site deliveries will also be instructed per the requirement for compliance with posted speed limits on all roads.
17.51		Speed limits posted within compounds will be considered mandatory and, therefore will be complied with.
		Temporary Signage
17.52	Construction	During the construction phase, signage will be installed to warn road users to the presence of the works access and the associated likely presence of large or slow-moving construction traffic.
17.53		General information signage will be installed to inform road users and local communities of the nature and location of the works, including contact details should they require additional information.
17.54		Indicative signage for use on these routes is illustrated in Figure 3.2.
17.55		Temporary signage will be formally agreed with FCC, DCC and DAA prior to installation and commencement of construction. All signing will also be provided in accordance with the Traffic Signs Manual.
		Temporary Traffic Management
17.56	Construction	The construction worksite requirements in conjunction with existing road corridor geometry in some locations necessitates that localised road closures and diversions will be required.
17.57		Other forms of traffic management include:
17.58		• Localised lane closure and traffic management signing on dual carriageway sections.
17.59		• Localised carriageway closure and traffic management signing and sharing of remaining carriageway space for two-way traffic on dual carriageway sections

	Phase	Mitigation and Monitoring
17.60		• Single alternate lane operation controlled by temporary traffic signals on two lane single carriageway sections.
17.61		• Single alternate lane operation controlled by temporary traffic signals and convoy operation (to control vehicle speed) on two lane single carriageway sections.
17.62		• Single alternate lane operation manually controlled using stop/go signs.
17.63		• Temporary passing bays to enable traffic to bypass works.
		Public Transport
17.64		The appointed contractor will discuss with FCC, DCC, DAA and local bus operators regarding matters that could affect the flow of buses and, will implement reasonable and practically achievable measures to mitigate any disruption to bus services and inconvenience to service users.
17.65		Public Transport services that may be affected by local traffic management are listed within Table 3.1 in the CTMP.
17.66		**Pedestrian, Cyclist or Equestrian Routes**
17.67		Appropriate signage advising of dates and hours of working will be installed on the pedestrian, cyclist, and recreational routes, among others, in advance of road crossing points to warn users of construction traffic.
17.68		Indicative signage for use at these locations is illustrated in Figure 3.3. The exact details and location of the signage would be agreed with FCC, DCC and DAA.
		Parking for Vehicles of Construction Workers, Operatives and Visitors
17.69		To avoid detriment associated with obstructive parking, adequate car parking space for permanent construction workers, 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 minimise the potential for obstruction and delay for other road users. The requirement for construction workers not to park their private vehicles on public roads will be a mandated and advised to all construction workers prior to commencement of works and reinforced via 'toolbox talks'.
17.70		Vehicle sharing will be promoted to construction workers by the contractor during the induction process.
		CTMP Implementation and Monitoring
		General
17.71	Construction	The implementation of the CTMP will be the responsibility of the appointed contractor who will also be responsible for monitoring. Further evolution of the CTMP will be required during the detailed proposed development planning stages and during the construction phase.
17.72		The appointed contractor may employ several sub-contractors, and all in such cases sub-contractors' activities will fall under the requirements of the CTMP and therefore sub-contractor construction workers and sub-contractor managed construction vehicle drivers will have an obligation to adhere to the CTMP. This obligation will form part of the procurement process and will be written into any relevant employment or commissioning contract.
17.73		CTMP compliance will be monitored by the Project Manager, on behalf of the appointed contractor, via spot checks to ensure that vehicles follow the measures in the CTMP and record any complaints. The appointed contractor will stipulate that all contractors circulate these rules to their sub-contractors.
17.74		Non-compliance with the CTMP will constitute a breach of contract, and action will be taken against the contractor or supplier should repeated non-compliance continue. Details of the proposed monitoring and enforcement regime will be supplied to FCC, DCC, or DAA upon request.

	Phase	Mitigation and Monitoring
		Responsibilities
17.75		The appointed contractor will nominate a person responsible for the coordination of all elements of traffic and transport during the construction process, a nominated Liaison Officer. The Liaison Officer will be the direct point of contact for the developer organisation with the local community. Accordingly, local residents and business holders can contact the Liaison Officer for information purposes or discuss specific matters about traffic management or site operation.
17.76		Contact details for the Liaison Officer will be made available to relevant parties and more generally, as agreed with local authorities, to the local community prior to commencement of works on-site.
17.77		The appointed contractor (or their appointed agent) will review the number of construction workers, traffic numbers, and the construction programme as the proposed development progresses. Any proposed or unplanned substantive changes will be discussed and agreed with FCC, DCC, or DAA as far as is reasonably practicable.
17.78		As necessary, meetings would be held with FCC, DCC, or DAA and the appointed contractor to discuss the CTMP and to discuss any relevant issues raised by the local community.
		Transport Co-ordination
17.79		The appointed contractor will be responsible for the co-ordination of all elements of HGV transport to and from the compounds and worksites. The appointed contractor (or their appointed agents) will be responsible for co-ordination and liaison with sub-contractors, FCC, and DCC, DAA, TII, emergency services and the local community.
17.80		The Liaison Officer will inform FCC, DCC, DAA (or agents thereof) of any important matters that could affect traffic movement through reports issued at regular intervals or by day-to-day reports of any substantial, essential changes to transport plans necessitated by circumstances.
		Communication and Consultation
17.81		As indicated above, the appointed contractor will nominate a Liaison Officer to act as a point of contact with the local community. The Liaison Officer would be responsible for keeping the local community informed of progress on the site and communicating upcoming activities which could give rise to increased construction vehicle movements.
17.82	**Construction**	The Liaison Officer will be able to attend Community Council meetings to provide a report and to be on hand to answer any questions that the local community may have. Contact details will be provided for the Liaison Officer (telephone number and email address) and will be made available locally so that members of the public have an opportunity to ask questions and provide feedback.
17.83		The appointed contractor will utilise local media channels to circulate information regarding traffic management.
17.84		Signs will be erected at access points to construction compounds to provide contact details of the appointed contractor’s Project Manager. These contact details will also be provided directly to the emergency services.
		Liaison with Other Developers/Contractors
17.85		It is recognised that the construction period associated with the proposed development could coincide with the construction of other proposed developments whereby construction related traffic will travel through the same area and use the same public roads.
17.86		If the construction phase of any notably sized development(s) appears likely to overlap with the proposed development, the appointed contractor will seek to liaise with the appropriate developer organisation regarding the scheduling of deliveries to identify potential means of reducing the effects of combined construction.
		CTMP Review

Phase	Mitigation and Monitoring
17.87	The CTMP, as a ‘live document’ will be reviewed on a regular basis by the appointed (as needed, in tandem with the appointed contractor(s) prior to and during the project construction phase. The CTMP, during the project’s evolution, will be subject to change to enable the most effective and suitable measures for implementation and where needed, approved by FCC, DCC, and DAA.

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