North-South 400 kV Interconnection Development

An Bord Pleanála Reference: PCI001

Environmental Impact Statement

Volume 3D – MSA (DRAFT)

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EXPLANATION OF TECHNICAL TERMS AND ABBREVIATIONS

Term	Explanation
AA	An appropriate assessment (AA) is an obligation under Article 6(3) of the EU Habitats Directive 92/43/EEC: ―*Any plan or project not directly connected with or necessary to the management of the site [a Natura 2000 site] but likely to have a significant effect thereon, either individually or in combination with other plans or projects shall be subject to appropriate assessment of its implications for the site in view of the site‟s conservation objectives".*
AADT	Annual Average Daily Traffic
ABP (The Board)	An Bord Pleanála
AC	Alternating Current
ACA	Architectural Conservation Area: A place, area, group of structures or townscape that is of special architectural, historical, archaeological, technical, social, cultural, or scientific, interest, or that contributes to the appreciation of a Protected Structure.
ACGIH	American Conference of Governmental Industrial Hygienists
ACSR	Actual Cross Section of a Typical Conductor
AEOS	Agricultural Environmental Options Scheme
AHO	Archaeological Heritage Objectives
AIMD	Active Implantable Medical Device
AIS	Air Insulated Switchgear
ALS	Amyotrophic Lateral Sclerosis ALS
An Foras Taluntais	The Agricultural Institute
AOD	Above Ordnance Datum
AOD	Angle of Deviation
APG	Austrian Power Grid Company
AR5	The Inter Governmental Panel on Climate Change (IPCC) *Climate Change 2013 - Physical Science Basis*.
ASI	Archaeological Survey of Ireland

Term	Explanation
ASSI	Areas of Special Scientific Interest
Bay	A bay is a connection point to a busbar, and comprises switchgear and measurement equipment.
BAP	Biodiversity Action Plan
BGL	Below Ground Level
Biodiversity	Word commonly used for biological diversity and defined as assemblage of living organisms from all habitats including terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part.
Birds Directive	Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds.
The Board	An Bord Pleanála (unless otherwise clarified)
BOD	Biological Oxygen Demand
BPA	Bonneville Power Administration
BS	British Standard
CA	Competent Authority
CAFE	Clean Air for Europe
CBSA	Cross Border Study Area
CDHS	California Department of Health Services
CDP	County Development Plan
CEMP	Construction and Environmental Management Plan
CENELEC	European Committee for Electrotechnical Standardization
CER	Commission for Energy Regulation
CEU	Council of Europe
CGS	County Geological Sites
CH4	Methane
CHS	Cultural Heritage Sites
Circuit	A line or cable, including associated switchgear, which carries electrical power.
CMSA	Cavan-Monaghan Study Area

Term	Explanation
CO	Carbon Monoxide
CO_2	Carbon Dioxide
Conductors	High capacity, high strength standard cable / wire
CIRIA	*Construction Industry Research and Information Association*
Constraint	A constraint can be described as any physical, environmental, topographical, socio-economic or other feature or condition that may affect the location, development or other aspect of a proposal.
Corine	Coordination of Information on the Environment: Dataset created from satellite imagery that represents different cover / land use classifications throughout Europe.
cSAC	candidate Special Area of Conservation
CRED	Carrickmacross Rural Electoral Division
CRED	Castleblayney Rural Electoral Division
CRFRAM	Catchment Flood Risk Assessment and Management Studies
CRTN	Calculation of Road Traffic Noise
CSO	Central Statistics Office
DAFM	Department of Agriculture, Food & the Marine
DAHG	Department of Arts Heritage and the Gaeltacht
DAS	Disadvantaged Areas Payment Scheme
dB	Decibel
DC	Direct Current
DCENR	Department of Communications, Energy and Natural Resources
DCMNR	Department of Communications, Marine and Natural Resources
DECC	UK Department of Energy and Climate Change
DED	District Electoral Division
Demand	Peak demand figures refer to the power that must be transported from grid connections generation substations to meet all customers‘ electricity requirements. These figures include transmission losses.
DETI	Northern Ireland Department of Enterprise, Trade and Investment

Term	Explanation
DMRB	Design Manual for Roads and Bridges
DoEHLG	Department of Environment, Heritage, & Local Government
DSO	Distribution System Operator
Earth / ground wire	Wire installed above the live conductors at the top of a tower to minimise the likelihood of direct lightning strikes to conductors.
EC	European Commission
EC	European Community
ECoW	Ecological Clerk of Works
EEC	European Economic Community
EFHRAN	European Health Risk Assessment Network on Electromagnetic Fields Exposure.
EHC	Environmental Health Criteria
EHS	Electromagnetic Hypersensitivity
EHV	Extra High Voltage, in this EIS means greater than 330 kV
EIA	Environmental Impact Assessment: An examination, analysis and evaluation carried out by the Board that shall identify, describe and assess in an appropriate manner, in accordance with Articles 4 to 11 of the Environmental Impact Assessment Directive, the direct and indirect effects of a proposed development. EIA is the process by which the anticipated effects on the environment of a proposed development or project are measured as required under Directive (85/337/EEC) as amended.
EIA Directive	Directive 2011/92/EU of the European Parliament and of the Council of 13 December 2011 on the assessment of the effects of certain public and private projects on the environment (codification).
EirGrid	The statutory electricity Transmission System Operator (TSO)
EirGrid Roadmap	EirGrid's development framework for projects under the Grid25 strategy
EIS	Environmental Impact Statement: A statement of the effects, if any, which the proposed development, if carried out, would have on the environment and shall include the information specified in Annex IV of the EIA Directive.
ELF	Extremely Low Frequency

Term	Explanation
EMF	Electric & Magnetic Fields
EMI	Electromagnetic Interference
ENTSO-E	European Network of Transmission System Operators for Electricity
EP	European Parliament
EPA	Environmental Protection Agency
EPRI	Electric Power Research Institute
EPUK	Environment Protection UK
ES	Environmental Statement (required pursuant to the laws of Northern Ireland)
ESB	Electricity Supply Board
ESBI	ESB International
ESBNG	ESB National Grid
ESBNL	ESB Networks Limited
ETS	Emission Trading Scheme
EU	European Union
European Site	European site: A candidate Site of Community Importance, a Site of Community Importance, a candidate Special Area of Conservation, a Special Area of Conservation, a Candidate Special Protection Area, and a Special Protection Area.
Fauna	All animal life occurring in the area
FDI	Foreign Direct Investment
Flora	All plant life occurring in the area
Franklin tip	Lightning rod
FRR	Final Re-evaluation Report
GAA	Gaelic Athletic Association
GDA	Greater Dublin Area (including County Meath)
GDSDS	*Greater Dublin Strategic Drainage Study*
Geo-directory Data	Dataset which provides spatial and attribute information of the location of all buildings in Ireland.

Term	Explanation
GHz	Gigahertz
GIL	Gas Insulated Transmission Lines
GIS	Gas Insulated Switchgear
GIS	Geographic Information System: A geographic information system which captures, stores, analyses, manages, and presents data that is linked to location.
GPS	Global Positioning System
Grid	A meshed network of high voltage lines, cables and substation nodes (400 kV, 220 kV and 110 kV) for the transmission of bulk electricity supplies around Ireland. The grid, electricity transmission network, and transmission system are used interchangeably in application documents.
GSI	Geological Survey of Ireland
Guarding Positions	Where a conductor is to be strung over roads, and possibly river locations, protection will be erected prior to the commencement of stringing locations. These ‗guarding' positions and the protection will be in the form of guard poles, scaffolding or a telescopic handler.
GWDTE	Groundwater Dependent Terrestrial Ecosystem
ha	Hectares (100m x 100m)
Habitat	A habitat is an ecological or environmental area that is inhabited by a particular animal and plant species. It is the natural environment in which an organism lives, or the physical environment that surrounds (influences and it utilised by) a species.
Habitats Directive	Council Directive 92/43/EC of 21 May 1992 on the conservation of natural habitats and wild fauna and flora.
HCN	Health Council of the Netherlands
HGV	Heavy Goods Vehicle
HPA	Health Protection Agency
HSA	Health & Safety Authority
HV	High Voltage, in this EIS means greater than 110kV
HVAC	High Voltage Alternating Current

Term	Explanation
HVDC	High Voltage Direct Current
Hz	Hertz, unit of frequency
IAA	Irish Aviation Authority
IARC	International Agency for Research on Cancer
ICD	Implantable Cardioverter Defibrillators
ICES	International Committee on Electromagnetic Safety
ICHEC	Irish Centre for High Engineering Computing
ICNIRP	International Commission on Non-Ionising Radiation Protection
IEC	International Expert Commission
IEEE	Institute of Electrical and Electronics Engineers
IEEM	Institute of Environmental & Ecological Management
IFA	Irish Farmers Association
IFC	Irish Folklore Commission
IFI	Inland Fisheries Ireland
IGH	Irish Geological Heritage
IGI	Institute of Geologists of Ireland
INP	Inertial Navigation System
IP	Implementation Programme
IPC	Infrastructure Planning Commission
IPPC	Irish Governmental Panel on Climate Change
ISLES	Irish-Scottish Links on Energy Study
ISO	International Organisation for Standardisation
I-WEBS	Irish Wetland Bird Survey
kHz	Kilohertz (one thousand hertz)
km	Kilometre (one thousand metres)
kV	Kilovolt (One thousand volts)
kV/m	Kilovolts Per Meter
LCA	Landscape Character Area

Term	Explanation
LCA	Landscape Character Assessment
LCC	Line Commutated Converters
LiDAR	Light Detection and Ranging: LiDAR is a remote sensing technology that uses laser scanning to collect height and elevation data.
Line Design	Location and design of transmission infrastructure (e.g. tower positions and types)
LV	Low Voltage, less than 1000 volts
L_{Aeq}	The A-weighted equivalent continuous steady sound level during the measurement period and effectively represents an average ambient noise value.
L_{Amax}	The maximum A-weighted sound level measured during the measurement period.
L_{Amin}	The minimum A-weighted sound level measured during the measurement period.
L_{A10}	The A-weighted sound level that is exceeded for 10% of the measurement period and is used to quantify road traffic noise.
L_{A50}	The A-weighted sound level that is exceeded for 50% of the measurement period and in this evaluation is used to quantify noise from overhead power lines.
L_{A90}	The A-weighted sound level that is exceeded for 90% of the measurement period and is used to quantify background noise level.
m	Metre
mbgl	Metres below ground level
mG	Milligauss, Gauss is the unit of measurement for magnetic field typically in use in North America. The corresponding unit of measurement used in Europe is tesla (T). One gauss is equal to 100 microtersla (μT).
MHz	Megahertz (one million hertz)
MLCA	Meath Landscape Character Assessment
MLCA	Monaghan Landscape Character Assessment
MPE	Maximum Permissible Exposures

Term	Explanation
MSA	Meath Study Area
MVA	Megavolt-Amperes
MW	Megawatt (One million Watts)
Natura 2000	Natura 2000 sites are part of a coherent European ecological network of special areas of conservation designated under Article 3 of the Habitats Directive (92/43/EEC) and includes Special Areas of Conservation (SAC) and Special Protection Areas (SPA).
NBDC	National Biodiversity Data Centre
NEEAP	National Energy Efficiency Action Plan
NGR	National Grid Reference
NH_3	Ammonia
Natural Habitat	Natural Habitats are terrestrial or aquatic areas distinguished by geographic, abiotic (i.e. inanimate) and biotic features, whether entirely natural or semi-natural.
Nature Reserves	Nature reserves are chosen from among the very best examples of our wildlife, habitats and geology. They contain a wide range of species, communities and geology their recognition by Ministerial order designation is a public recognition by the State Government of their importance.
NEPP	North East Pylon Pressure
NESA	North East Study Area
NGR	National Grid Reference
NHA	Natural Heritage Area: Natural Heritage Areas are designated by Ministerial order and include sites that may be significant in biological terms for species, communities and habitats or of interest for landforms, geological or geomorphological features or for their diversity of natural attributes. In Ireland the basic designation for wildlife is the Natural Heritage Area (NHA). This is an area considered important for the habitats present or which holds species of plants and animals whose habitat needs protection.
NHA	Natural Heritage Area
NI	Northern Ireland
NIAH	National Inventory of Architectural Heritage

Term	Explanation
NIAUR	Northern Ireland Authority for Utility Regulation
NIE	Northern Ireland Electricity
NIEA	Northern Ireland Environment Agency
NIS	Natura Impact Statement: Natura Impact Statement means a statement, for the purposes of Article 6 of the Habitats Directive, of the implications of a proposed development, on its own or in combination with other plans or projects, for one or more than one European site, in view of the conservation objectives of the site or sites. It is the output from the Appropriate Assessment process, required under the EU Habitats Directive 92/43/EEC.
NISRA	Northern Ireland Statistics & Research Agency
NITB	Northern Ireland Tourism Board
NMI	National Museum of Ireland
NMA	National Monuments Act
NMI	National Museum of Ireland
NMS	National Monuments Service
NNA	National Normative Aspects
NOx	Nitrous Oxide
NPWS	National Parks and Wildlife Service: The NPWS is part of the Department of Arts, Heritage and Gaeltacht and is charged with the conservation of a range of habitats and species in Ireland.
NRA	National Roads Authority
NREAP	National Renewable Energy Action Plan
NRPB	National Radiological Protection Board of Great Britain
NSL	Noise Survey Level
N-S Link	North-South Link
NTC	Net Transfer Capacity
NUI	National University of Ireland
NYPSC	New York Public Service Commission
OHL	Overhead Line

Term	Explanation
OPGW	Earth / ground wire or shield wire with embedded optical fibres
OPW	Office of Public Works
OSI	Ordnance Survey of Ireland
PAC	Planning Appeals Commission
PAH	Polycyclic Aromatic Hydrocarbons
PLS-CADD	Specialised computer aided design programme used for full 3-D design of overhead lines.
PM_5	Particulate Matter 5
PM_{10}	Particulate Matter 10
pNHA	Proposed Natural Heritage Area
Power Flow	The flow of ‗active' power is measured in Megawatts (MW). When combined with the flow of ‗reactive power', which is measured in Mvar, the resultant overall power flow is measured in MegaVolt-Amperes (MVA).
PPP	Public-Private Partnership
PRR	Preliminary Re-evaluation Report
PPSR	Preferred Project Solution Report
PPV	Peak Particle Velocity
Ramsar Convention/Site	The Convention on Wetlands, signed in Ramsar, Iran, in 1971, is an intergovernmental treaty which provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources. The list of Ramsar sites in Ireland includes wetlands that are considered to be of international importance under the Ramsar Convention.
Raster	A data structure representing a generally rectangular grid of pixels, or points of colour, viewable via a monitor, paper, or other display medium.
RBD	River Basin District - Administrative area for coordinated water management, composed of multiple river basins (or catchments), designated pursuant to the requirements of the Water Framework Directive.
Receptor	Any element of the environment which is subject to impact.
RES	Renewable Energy Sources
RFC	Ration to Flow Capacity Value

Term	Explanation
RMP	Record of Monuments and Places
RPA	Registered Protected Areas
RPS	Record of Protected Structures
RSA	Road Safety Authority
SAC	Special Areas of Conservation: SACs are sites that have been designated by the Minister as a special area of conservation pursuant to Article 4, paragraph 4 of the European Habitats Directive (92/43/EEC). They have been designated because of a possible threat to the special habitats or species which they contain.
SCENIHR	Scientific Committee on Emerging and Newly Identified Health Risks
SEA	Strategic Environmental Assessment: Requirement for assessment of Plans the effects of certain Plans and Programmes on the environment (pursuant to the EU SEA Directive 2001/42/EC).
SEAI	Sustainable Energy Authority of Ireland
SEM	Single Electricity Market
SEMO	Single Electricity Market Operator
Sensitivity	The potential of a receptor to be significantly changed
SIA	Strategic Infrastructure Act
SID	Strategic Infrastructure Development: Section 182A of the *Planning and Development Act 2000* (as amended) defines strategic infrastructure development to include development comprising, or for the purposes of electricity transmission, including the transport of electricity by means of a high voltage line where the voltage would be 110 kilovolts or more, or an interconnector, requiring direct application for statutory approval to An Bord Pleanála.
SMR	Sites and Monuments Record (predecessor of RMP)
SO_2	Sulphur Dioxide
SONI	System Operator of Northern Ireland
SPA	Special Protection Area
SPS	Single Payment Scheme

Term	Explanation
SSM	Swedish Radiation Protection Authority
Stringing	The term used to describe the installation of electricity conductors or wires on the overhead line support structures. The conductors are ‗strung‘ from one structure to the next.
Substation	A substation is the location on the grid where equipment is placed in order to safely change the electricity from higher transmission voltages to lower voltages that are appropriate for use by end-customers. It does this by using equipment known as transformers. They ‗transform‘ the electricity from one voltage to another and they represent the means through which electricity is drawn from the transmission system. A substation also acts as a point of common connection of a ‗node‘ for several circuits. It is helpful to think of them like an intersection on a road network. Power comes in on one circuit (road) and can be redirected onto another circuit. This is achieved by using other equipment in the substation such as switches, circuit breakers and other apparatus.
SuDS	Sustainable Urban Drainage System
SUR	Standardised Unemployment Rate
SV	Scenic View
SVC	Static Var Compensator
Switchgear	A combination of electrical disconnects and / or circuit breakers used to isolate equipment in or near an electrical substation.
SWDTE	Surface Water Dependent Terrestrial Ecosystem
TAO	Transmission System Owner: The owner of the assets that form the transmission system.
TCD	Trinity College Dublin
TCS	Tourism Content System
TEPCO	Tokyo Electric Power Company of Japan
TOC	Table of Contents
Transformer	An item of equipment connecting other electrical equipment at two different nominal voltages.
Transposition	Describes the changing of the spatial arrangement of the conductors on a transmission line relative to each other for the purpose of improving the operating performance of the transmission line.

Term	Explanation
TRL	Transport Research Laboratory
TRM	Transmission Reliability Margin
TSO	Transmission System Operator
TTC	Total Transfer Capacity
TYNDP	Ten Year Network Development Plan
μT	Microtesla – where tesla (T) is the unit of measurement for magnetic field strength and 1T is equal to 1,000,000μT.
UAA	Utilisable Agricultural Areas
UCC	University College Cork
UCD	University College Dublin
UGC	Underground Cable
UK	United Kingdom
UNESCO	United Nations Educational Scientific and Cultural Organisation
VEM	Visual Envelope Map
VOM	Volatile Organic Map
V/m	Volt Per Meter
VSC	Voltage Sourced Converter
WFD	Water Framework Directive (2000/60/EEC): Water Framework Directive (WFD) is European legislation that promotes a new approach to water management through river basin planning. It covers inland surface waters, estuarine waters, coastal waters and groundwater.
WHO	World Health Organisation
Working Swathe	Working area required to install transmission lines particularly for underground construction methodologies.
WWTP	Waste Water Treatment Plant
XLPE	Cross Linked Polyethylene
ZTV	Zone of Theoretical Visibility
ZVI	Zone of Visual Influence

1 INTRODUCTION

1.1 INTRODUCTION

1 This volume (**Volume 3D**) of the Environmental Impact Statement (EIS) provides an evaluation of the potential for environmental impacts arising from the proposed North-South 400 kV Interconnection Development for the section of the proposed development which is located in the Meath Study Area (MSA) as defined in Chapter 5, **Volume 3B** of the EIS. The contents of this volume are supported by two separate volumes: **Volume 3D Appendices** of the EIS and **Volume 3D Figures** of the EIS.

2 The proposed development in the MSA comprises a new single circuit 400 kV overhead transmission circuit supported by 165 new towers (Tower 237 to Tower 401) extending for a distance of approximately 54.5km from Tower 237 in the townland of Clonturkan, County Cavan to Tower 402 (an existing double circuit tower on the Oldstreet to Woodland 400 kV transmission line) in the townland of Bogganstown (ED Culmullin), County Meath. It also includes the addition of a new 400 kV circuit for some 2.85km along the currently unused (northern) side of the existing double circuit 400 kV overhead transmission line (the Oldstreet to Woodland 400 kV transmission line) extending eastwards from Tower 402 in the townland of Bogganstown (ED Culmullin), County Meath to Tower 410 and to the Woodland Substation in the townland of Woodland, County Meath. It also includes an extension to and works within the existing ESB Woodland Substation, in the townland of Woodland, County Meath. The MSA section of the transmission circuit is illustrated in **Figure 1.1**.

3 The portion of the overall proposed interconnector occurring within Ireland runs a linear distance of approximately 103.5 kilometres (kms) between Lemgare in County Monaghan and Woodland in County Meath. However, for the purposes of presenting the information in the EIS, it has been subdivided into the Cavan Monaghan Study Area (CMSA) (**Volume 3C**) and the MSA (**Volume 3D**).

4 Chapter 1, **Volume 3B** of the EIS provides a comprehensive introduction to the proposed development which considers the following:

- Context of the proposed development;
- Requirements for Environmental Impact Assessment (EIA);
- Preparation of the Environmental Impact Statement (EIS);
- Structure and content of the EIS; and
- Technical difficulties encountered during preparation of the EIS.

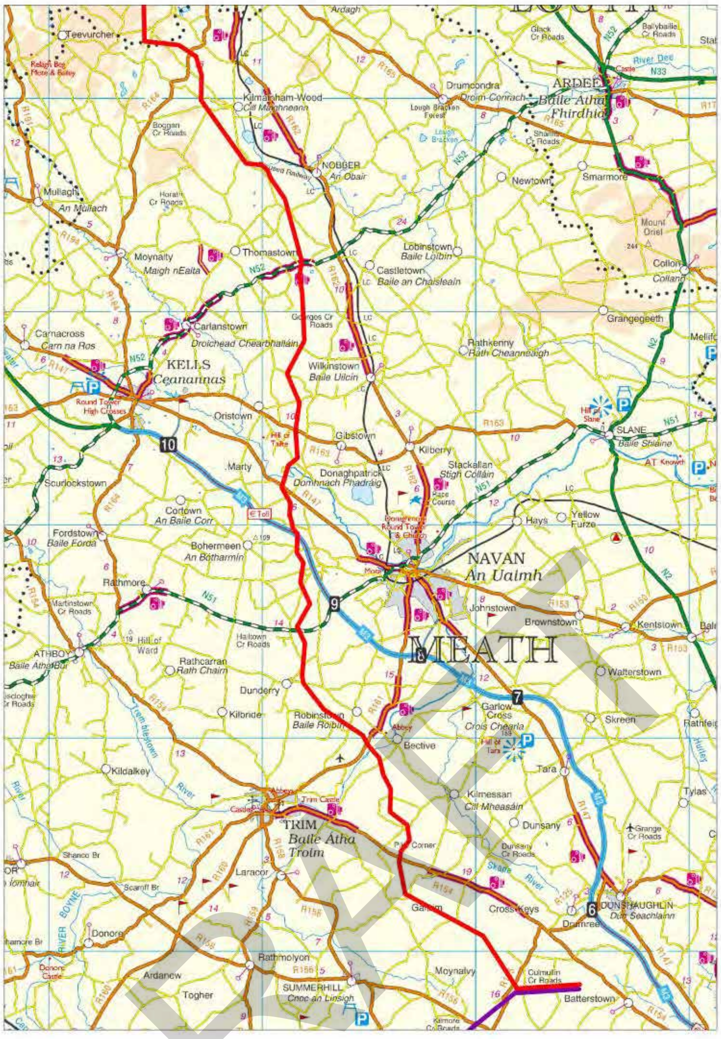

Figure 1.1: MSA Section of Transmission Circuit

5 This volume of the EIS provides the following:

- A description of the potential effects of the proposed development on the environment in relation to specific environmental headings;
- A description of the data required to identify and the forecasting methods used to evaluate the potential effects in relation to the environmental headings;
- A description of the measures envisaged to avoid, reduce and, where possible, remedy significant adverse effects on the environment;
- A description of the residual impacts, if any; and
- A description of the interrelationships between environmental factors.

6 **Volume 3B** of the EIS provides an evaluation of the potential for transboundary impacts. It also provides an evaluation of the potential for cumulative impacts as well as an evaluation of the interrelationships between the environmental topics in **Volumes 3C** and **3D** of the EIS.

7 A non-technical summary of the EIS is provided in **Volume 3A** of the EIS.

8 In addition to the consideration of transboundary effects in **Volume 3B** of the EIS, **Volume 4** of the application documentation comprises a *Joint Environmental Report*. This report has been prepared by EirGrid and System Operator Northern Ireland Ltd (SONI) (the respective applicants)[1] to provide an overview of the impacts as presented in the separate EIS / Environmental Statement (ES) documents. The report also provides an overview of transboundary impacts in a manner consistent with a suggested approach of recent European Commission guidance, *Guidance on the Application of the Environmental Impact Assessment Procedure for Large-scale Transboundary Projects* (May 2013).

1.2 EIS FORMAT

9 This volume of the EIS follows a grouped format structure. Using this structure, this volume of the EIS is prepared in a framework which examines each environmental topic (as prescribed by the EIA Directive and Irish national regulations) in a separate section. These sections include reference to:

- The characteristics of the proposed development;
- The existing (receiving) environment;
- Potential impacts;
- Mitigation measures;
- Residual impacts (where applicable);
- Interrelationships between environmental factors; and
- Conclusions.

[1] The planning of that portion of the proposed interconnector within Northern Ireland was originally undertaken by Northern Ireland Electricity (NIE). However, NIE was obligated by the European Commission to transfer its investment planning function (the ―Planning Function”) to SONI. The SONI transmission system operator licence (the ―Licence”) was amended on 28th March 2014 to take account of the transfer of the Planning Function following a consultation process by the Northern Ireland Authority for Utility Regulation (NIAUR). The Licence amendments took effect on 30th April 2014. Accordingly, responsibility for the pursuance of the planning application in respect of the proposed interconnector within Northern Ireland has been transferred from NIE to SONI.

2 HUMAN BEINGS – POPULATION & ECONOMIC

2.1 INTRODUCTION

1 This chapter of the Environmental Impact Statement (EIS) presents an evaluation of the proposed development as set out in Chapter 6, **Volume 3B** of the EIS in relation to population and socio-economic issues. The information contained within this chapter relates to the Meath Study Area (MSA) as described in Chapter 5, **Volume 3B** of the EIS.

2 Chapter 6, **Volume 3B** of the EIS describes the full nature and extent of the proposed development, including elements of the overhead line (OHL) design and the towers as well as works to the existing Woodland Substation. It provides a factual description, on a section by section basis, of the entire line route. The proposed line route is described in that chapter using townlands and tower numbers as a reference. The principal construction works proposed as part of the development are set out in Chapter 7, **Volume 3B** of the EIS.

2.2 METHODOLOGY

2.2.1 Scope of the Evaluation

3 This section of the EIS has been prepared in accordance with relevant EU and Irish legislation and guidance, including the requirements of Annex IV of the EIA Directive (which requires a description of the aspects of the environment likely to be significantly affected, including population) and in accordance with Schedule 6 of the *Planning and Development Regulations, 2001* (as amended) and conforms to the relevant requirements as specified therein. The scope of the evaluation is based on a review of legislation, guidance documents, other EISs, feedback from public consultation, consultation with prescribed bodies, consultation with An Bord Pleanála (the Board) and on a consideration of the likelihood for significant impacts arising, having regard to the nature of the receiving environment and the nature and extent of the proposed development.

4 The scoping opinion received from the Board (Refer to Appendix 1.3, **Volume 3B Appendices** of the EIS) identified the following issues as being relevant to this chapter of the EIS:

- The identification of potential impacts on settlement patterns along the route, including the identification of existing dwellings, community facilities or other public buildings such as schools, healthcare facilities, etc. and any extant planning permissions for such development;

- An assessment of the likely impacts on the linguistic or cultural heritage of the Gaeltacht area through which the route passes, or on the promotion of Irish as the community language;

- Any implications for, or impacts on, the local regional or national economy;

- An assessment of the likely effects on the amenity / tourism value of the area, including designated tourist routes (e.g. the Monaghan Way) and possible impacts on fishing and fisheries tourism; and

- Address impacts on the potential future use of disused railways.

5 Therefore, this chapter concentrates on the population aspects of the existing environment and the potential for impacts on population, settlement, employment and economic opportunities as a result of the proposed development in the MSA.

6 An evaluation of tourism and amenity issues in the MSA is described in **Chapter 4** of this volume of the EIS.

7 Indirect impacts to employment locations may occur during the construction phase arising mainly from temporary traffic disruptions. These impacts have been considered and mitigation measures, where required, are outlined in **Chapter 13**, of this volume of the EIS. Impacts from maintenance traffic during operation will be negligible and further consideration of these impacts with regard to employment locations has therefore been scoped out of this evaluation.

8 The evaluation primarily concentrates on the preferred corridor as identified in the *Final Re-evaluation Report (FRR) (April 2013)* (Refer to Appendix 1.1, **Volume 3B Appendices** of the EIS) within which the proposed overhead line (OHL) is situated but does take account of the wider socio-economic environment outside of this corridor.

2.2.2 Information Sources

9 The information sources used to prepare this chapter include the following:

- Census and employment information published by the Central Statistics Office (CSO) 2002 - 2014;

- Census information published by the Northern Ireland Statistics and Research Agency (NISRA) 2002 - 2014;

- Ordnance Survey Ireland (OSI) mapping and aerial photography;

- National and Regional Development Plans;
- *Meath County Development Plan 2013 -2019*;
- Local information and relevant websites (e.g. Meath County Council, Greater Dublin Regional Authority, OSI);
- Information provided as a result of project consultation and scoping; and
- Site visits to the MSA.

2.3 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

10 The proposed development primarily involves the erection of an overhead electricity line on lattice steel support structures. The types of issues which OHL developments of this nature typically raise in relation to this environmental topic include the potential for impacts on population, settlement, employment and economic opportunities. In that regard, the evaluation considers the construction, operational and decommissioning aspects of the proposed development.

2.4 EXISTING ENVIRONMENT

2.4.1 Population

2.4.1.1 Population Structure and Change

11 In terms of the county, region and the state, population structure and change is more strongly influenced by migration and emigration rates than by birth and death rates. The mid to late 1980s in Ireland was a period of heavy population outflow, mainly due to the poor economic and employment situation in the country at that time. Since 1990 there has been significant migration into the country with resulting population growth, mainly due to the improved economic performance of the Irish economy. **Table 2.1** provides an analysis of population change for the island of Ireland and at national, regional and local levels since 2002.

Table 2.1: Population Structure and Change at National, Regional and Local Level

Area	2002	2006	% Change 2002 -2006	2011	% Change 2006-2011
Ireland (incl. NI)	5,603,030	5,984,925	6.8	6,399,152	6.9
Ireland	3,917,203	4,239,848	8.2	4,588,252	8.2
GDA Region[2]	1,535,446	1,662,536	8.2	1,804,156	8.5
County Meath	134,005	162,831	21.5	184,135	13.1

(Source: Census of Population Ireland, 2002, 2006, 2011 and NI Census 2001 and 2011)

12 The population statistics in **Table 2.1** show significant increases in population between 2002 and 2011. The most recent population estimates (April 2014) published by the CSO[3] and the NISRA indicate that despite continuing high levels of emigration, population is still increasing in both Ireland and Northern Ireland, although at a lower rate than previously. Population projections for Ireland up to 2046 anticipate a population of approximately five million under the most pessimistic scenario and over 6.7 million under the most optimistic scenario. Population projections for Northern Ireland up to 2034 anticipate a population of approximately two million[4].

13 As detailed in **Table 2.1**, the Greater Dublin Area (which includes Dublin City and the administrative areas of Fingal, South Dublin and Dun Laoghaire-Rathdown as well as counties Meath, Wicklow and Kildare) shows significant population growth between 2002 and 2011 which is in excess of population growth at national levels. Significant population pressures have been exerted on certain parts of the GDA particularly those areas which are within close commuting distance of Dublin; this includes large areas of east and south Meath. In the case of the GDA, population levels specified in the *Greater Dublin Regional Planning Guidelines 2010 – 2022* are projected to be in excess of 2 million by the year 2022.

14 County Meath has experienced significant population growth over the last fifteen years, with the population increasing from 109,732 in 1996 to 184,135 in 2011. This equates to an increase of 68%. Within the GDA, Meath experienced the second greatest rate of population increase between 2002 and 2011 at 37%.

[2] County Meath lies with in the Mid East Region. For regional planning purpose the Mid East Region is combined with Dublin City and County in the *Regional Planning Guidelines for the Greater Dublin Area 2010–2022*. Population statistics are therefore stated for the GDA.

[3]www.cso.ie/en/media/csoie/releasespublications/documents/population/2013/poplabfor2016_2046.pdf.

[4]www.nisra.gov.uk/archive/demography/population/projections/Northern%20Ireland%20Population%20Projections%202010%20-%20Statistics%20Press%20Notice.pdf.

15 Within County Meath an analysis of the population data indicates that population trends are as follows:

- Substantial growth has occurred in eastern and southern towns which are located on high quality public transport corridors linked to Dublin;
- The population of Meath is relatively young compared to the national average with a significant number of people in the 30–44 age cohort;
- Population growth has occurred in rural areas with a significant increase in rural dwellings; and
- Rural areas in the north and west of the county have limited or negative population growth.

The trends reflect trends being experienced in counties surrounding Dublin City and County.

16 The *Meath County Development Plan 2013–2019* (the Meath CDP) forecasts a population increase for County Meath to 210,000 by 2022.

17 It is evident from population statistics published by the CSO that County Meath has experienced significant population growth since 2002, and are forecasting further but more limited growth up to 2022. It is also evident that significant growth has taken place in rural areas outside the main settlements.

2.4.1.2 Settlement Patterns

18 Navan and Drogheda Environs are the largest urban settlements in the county; however Drogheda Environs lies outside the immediate vicinity of the MSA where the proposed development is located.

19 Of most relevance to the proposed development are the population numbers and structure relating to settlements in County Meath in the vicinity of the proposed development. The main urban settlements that lie within the local and wider vicinities of the proposed development are profiled below. Urban settlements generally include a range of residential, commercial and community facilities. Smaller villages typically include a school, church, local shops as well as other community and recreational facilities.

20 As significant population growth has also occurred outside the main urban areas a number of smaller settlements are also identified.

21 Outside of identified settlements, it is recognised that other more dispersed settlements, often comprising of groups of individual dwellings (termed Graigs in the Meath CDP) occur frequently in the vicinity of the proposed development.

22 Single (one-off) dwellings, outside groups of dwellings, are also a significant feature of settlement patterns in County Meath. These are both dispersed, and in clustered or linear patterns, throughout the receiving environment of the proposed development.

Navan (town centre located approximately 5km from the line route)

23 Navan town centre is located approximately 5km from the line route and its outskirts are some 2.8km from the line route. Navan is bypassed to the west by the M3 Motorway, with the proposed development located further west of the M3. Navan is identified as a large growth town in the Meath CDP. It has grown significantly over each census with unprecedented growth between 2002 and 2011 which was amongst the highest experienced by any urban centre in the country. The population of Navan and Environs increased by almost 15% between Census 2006 and 2011, to its current population of 28,559. It is planned that Navan will grow in the longer term (2022) to a population of 50,000 persons.

24 Outside of the town, there is a much larger population of approximately 16,000 persons living in the surrounding Navan Rural Electoral Division (NRED). The NRED includes the District Electoral Divisions (DEDs) of; Ardbraccan, Ardmulchan, Bective, Castletown, Donaghpatrick, Kentstown, Navan Rural (part), Painestown, Rathkenny, Slane, Stackallen and Tara. Navan as a large growth town is planning to accommodate significant new investment in transport, in economic and commercial activity and in housing. It is intended that Navan will act as an important self-sustaining regional economic driver for the GDA, capitalising on its international connectivity and high quality connections to Dublin City, whilst also supporting and servicing a wider local economy.

25 Of the DEDs referred to above, the line route passes through the DEDs of; Bective, Castletown and Donaghpatrick.

Dunshaughlin (town centre located approximately 6.4 km from the line route)

26 The town centre of Dunshaughlin is located approximately 6.4km from the line route with its outskirts located approximately 5.6km from the line route. Dunshaughlin is bypassed to the west by the M3 Motorway, with the proposed development located further west of the M3. Dunshaughlin is identified as a moderate sustainable growth town in the Meath CDP. Dunshaughlin is approximately 12km from Dunboyne to the south and approximately 20km from Navan to the north. In CSO data for 2011, the population of Dunshaughlin Town was recorded at 3,908, an increase of 15% on the 2006 figure. Outside of the town there is a much larger

population of approximately 44,300 additional people living in the surrounding Dunshaughlin Rural Electoral Division (DRED). The DRED includes the DEDs of; Culmullin, Donaghmore, Dunboyne, Kilbrew, Killeen, Kilmessan, Kilmore, Rathfeigh, Rathoath, Rodanstown and Skreen.

27 Dunshaughlin as a moderate sustainable growth town is planning to develop in a self-sufficient manner and levels of growth will be balanced to ensure that any increase in population will be in tandem with employment opportunities. The town needs to provide a full range of services adequate to meet local needs, both within the town and in the surrounding rural catchment area, but should not generate long distance travel patterns.

28 Of the DEDs referred to above, the line route passes through the DEDs of; Culmullin and Kilmessan.

Trim (town centre located approximately 5.5km from the line route)

29 Trim is also identified as a moderate growth town in the Meath CDP. The town centre of Trim is approximately 5.5km to the line route and its outskirts are approximately 3.8km to the line route. Trim town is located 14.5km south-west of Navan. It is one of the largest urban centres serving the southwest of the county. Trim is a main service centre, providing for the town's population and a large hinterland. Trim experienced steady growth at each census from 1961 to 2006. In CSO data for 2011, the population of Trim was recorded at 1,441, an increase of almost 5% on the 2006 figure. Outside of the town there is a much larger population of approximately 31,000 additional people living in the surrounding Trim Rural Electoral Division (TRED) - the TRED includes the DEDs of; Ardnamullan, Baile Atha Bui, Ballyboggan, Ballyconnell, Castlejordan, Castlerickard, Cloghbrack, Clonmacduff, Gallow, Galtrim, Grennanstown, Hill of Down, Innfield, Cill Bride, Kilcooly, Kildalky, Killaconnigan, Killyon, Laracor, Rahinstown, Rathmoylan, An RathMhor and Summerhill.

30 Of the DEDs referred to above, the line route passes through the DEDs of Galtrim and Kilcooly.

Nobber (located approximately 1.7km from the line route)

31 Nobber is identified as a key village in the Meath CDP. Nobber is located along the R162 Regional Route, from Navan to Kingscourt in County Cavan. In CSO data for 2011, the population of Nobber was recorded at 357, an increase of almost 53% on the 2006 figure. The population of Nobber DED, which includes the village, was recorded at 748 in the 2011 census. Key villages tend to be located more remotely from major towns or centres and play a key local role for services for the local rural and adjoining village populations. In effect, they operate as rural service centres; a vital role to sustain rural communities.

Summerhill (located approximately 4.3km from the line route)

32 Summerhill is similarly identified as a key village in the Meath CDP. Summerhill is situated in the south western part of County Meath, approximately 40km from Dublin, 11km from Trim and 29km from Navan. In CSO data for 2011, the population of Summerhill was recorded at 832, an increase of 4% on the 2006 figure. The population of Summerhill DED, which includes the town, was recorded at 1,299 in the 2011 census.

Kilmainhamwood (located approximately 650m from the line route)

33 Kilmainhamwood is similarly identified as a key village in the Meath CDP. Kilmainhamwood is located in the northern part of County Meath, 16km from Kells, 7km from Kingscourt and 6km from Nobber. In CSO data for 2011, the population of Kilmainhamwood DED was recorded at 761, an increase of 2.7% on the 2006 figure.

Kilmessan (located approximately 2.5km from the line route)

34 Kilmessan is similarly identified as a key village in the Meath CDP. Kilmessan is located approximately 13km from Navan and 10km from Trim and Dunshaughlin. In CSO data for 2011, the population of Kilmessan DED was recorded at 1,388, an increase of 19% on the 2006 figure.

Gaeltacht Area (OHL passes through this area)

35 The Meath Gaeltacht is the smallest Gaeltacht area in Ireland and consists of two adjacent villages of Ráth Chairn and Bhaile Ghib with a population recorded in Census 2011 of 1,771 which represents 1.7% of total Gaeltacht population in Ireland. As illustrated in **Figure 2.1**, it encompasses a geographical area of 44km^2, which represents 1% of total Gaeltacht land area (www.udaras.ie).

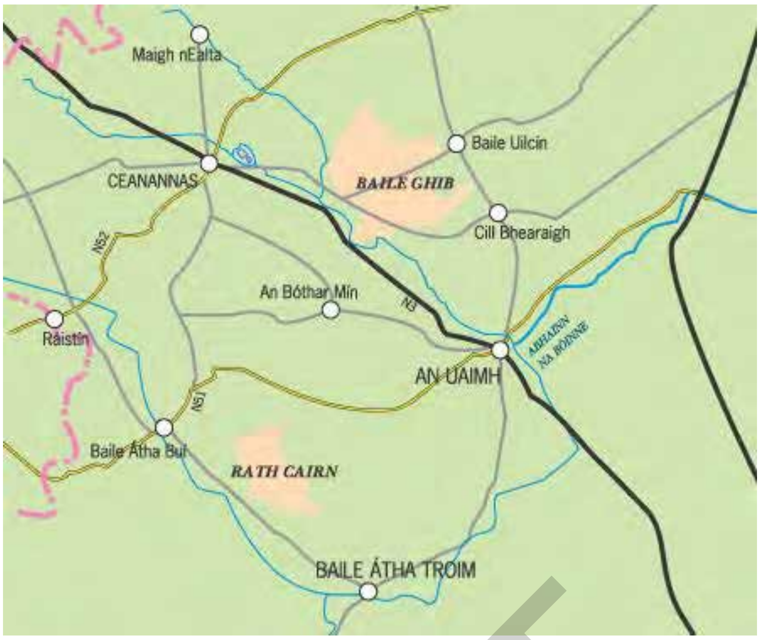

Figure 2.1: Map of Meath Gaeltacht

(Source: www.udaras.ie)

36 The Gaeltacht of Meath has a slightly different history than that of the country's other Irish speaking regions. The two Gaeltachtaí of Bhaile Ghib and Ráth Chairn are resettled communities, where the Irish government of the 1930s redistributed the estates of absentee landlords as small farm holdings to poor farmers from the Gaeltacht areas of Connemara, Mayo and Kerry. When the Irish farmers returned to the land in Meath, they brought with them their native language and culture which today is found the small Gaeltacht of Bhaile Ghib and Rath Cairn. In 2011 there were 190 people employed in a full-time capacity in Údarás na Gaeltachta client-companies in the Meath Gaeltacht.

37 It is a policy of the Meath CDP to ensure that all new developments in the Gaeltachtaí have a positive impact upon the use of Irish in the area. The OHL runs through the Meath Gaeltacht close to Bhaile Ghib.

38 Údarás na Gaeltachta did not make a submission in relation the scoping of the EIS by An Bord Pleanála. The proposed development is a linear development which will pass through a small area of the Gaeltacht. It is not a type of development which has the characteristics to adversely impact on the linguistic or cultural heritage of the area through which it passes or on the promotion of Irish as the community language.

Other Settlements and District Electoral Divisions (DED)

39 The Meath CDP contains a further settlement tier and these are called Graigs or rural clusters. Graigs located within 5km of the proposed OHL include; Robinstown, Dunderry, Bohermeen, Oristown, Wilkinstown, Castletown, Drumree, Dunsany, Cortown, Teervurcher and Batterstown.

40 Graigs are the smallest type of settlement identified in the Meath CDP. The character of these settlement areas mirror the rural countryside but have scattered individual houses, with some clustering around one or more focal points. Focal points may include existing development around a cross roads, a shop, church and a post office. Post offices and schools are provided in some of these centres and the centres serve an important community purpose.

41 Outside of Graigs, single (one-off) dwellings are also a feature of settlement patterns in County Meath.

42 In considering individual dwellings one of the design criteria for routing transmission infrastructure is to seek to maximise the distance from the OHL to such dwellings in so far as is practicable. An analysis of the dwellings along the route of the proposed OHL shows that, notwithstanding the extent of existing scattered one-off housing within the area of the proposed development, there are 23 dwellings within 100 metres (m) of the centre of the proposed MSA line route (not including the existing double circuit line). The location of these dwellings is shown on the planning drawings included in **Volume 1B** of the planning application documentation.

43 Community facilities, such as schools, churches and sports clubs, where large numbers of people frequently visit, are often found outside of the smaller settlements referred to previously. Similarly to dwellings, an additional design criterion seeks to maximise the distance to such facilities. In this regard the nearest community facilities which are located within 1km of the OHL are; Oristown Church (approximately 150m west of Towers 302 and 303) and Robinstown National School (approximately 570m north-east of Tower 349).

44 Other sections of this volume of the EIS evaluate the potential for specific environmental impacts on dwellings and community facilities arising from the construction and operation of the proposed OHL.

Conclusions

45 An increase in population has been experienced at a national and local level and in the towns and villages listed in this section. The predominance of scattered and clustered one-off housing in the MSA has ultimately influenced the positioning of the line, due to the aim of maximising separation distance between the proposed line and existing houses.

2.4.2 Employment and Economic Activity

2.4.2.1 Employment Profile

46 The economic base in County Meath is relatively diverse. While employment and economic activity is dispersed throughout County Meath, it is concentrated in the main primary and secondary economic growth towns of Navan, Drogheda, Ashbourne, Dunboyne, Kells and Trim. A significant proportion of the population commutes for work to areas outside the county. The economic strategy of the Meath CDP indicates that this strategy seeks to focus investment in Navan as the primary centre of economic development and employment in the county. This will rebalance the provision of jobs so that residents of Navan have access to opportunities for employment within easy distance from their homes, thereby reducing levels of commuting in the area as a whole. The strategy will ensure that the primacy of Navan is recognised, protected and promoted whilst ensuring that over time, a number of other major supporting employment centres are developed which provide balance to the location of employment opportunities across the county.

47 Within the primary and secondary economic growth towns, there are a number of key strategic, integrated and specialised employment centres which provide different types of functions. The main issues critical to the success of these major employment centres are continued availability of suitable land, improved public transport services to relieve congestion and reliance on the main inter urban road network and comprehensive infrastructure, to include piped water services, broadband and electrical power.

48 The economic condition of Ireland has dramatically changed in the last five years, with unemployment at its highest in for many years, but recently according to a variety of CSO economic indicators and data sources the economy is beginning to show signs of improvement. While the economic downturn has resulted in an increase in unemployment throughout the country, GDA counties, including County Meath have suffered less than more peripheral counties due to their proximity to the major employment base of Dublin. **Table 2.2** presents an economic status profile for County Meath.

Table 2.2: Persons Aged 15 Years + Classified by Principal Economic Status, 2011

	Meath		National
Economic Status	**Persons**	**%**	**%**
Pop. aged 15+	137,669	-	-
Pop. aged 15+ in Labour Force	90,634	-	-
Employed	74,342	54.0	50.1
Looking for first job	1,137	0.8	1.0
Unemployed	15,155	11.1	10.8

Student	13,775	10.0	11.3
Home duties	14,108	10.2	9.4
Retired	13,959	10.2	12.7
Unable to work	4,839	3.5	4.4
Other	354	0.2	0.4

(Source: Census 2011 Profile 3 Employment, Occupations and Industry)

49 **Table 2.2** shows that the unemployment rate for County Meath in 2011 was marginally in excess of the national average.

50 More recent CSO data in relation to unemployment rates is available from the CSO live register data which is published monthly. Live register figures, published in September 2014 by the CSO indicate that the standardised unemployment rate (SUR) in the state was 11.1% compared to 14.3% in December 2011. The downward trend in unemployment is reflected in live register data for county Meath..

2.4.2.2 Economic Activity

51 Diversity of employment and economic activity is measured by the CSO by analysing employment sectors. The diversity of employment within County Meath is illustrated in **Table 2.3.**

Table 2.3: Persons Aged 15+ Classified by Employment Sector, 2011

	Meath		National
Occupation	**Persons**	**%**	**%**
Total persons in labour force	74,342	-	-
Agriculture, forestry and fishing	3,693	5.0	5.2
Building and construction	4,670	6.1	5.0
Manufacturing and industry	7,064	9.5	10.7
Mining and quarrying	741	1.0	0.3
Wholesale and retail	11,671	15.7	14.7
Electricity, gas and water supply	977	1.3	0.7
Hotels and restaurants	3,460	4.7	5.7
Transport, storage and communications	6,958	9.4	5.4
Banking and financial services	3,944	5.3	5.2
Real estate, renting and business activities	9,003	12.1	10.2
Public service and community service	18,502	25.0	31.3
Others	3,654	4.9	5.6

(Source: Census 2011 Profile 3 Employment, Occupations and Industry)

52 A breakdown of those working within the broad employment groups, as outlined in **Table 2.3**, illustrates that although traditional sectors like agriculture, construction and manufacturing remain important, with approximately 20% of the working population being employed in these sectors they are not the dominant sectors. The service sector (including wholesale and retail, hotels and restaurants, transport, storage and communications, banking and financial services, real estate, renting and business activities and public service and community) was the most important employer accounting for over 72% of the total working population; this is similar to the national average of 72%.

53 Employment trends anticipate a continued contraction in the traditional sectors of the economy. It is therefore the aim of the *Meath Economic Development Strategy*, as outlined in the Meath CDP, to diversify and increase employment and economic activity across a wide range of sectors including high technology manufacturing and research, international and nationally traded services, ICT, office based industry, food production and processing, public administration, healthcare, banking and retail. An improved economy will assist in achieving these aims.

54 The Meath CDP reflects the need to deliver regional investment and to create jobs and growth. The plan has an objective to facilitate energy infrastructure provision, including the development of renewable energy sources at suitable locations, so as to provide for the further physical and economic development of Meath.

2.5 POTENTIAL IMPACTS

2.5.1 Do Nothing

55 Population demographics will continue to change in future years irrespective of whether this proposed development proceeds. The proposed development will have no noticeable impact on population demographics as they are influenced by wider social and economic factors.

56 In terms of employment and economic activity, in order to continue to attract future investment (both domestic and foreign) to both Ireland and Northern Ireland, it is essential that the electricity grid is maintained and improved. For example, in the *Government Policy Statement on the Strategic Importance of Transmission and Other Energy Infrastructure* published by the Department of Communications, Energy and Natural Resources (DCENR) on the 17th July, 2012 it is stated that:

> *–Our ability to rebuild the economy, deliver regional development, create jobs and growth and ensure the wellbeing of everyone as well as realising the economic potential of Ireland‟s own renewable energy resources requires significant energy infrastructure.”*

57 Doing nothing may eventually lead to a situation where an inadequate electricity grid becomes a barrier to further significant investment in employment and economic generating activities.

2.5.2 Construction Phase

58 The construction phase of the proposed development will not have any significant impacts on population demographics.

59 The construction phase within the Meath Gaeltacht is limited to a short section of OHL and it will be of short duration. It is not likely to adversely impact on the linguistic or cultural heritage of the area or on the promotion of Irish as the community language.

60 In economic terms, the capital value of the proposed interconnector is estimated to be in the region of €286million. The project will involve the provision of direct and indirect jobs both on and off site, over the construction period. Employment will be created by the construction of the proposed development. Like other major construction projects, this project will be put out for competitive tender. Therefore, it is not possible to state what volume of construction materials, services, etc. will be purchased locally. Materials such as concrete and other standard materials may be sourced locally where possible. Other more specialised electrical materials such as, steel towers, conductors, insulators and other line hardware will be sourced outside the MSA. Indirect employment and economic activity in local shops, restaurants and hotels is likely to be sustained as a result of the construction project and its employees being located in the MSA.

61 Therefore, during the construction phase of the proposed development there are likely to be some local positive economic benefits in the study area.

2.5.3 Operational Phase

62 In order to provide for future forecasted population growth on the island of Ireland, it is essential that the electricity grid is maintained and improved. When operational, the proposed development will contribute towards ensuring that the electricity grid is adequate to meet the needs of future forecast population levels throughout the island of Ireland.

63 When operational, the proposed development will contribute towards ensuring that the electricity grid is not a barrier to further significant investment in employment generating activities.

64 The proposed development is a linear development which will pass through a small area of the Meath Gaeltacht. It is not a type of development which has the characteristics to significantly adversely impact on the linguistic or cultural heritage of the Gaeltacht area through which it passes or on the promotion of Irish as the community language.

2.5.4 Decommissioning

65 The proposed development will become a permanent part of the transmission infrastructure. The expected lifespan of the development is in the region of 50 to 80 years. This will be achieved by routine maintenance and replacement of hardware as required. There are no plans for the decommissioning of the OHL. In the event that part of, or the entire proposed infrastructure is to be decommissioned, all towers, equipment and material to be decommissioned will be removed off site and the land reinstated. Impacts would be expected to be less than during the construction phase and would be of short term duration.

2.6 MITIGATION MEASURES

66 As the proposed development will have no noticeable impact on population demographics, no mitigation measures are required.

67 In terms of minimising the potential for impacts on the amenities of existing and future populations, the principal mitigation measure has been to maximise the distance between the proposed development and larger urban settlements, local villages, clustered settlements, individual one-off dwellings, schools, churches and community facilities.

68 Specific mitigation measures are included in other chapters of this EIS to mitigate potential adverse impacts which could arise during the construction and operational stage on human beings, arising from other environmental pathways.

2.7 RESIDUAL IMPACTS

69 Once the proposed development is operational, no significant residual impacts on population demographics and local economic activity are anticipated.

2.8 INTERRELATIONSHIPS BETWEEN ENVIRONMENTAL FACTORS

70 This chapter should be read in conjunction with other chapters of this volume of the EIS including; **Chapter 3** Human Beings – Land Use, **Chapter 4** Human Beings – Tourism and Amenity, **Chapter 5** Human Beings – EMF, **Chapter 9** Air – Noise and Vibration, **Chapter 10** Air – Quality and Climate, **Chapter 11** Landscape, **Chapter 12** Material Assets – General and

Chapter 13 Material Assets – Traffic, for a full understanding of the main interrelationships between these environmental topics.

71 Impacts to population are inherently interrelated to the various environmental topics evaluated in the EIS. All likely significant impacts in relation to population have been considered throughout the relevant chapters which detail the environmental topics. The main impacts on population arise from the following interrelationships:

- **Chapter 4** - Tourism and Amenity - There may be a slight reduction in tourism spend and associated economic activity in the immediate areas where the proposed development will be located.

- **Chapter 9** - Air – Noise & Vibration - There is the potential for noise impact to population in the form of impact to sensitive receptors such as private dwellings etc. in the construction phase and the operational phase. In the operational phase corona noise has the potential to cause noise impact during inclement weather conditions. These impacts are addressed in the EIS and are not deemed to be significant.

- **Chapter 11** - Landscape - There is a negative impact for dwellings that are located in close proximity to the proposed development which arises from the visual impacts.

2.9 CONCLUSIONS

72 An evaluation of the impact on community amenity has been undertaken through the identification of community facilities within 1km of the proposed development. The closest community facility is 150m from proposed development. In total there are two community facilities within the 1km corridor of the proposed development; Oristown Church and Robinstown National School. Additionally there are 23 dwellings within 100m of the centre of the proposed MSA line route (not including the existing double circuit line).

73 The likely impacts during both the construction and operational phases have been evaluated. The significance of these impacts is evaluated within the various specialist chapters of this EIS. Impacts to residential amenity are inherently interrelated to the various environmental topics evaluated in this EIS. All likely significant impacts in relation to residential amenity have been considered throughout these topics. The main impact on residential amenity which is likely to be significant arises from the visual impacts, where dwellings are located in close proximity to the proposed development. The extent and significance of such visual impacts is detailed in **Chapter 11** of this volume of the EIS.

74 It is considered that the landscape and visual resources of the wider MSA will not deteriorate to a significant degree and the overall impact upon population and residential amenity in general is therefore restricted to those receptors / areas within close proximity to the towers and OHL.

The routing of the proposed OHL is considered to present the best overall option amongst the many alternatives considered throughout the development process.

75 There will be wider economic benefits arising from the improvements to the electricity grid in the island of Ireland; these will be experienced in both jurisdictions.

3 HUMAN BEINGS – LAND USE

3.1 INTRODUCTION

1 This chapter of the Environmental Impact Statement (EIS) presents an evaluation of the proposed development as set out in Chapter 6, **Volume 3B** of this EIS, in relation to Human Beings – Land Use. The information contained within this chapter considers the land-use of the Meath Study Area (MSA) as defined in Chapter 5, **Volume 3B** of the EIS. In that regard, the evaluation considers the construction, operational and decommissioning aspects of the proposed development in the MSA.

2 This chapter sets out the methodology followed in this evaluation (refer to **Section 3.2**), describes the characteristics of the proposed development (refer to **Section 3.3**), describes the existing land use environment (refer to **Section 3.4**), evaluates potential impacts (refer to **Section 3.5**), sets out mitigation measures proposed (refer to **Section 3.6)** and describes anticipated residual impacts (refer to **Section 3.7**). Potential transboundary impacts are addressed in Chapter 9**, Volume 3B** of the EIS. Potential cumulative impacts and potential interrelationships between environmental factors are dealt with in Chapter 10, **Volume 3B** of the EIS.

3.2 METHODOLOGY

3.2.1 Scope of the Evaluation

3 The scope of the evaluation of this chapter of the EIS has been confined to agriculture, forestry and horticulture. The 2006 Corine Land Cover data indicates that within a 1km corridor of the proposed project alignment 99% of the land is classified as agricultural, 1% is classified as forestry, woodland and peatland. As detailed in **Chapter 2** of this volume of the EIS and also in Chapter 1, **Volume 3B** of the EIS, the proposed development has avoided the largest settlements in the MSA and is located in an area where the land use is primarily agricultural, with associated secondary land uses including food processing as well as rural settlements, enterprises and tourism.

4 The scoping opinion received from the Board (refer to Appendix 1.3, **Volume 3B Appendices** of the EIS) identified the following issues as being relevant to this chapter of the EIS:

- Assess the likely land use impact, including restrictions on existing uses such as agriculture or commercial forestry.

5 The following guidelines were referred to while preparing and writing this appraisal:

- Environmental Protection Agency (EPA) (2002). *Guidelines on the Information to be contained in Environmental Impact Statements;*
- EPA (2003). *Advice Notes on Current Practice (in the preparation of Environmental Impact Statements); and*
- Design Manual for Roads and Bridges (UK) *Vol 11, Section 2 part 5, Determining Significance of Environmental Effects* (2008), published by the UK Highway Authority.

3.2.2 Information Sources

6 The following data sources were used to inform the appraisal:

- Landowner interviews and discussions;
- Road side surveys in August 2011 and August - September 2013;
- Examination of aerial mapping information;
- Land Registry boundary data;
- Ordnance Survey field mapping;
- Central Statistics Office (CSO) data from the 2010 Census of Agriculture and;
- Other sources of information referred to include:
  - *Soils & Subsoils Class* digital data downloaded from the EPA website in September 2013;
  - Corine Land Cover Map of Ireland (2006);
  - Health and Safety Authority Ireland (2013). *Farm Safety Action Plan 2013-2015*;
  - Health and Safety Authority Ireland (2010). *Guidelines for Safe Working near Overhead Electricity Lines in Agriculture*, (http://www.hsa.ie/eng/Publications_and_Forms/Publications/Agriculture_and_Forestry;
  - Electricity Supply Board (ESB) and Irish Farmers Association (IFA) (October 1985). *Code of Practice for Survey, Construction and Maintenance of Overhead Lines in Relation to the Rights of Landowners;*
  - ESB) and IFA (September 1992). *Agreement on Compensation for Loss of Tree Planting Rights;*

- ESB Networks. *Farm Well, Farm Safely* (http://www.esb.ie/esbnetworks/en/safety-environment/safety_farm.jsp)*;* and
- *National Forestry Inventory* (2007) (Republic of Ireland) published by the Forestry Service, Department of Agriculture, Fisheries and Food.

7 The evaluation methodology involves three stages:

- A baseline appraisal was carried out. The type and size of land parcels[5] and their character is described in **Section 3.4.** The methodology of evaluation of sensitivity is explained in **Section 3.2.3;**
- An appraisal of potential impacts during construction, operation and decommissioning phases is carried out. The magnitude of potential impacts is evaluated based on criteria as set out in **Section 3.2.4** and
- The significance of impact is provided by evaluating the sensitivity of the land parcel and magnitude of impact and is based on the criteria set out in **Section 3.2.5**.

3.2.3 Evaluation of Baseline

8 The land use appraisal for the MSA includes land parcels along the proposed development and along temporary access routes. The existing agricultural, horticultural and forestry environment is evaluated by interviewing landowners (where possible), roadside surveys and by examination of aerial photography and land registry mapping data. The 2010 *Census of Agriculture* provides comprehensive information on agricultural and horticultural farms in counties Cavan and Meath. The character of the agricultural environment is categorised by evaluating the sensitivity of each land parcel along the proposed development.

3.2.3.1 Sensitivity

9 In this evaluation, the main criterion for determining the sensitivity of a land parcel is the enterprise type. Land quality and farming intensity are also considered. The range of sensitivity values range from very low, low, medium, high and very high. The criteria for categorisation of sensitivity are shown in **Table 3.1.**

[5] A land parcel is land owned as determined from the land registry mapping. The land parcel may not be the entire holding of a landowner.

Table 3.1: Criteria for Categorisation of Sensitivity

Sensitivity Category	Enterprise Type	Characteristics
Very High	Experimental Husbandry Farms. Stud Farms (large scale equine, breeding regionally and nationally important horses). Race Horse Training Enterprises. Intensive Livestock enterprises (pigs and poultry), Commercial tree plantations, Intensive Horticultural enterprises. Commercial Forestry Plantations.	Rare and important on a regional or national basis. There is limited potential for substitution due to specific facilities and internal farm layout. Very high potential for change if a tower or OHL is located on these enterprises. In the case of pig and poultry farms there is a limited potential for substitution due to difficulty in obtaining suitable alternative sites. Very high potential for change within a 74m wide corridor of the OHL
High	Dairy farms. Equine enterprises (Significant enterprise on the farm but not including intensive Stud Farms).	Any impact that restricts the movement of livestock to and from the farm hub will have a high potential to cause change. These farms generally have a specific grazing paddock layout to allow access to the farm yard – which is difficult to substitute.
Medium	Beef farms, Sheep farms. Equine Enterprises (not a significant enterprise on the farm). Tillage and field cropping, grass cropping farms (hay or silage)	The potential for change is lower than dairy farms because livestock generally do not have to be moved on a daily basis and the grazing layout requirement is less rigid than on dairy farms. Crops and cropping programmes are less sensitive to change in the longer term. There is less restriction on substituting the land in these enterprises.
Low	Rough Grazing and Commonage, Low Stocking rate.	The potential for change is low because the scale or intensity of enterprise is so low that there is a low response to impacts.
Very Low	Little or no agricultural activity e.g. Woodland, Bog.	The potential for change is very low because the scale or intensity of enterprise is so low that there is a very low response to impacts.

(Source: Table 3.1 is based on the EPA guidelines 2002 and the *Design Manual for Roads and Bridges (DMRB) 200*8. The EPA guidelines 2002 define sensitivity as the “*Potential of a receptor to be significantly changed*”. The concepts of Importance, Rarity and Potential for Substitution are introduced in Table 2.1 Volume 2, Section 2, part 5 of DMRB 2008).

10 Sensitivity may vary from indicated values due to professional judgement and depending on site specific factors. Examples of such site specific factors include:

- The presence of specialised facilities on affected land parcels e.g. dog training tracks and horse race / training tracks; and
- Where land parcels have livestock or crops which have a value or importance which is above the normal for this type of farm, the sensitivity value may be increased. Possible examples are experimental sites and rare breeds.

3.2.4 Evaluation of Magnitude of Impacts

11 The elements of the proposed development which will cause potential impacts on the agronomy environment are identified in **Section 3.5**. The magnitude of the impact is the scale of impact due to the proposed development and are assigned values ranging from very low to very high. The probability and duration of occurrence is also considered. The criteria and methodology for evaluation of impact magnitude are set out in **Table 3.2**.

Table 3.2: Criteria and Methodology for Evaluation of Impact Magnitude

Magnitude	Determining Criteria
Very High	A permanent restriction on the operation of a land parcel or site where the location of towers or OHL permanently restricts a vital operational aspect of an enterprise. For example a permanent change in land or forest area of approximately 15% (or more) or the removal of critical buildings or the restriction of access to an intensive enterprise (e.g. pigs, poultry, horticulture).
High	A permanent restriction on the operation of a land parcel or site where the location of towers or OHL permanently restricts an important operational aspect of an enterprise. For example a permanent change in land or forest area of approximately 10-15% or the removal of standard cattle or sheep buildings in a conventional farmyard. Construction phase impacts without mitigation could in rare situations have a high magnitude of impact (e.g. significant damage to land drainage, allowing livestock to stray onto public roads).
Medium	A permanent restriction on the operation of a land parcel or site where for example a permanent change in land or forest area of approximately 5-10%. Where access to land or farmyard is restricted but there is alternative access. Where the development of, or expansion of, a farmyard is restricted but there is alternative land available for this development. Construction phase impacts without mitigation will generally result in medium magnitude impacts (for example poor re-instatement of fences of land, rutting along access tracks not being reinstated or levelled).

Low	A permanent change in land or forest area of approximately 1-5%. The presence of multiple tower sites and a central alignment of the OHL will tend to give a low impact.
Very Low	A permanent change in land or forest area of approximately 1% (or less). The presence of one tower site in an average sized land parcel and an alignment of the OHL at the edge of the farm will tend to give a very low impact.

(Source: Based on author's experience in assessing magnitude and significance of impacts.)

12 The criteria in **Table 3.2** are indicative and are subject to a qualitative evaluation of impact based on professional judgement. Consideration is also made as to the likelihood, frequency and probability of an impact occurring.

3.2.5 Evaluation of Significance of Impact

13 The significance of the impact is the importance of the outcome of the impact or the consequences of the change. The EPA *Advice Notes on Current Practice (in the preparation of Environmental Impact Statements)* (September 2003) contain guidelines for describing the significance of impacts. The significance of impact is determined by evaluating the magnitude of the impact and the sensitivity of the affected land parcel. **Figure 3.1** gives a guide for determining the level of significance of impact.

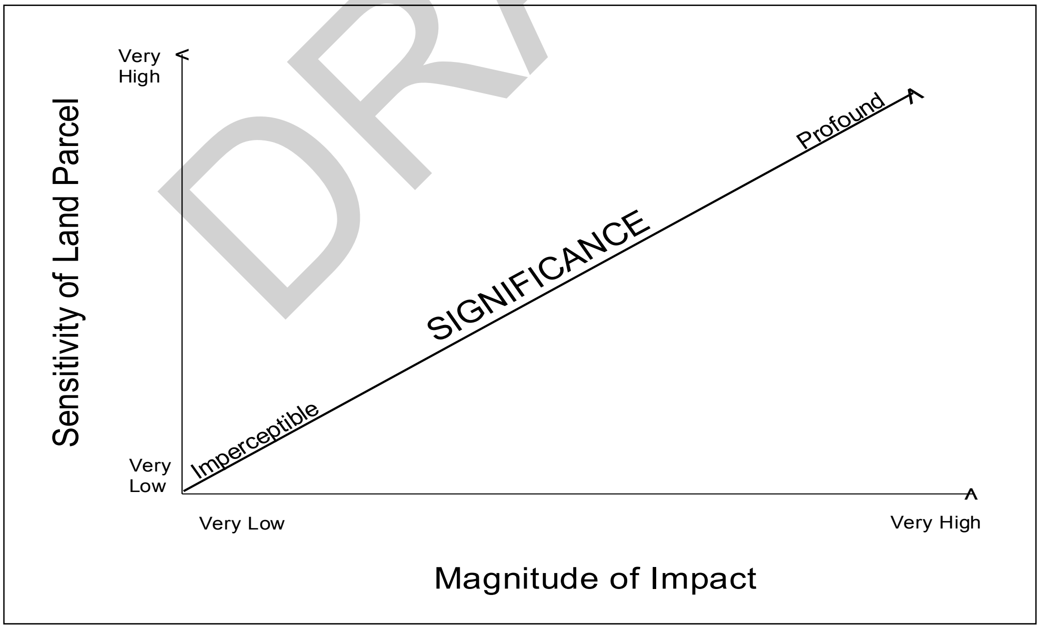

Figure 3.1: Significance of Land Parcel Impacts[6]

[6] Based on Design Manual for Roads and Bridges (UK) Vol 11, Section 2 part 5, Determining Significance of Environmental Effects (2008, published by the UK Highway Authority).

14 The significance of the impacts is described as follows:

- An ‗Imperceptible‘ impact is either an impact so small that it cannot be measured or is capable of measurement but without noticeable consequences;
- A ‗Slight Adverse‘ impact causes noticeable changes in the operation of an enterprise on a land parcel in a minor or slight way;
- A ‗Moderate Adverse‘ impact changes a land parcel causing operational difficulties that require moderate changes in the management and operational resources;
- A ‗Major Adverse‘ impact changes a land parcel so that the enterprise cannot be continued, or if continued will require major changes in management and operational resources; and
- A ‗Profound Impact‘ changes the land parcel in a way that it obliterates the land parcel enterprise.

3.2.6 Consultation

15 The Department of Agriculture, Food and the Marine (DAFM) and ESB were consulted in relation to the proposed development. In addition, all landowners along the proposed route alignment were written to and offered an agricultural assessment. (Refer to the *Public and Landowner Consultation Report* in **Volume 2B** of the application documentation and Chapter 3, **Volume 3B** of this EIS for details on scoping and statutory consultation).

Difficulties Encountered

16 These issues are dealt with in the Public and Landowner Consultation Report in Volume 2B of the application documentation and Chapter 3, Volume 3B of the EIS for details on scoping and statutory consultation. The majority of the landowners along the proposed alignment choose not to engage with the agronomist which presents the following difficulties.

Difficulty Confirming the Full Extent of Landowner’s Farms

17 Land registry mapping is available for all of the proposed alignment and along the proposed temporary access routes. Reliance on land registry mapping as the only source of information on land ownership will lead to both an overestimation of the number of farmers affected and an

underestimation of the area farmed (e.g. some of the land farmed may be registered in a spouse‘s name or in a relative‘s name). The magnitude of impact in this EIS is partly based on the percentage of the land parcel restricted under the towers, at working sites and along temporary access routes. The consequence of underestimating areas of land farmed is that the magnitude of impact tends to be overestimated. This is an acceptable consequence in the context of this proposed development where the impacts are generally low.

Difficulty Confirming Enterprise Types

18 The standard practice in land use assessments is to categorise the baseline sensitivity. Farm enterprise is an important criteria in this categorisation. This information is generally obtained from a combination of landowner interviews, roadside surveys and examination of aerial photography. The consequence of incorrectly identifying a high sensitive farm as medium sensitive is that the significance of impact would be underestimated (refer to **Figure 3.1**). However the author is satisfied that the evaluation of land parcel sensitivity is adequate based on the following reasons:

- Roadside surveys and examination of aerial photography have accurately identified very high sensitive land parcels (e.g. commercial forests, stud farms, poultry farms, Teagasc experimental husbandry farms and intensive horticultural enterprises with glass houses & poly tunnels);
- The main difficulty encountered is determining whether grass enterprises were medium sensitivity (beef and or sheep) or high sensitivity (dairy and equine) in situations where livestock were not seen on the land parcel. In order to assess sensitivity in these situations other aspects of the land parcel were examined such as, presence of a farm yard, presence of stables, presence of milking facilities, presence of access suitable for a milk lorry, access into adjoining land parcels (if any) and a well-developed farm paddock system;
- An evaluation was conducted for each land parcel; and
- The 2010 *National Census of Agriculture* is referred to, which provides an accurate description of the baseline environment and therefore the expected enterprise mix along the proposed alignment.

Difficulty in Specifying Land Use Mitigation Measures for Inclusion in the Design, Construction and Operation of the Proposed Development

19 The nature of the proposed development is different from road infrastructural projects because farms are not divided and access is not significantly affected. The land utilisation under the OHLs will not change significantly. The impacts are lower than for road infrastructural projects

and there is no requirement for constructed accommodation works for land use purposes. In common with other infrastructural projects, this proposed development reduces overall impact by minimising the overall length, minimising the number of towers and avoiding farm yards. Therefore, although engagement with landowners is desirable, the design of the proposed alignment is not as reliant on landowner engagement as road projects. For this development if landowners engaged with the project team then additional land use mitigation could have been provided (e.g. placing towers on some field boundaries) and alternative locations for temporary access routes could be specified. While this may result in outcomes that are more satisfactory for landowners, it would result in a lower impact in a very small number of cases. Therefore the consequence due to limited landowner engagement on the design of the proposed development is not significant from a land use point of view. The construction and operation mitigation measures are informed by the author's own experience as an agricultural consultant and reference is made to the ESB / IFA agreement. There is no significant consequence due to limited landowner engagement on construction and operation mitigation measures.

3.3 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

20 The characteristics of the proposed development which have the potential to create impacts on land uses arise from the specific locations of towers and the OHL on lands.

21 During the construction phase, the construction sites around the towers, guarding locations, the stringing sites and the temporary access routes have the potential to cause adverse, albeit largely temporary effects. There will be potential disturbance where trees located within their falling distance from the OHL infrastructure and where these need to be felled. Forestry plantations within a maximum 74m wide corridor will be cleared. A detailed description of the proposed development and how it will be constructed is presented in Chapters 6 and 7, **Volume 3B** of this EIS.

3.4 EXISTING ENVIRONMENT

3.4.1 Land Use along the Proposed Alignment

22 The MSA is shown in Figures 3.2 - 3.12, **Volume 3D Figures** of the EIS. **Table 3.3** presents and compares the CSO *2010 Agricultural Census* (hereinafter referred to as the 2010 Census) statistics and data from the agricultural evaluation.[7]

[7] Statistics for County Cavan can be found in Chapter 3 of **Volume 3C** of the EIS.

Table 3.3: Agricultural and Forestry Statistics for County Meath, the State and Land Parcels evaluated along the Proposed Alignment

	Typical Sensitivity	Statistics for County Meath	State Statistics	Evaluated Land parcels
Average size (ha)	-	42	32.7	26.5
Number of land parcels / farm	-	3.2	3.8	-
Dairy Farms (% of total number)	High	10%	11%	77.5[8]
Beef, sheep, silage & hay farms (% of total number)	Medium	79%	83%	
Tillage farms (% of total number)	Medium	8%	3%	13
Mixed crops and livestock farms (% of total number)	Medium	2%	2%	3.5
Other enterprises (e.g. pigs, poultry, horticultural cropping, equestrian as the main enterprises) (% of total number)	High	1%	1%	6
Forestry (% of total land area)	Very High	5%	10%	6
Horticultural area (vegetable crops, fruit, nursery, other crops – Table 7D of 2010 census) (% of total area)	High - Very High	0.4%	0.2%	0.2%

(Source: The data in the last column is based on the author's evaluation of land parcels along the proposed development. Data in the remaining columns is based on the *National Forestry Inventory* (2007) (Republic of Ireland) published by the Forestry Service, Department of Agriculture, Fisheries and Food and 2010 Census of Agriculture (CSO)).

23 The 2010 census data for County Meath gives a good indication of the agricultural and horticultural holdings along the proposed development within County Meath.

- Farms in County Meath are larger than the average farm in the state (42ha vs 32.7ha – Table 1 of 2010 Census);
- Farms in County Meath will have just over three separate land parcels per farm (Table 28 of 2010 Census);

[8] Excluding forestry and based on visual inspections of land parcels along the proposed project alignment and contact with landowners – 9% are dairy, 38.5% are beef and/or sheep, 30% are unconfirmed grass enterprises and hay and silage.

- The standardised economic output per farm (Table 3 of 2010 Census) is €46,500 in County Meath compared to the state average of €30,700 (and €47,400 for surrounding counties);
- On average there are 1.3 standard work units employed on County Meath farms compared to 1.2 work units in the state (Table 38 of 2010 Census). Farming is the sole or major occupation of two thirds of County Meath farmers which is similar to the state (Table 36 of 2010 Census); and
- Compared to the state there is a lower proportion of grass type farms and higher proportion of tillage farms in County Meath. The percentage area of horticultural crops is higher and the percentage area of forestry is lower in County Meath. Table 7D of the 2010 Census indicates that the area sown to potatoes is approximately 1.3% of the total area of County Meath farms compared to 0.2% of the state. Table 8D of the 2010 Census indicates that 10% of farms in County Meath will have brood mares with an average of approximately three mares per farm (this is similar to the state average). Approximately 0.4% of the land in County Meath is sown with horticultural crops (vegetables, fruit, nursery & other crops) compared with 0.2% of the state area.

24 A total of 178 land parcels are evaluated for impacts along the proposed development. The potential impacts on these land parcels is summarised in **Appendix 3.1, Volume 3D Appendices** of the EIS. The land parcel enterprises evaluated along the proposed alignment are as follows:

- 66 are beef and /or sheep enterprises;
- 15 are dairy enterprises;
- 51 are grass land parcels where the farm enterprise is unconfirmed or are used solely for hay or silage;
- 22 are tillage enterprises;
- Six are mixed crops & livestock enterprises;
- Six are equine enterprises (LMC- 023, 046, 058, 059, 099 and 132);
- Four are other enterprises (one grass plot adjoining a dwelling, 2 poultry and livestock enterprises, one horticultural enterprise (LMC-029)); and
- Eight are forestry enterprises (LMC-067, 105, 110, 157, 170, 171 and 196). LMC-135 is a forestry and equine enterprise.

3.4.2 Soils Types in Land Parcels along the Proposed Alignment

25 In this section reference is made to *Soils & Subsoils Class* digital data downloaded from the EPA website in September 2013[9]. The main soil types of land parcels along the proposed development in the MSA are:

- Approximately 50% of soil in land parcels is a mineral soil EPA Code 1. This is categorised as a deep well drained good quality soil. It is the dominant soil in land parcels between Tower 265 (Altus / Brittas) and Tower 285 (Drakerath) and between Towers 336 (Hall town) and 373 (Branganstown). This soil type also occurs in parts of Dowdstown, Glebe, Castlemartin and Irishtown.

- Approximately 30% of soil in land parcels is a mineral soil EPA Code 3. This is categorised as a deep heavy soil which generally has poor drainage characteristics. However this soil can be drained and the majority of this soil type along the proposed development is good quality grassland. It is the dominant soil in land parcels between Towers 237 (Clonturkan) and 256 (Boynagh (ED Kilmainham), between Towers 328 (Betaghstown) and 333 (Irishtown) and between Towers 381 (Martinstown / Derrypatrick) and 410 (Woodland).

- Approximately 10% of soil in land parcels is a mineral soil EPA Code 2. This is categorised as a shallow well drained good quality soil. It is the dominant soil in land parcels between Towers 374 to 381 (Branganstown / Boycetown) and occurs to a lesser extent between Towers 259 (Altmush) and 270 (Brittas), between Towers 345 and 351 (Dunlough / Balbrigh) and near Tower 387 (Derrypatrick).

- Approximately 5% of land in land parcels is bog and wet peaty type soils EPA Codes 4 and 6. These soils occur mainly in land parcels between Towers 286 (Drakerath) and 292 (Fletcherstown);

- Approximately 5% of land in land parcels is described as Alluvial EPA Code 5. These soils occur along rivers and streams and may be of variable quality depending on whether they have been successfully drained or not.

26 The visual evaluation of land parcels along the proposed development in County Meath suggests that the majority of the land is good quality. From Clonturkan to Clooney / Raffin (between Towers 237 and 280) the topography is hilly (southern part of drumlin belt). Between

[9] Prepared by the Teagasc Spatial Analysis Group at Kinsealy Research Centre (in collaboration with EPA, Department of the Environment, Heritage and Local Government, Forest Service and GSI.

the N52 and Woodland the topography is generally flat or rolling lowland. Artificial land drainage systems are a feature of the land along the line route.

3.4.3 Categorisation of Land Parcels

27 The results of the evaluation and categorisation of agricultural land parcels along the proposed development in the MSA are shown in **Appendix 3.1, Volume 3D Appendices** of the EIS. These land parcels are categorised based on the criteria described in **Section 3.2.3**. The sensitivity of land parcels along the proposed development is as follows:

- 5% (9 No.) are categorised as very high sensitivity. These include one horticultural land parcel (Ref. No. LMC-029), Teagasc experimental husbandry farm (Ref. No. LMC-022) and 6 land parcels where commercial forestry primarily is affected (Ref. Nos. LMC- 067, 110, 157, 170, 171 and 196). Land parcel LMC-135 has a forestry and equine enterprise.

- 14.5% (26 No.) are categorised as high sensitive with 15 dairy enterprises, 2 poultry and other livestock farms (Ref No LMC-111 and LMC-116), 2 beef and forestry enterprise (Ref. No. LMC-105 and LMC-158), 4 equine enterprises (Ref. Nos. LMC-023, 046, 059 and 132 & 214 & 215) and 3 unconfirmed grass enterprises (LMC- 065 & 079, 120 and 137).

- 80% (142 No.) are categorised as medium sensitivity. These are cattle, sheep, grass crops, tillage and mixed grassland and tillage farms. Two equine enterprises are classed as medium sensitivity (Ref. No. LMC-058 and LMC-099).

- 0.5% (1 No.) is categorised as low sensitivity (Ref. No. LMC-096).

3.5 POTENTIAL IMPACTS

3.5.1 Do Nothing

28 In the case of the ‗Do Nothing Scenario' there would be no negative impacts on the environment and there would be no change to the existing environment.

3.5.2 Construction Phase

29 The construction phase impacts are those impacts that may potentially affect land parcels during the projected 36 month period of the construction programme. Chapter 7, **Volume 3B** of the EIS describes the five stages of the construction programme for the OHL. The stages are summarised here:

- Stage 1 – Preparatory Site Work (1 – 7 days);
- Stage 2 – Tower Foundations (3 – 10 days);
- Stage 3 – Tower Assembly and Erection (3 – 4 days);
- Stage 4 – Conductor / Insulator Installation (7 days); and
- Stage 5 – Reinstatement of Land (1 – 5 days).

30 Taking the maximum duration of works figures for stages 1 – 5 above, the construction work at one tower should be completed within 32 days or 1 month. However, because the contractor will be working on several tower locations at one time, the construction work will be spread over a six to eight week period at each tower site, up to stage 3. After stage 3 there will be a period of inactivity until stage 4 and 5 works are completed at a later date.

31 In addition to the works along the proposed tower locations and OHL, construction works will also take place within the existing substation site at Woodland. This construction work will take place within the existing site boundary.

3.5.2.1 Construction Traffic

32 The construction vehicles required for stages 1 – 3 are described in Chapter 7, **Volume 3B** of the EIS. Typical vehicles accessing agricultural land are; 4x4 jeep, 360˚ tracked excavator (up to 22 tons), wheeled dumper or track dumper (up to 8 tons), transit van, cement lorry (up to 38 tons) or dumper if ground conditions and terrain are not suitable, goods lorries and tractor and trailer.

3.5.2.2 Construction Impacts

33 The potential impacts during the construction phase are as follows:

- Wheel rutting and compaction along temporary access routes and at construction and winching sites will cause damage to soil at all stages of the construction programme. Rutting will restrict machinery operations such as fertiliser spreading, spraying and harvesting. The damage will be dependent on ground conditions and weather. Damage will be worst at tower construction sites.
- There is the potential for general disturbance to farm enterprises at all stages of the construction programme. Construction activities and traffic could interfere with users of existing and temporary access routes and could generate noise and dust. The movement of construction traffic could disturb livestock. Grazing livestock are generally

familiar with the landowner and his machinery and may be disturbed when different machinery and personnel are introduced on to a farm particularly horses, young cattle and suckler cows. As well as the land lost to arable crops and grassland, temporary access routes and construction sites may cause temporary separation or unavailability of land. For example, access for dairy cows to a milking parlour or access for livestock to water sources could potentially be interfered with. In the unlikely event that rock breaking or piling is required the resulting loud sudden noise could cause a ‗fight or flight‘ response in livestock. There is an increased risk of livestock escaping via new temporary access points or due to gates being left open or failure to make fences stock proof. Farming operations may be interrupted or take longer to complete as a result of the construction activity. Landowners may have to spend additional time organising their farm enterprise.

- At construction stage 1 disturbance may occur as a result of the preparation of the tower construction areas and temporary access routes.

- There is an increased risk of spreading animal and crop diseases (soil borne crop diseases) due to personnel and machinery moving between farms at all stages of the construction programme. Construction machinery using existing tracks / roads or accessing land through farm yards increases the risk of spreading farm diseases because the construction machinery may encounter accumulations of animal manure. Construction machinery may inadvertently spread soil borne diseases particularly in potato and vegetable cropped fields.

- The construction of the proposed development may have direct impacts on Area Based Farm Payments (e.g. Single Payment Scheme (SPS), Disadvantaged Areas Payment Scheme (DAS) and 2015 Basic Payment Scheme and 2015 Greening Payment Scheme). These payments are dependent on the Utilisable Agricultural Area (UAA) which in certain situations will be reduced due to temporary access tracks and construction sites. The implementation of Nitrates Regulations on farms is sensitive to reductions in UAA. The payments of other farm schemes such as the Agricultural Environmental Options Scheme (AEOS) and Green, Low-carbon Agri-Environmental Scheme (GLAS) are also based on the UAA. Certain Agri-Environmental Options may be affected by the location of temporary access tracks and construction sites (e.g. Species Rich Grassland Option and Traditional Hay Meadow Option). In the case of Area Based Payment Schemes and Nitrates Regulations the reduction in UAA due to the proposed development is generally less than 1-2% of the area farmed and the larger area reductions are generally temporary (e.g. at tower construction sites). In relation to Agri-Environmental Schemes the DAFM will review individual cases on a case by case basis.

- Tree felling in forestry plantations would have a very low to very high impact depending on the proportion of the plantation felled. Opening up the plantation may increase windfalls. Beside the provision of stock proof fencing, the only mitigation is compensation. The cleared land can in certain situations be sown with grass.

- At construction stages 1 and 3 there is the potential for land drains to be disturbed during excavation.

- At the tower construction sites any spillages of fuel oil could contaminate soil and surface water.

- In construction stage 2 spillages of concrete may occur which could contaminate soil and surface water.

- Any potential surface water runoff from soil excavations in to water courses could temporarily contaminate drinking sources for cattle.

34 Where the mitigation measures identified in this EIS are implemented, the significance of these construction phase impacts in **Appendix 3.1**, **Volume 3D Appendices** of the EIS may be summarised as:

- 140 land parcels in the MSA are predicted to have an imperceptible impact – 79% of total number;

- 32 land parcels in the MSA are predicted to have a slight adverse impact – 18% of total number;

- Four land parcels in the MSA are predicted to have a moderate adverse impact – 2% of total number (Ref. Nos. 105, 110, 157 and 171 - all forestry plots);

- Two land parcels in the MSA are predicted to have a major adverse impact – 1% of total number (Ref. Nos. 067 and 170 - forestry plots); and

- There are no profound construction impacts.

35 The evaluated significance is relatively low and is dependent on the temporary nature of construction impacts. In line with EPA guidance, temporary impacts have a lower significance than permanent impacts. Without mitigation the impacts would be longer term in nature and therefore the significance would increase dramatically. Construction traffic will have to use existing private farm tracks to access working areas. The impact on land parcels along these tracks is evaluated to be imperceptible.

3.5.3 Operational Phase

36 The potential impacts during the operational phase are as follows:

3.5.3.1 Noise Impacts

37 Noise sources from the OHLs are described in detail in **Chapter 9** of this volume of the EIS. These noise sources include operational noise sources from the OHLs and noise generated during maintenance works.

3.5.3.2 Permanent Disturbance

38 Permanent disturbances as a result of the proposed development are:

- Maintenance works will cause infrequent disturbance during the operational phase (Chapter 7, **Volume 3B** of the EIS). Emergency patrol crews may have to access land, particularly after extreme weather events. Routine maintenance work involves foot patrols to examine OHLs and towers every five years, tower painting at approximately 35 to 40 years and replacement of 25% of shield wire and 5% of insulators at approximately 30 years. Routine maintenance work, as carried out on the existing OHL network, may result in very low levels of disturbance.

- The towers will be a physical obstacle to farm machinery operations. In grassland fields the bases of the towers may be grazed but it will not be possible to reseed or manage them to their full potential. Silage will not be harvested from the area directly under the tower and there will be small inaccessible areas around the tower where silage may not be harvested. In tillage fields there will be uncropped areas under and around the towers;

- The area under the towers may act as a reservoir for weeds species, some of which are referred to in the Noxious Weeds Act and therefore place an extra responsibility on landowners to control them.

- The construction activity at the tower, guarding and stringing sites and traffic along temporary access routes will cause soil damage which will be evident in the medium term during the operational phase.

- The presence of the towers and OHLs will have direct impacts on the operation of farm schemes during the operational phase. Area Based Payments are dependent on the UAA which in certain situations will be reduced due to the presence of towers. The implementation of Nitrates Regulations on farms is sensitive to reductions in UAA. The payments of other farm schemes such as the AEOS and GLAS are also based on the

UAA. Certain Agri-Environmental Options may be affected by the location of towers (e.g. Species Rich Grassland Option and Traditional Hay Meadow Option) and tree planting options may be affected under the OHLs. In relation to Agri-Environmental Schemes the DAFM will review individual circumstances on a case by case basis and if possible alternative sites on the farm will be agreed with the landowner (e.g. for tree planting options).

3.5.3.3 Farmyard Development

39 The presence of the OHL may restrict construction of some agricultural and horticultural buildings.

3.5.3.4 Impact on Commercial Forestry

40 The presence of the OHL will cause a permanent reduction in the area of forestry and tree plantations (which can often be replaced with grass land).

3.5.3.5 Health and Safety Risks

41 The minimum clearance for the proposed OHLs will be 9m. In general most farm machinery activities can take place safely under these electricity lines (e.g. fertilising, low trajectory slurry spreading, spraying, crop harvesting) but there may be unacceptable risks associated with transporting exceptionally high loads (e.g. bales), irrigating crops with rain guns, high trajectory spreading of slurry and using machinery with loader attachments under the electricity lines.

3.5.3.6 Electric and Magnetic Fields

42 Electric and Magnetic Fields (EMF) are described in **Chapter 5** of this volume of the EIS. There are no known adverse effects on livestock or crops as a result of EMF.

3.5.4 Decommissioning

43 The proposed development will become a permanent part of the transmission infrastructure. The expected lifespan of the development is in the region of 50 to 80 years. This will be achieved by routine maintenance and replacement of hardware as required. There are no plans for the decommissioning of the OHL. In the event that part of, or the entire proposed infrastructure is to be decommissioned, all towers, equipment and material to be decommissioned will be removed off site and the land reinstated. Impacts would be expected to be less than during the construction phase and would be of short term duration.

3.6 MITIGATION MEASURES

3.6.1 Construction Phase

44 During the design phase impacts have been mitigated by minimising the number of towers having regard to requirements imposed by technical and environmental constraints and constructing an OHL development that is structurally sound and safe.

45 Tower sites have been located away from farm yards where possible and all reasonable efforts were made to involve landowners in discussions regarding location of towers.

46 Prior to commencement of work the construction contractors will prepare method statements and work programmes that show detailed phasing of work. A wayleave agent will be appointed by the contractor to liaise with the landowners along the line route and ensure that their requirements for entry are met so far as is possible and that landowners are made aware of the schedule of works to be carried out on their land.

47 All employees and contractors involved in the construction phase will receive adequate training in particular in relation to issues relating to livestock safety and bio security on farms.

48 Landowners will be notified in advance of the commencement of construction.

49 The contractor will ensure that landowners have reasonable access to all parts of their farm during the construction phase.

50 Disease protocols will be adhered to. As referenced in the ESB / IFA agreement the contractor will comply with any DAFM regulation pertaining to crops and livestock diseases.

51 Where required, fencing will be erected to exclude livestock from construction sites.

52 In most situations mitigation measures for noise will not be required during the construction phase. This is because livestock will quickly adapt to changes in their noise environment. In the unlikely event that rock breaking or pilling are required owners of livestock in adjoining fields will be notified in advance.

53 It will be construction policy to minimise non tracked vehicular access to sites in wet weather. Temporary aluminium or panel tracks will be used in certain situations to prevent damage to soil (see Chapter 7, **Volume 3B** of the EIS).

54 Excavations will be minimised. The locally excavated material will be reinstated surrounding the tower base following construction. All unused excavated fill will be removed from the site and disposed of at a licensed waste facility.

55 Affected land drains will be redirected in a manner that maintains existing land drainage.

56 Where top soil is stripped back it will be replaced. All disturbed field surfaces will be re-instated.

57 Any losses or additional costs incurred by the landowner which are directly attributed to the proposed development, during the construction phase or the operational phase, including additional necessary remedial works and including losses and or additional costs arising from implementation of Area Based Payment Schemes. Nitrates Regulations and Agri-Environmental Schemes will be paid to the landowner as per the ESB / IFA agreement.

58 Mitigation relating to potential effects on water quality and soil contamination due to fuel or concrete spillages are detailed in **Chapters 7 and 8** of this volume of the EIS.

59 Mitigation measures to be outlined in the Construction and Environmental Management Plan (CEMP) in relation to land use will be implemented as part of the construction management. A summary of all mitigation measures are detailed in Chapter 11, **Volume 3B** of the EIS.

3.6.2 Operational Phase

60 The OHL infrastructure will be inspected and maintained as set out in Chapter 7, **Volume 3B** of the EIS.

61 Disease protocols will be adhered to during maintenance works.

62 ESB will provide safety information directly to all affected landowners e.g. HSA *Guidelines for Safe Working near Overhead Electricity Lines in Agriculture* and ESB Networks *Code of Practice for Avoiding Danger from Overhead Electricity Lines in Agriculture*. These publications will enable farmers to fulfil their statutory requirements under Health and Safety Regulations.

63 For general operational noise there is no practical mitigation (refer to **Chapter 9** of this volume of the EIS), but the potential impacts on agricultural activities from noise is negligible. During maintenance works mitigation will involve notification to landowners in advance of any construction activity.

64 Helicopter inspections will be announced in local newspapers and the Farmer's Journal.

65 Other damage and disturbance impacts which cannot be mitigated directly by the contractor will be addressed in the statutory compensation process. For example the land at construction sites and along temporary access routes may require subsoiling, ploughing and reseeding a few years after the construction period, if crop re-establishment is not satisfactory. Annual payments will be paid to landowners for the interference caused by the towers on their land.

3.7 RESIDUAL IMPACTS

66 Agronomy residual impacts are discussed under three headings;

- Residual Impacts at a national and regional level;
- Residual Impacts along the proposed development in the MSA; and
- Residual Impacts on individual land parcels.

3.7.1 Residual Impacts at a National and Regional Level

67 The area of agricultural land (excluding commonage) in County Cavan is 139,374ha and in County Meath is 191,846ha (2010 census data). The combined area of both counties is approximately 7% of the national agricultural area.

- The area of land beneath the towers in County Cavan (within the MSA) will be approximately 0.06ha. There will be short to medium term impacts due to damage to soil on approximately 0.4ha at construction sites and along temporary access routes. The impact is imperceptible based on the low percentage of total area affected.
- The area of land beneath the towers in County Meath will be approximately 3.42ha. When additional wastage is allowed around towers in tillage fields this area increases to 4.2ha. In addition to this 14.6ha of commercial forest (0.15% of the area of forest in County Meath) will be cleared within a 74m corridor centred on the OHL. There will be short to medium term impacts due to damage to soil on approximately 57ha at construction sites, guarding locations and along temporary access routes. The impact is imperceptible based on the low percentage of total area affected.
- There will be no significant change in land use due to the location of the proposed OHLs.

68 Overall the significance of residual impact on a regional or national level will be imperceptible.

3.7.2 Residual Impacts along the Proposed Development within the MSA

69 The impact on the study area (approximately 4,700ha) within the MSA, which consists of all the land parcels (No. 178) along the proposed development, is evaluated to be imperceptible based on the following:

- The area of land beneath and around the tower bases is approximately 4.2ha which is approximately 0.1% of the area of land parcels along the proposed alignment within the MSA.

- There will be short to medium term impacts due to damage to soil on approximately 57ha at construction sites, guarding locations and along temporary access routes and approximately 14.6ha of forestry will be cleared. Therefore there will be direct impacts on approximately 1.5% of the area of land parcels along the proposed alignment within the MSA.

- There will be no significant change in land use under the OHLs on land parcels along the proposed development.

3.7.3 Residual Impacts on Individual Land Parcels

70 The land parcel impacts in the operational phase are due to land use restrictions at tower sites, short to medium term damage caused to land during the construction phase, long term inconvenience and additional safety risk caused by presence of the electricity lines and towers and potential impacts caused to farm yards. Disturbance due to maintenance works will also contribute to land parcel impacts. Construction phase disturbance impacts are general short term (1–3 years) and with mitigation there should be no residual impact. Impacts due to damage to soil are short to medium term (5–15 years; based on author‘s experience) and with mitigation lands can be restored to pre-construction condition. Impacts due to loss of land beneath the towers and impacts due to OHLs are permanent (>60 years). Intermittent disturbance due to maintenance works during the operational phase is a permanent impact (>60 years). Helicopter inspections will generally cause a ‗fight or flight‘ reaction in livestock, particularly with sensitive animals such as thoroughbred horses and young livestock. The potential impact could be high. Given the rare occurrence of injury from ‗fight or flight‘ events the magnitude of impact with mitigation is low. The OHLs will be an additional safety risk on farms, however the magnitude of impact is generally evaluated to be very low based on the existence of similar OHL infrastructure throughout Ireland. The clearance of trees in commercial forests is a permanent impact (>60 years). Overall magnitude of impacts on individual land parcels tend to be low or very low and the sensitivity of land parcels is medium in the majority of cases (90%). The magnitude and significance of the impact on each land parcel

along the proposed development is shown in **Appendix 3.1, Volume 3D Appendices** of the EIS**.**

- There will be imperceptible impacts on 88 land parcels within the MSA – 49.5% of total number;
- There will be slight adverse impacts on 80 land parcels within the MSA – 45% of total number;
- There will be moderate adverse impacts on seven land parcels within the MSA – 4% of total number;
- There will be a major adverse impact on three land parcels within the MSA – 1.5% of total number; and
- There will be no profound impacts.

71 Major adverse impacts arise in land parcel LMC-029 due to the OHL traversing pollytunnels in an intensive horticultural enterprise, in land parcel LMC-067 due to the clearance of 20% of a 14ha forest and in land parcel LMC-170 due to the clearance of 31% of a 5.1ha forest. The moderate adverse impacts on three land parcels (Ref. No. 065 & 079, 088 and 132 & 214 & 215) arise where the OHLs oversail the land parcel in a manner that may impact on potential future farm yard development. The moderate adverse impacts on four forestry land parcels (Ref. No. 105, 110, 157 and 171) arise due to clearance of forestry under the OHLs.

3.8 INTERRELATIONSHIPS BETWEEN ENVIRONMENTAL FACTORS

72 Interaction between environmental factors include the following:

- Flora and Fauna - Many farmers participate in Environmental Schemes funded by the Department of Agriculture, Food and the Marine, for example the Agricultural Environmental Options Scheme (AEOS). Environmental Options such as Species Rich Grass, Traditional Hay Meadows and Tree Planting may be affected by the placement of the OHLs and the towers. Therefore there is a potential impact on biodiversity on farms. In addition, if trees are cleared in the vicinity of OHLs there is a potential impact on shelter. Overall, the impact from the proposed development on the biodiversity on farms and the availability of shelter is imperceptible.
- Soils, Geology and Hydrogeology - Soil quality and land drainage will be affected by construction works with a resulting impact on crop growth. Overall, this could have an imperceptible or slight adverse impact on land use.

- Water – During construction there is a potential effect on water quality due to surface run-off. With the appropriate mitigation measures this will not impact on water sources for livestock.

- Air – Quality and Climate - Construction activity may cause dust to be deposited on agricultural land which can effect grazing livestock and quality of crops.

- Air – Noise & Vibration - During construction and operational phase's noise may impact on livestock. Maintenance works and helicopter inspections cause noise that may have an effect on livestock. With appropriate mitigation this impact is imperceptible.

73 After evaluating these interrelationships there are no significant additional impacts.

3.9 CONCLUSIONS

74 The low level of landowner engagement presented some difficulties for the evaluation of the baseline environment, particularly with the identification of grass based enterprises where livestock were not seen. Despite these difficulties a detailed evaluation was carried out on land use along the development in the MSA using roadside surveying and examination of aerial photography. The proposed electricity development within the MSA will have an imperceptible impact on land use arising from the construction of 165 towers on 4.2ha of land, 57ha of soil damage caused by construction activity (one tower will be constructed on ESB property which is non-agricultural) and the clearance of approximately 14.6haof forestry. The residual impacts are either imperceptible or slight adverse on 95% of the land parcels along the proposed alignment within the MSA. Three (1.5%) moderate adverse impacts and one (0.5%) major adverse impact are due to potential restriction of farm yard development. Four (2%) moderate adverse impacts and two (1%) major adverse impacts occur on forestry land parcels where the trees will have to be cleared within a 74m corridor centred on the OHL.

4 HUMAN BEINGS – TOURISM AND AMENITY

4.1 INTRODUCTION

1 This chapter presents an evaluation of the proposed development as described in Chapter 6, **Volume 3B** of the Environmental Impact Statement (EIS), in relation to tourism and amenity considerations. The information contained within this chapter is concerned with tourism and amenity in the Meath Study Area (MSA) as defined in Chapter 5, **Volume 3B** of the EIS. It should be read in conjunction with other chapters of this volume of the EIS, particularly **Chapter 2**, for a full understanding of the potential for socio-economic impacts associated with the proposed development.

2 Chapter 6, **Volume 3B** of the EIS describes the full nature and extent of the proposed development, including elements of the overhead line (OHL) design and the towers. It provides a factual description, on a section by section basis, of the entire line route. The proposed line route is described in that chapter, using townlands and tower numbers as a reference. The principal construction works proposed as part of the proposed development are set out in Chapter 7, **Volume 3B** of this EIS.

4.2 METHODOLOGY

4.2.1 Scope of the Evaluation

3 This chapter of the EIS has been prepared in accordance with relevant EU and Irish legislation and guidance, including the requirements of Annex IV of the EIA Directive and in accordance with Schedule 6 of the *Planning and Development Regulations, 2001* (as amended) and conforms to the relevant requirements as specified therein. The scope of the evaluation is based on a review of legislation, guidance documents, other EISs, feedback from public consultation, consultation with prescribedauthorities, consultation with An Bord Pleanála (the Board) and on a consideration of the likelihood for significant impacts arising, having regard to the nature of the receiving environment and the nature and extent of the proposed development.

4 The scoping opinion received from the Board (Refer to Appendix 1.3, **Volume 3B Appendices** of the EIS) identified the following tourism and amenity related considerations as being relevant to this chapter of the EIS:

- Fáilte Ireland as a Prescribed Body have stated that, from a preliminary analysis of the *Preferred Project Solution Report (PPSR),* July 2013 (Appendix 1.2, **Volume 3B Appendices**), it considers that the main tourism assets in the vicinity of the proposed development within the MSA are the Hill of Tara, Bective Abbey and the Boyne Valley Drive with its surrounding attractions. It is further submitted that additional tourism amenities and assets in the area which may be potentially impacted upon should also be identified and this identification can be undertaken in consultation with Fáilte Ireland by reviewing data from their Tourism Content System (TCS).

- Meath County Council has made no specific comments in relation to tourism and amenity. It is considered that the issues raised in the submission from Fáilte Ireland broadly reflect the tourism related issues raised previously by Meath County Council during pre-planning consultations.

5 This chapter concentrates on the tourism and amenity aspects of the existing environment and the potential for impacts on the tourism and amenity value of the area as a result of the proposed development in County Meath.

6 In reaching conclusions in this evaluation, consideration has been given to those locations and activities that are identified in publications and which have been identified during the public consultation process as well as through site visits to the MSA. The purpose of the evaluation is to identify those impacts that are likely to be significant and to propose mitigation measures where feasible and necessary.

7 An evaluation of other economic activities and employment in the MSA is described in **Chapter 2** of this volume of the EIS.

8 Indirect temporary impacts to tourism locations may occur during the construction phase arising mainly from visibility of construction activities and temporary traffic disruptions. These potential impacts have been evaluated and mitigation measures, where required, are outlined in **Chapters 11** and **13** of this volume of the EIS. Impacts from maintenance traffic during operation will be negligible and further consideration of these impacts with regard to tourism locations has therefore been scoped out of this evaluation.

9 The evaluation primarily concentrates on the preferred corridor as identified in the *Final Re-evaluation Report (FRR)* (April 2013) (Appendix 1.1, **Volume 3B Appendices** of the EIS) within which the proposed OHL is situated but it does take account of the wider environment outside of this corridor in an area within at least 5km from the outer edge of the corridor.

4.2.2 Information Sources

10 The information sources used to prepare this chapter include the following:

- Tourism information published by Fáilte Ireland;

- *Guidelines on the treatment of tourism in an EIS*, provided by Fáilte Ireland as part of their submission to the Board referred to in **Section 4.2.1**;
- Local tourism information publications and websites including Meath Tourism www.meath.ie/tourism;
- Other websites related to specific tourist attractions or facilities (e.g. Office for Public Works (OPW) website for attractions managed by them, Údarás na Gaeltachta website for information about the Gaeltacht, local accommodation and attraction websites);
- National and Regional Development Plans;
- *Meath County Development Plan 2013-2019* (the Meath CDP);
- Ordnance Survey Ireland (OSI) mapping and aerial photography;
- Information provided as a result of project consultation and scoping; and
- Site visits to the MSA.

4.2.3 Fáilte Ireland Guidelines on Treatment of Tourism in an EIS

11 Fáilte Ireland has developed these guidelines to facilitate its evaluation of projects on the potential for impacts on tourism and amenities and it is considered that these guidelines are the most appropriate evaluation methodology to use for this EIS. The guidelines differentiate between tourism projects and impacts of other projects affecting tourism (e.g. the quality of a destination or a tourism activity).

12 The guidelines suggest that in the area likely to be affected by the proposed development, the attributes of tourism, or the resources that sustain tourism, should be described under the headings of context, character, significance and sensitivity. They further note that the detailed description and analysis will usually be covered in the section dealing with the relevant environmental topic – such as ‗*Landscape*'. Only the relevant findings as to the likely significance to, or effect on, tourism needs to be summarised in the tourism section.

13 In interpreting the guidelines, the following approach has been used:

- Characteristics of the Proposed Development: The nature and extent of the proposed development in terms of being a linear development;

- Existing Environment: This addresses the context, character, significance and sensitivity of the tourism assets of the area by providing a profile of the tourism base of the area;
- Potential Impacts: Consideration of the likely impacts to the tourism and amenity assets of the area as a result of the proposed development;
- Mitigation Measures: Description of mitigation measures; and
- Residual Impacts: Potential impacts following mitigation measures.

4.3 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

14 The proposed development primarily involves the erection of an overhead electricity line on lattice steel support structures. The types of issues which OHL developments of this nature typically raise in relation to this topic include; the potential for impacts on the attractiveness and amenity value of an area and the associated impact on tourist numbers and revenue to the area. In that regard, the evaluation considers the construction, operational and decommissioning phases of the proposed development.

4.4 EXISTING ENVIRONMENT

4.4.1 Description of Key Tourism Attractions and Amenities in the Area

15 Meath is a large county and has many tourist attractions throughout the county. It is an important tourist destination, with the UNESCO World Heritage Site of Brú na Bóinne, incorporating the passage tombs at Newgrange, Knowth and Dowth which are a particular focus of tourist activity. The importance of the county as a tourist destination arises as a result of the archaeological and architectural heritage, the rural landscape, the towns and villages and the coastline. As well as the UNESCO sites, Trim Castle and the Hill of Tara also have a high profile in both the domestic and overseas tourist markets. Loughcrew, Tailteann, the Hill of Ward, Christian sites at Kells, Slane, Donaghmore, Killeen, Dunsany and Duleek, monastic ruins at Bective and Trim and country houses from the 18th Century onwards all contribute to the tourism assets in County Meath.

16 Figure 4.1, **Volume 3D Figures** of the EIS provides a detailed map of accommodation, attractions and activities focusing on those within 5km of the OHL. The material is sourced from information provided in October 2014 by Fáilte Ireland. Figure 4.1, **Volume 3D Figures** of the EIS is representative of what Fáilte Ireland has in its Tourism Content System database at a point in time and should not be construed as representing all tourism businesses in any

particular area. It does not include, for example, tourism accommodation providers that are not registered with Fáilte Ireland. Figure 4.1**, Volume 3D Figures** of the EIS is also representative of tourist attractions and activities in counties Cavan, Monaghan and Meath, as identified in publications compiled by the local tourist organisation, Meath Tourism. The relevant tourist attractions and activities which are described in this EIS are confined to those main tourism assets that are proximate and relevant to the project MSA section of the proposed development.

17 From the information provided, the most significant visitor attractions identified by Fáilte Ireland in County Meath, some of which lie outside the MSA project area and are therefore not shown on Figure 4.1, **Volume 3D Figures** of the EIS are as follows:

- Battle of the Boyne site – Oldbridge Estate (located approximately 22km east of the OHL);
- Brú na Bóinne Visitor Centre (located approximately 20km east of the OHL);
- Newgrange, Knowth and Dowth (located approximately 18km east of the OHL);
- Trim Castle (located approximately 6km west of the OHL);
- Hill of Tara (located approximately 6km east of the OHL);
- Bective Abbey (located approximately 800m north-east of the OHL); and
- Boyne Valley Drive and surrounding attractions (traversed by the OHL).

18 It is important to note that with the exception of Trim Castle, Hill of Tara, Bective Abbey and Boyne Valley Drive, the other attractions lie a significant distance from the proposed alignment of the OHL and have not been identified by Fáilte Ireland as tourism assets within the MSA related to the OHL. Brú na Bóinne Visitor Centre, Newgrange, Knowth, Dowth, the Battle of the Boyne site – Oldbridge Estate and Trim Castle have been considered during the route selection stage and avoidance of these has been the objective during route selection. The most relevant tourism assets proximal to the OHL from the list above are described in the following sections.

4.4.1.1 Trim Castle (approximately 6km west of the OHL)

19 Trim Castle and Visitor Centre (see **Figure 4.2**) is located in the Heritage Town of Trim and is managed by the Office for Public Works (OPW). The visitor centre exhibition portrays Trims past, which coincided with the early period of Norman power in Ireland. The castle is open to the public and guided tours are available year round. The latest available statistics from the OPW show that almost 50,000 people visited Trim Castle in 2013. It features as a stop on many tourist coach itineraries.

Figure 4.2: Image of Trim Castle

4.4.1.2 **Hill of Tara (approximately 6km east of the OHL)**

20 The Hill of Tara is an area of raised upland to the south of Navan (see **Figure 4.3**), with extensive views over the surrounding countryside. It is immediately proximate to the M3 national primary route, which links Navan to Dunshaughlin to the east of the Hill of Tara. Though best known as the seat of the High Kings of Ireland, the Hill of Tara has been an important site since the late Stone Age when a passage tomb was constructed there. The site is managed by the OPW. It is open to the public from May to September and guided tours and an audio-visual show are available along with restaurant facilities. The latest available statistics from the OPW show that almost 10,000 people visited the Hill of Tara in 2013. It features as a stop on many tourist coach itineraries.

Figure 4.3: Views from Hill of Tara

4.4.1.3 Bective Abbey (approximately 800m north-east of the OHL)

21 Bective Abbey (see **Figure 4.4**) which lies between Trim and Navan is a lesser known National Monument in County Meath and is managed by the OPW. Bective Abbey is the oldest Cistercian foundation in County Meath and the second oldest Cistercian foundation in Ireland. The abbey at Bective was dissolved in 1536 and the stones from the abbey were used in the repair of Trim Castle. It is open to the public year round and was used as a film set in 1995. No visitor statistics are collected as entry is free. Visitor facilities are limited to a car park.

Figure 4.4: Views of Bective Abbey

4.4.1.4 Towns and Villages

22 The many smaller towns and villages around County Meath have a number of local attractions and amenities for tourists and the surrounding population. The following villages are those which are located in the MSA in surrounding areas where the proposed development is located; Nobber, Kilmainhamwood, Gibstown, Robinstown, Dunderry, Bohermeen, Oristown, Wilkinstown, Castletown, Drumree, Dunsany, Cortown, Teervurcher and Batterstown.

4.4.2 Description of Visitor and Recreational Activities and Events

23 There are a number of visitor activities available in County Meath as indicated in Figure 4.1, **Volume 3D Figures** of the EIS and in local tourist publications. While many indoor activities

are located in towns and villages, there are a variety of outdoor activities available at different locations throughout the county. This section focuses on those outdoor activities which are proximate to the proposed line route.

4.4.2.1 Angling, Shooting and Hunting

24 County Meath is known as an angling destination, particularly along the Rivers Boyne, Blackwater and their tributaries for salmon and trout fishing. The main rivers that the line route crosses are the River Boyne and the River Blackwater; sections of both rivers are within the Special Area of Conservation (SAC). Other rivers that the line route crosses are the River Dee, Kilmainham River, Clady River, Derrypatrick River and the Boycetown River.

25 Shooting clubs and hunting is a popular activity in County Meath and while there are no specific designated areas within the MSA for such activities, the area along the line route is the type of lands where such activities can take place.

4.4.2.2 Equestrian

26 There are a number of equestrian centres and stables throughout County Meath. Batchelors Lodge Equestrian Centre is approximately 1km east of the OHL. Equestrian activities and horse riding take place in many rural areas throughout the county and are likely to occur in other areas in the general vicinity of the proposed development.

4.4.2.3 Walking, Cycling and Other Recreational Activities

27 There are no waymarked walking trails listed on www.irishtrails.ie located in close proximity to the proposed development, the nearest being in the south of the county along the Royal Canal approximately 13km to the south of the proposed development. While there are no waymarked routes walking, cycling, local gatherings and other recreational activities take place along quieter country roads and in settlements throughout the area.

28 A feasibility study has recently been completed (July 2013) by the Navan to Kingscourt Railway Committee to examine the feasibility of the development of the disused Navan to Kingscourt railway line as a Greenway for both walkers and cyclists. The route which mainly follows the now disused Navan – Kingscourt Railway line would be approximately 30km in length would extend from the major tourist and amenity area of the Boyne Valley to Kingscourt, in County Cavan. Should this Greenway proceed it is likely to attract additional cycling tourism to the area.

4.4.2.4 **Driving Routes**

29 Fáilte Ireland has recently completed the Boyne Valley Driving Route project. Figure 4.1, **Volume 3D Figures** of the EIS shows the driving route relative to the proposed OHL. Fáilte Ireland has identified this as a tourism asset within the MSA where the proposed development is located. The route is 225km long and takes in 22 historic sites including two world heritage sites along the way. Included in the route are Brú Na Bóinne (the UNESCO World Heritage sites at Newgrange, Knowth and Dowth), Trim Castle, Monasterboice, Slane Castle and Mellifont Abbey. Phase one of the Boyne Valley Driving Route project, which included signage along the route is complete and plans are underway for the next phase regarding the layout and design of the sites to ensure a cohesive look to the drive. Funded by Fáilte Ireland, the route was created in collaboration with local authorities in Meath and Louth in a bid to revitalise the region and promote the Boyne Valley as a must-visit destination for overseas visitors.

30 As illustrated in Figure 4.1**, Volume 3D Figures** of the EIS the proposed OHL route crosses the driving route at two locations, close to Bective Abbey and close to Bhaile Ghib. There are various scenic views along the route; these are described in **Chapter 11** of this volume of the EIS.

4.4.2.5 **Activities Related to Trim Airfield**

31 Trim Airfield is located approximately 4km north-west of Trim and has one grass runway that is 560m long. It is used for a range of aviation activities including hot air ballooning, microlight flying and helicopter use. The airfield is located approximately 1.2km from the OHL. The airfield and its uses and the potential for impacts on airfield activities are described in **Chapter 12** of this volume of the EIS.

4.4.2.6 **Gaeltacht Area**

32 The Meath Gaeltacht is the smallest Gaeltacht area in Ireland and consists of two adjacent villages of Ráth Chairn and Bhaile Ghib. It encompasses a geographical area of 44km^2, which represents 1% of total Gaeltacht land area (www.udaras.ie). An evaluation of the proposed development in relation to the Gaeltacht is discussed in **Chapter 2** of this volume of the EIS.

4.4.2.7 **Dunderry Fair and Festival**

33 Dunderry Fair has been held in recent times on an annual basis since 2004 in the month of May in the field to the west of Dunderry House, which is the field adjacent to Dunderry graveyard. In 2013 it was reported that 16,000 people attended this Fair compared to 6,000 people in 2004. To date, it is reported that the Fair has donated over €200,000 to local and national charities.

The Fair, although conceived by locals in 2004, has deep historical roots. Previous to this, the last Dunderry Fair was held over 150 years ago. Activities include vintage motor parade, ICA workshops, live music, farm animals and ‗half an acre' of amusements. For more information refer to www.dunderryfair.ie.

34 Dunderry Park Festival also known as 'Spirit of Folk Festival' is held in September in Dunderry Park. This event celebrates the Autumn Equinox through ritual ceremony and includes Shamanic drumming, druidic rites as well as dance, yoga, voice and many other workshops. For more information refer to www.spiritoffolk.com. In addition to this Festival, workshops are held in Dunderry House including 'The Shaman's Journey‗ in August and November, 'The Shaman's Breath‗ in February, April, July and November, in addition to this there are ongoing courses in Shamanic Healing and Shaman Counselling Training throughout the year. From the above, it is apparent that the Dunderry area is a high amenity area with both Dunderry Fair and the Dunderry Park festival taking place once a year.

4.4.2.8 The Gathering 2013 and Other Events

35 Throughout 2013 Fáilte Ireland promoted a national tourism initiative referred to as the ‗The Gathering‗. Recently published figures by Fáilte Ireland for this initiative indicate that it has resulted in additional overseas visitors to the country and may provide a basis for future tourism growth.

36 There are a number of other local festivals and events which take place in the area, including the Drive In Bingo held in a field outside Bhaile Ghib, the location of this activity is located immediately adjacent to the proposed OHL.

4.4.3 Description of Accommodation Providers

37 There are a wide variety of accommodation types throughout County Meath, with the majority of them located in or on the outskirts of the main towns. Fáilte Ireland has provided details of all registered accommodation, which has been mapped, see Figure 4.1, **Volume 3D Figures** of the EIS.

38 The nearest registered accommodation provider to the proposed development is Kiltale Holiday Homes and Farm which is approximately 950m east of Tower 376. This consists of seven self-catering units located on a farm with various on site activities available.

4.4.4 Value of Tourism to the Area

39 The value of overseas tourism for each county in Ireland is available from statistics published by Fáilte Ireland for the period 2012. The latest available figures for 2012 for Meath are presented in the context of highest and lowest in **Table 4.1** in order to give an indication of the value of tourism to the area within a wider context.

Table 4.1: Overseas Visitor Number and Value 2012

County	Overseas Visitors ('000)	Associated Revenue (€m)
Meath	122	44
Dublin (Highest)	3,641	1,267
Longford (Lowest)	20	6

Source: www.failteireland.ie.

40 Figures for domestic tourism for each county are not available as statistics are only collected in relation to overseas visitors. However, the importance of domestic tourism is highlighted by the fact that Fáilte Ireland estimated that domestic visitors took almost nine million trips and generated expenditure of €1.7 billion in 2013.

41 Tourism is important to County Meath, particularly as it is located adjacent to Dublin, which receives the highest number of overseas tourists and revenue. Fáilte Ireland statistics record that the World Heritage Sites of Brú na Bóinne attracted in excess of 130,000 visitors in 2013.

42 Recognising the importance of tourism to economic growth and the opportunities available by being located adjacent to Dublin, the Meath Tourism - *Tourism Strategic Plan 2011-2013* recommends that Meath Tourism channels its focus of activity into two main areas to make a national and international impact:

- Heritage and Culture Tourism as Ireland's Heritage Capital; and
- Business Tourism.

43 The strategic plan recommends that all promotional activities should fall under these two main headings to ensure Meath achieves greater penetration in the heritage and culture arena and the concentive (conference and incentive) market, Ireland's two most lucrative visitor areas.

44 Development of rural tourism and leisure is identified as an important area of diversification for agricultural enterprises in the county development plan. There are a number of existing rural tourism enterprises in the county in the vicinity of the proposed development including the

Crystal Maze and Royal Breffni Tours. The alignment passes through an area with potential to be developed as a tourist attraction at Teltown.

45 Notwithstanding the statistics published by Fáilte Ireland in terms of visitor numbers and revenue, tourism revenue is an important source of income to local areas where it is earned and is likely to become more important as tourism products develop in the future.

4.5 POTENTIAL IMPACTS

4.5.1 Do Nothing

46 Tourism and amenity development is likely to evolve and develop in line with national trends, the location of visitor attractions and amenities and with local strategies. Doing nothing will have no effect on tourism and recreation in County Meath.

4.5.2 Construction Phase

47 Construction of the proposed development will be visible to tourists for the duration of the construction period, although as noted in Chapter 7, **Volume 3B** of the EIS, the linear nature of the proposed development will mean that the construction of the proposed development will be of short duration in any one locality. An outline Construction and Environmental Management Plan (CEMP) is included in this EIS as part of Appendix 7.1, **Volume 3B Appendices** of the EIS. The visual impact of the proposed development during construction is addressed in **Chapter 11** of this volume of the EIS. This will be a temporary slight impact and will not have any significant long term impacts on tourism and amenity. There may be some periodic disruption along local roads in the area during construction but this will be managed as detailed in **Chapter 13**, of this volume of the EIS.

4.5.3 Operational Phase

48 The Fáilte Ireland guidelines advise that the predicted impacts section should describe the location, type, significance, magnitude / extent of the tourism activities or assets that are likely to be affected.

49 The tourism profile of the area shows that the many of the key tourism assets identified by Fáilte Ireland, which attract very significant numbers of visitors, lie in the region of 20km from the proposed development, including Battle of the Boyne site – Oldbridge Estate, Brú na Bóinne Visitor Centre and Newgrange, Knowth and Dowth. Others tourism assets (e.g. Trim Castle and the Hill of Tara) lie approximately 6km from the proposed development, while two tourism assets (e.g. Bective Abbey and Boyne Valley Drive) lie within 1km of the proposed

development. Avoidance of the significant tourism assets has been the objective during route selection stage.

50 The context, character, significance and sensitivity of the tourism and amenity resource of the existing area have been described previously. The description concluded that the main tourism assets in close proximity of the proposed development are Bective Abbey and the Boyne Valley Driving Route. At a local level, there are other attractions and activities which take place within the vicinity of the proposed development including aviation related activities at Trim Airfield, fair / festivals and other activities in Dunderry Park and House and the Gibstown Drive In Bingo. Activities which take place throughout the area include walking, cycling, equestrian, angling, sports activities and other forms of passive and active recreation. These activities have the potential to be impacted by the proposed development.

51 While there are other tourist attractions and local amenities outside the key tourism assets, these are less sensitive to change when compared to the key assets. While tourism is important to particular areas of County Meath, overall visitor numbers to the county are high by comparison with other counties in Ireland. This arises particularly as a result of the UNESCO World Heritage Site at Brú na Bóinne. Outside of significant tourist attractions tourism revenue can be an important source of income to local areas where it is earned, particularly in rural areas.

52 While there is future potential for development of tourism in rural areas where the proposed development is located, this potential is generally based on further development of existing activities and products, such as angling, water based activities, driving, walking and cycling. The landscape and land use of an area is an important factor in the development of tourism as it provides a setting for the activities which take place in the area.

53 The proposed development will not directly inhibit any tourist and amenity activities along its route, however, the reduction in the visual amenity of a local area may be perceived as reducing the attractiveness of an area used for tourist and amenity related activities. There will be a direct though localised visual impact on a short section of the Boyne Valley Driving Route, as the line crosses this route at two locations close to Bective Abbey and Gibstown. There will be direct but limited visibility when viewed from specific locations within Bective Abbey. The potential visual impacts are detailed in **Chapter 11** of this volume of the EIS.

54 Other outdoor amenity areas and activities, including the location of Gibstown Drive In Bingo, are in close proximity to the proposed development. While the OHL will be visible from these areas and there may be a reduction in the visual amenity of these areas it is unlikely to prohibit recreational activities continuing at these locations.

55 As the proposed line route will pass through some areas of localised landscape sensitivity and, in particular, short sections of the Boyne Valley Driving Route and close to the location of Bective Abbey, it may have slight indirect impacts on the attractiveness and associated tourism and amenity value of these and other areas. The degree to which the line route could potentially affect the visual amenities of these areas is evaluated in **Chapter 11** of this volume of the EIS.

56 As the most significant tourist accommodations, attractions and activities, as identified by Fáilte Ireland and local tourism agencies, are being avoided, with the exception of the Boyne Valley Driving Route and existing activities can continue in the vicinity of the proposed development, it is reasonable to conclude that overall there may be slight localised impacts on tourism and recreational amenities and associated economic activity arising directly as a result of the proposed development.

4.5.4 Decommissioning

57 The proposed development will become a permanent part of the transmission infrastructure. The expected lifespan of the development is in the region of 50 to 80 years. This will be achieved by routine maintenance and replacement of hardware as required. There are no plans for the decommissioning of the OHL. In the event that part of, or the entire proposed infrastructure is to be decommissioned, all towers, equipment and material to be decommissioned will be removed off site and the land reinstated. Impacts would be expected to be less than during the construction phase and would be of short term duration.

4.6 MITIGATION MEASURES

58 Route selection has been the main mitigation measure used to reduce the potential for adverse impacts on tourism and amenity as a result of the operation of the proposed development and the potential for adverse impacts is classified as localised slight. Other than locating the line route to a different area, which may create more significant impacts in that area, no further mitigation measures can be employed. The route alternatives are considered in Chapter 5, **Volume 3B** of the EIS.

4.7 RESIDUAL IMPACTS

59 Once the proposed development is operational, slight localised residual impacts on tourism and amenity may arise.

4.8 INTERRELATIONSHIPS BETWEEN ENVIRONMENTAL FACTORS

60 This chapter should be read in conjunction with other chapters of this volume of the EIS including; **Chapter 2** Human Beings – Population and Economic, **Chapter 3** Human Beings – Land Use, **Chapter 6** Flora and Fauna, **Chapter 11** Landscape and **Chapter 14** Cultural Heritage for a full understanding of the main interactions between these environmental topics.

61 The main potential interactions arise from the following interrelationships:

- **Chapter 2** - Human Beings – Population and Economic – There may be a slight reduction in tourism spend and associated economic activity in the immediate areas where the proposed development will be located.

- **Chapter 11** - Landscape – The OHL will be visible from some short sections of the Boyne Valley Driving Route. This may be perceived as reducing the attractiveness of the attractions at these locations for tourism and amenity purposes.

- **Chapter 14** - Cultural Heritage – The OHL will be visible from some areas within Bective Abbey. This may be perceived as reducing the attractiveness of this area for tourism and amenity purposes.

4.9 CONCLUSIONS

62 Impacts to tourism and amenity will not be direct impacts, as no tourist sites will be physically impacted by the proposed development. Potential negative impacts on tourism and amenity are anticipated to be limited to indirect localised visual impacts on the landscape in close proximity to the OHL. The Boyne Valley Driving Route and Bective Abbey are the tourism assets which have the potential to experience such visual impacts.

5 HUMAN BEINGS – ELECTRIC AND MAGNETIC FIELDS

5.1 INTRODUCTION

1 This chapter of the Environmental Impact Statement (EIS) presents an evaluation of the proposed development as set out in Chapter 6, **Volume 3B** of the EIS**,** in relation to Electric and Magnetic Fields (EMF). The information contained within this chapter relates to the Meath Study Area (MSA) as described in Chapter 5 **Volume 3B** of the EIS.

2 Chapter 6, **Volume 3B** of the EIS describes the full nature and extent of the proposed development, including elements of the overhead line (OHL) design and the towers. It provides a factual description, on a section by section basis, of the entire line route. The proposed line route is described in that chapter using townlands and tower numbers as a reference.

3 In particular, Chapter 8, **Volume 3B** of the EIS describes those aspects of the evaluation of EMF which are common to both the Cavan Monaghan Study Area (CMSA) (refer to **Volume 3C** of the EIS) and the MSA. That chapter should be read prior to this volume for a full understanding of the environmental topic. Chapter 8, **Volume 3B** of the EIS describes the following:

- An overview of EMF:
    - Electromagnetic spectrum; and
    - Extremely Low Frequency (ELF) EMF sources and exposure considerations.
- EMF from the proposed development;
- Compliance with Exposure Guidelines;
- ELF EMF Health Research;
- The Precautionary Principle and EMF;
- Technical Calculations and Results - EMF Associated with the proposed development; and
- Summary and Conclusions.

4 This chapter provides an analysis of the EMF associated with the proposed OHL, as it pertains to the line route in the MSA.

5.2 METHODOLOGY

5 Calculations of EMF were performed to a distance of 150m either side of the centre of the OHL.

6 As discussed in Chapter 8, **Volume 3B** of the EIS the vast majority of the proposed electricity line will be supported by single circuit lattice towers. Though the proposed development is divided into the CMSA and MSA portions for ease of description of other aspects of the proposed development, the EMF from the proposed electricity line are determined by the particular configuration and tower type used in different portions of the route rather than by reference to a particular study area. The discussion of the EMF from the proposed electricity line therefore is divided into these separate sections of the proposed line with different electricity line tower configurations.

7 Over the vast majority of the proposed route, the proposed OHL will be of a single circuit configuration supported on lattice towers. In short sections elsewhere along the route, the electricity line is proposed to be built in two different configurations: single circuit supported on transposition towers in the CMSA section of the route and by utilising existing double circuit lattice towers in the MSA section of the route. **Figure 5.1** shows the location of the different sections of the electricity line route with different circuit configurations.

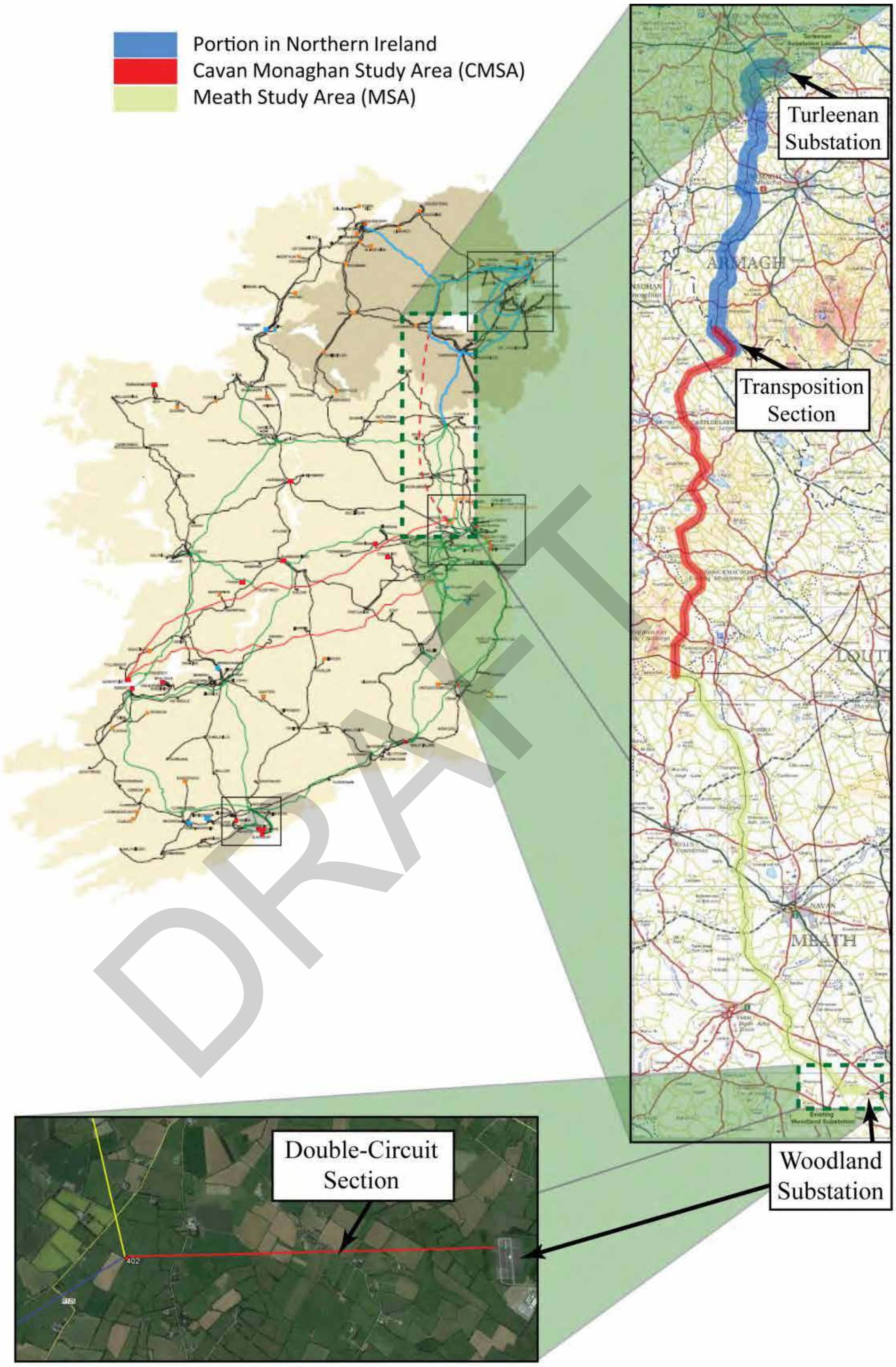

Figure 5.1: Map of the Proposed Interconnector Showing the Proposed Electricity Line Route

8 Over the short distance where it is proposed to use the unused (northern) side of the existing double circuit lattice towers, which support the Oldstreet to Woodland 400 kV circuit, for the proposed development, the EMF from the electricity line on this short segment of the route constructed on these double circuit lattice towers shown in **Figure 5.2(a)**, will differ from the EMF from the electricity line on the single circuit lattice towers and therefore is considered as a separate case. A map of this portion of the proposed development, indicating the type and location of the double circuit lattice towers is shown in more detail in **Figure 5.2(b).**

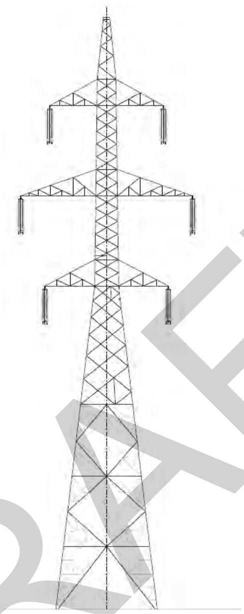

Figure 5.2(a): Existing Double-Circuit Lattice Tower

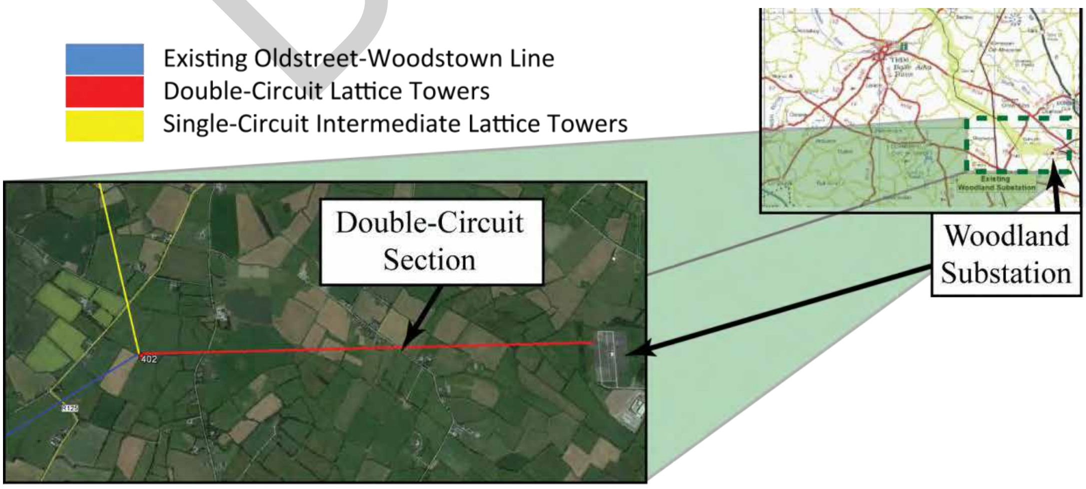

Figure 5.2(b): Map of the Proposed Development Showing the Location of the Double-Circuit Lattice Tower Section

5.3 CHARACTERISTIC OF THE PROPOSED DEVELOPMENT

9 The proposed development involves the erection of an OHL supported by steel lattice towers over a distance of approximately 54.5km and using the unused side of existing double circuit towers over a distance of 2.85km. Electric and magnetic fields are associated with OHLs.

5.4 EXISTING ENVIRONMENT

10 Chapter 8, **Volume 3B** of the EIS discusses the existing environment in relation to EMF in detail. It discuss the scientific background to EMF, gives information on the sources and levels of background EMF which are typically found in the existing environment, reviews information in relation to ELF EMF health research and provides information in relation to how EirGrid complies with exposure guidelines. Finally, Chapter 8, Section 8.7 of **Volume 3B** of the EIS (Technical Calculations) provides the methodology for and the calculations of the EMF associated with each proposed electricity line tower configuration.

5.5 POTENTIAL IMPACTS

5.5.1 Do Nothing

11 EMF background levels from existing EMF sources will be unchanged. EirGrid will continue to comply with exposure limits set out in relevant exposure guidelines.

5.5.2 Construction Phase

12 EMF only occurs when an OHL becomes operational. There will be no EMF from the OHL during the construction stage of the proposed development.

5.5.3 Operational Phase

13 EMF levels were calculated at 1m above ground, in accordance with IEC Std. 61786 (1998), using algorithms developed by the Bonneville Power Authority (BPA) of the U.S. Department of Energy (BPA, 1991). Calculated values are reported as the root-mean-square resultant quantities of the field ellipse at each location along a transect perpendicular to the electricity line

centre line at distances out to 150m[10]. Data for the proposed electricity line's geometrical configurations, conductor type and loading were provided to Exponent[11] by EirGrid.

5.5.3.1 **Magnetic Fields Associated with Single Circuit Lattice Tower Sections**

14 The magnetic field associated with the single circuit lattice tower sections of the electricity line supported on a combination of intermediate and angle towers is shown in **Figure 5.3** for both average and peak loading. Two views of the same graph are shown in each figure. Both have the same X-axis range of 0 to 150m from the centre line of the route alignment. The uppermost graph has a Y-axis range of 0 to 100 microtesla (μT)[12] and can be used to visually determine the calculated magnetic field levels at locations within 50m of the centre line relative to the International Commission on Non Ionising Radiation Protection (ICNIRP) Reference Level. The lowermost graph has a Y-axis range of 0 to 2μT and can be used to visually determine the calculated magnetic field levels at locations beyond 50m from the centreline which are indiscernible on the uppermost graph.

15 The maximum magnetic field level at average loading is calculated to be directly beneath the lines and will be approximately 16μT. The magnetic field intensity diminishes with distance, to about 1.0μT at a distance of 50m and to approximately 0.25μT at a distance of 100m from the centre line, a reduction by a factor of 64. The maximum magnetic field levels, as well as field levels at 50m and 100m from the centre line, are shown in Tables 8.5 and 8.6, **Volume 3B** of the EIS for average and peak loading, respectively.

[10] The BPA algorithms employed assume that conductors are at the midspan conductor height and infinite in extent. Near the Transposition Towers where the phase transposition takes place, the assumption of conductors of infinite extent is not satisfied, but field levels in these locations would be lower than those presented in calculations for midspan conductor heights.

[11] Exponent is the specialist consultant responsible for the preparation of the EMF aspects of this EIS.

[12] The magnetic field level of 100μT equates to the ICNIRP (1998) Reference Level; refer to Table 8.2 of Chapter 8 of **Volume 3B** of the EIS.

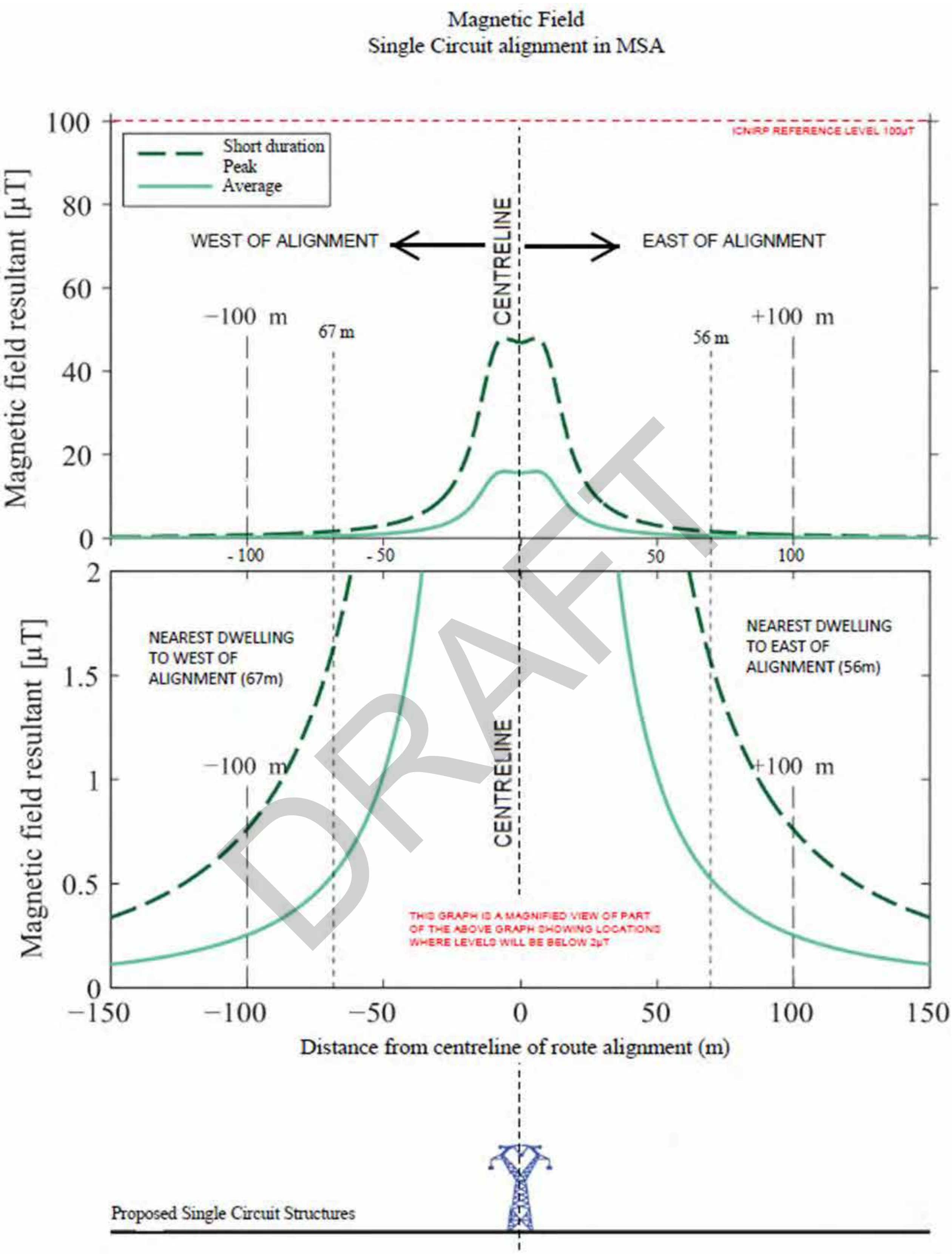

Figure 5.3: Calculated Magnetic Field Profile for the Proposed Single Circuit Lattice Tower Configuration for Short Duration Peak Load and Average Load

5.5.3.2 Electric Fields Associated with Single Circuit Lattice Tower Configuration

16 The electric field level associated with the single circuit lattice towers is shown in **Figure 5.4**. Two views of the same graph are shown in each figure. Both have the same X-axis range of 0 to 150m from centre line of the route alignment. The uppermost graph has a Y-axis range of 0 to 15kV/m and can be used to visually determine the calculated electric field levels at locations within 50m of the centre line relative to the ICNIRP Basic Restriction Level of 9kV/m[13.] The lowermost graph has a Y-axis range of 0 to 2kV/m and can be used to visually determine the calculated electric field levels at locations from 50m to 150m from the centre line which are indiscernible on the uppermost graph.

17 The maximum electric field levels beneath the electricity line is calculated to be approximately 7.9 kV/m, and decreases to below 1 kV/m beyond approximately 25m from the centre line. The highest calculated electric field levels, as well as field levels at 50m and 100m, are shown in Table 8.7, **Volume 3B** of the EIS.

[13] Refer to Table 8.2 of Chapter 8 of **Volume 3B** of the EIS.

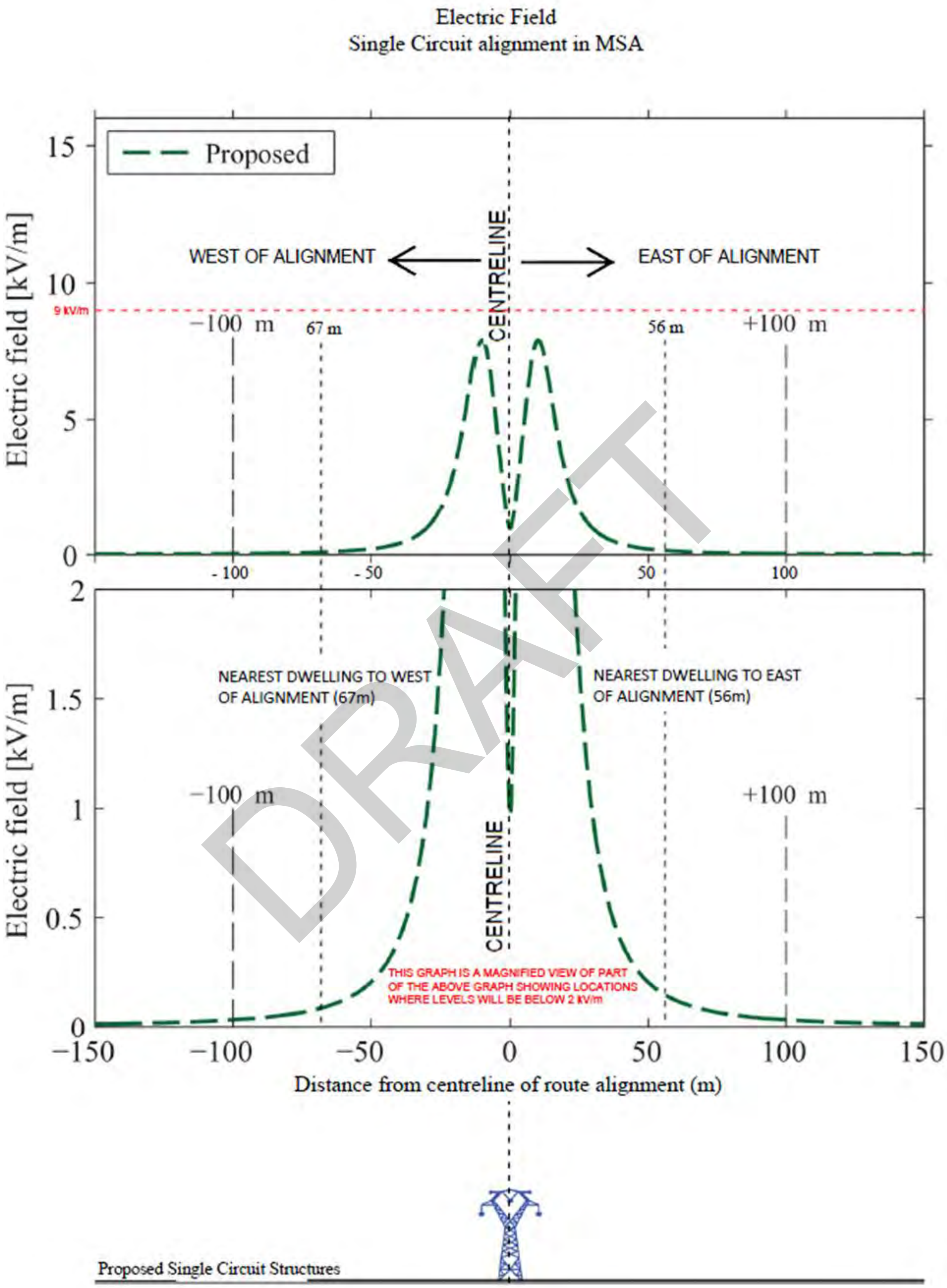

Figure 5.4: Calculated Electric Field Profile for the Proposed Single Circuit Lattice Tower Configuration

5.5.3.3 Magnetic Fields Associated with Double Circuit Lattice Tower Configuration

18 The magnetic field associated with the existing and new electricity line on the double circuit lattice towers is shown in **Figure 5.5** and is similar to that from the new single circuit electricity line described in Chapter 8, **Volume 3B** of the EIS. Two views of the same graph are shown in each figure. Both have the same X-axis range of 0 to 150m from centre line of the route alignment. The uppermost graph has a Y-axis range of 0 to 40μT[14] and can be used to visually determine the calculated magnetic field levels at locations within 50m of the centreline. The lowermost graph has a Y-axis range of 0 to 2μT and can be used to visually determine the calculated magnetic field levels at locations beyond 50m from the centre line which are indiscernible on the uppermost graph.

19 The magnetic field is calculated to be highest beneath the electricity line conductors and decreases rapidly with distance. The maximum magnetic field beneath the electricity line for two lines operating on the double circuit lattice towers is calculated to be approximately 12-14μT depending on the selected phasing. Magnetic field levels, however, decrease more rapidly with distance for the optimal phasing[15] configuration than for non-optimal phasing configuration.

20 The magnetic field level near the electricity centre line will increase due to the installation of the new circuit on the existing structures. For optimal phasing the magnetic field levels to the south will decrease by as much as 1.4μT beyond approximately 10m from the centre line. To the north of the electricity line the magnetic field levels will not change appreciably (<1μT) beyond approximately 25m from the centre line and will decrease beyond approximately 40m from the centre line. To show the effect of phasing, the magnetic field calculations associated with the optimal and non-optimal phasing configurations are shown in **Figures 5.5** and **5.6**, respectively.

21 The highest calculated magnetic fields at average loading, as well as field levels at 50m, and 100m from the centre line, are shown in Table 8.5, **Volume 3B** of the EIS for both optimal and non-optimal phasing configurations. Peak magnetic fields that might only occur for a few hours in a decade are summarised in Table 8.6, **Volume 3B** of the EIS.

22 The magnetic field level across a range of loading levels could well be substantially lower than calculated because the modelling assumptions made here are chosen to ensure a conservative estimate of magnetic field level applicable to all locations. Indications that the calculated

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[14] The ICNIRP (1998) Reference Level is 100μT - refer to Table 8.2 of Chapter 8 of **Volume 3B** of the EIS.
[15] Phase Optimisation is a _noor low cost' mitigation measure for EMF that can be applied to double circuit OHLs. It is discussed in greater detail in Section 8.7, Chapter 8 of **Volume 3B** of the EIS.

magnetic field levels are higher than would be expected under other typical loading is supported by measurements of existing 400 kV electricity lines in Ireland, which indicate that the magnetic field from 400 kV lines on similar towers is as much as three to four times lower than calculated here.

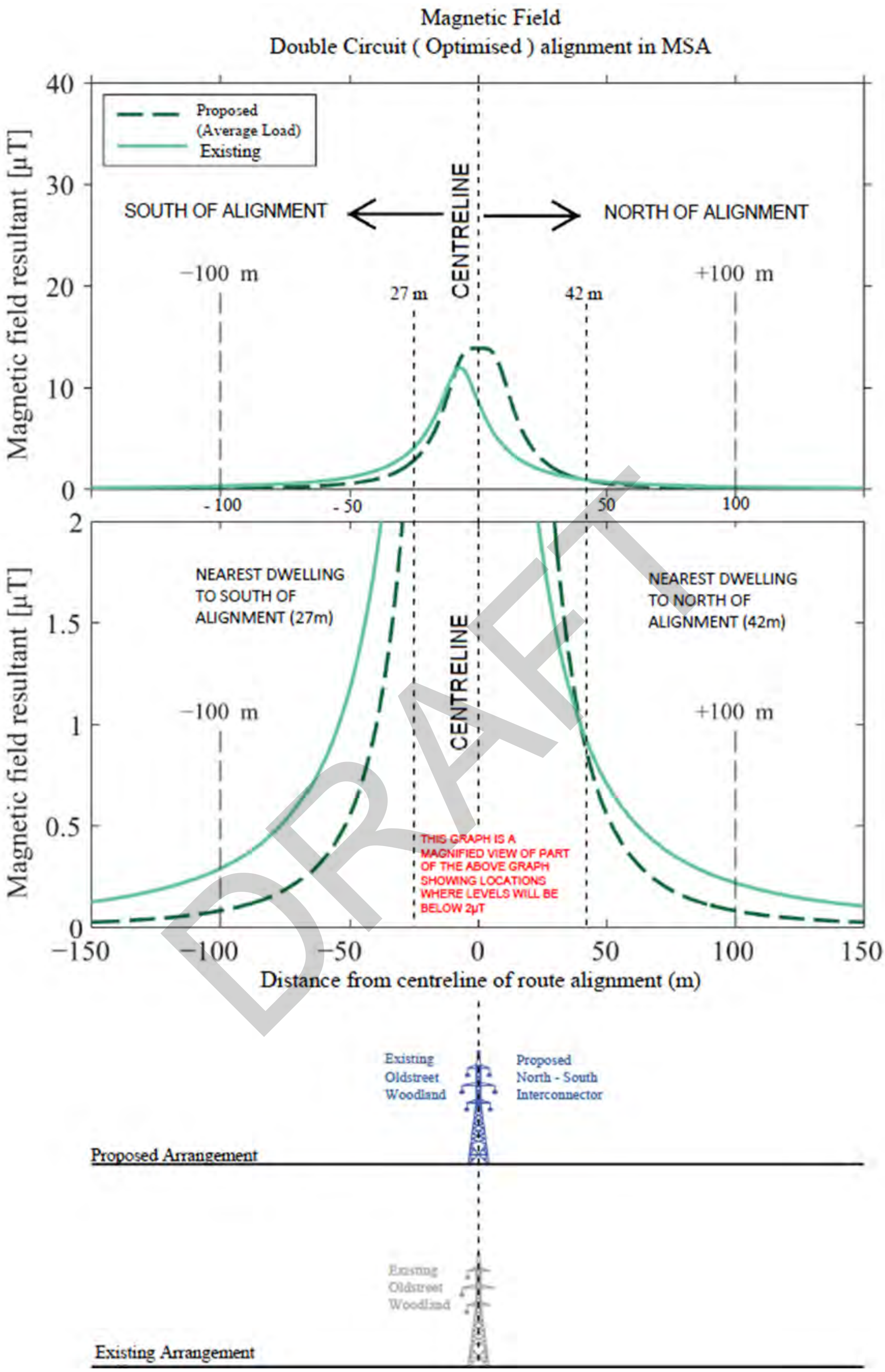

Figure 5.5: Calculated Magnetic Field Profile for the Existing and Proposed Double-Circuit Lattice Tower Configuration for Average Load and Using Optimised Phasing

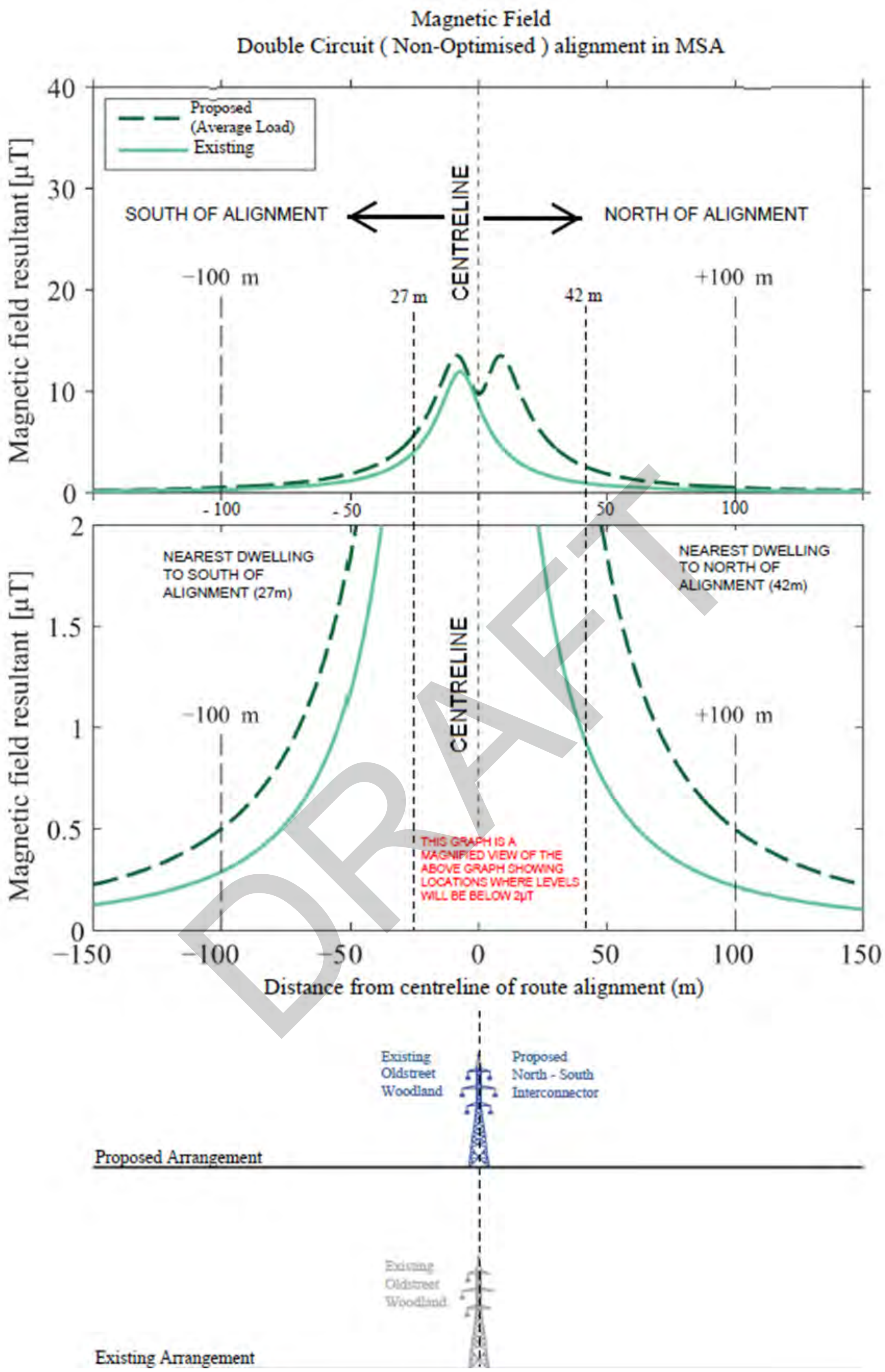

Figure 5.6: Calculated Magnetic Field Profile for the Existing and Proposed Double-Circuit Lattice Tower Configuration for Average Load and Using Non-Optimised Phasing

5.5.3.4 Electric Fields

23 The electric field from the existing and new electricity line on the double circuit lattice towers is shown in **Figure 5.7** (optimal phasing[16]) and **Figure 5.8** (non-optimal phasing) and is similar to that from the new single circuit electricity line described in Chapter 8, **Volume 3B** of the EIS. Two views of the same graph are shown in each figure. Both have the same X-axis range of 0 to 150m from centre line of the route alignment. The uppermost graph has a Y-axis range of 0 to 15kV/m and can be used to visually determine the calculated electric field levels at locations within 50m of the centre line relative to the ICNIRP Basic Restriction Level of 9kV/m[17]. The lowermost graph has a Y-axis range of 0 to 2kV/m and can be used to visually determine the calculated electric field levels at locations beyond 50m from the centre line which are indiscernible on the uppermost graph.

24 The electric field level is calculated to be highest beneath the electricity line conductors and decrease rapidly with distance. The highest electric field is calculated to vary from approximately 8.0 to 8.8kV/m depending on the phasing configuration selected, but will decrease to below 0.3kV/m beyond 50m from the centre line and to 0.04kV/m beyond approximately 100m from the centreline regardless of the selected phasing, a reduction of over 200-fold. The highest calculated electric field levels, as well as field levels at 50m, and 100m from the centre line are shown in Table 8.7 of Chapter 8, **Volume 3B** of the EIS for both optimal and non-optimal phasing configurations.

[16] Phase Optimisation is a _noor low cost' mitigation measure for EMF that can be applied to double circuit OHLs. It is discussed in greater detail in Section 8.7, Chapter 8 of **Volume 3B** of the EIS.
[17] Refer to Table 8.2 of Chapter 8 of **Volume 3B** of the EIS.

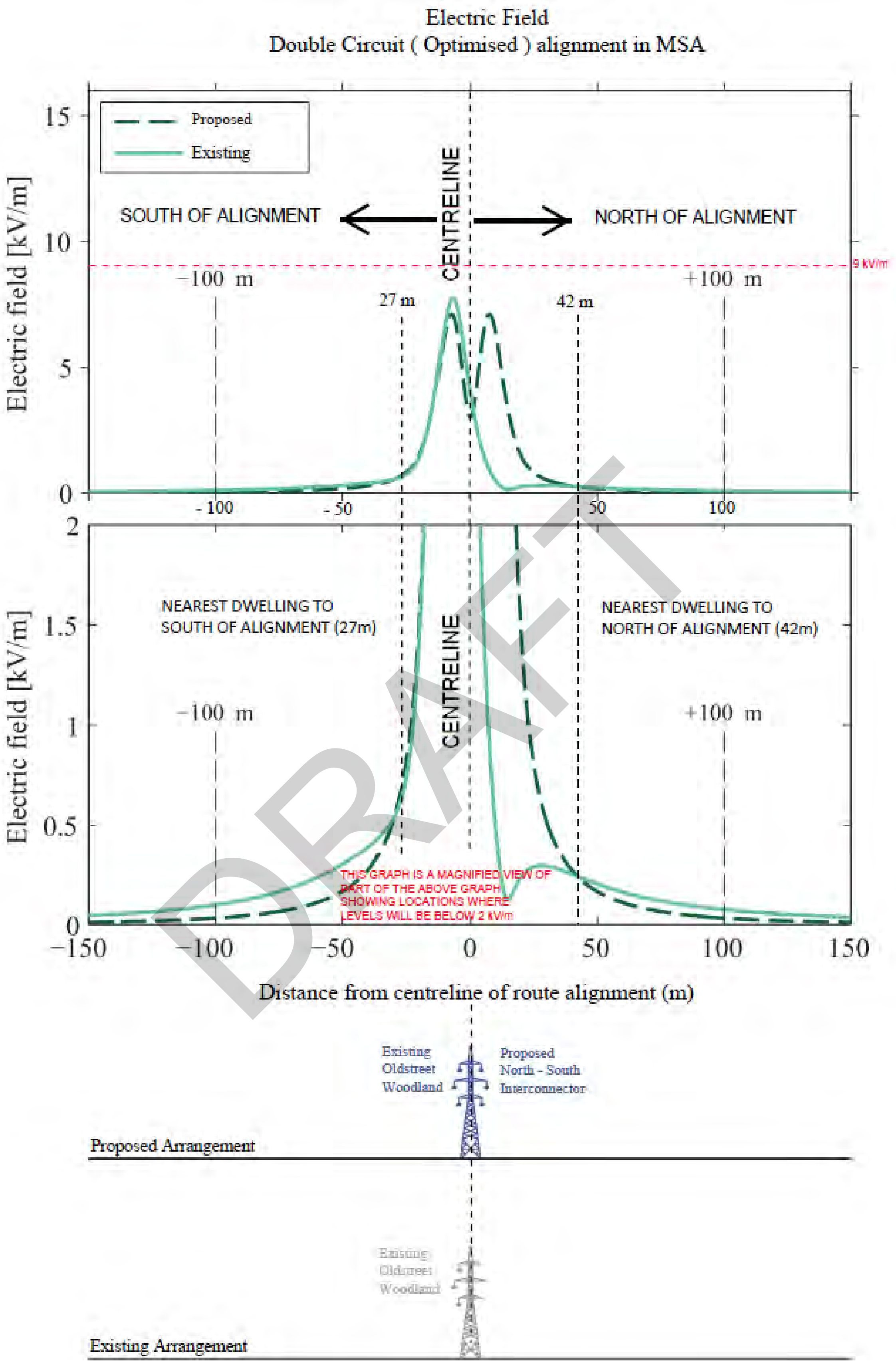

Figure 5.7: Calculated Electric Field Profile for the Existing and Proposed Double-Circuit Lattice Tower Configuration Using Optimal Phasing

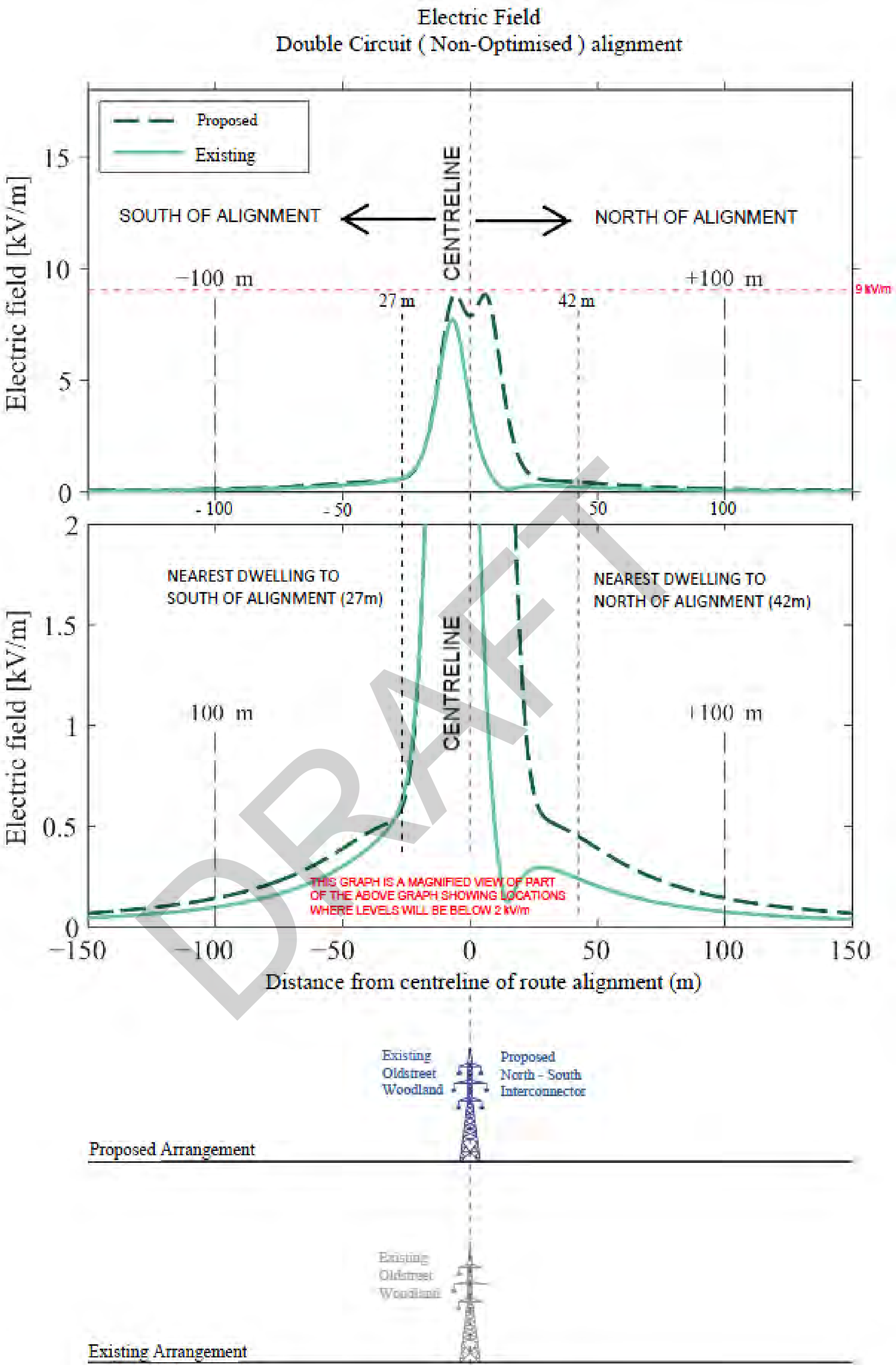

Figure 5.8: Calculated Electric Field Profile for the Existing and Proposed Double-Circuit Lattice Tower Configuration Using Non-Optimal Phasing

5.5.4 Decommissioning

25 The proposed development will become a permanent part of the electricity infrastructure. The expected lifespan of the development is in the region of 50 to 80 years. This will be achieved by routine maintenance and replacement of hardware as required. There are no plans for the decommissioning of the OHL. In the event that part of, or the entire proposed infrastructure is to be decommissioned, all towers, equipment and material to be decommissioned will be removed off site and the land reinstated. Impacts would be expected to be less than during the construction phase and would be of short term duration.

5.6 MITIGATION MEASURES

26 The proposed development will be operated in compliance with relevant guidelines for the control of EMF, specifically with the relevant quantitative exposure guidelines. Optimising the phase configuration of the double circuit Lattice Tower portion of the route is a ‗no or low cost' mitigation measure that may be implemented to reduce both electric and magnetic field levels. A summary table describing the reduction in electric and magnetic field levels at various distances for the optimal and non-optimal phasing configurations is shown in Table 8.8 of Chapter 8, **Volume 3B** of the EIS.

5.7 RESIDUAL IMPACTS

27 No residual impacts are anticipated as the proposed development will be operated in compliance with relevant guidelines.

5.8 INTERRELATIONSHIPS BETWEEN ENVIRONMENTAL FACTORS

28 This chapter should be read in conjunction with other chapters in this volume of the EIS including; **Chapter 2** Human Beings – Population and Economic, **Chapter 3** Human Beings – Land Use, and **Chapter 6** Flora and Fauna for a full understanding of the main interrelationships between these environmental topics.

29 Chapter 8, **Volume 3B** of the EIS details the potential for interactions between human beings and flora and fauna and the related research and scientific studies.

30 The main potential interrelationships arise from the following:

- **Chapter 2** - Human Beings – Population and Economic – There is a potential for interactions with human beings. However, the operating conditions for the proposed 400 kV line will ensure that EMF will remain below EMF guidelines for Ireland and the

EU. A survey of scientific research on topics relating EMF to health of humans did not show that EMF at these levels would have adverse effects on these populations.

- **Chapter 6** - Flora and Fauna – There is a potential for interactions with flora and fauna. However, the operating conditions for the proposed 400 kV line will ensure that EMF will remain below EMF guidelines for Ireland and the EU. A survey of scientific research on topics relating EMF to health of animal species did not show that EMF at these levels would have adverse effects on these populations.

5.9 CONCLUSIONS

31 The proposed development in the MSA area primarily involves the development of a single circuit OHL over a distance of approximately 54.5km. In addition to this distance is a 2.85km section where it is proposed to use the unused side of the existing double circuit Lattice Towers which support the Oldstreet to Woodland 400 kV circuit, for the proposed development.

32 Chapter 8, **Volume 3B** of the EIS discusses exposure guidelines, and how EirGrid complies with such guidelines. It discusses the scientific background to EMF, gives information on the sources and levels of background EMF which are typically found in the existing environment, reviews information in relation to ELF EMF health research and provides information in relation to how EirGrid complies with exposure guidelines. Having regard to the exposure guidelines outlined in Chapter 8, **Volume 3B** of the EIS the calculations of EMF provided in this section clearly demonstrate that the magnetic field levels produced by the proposed 400 kV line are below the EU (1999) exposure limits (basic restrictions) and so would not cause internal electric fields and current density to exceed these biologically based limits on exposure. Since these calculations are based on conservative assumptions about the operation of the proposed 400 kV line, they are likely to overestimate levels of EMF from the electricity line.

33 In summary, even making conservative assumptions about the operating conditions assumed for the EMF calculations that would tend to overestimate field levels, the EMF from the proposed 400 kV line is still below EMF guidelines of Ireland and the EU. A survey of scientific research on topics relating EMF to health of humans and other species did not show that EMF at these levels would have adverse effects on these populations. This evaluation is consistent with reviews by national and international health and scientific agencies.

6 FLORA AND FAUNA

6.1 INTRODUCTION

1 This chapter presents an evaluation of the proposed development as set out in Chapter 6, **Volume 3B** of the Environmental Impact Statement (EIS) in relation to the potential for ecological impacts within the Meath Study Area (MSA).

2 That chapter describes the nature and extent of the proposed development, including elements of the overhead line (OHL) design and the towers. It provides a factual description, on a section by section basis, of the entire line route. The proposed line route is described in Chapter 6, Volume 3B of the EIS using townlands and tower numbers as a reference. The principal construction works proposed as part of the development are set out in Chapter 7, **Volume 3B**of the EIS.

3 The receiving environment of the MSA is described and evaluated in terms of flora and fauna. The potential impacts (direct, indirect and cumulative) of the proposed development on flora, fauna and fisheries of the MSA are evaluated and, where necessary, mitigation measures are proposed in order to avoid or reduce the severity of impacts. The potential impacts of the proposed development on European sites (sites designated as candidate Special Areas of Conservation (cSACs) or Special Protection Areas (SPAs) that form part of the Natura 2000 network) in the surrounding area have also been evaluated. This appraisal is presented separately in the form of a *Natura Impact Statement* (NIS) (refer to **Volume 5** of the application documentation).

4 The proposed development involves the construction of 165 individual steel towers, along a route totalling approximately 54.5km in length and the stringing of conductors and the earth wires that will be supported by the towers. For the purpose of this chapter, the proposed alignment is described in a south to north direction.

5 For description purposes, the proposed transmission line including towers and conductors is generally referred to as the 'alignment or line' in text here. Towers and associated conductors are the main infrastructure being developed. The 'study area' includes the route of the alignment but also the wider area in the vicinity as relevant to key ecological receptors discussed.

6 A large number of ecological studies, consultations and associated reports have been carried out to inform the baseline ecology of the receiving environment and recommended design since 2007. These have informed the ecological impact assessment and include the following:

- *Route Constraints Report* (September 2007);

- . *Route Constraints Report Addendum*, (September 2007);
- *North-South 400 kV Interconnection Development Preliminary Re-evaluation Report* (May, 2011);
- *North-South 400 kV Interconnection Development Final Re-evaluation Report* (April, 2013);
- *North-South 400 kV interconnection Development Preferred Project Solution Report* (July 2013);
- Public consultation process; and
- Ecological studies (2007 – 2014).

7 These studies have informed the approach which has been taken throughout the route selection process with the aim of avoiding where possible, potential impacts on the ecological receptors identified. The approach includes avoiding locating structures on hedgerows and treelines of high ecological value, which are the main notable ecological receptors in the MSA.

6.1.1 Objectives

8 The objectives of the flora and fauna evaluation included:

- To carry out a desktop study in order to determine the previously recorded ecology of the area;
- To carry out a baseline flora and fauna survey of areas in close proximity to the proposed development;
- Evaluate the ecology of the MSA based on the results of desk and field studies and identify Key Ecological Receptors (features of ecological importance that may be sensitive to impacts from the proposed development);
- To predict the potential direct and indirect impacts of the proposed development on the flora and fauna of the area;
- To propose mitigation measures in the design, construction and operation of the proposed development so as to minimise potential impacts on flora and fauna; and
- To prepare this chapter of the EIS (Flora and Fauna) in accordance with the requirements of national and international legislation and inform the NIS (refer to **Volume 5** of the application documentation).

6.1.2 Statutory and Guidance Documents Context

9 The appraisal has been prepared in accordance with the following legislation:

- Consolidated EIA Directive 2011/92/EU;
- *Wildlife Acts 1976-2012*;
- The Habitats Directive 92/43/EEC;
- The Birds Directive 2009/147/EC;
- The European Communities (Birds and Natural Habitats) Regulations 2011 [S.I. No. 411/2011];
- European Communities (Environmental Impact Assessment) (Agriculture) Regulations 2011 [S.I. No. 456/2011];
- European Union (Environmental Impact Assessment and Habitats) Regulations 2011 [S.I. No. 473/2011];
- European Union (Environmental Impact Assessment and Habitats) Regulations 2012 [S.I. No. 246/2012]; and
- Flora (Protection) Order, 1999.

10 In addition, in considering the ecological impacts of the proposed development in the MSA, regard was made to the following guidance and information documents:

- *Cavan County Development Plan 2014-2020*;
- Department of Arts, Heritage and the Gaeltacht (DAHG) (2011). *Irelands National Biodiversity Plan: Actions for Biodiversity 2011 – 2016*;
- Department of Environment, Community and Local Government (DoECLG) (March 2013). *Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment*;
- DoEHLG (2009). *Appropriate Assessment of Plans and Projects in Ireland*;
- EirGrid (2012). *Ecology Guidelines for Transmission Projects*; *A Standard Approach to Ecological Impact Assessment of High Voltage Transmission Projects*;
- Environmental Protection Agency (EPA) (2002). *Guidelines on the information to be contained in Environmental Impact Statements*;

- EPA (2003*). Advice notes on current practice (in the preparation of Environmental Impact Statements)*;
- EPA (2013). *Integrated Biodiversity Impact Assessment – Streamlining AA, SEA and EIS Processes: Practitioners Manual;*
- European Commission (2002). *Assessment of plans and projects significantly affecting Natura 2000 sites*;
- European Commission (2013). *Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment*;
- Fossitt (2000). *A Guide to Habitats in Ireland*;
- Institute of Ecology and Environmental Management (IEEM) (2006). *Guidelines for Ecological Impact Assessment in the United Kingdom;*
- *Meath County Development Plan 2007 – 2013*;
- *Meath County Development Plan 2013-2019*;
- National Roads Authority (NRA) (2005a). *Guidelines for the Crossing of Watercourses During the Construction of National Road Schemes;*
- NRA (2005b). *Best Practice Guidelines for the Conservation of Bats in the Planning of National Road Schemes;*
- NRA (2006a). *Guidelines for Assessment of Ecological Impacts of National Road Schemes (Revision 1, National Roads Authority);*
- NRA (2006b). *Guidelines for the Treatment of Badgers prior to the Construction of National Road Schemes;*
- NRA (2006c). *Guidelines for the Treatment of Otters prior to the Construction of National Roads Schemes. National Roads Authority, Dublin.*
- NRA (2006d). *Guidelines for the Treatment of Bats during the Construction of National Roads Schemes;*
- NRA (2009a). *Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes;*
- NRA (2009b). *Guidelines for Assessment of Ecological Impacts of National Road Schemes. (Revision 2, National Roads Authority); and*

- Smith et al. (2011). *Best Practice Guidance for Habitat Survey and Mapping in Ireland.*

- NRA (2010 Guidelines on the management of Noxious Weeds and non-Native Plan Species on National Roads (see 3C Page 6-5.

6.1.3 Meath Study Area (Ecology Context)

11 A consideration of the general ecological character of the study area is important in scoping and evaluating key ecological receptors. The MSA traverses County Meath with the most northerly towers located in County Cavan. Due consideration has been given to known ecological sites that occur in the wider MSA (within 5km of the alignment), while more detailed assessment of ecological receptors has been undertaken within the likely zone of impact which is deemed to be within an 80m wide corridor centred on the alignment.

12 The landscape in this area is largely dominated by agricultural farmland, managed for livestock rearing, dairy farming and arable farmland. Fields are typically extensive and actively managed for agriculture. Field boundaries largely consist of overgrown linear hedgerows with many growing in association with more mature trees. Mature deciduous treelines occur, notably around demesnes. Areas of immature forestry are scattered throughout the alignment including several recently planted areas (2012/ 2013) predominantly in former wet grassland.

13 A general difference exists between landscape and habitats within the study area to the north of the N52 road (Towers 280 to 237) and lands further to the south (Towers 280 to 402). This southern section consists largely of relatively flat intensively managed mixed farmland (arable and livestock grazed). Two major river crossings occur in this section, at the River Boyne (near Trim) and at the River Blackwater (near Donaghpatrick village at Teltown). This section includes a number of large demesne estates with associated mature deciduous woodland. Large fields in this section of the alignment are typically enclosed by mature, species-rich hedgerows with large mature trees. A number of these mature field boundaries will require crossing by the alignment.

14 The northern section of the MSA consists of rolling drumlins with smaller intensively managed fields typically enclosed by hedgerows. Arable land is less frequent and linear semi-natural woodland occurs at several alignment crossing points. Less managed grassland and wet grassland occurs locally, much of which has recently been drained and planted with trees. A number of lakes are located at least 0.5km from the proposed alignment in the northern section including Whitewood, Newcastle and Breaky Loughs.

15 More significant ecological features, such as designated conservation sites, semi-natural woodland, wetlands, semi-natural (unimproved) species rich grasslands, are scarce in the MSA and are largely avoided by careful line design, except where the River Boyne and River Blackwater are oversailed by the proposed alignment

16 The key static ecology features requiring consideration are the boundary hedgerows and river crossings. Treelines and rivers (including wooded riparian corridors) are the key ecological receptors requiring consideration. These habitats are also important for protected fauna as they are typically used for breeding, shelter, feeding and commuting. Mobile flocks of Whooper Swans specifically also require consideration. More significant ecological features such as designated conservation sites, and significant areas of semi-natural habitat are scarce in the area and are largely avoided by careful line design which included repeated appraisal and due consideration to ecological concerns identified during the design phase of the development.

6.1.4 Project Description

17 A detailed description of the proposed development is presented in Chapters 6 and 7, **Volume 3B** of the EIS. The key phases of the development as relevant to the evaluation of ecological impacts will consist of the construction and operational phases.

6.1.4.1 Construction Phase

18 The following activities will be undertaken during the construction phase and therefore need to be given due consideration in the evaluation of ecological impacts:

- Site clearance and any drainage requirements at tower locations to facilitate construction;
- Temporary access routes to be used by machinery during construction;
- The use of heavy machinery and associated disturbance within the ‗works area' during construction;
- The excavation of soils for the installation of tower foundations and any associated drainage requirements;
- The use of concrete and other potentially harmful substances at each works area;
- Management, storage and disposal of excavated material during the construction;
- Locations to be used by machinery for the stringing of conductors; and

- Trimming and lopping of woody vegetation to facilitate clearance beneath the line between towers.

6.1.4.2 **Operational Phase**

19 The operational phase of the development will require:

- Occasional tree trimming beneath the alignment to ensure safe clearance distances around infrastructure;
- Maintenance of towers and associated equipment throughout the lifetime of the proposed development;
- Maintenance of bird diverters as the line may pose a collision risk to vulnerable bird species; and
- Monitoring of mitigation measures (including bird diverters) to ascertain and ensure effectiveness of proposed mitigation measures, with improvements being made if and as required.

6.1.5 Constraints and Technical Difficulties

20 The main constraint during the preparation of the EIS was restricted land access to undertake baseline surveys (refer to Sections 1.5.1 and 1.5.2 of **Volume 3B** of the EIS for further details on restricted access). However, notwithstanding this difficulty, a comprehensive description of the baseline ecology of the MSA, likely to be impacted by the proposed development, is presented in this chapter of the EIS. This evaluation is based on a combination of three different survey approaches including:

- Walkover ecology surveys (see further information on methodology in **Section 6.2**) were undertaken on lands where access for survey was granted and at locations where the alignment crosses public roads. In all, 44 tower locations and associated alignment sections were subjected to walkover field surveys.
- Visual surveys of the route were undertaken from an extensive network of public roads throughout the MSA and at all locations where the alignment crosses public roads. This allowed a large proportion of the route to be viewed and together with desktop sources (Geographical Information System (GIS) and aerial photo analysis) enabled a thorough consideration, identification and confirmation of habitat types and dominant species composition. In all, approximately 68 tower locations and a large number of intervening alignment sections were subjected to visual surveys.

- The proposed line route was evaluated using LiDAR (Light Detection and Ranging) imagery (refer to Section 1.5 of **Volume 3B** of the EIS for a detailed description of LiDAR and its capabilities) and other GIS datasets (including the subsoils dataset (Meehan 2004), Ordnance Survey Ireland (OSI) six inch mapping, OSI contours, OSI 1:5,000 vector mapping) where walkover or visual surveys were not possible.

21 To overcome the difficulties with limited land access, and to ensure that appropriately robust appraisals were undertaken, a precautionary approach was adopted in the design of the proposed development. In those situations where towers are required on lands that were not subject to field survey, tower locations were selected based on the presence of habitats of low ecological value (e.g. improved agricultural grassland) thereby minimising the potential for impacts of significance associated with tower construction.

22 Further details on the methodology used in defining the baseline ecology of the study area is presented in **Section 6.2**.

6.2 METHODOLOGY

23 The ecological appraisal included three main elements to inform the baseline ecology of the MSA. These included, consultation with key stakeholders, a desktop ecological evaluation, and field surveys. The approach and methodology has regard to the guidance documents listed in **Section 6.1.2**.

6.2.1 Consultation and Constraints Identification

24 As part of the overall proposed development and EIS preparation, a desktop review was carried out to identify features of ecological importance within the wider MSA and surrounding region, including a review of sites designated for nature conservation.

25 Consultation with various state agencies and environmental Non-Governmental Organisations (NGO's) was undertaken to inform the EIS. As part of the consultation on the *Preferred Project Solution Report (PPSR)* (July, 2013) these consultees were invited to comment on the preferred line design and issues to be addressed in the environmental appraisal.

26 The project ecologist consulted with the National Parks and Wildlife Service (NPWS) through the Development Applications Unit (DAU) and directly with divisional ecologists and local staff from the Northern and Eastern Division of the NPWS, Inland Fisheries Ireland (IFI), Meath County Council and Cavan County Council.

27 A summary of key meetings conducted with prescribed authorities and key NGO parties is detailed below.

6.2.1.1 National Parks and Wildlife Services (NPWS)

28 Meetings were conducted with NPWS divisional ecologists on the following dates: 21st October 2010, 26th November 2011, 13th November 2012 and 18th December 2012.

29 The outcome of these meetings was an approach to locating the vast majority of towers off hedgerows and onto agricultural land and avoiding hedgerows and treelines. The approach also included avoiding other semi-natural habitats such as wetlands and woodlands.

30 It was confirmed that flight diverters would be used for sections of transmission lines identified as being of a localised collision risk hazard for wintering birds, in particular Whooper Swan.

31 The outcome of these meetings resulted in response letters from the Department of the Arts Heritage and the Gaeltacht (DAHG) on the 13th February and 10th April 2013, refer to **Appendix 6.2, Volume 3D Appendices** of the EIS. These letters indicated that they were satisfied with the approach being adopted in relation to ecological assessment for the development, and welcomed the fact that there would be less hedgerow loss due to the modified approach (avoidance of hedgerows and treelines).

6.2.1.2 Inland Fisheries Ireland (IFI)

32 A meeting was held with IFI on 1st October 2013 which focused on water quality protection measures and significant fisheries in the MSA. During this meeting, clarification was provided to IFI regarding the proposed development works and associated risks. It was confirmed that water pollution prevention measures would be carefully considered in the EIS. No further correspondence has been received to date.

6.2.1.3 Department of Agriculture, Food and Marine (DAFM)

33 All tower locations were reviewed by the managers of the wildlife programme in the DAFM[18]. The DAFM has a very extensive database (data as recent as 2012) of badger sett locations throughout County Meath (32.17% farmland surveyed) and Cavan (38.26% farmland surveyed) which they have gained as part of the Bovine Tuberculosis (BTB) eradication programme Eradication of Animal Diseases Board (ERAD). The DAFM advised which towers may

[18] http://www.agriculture.gov.ie/animalhealthwelfare/diseasecontrol/bovinetbbrucellosiseradicationschemes/wildlifepolicybadgers/

potentially disturb badger setts. In this regard, towers potentially close to a known badger sett were relocated as a precautionary measure in order to avoid potential impacts. It was however also noted that towers which offset hedgerows are also likely to avoid and / or minimise disturbance. It should be noted that information on badger sett locations collected under the ERAD programme is confidential and therefore locations are not detailed in this EIS.

6.2.1.4 BirdWatch Ireland

34 As part of ongoing consultation with BirdWatch Ireland, reports on Winter Bird Studies conducted in the MSA (October 2013) were submitted for comments.

35 A submission was received from BirdWatch Ireland on 6th November 2013 relating to this report and other ongoing EirGrid projects. This submission is included in **Appendix 6.2, Volume 3D Appendices** of the EIS. A number of key considerations relevant to the project were outlined as follows

- Ireland's obligations for protection of birds and the protection status of birds;
- Best practise guidelines to reduce the impact of power lines on birds;
- Potential impacts to sensitive bird species in particular collision and displacement impacts; and
- Required actions including required surveys to inform the assessment of potential impacts, recommendations for an Avian Protection Plan and post construction monitoring.

36 A subsequent meeting was held with BirdWatch Ireland on 11th December 2013. During this meeting BirdWatch Ireland reiterated concerns detailed in their submission, in particular, in relation to Whooper Swans and wider impacts on populations, appropriate mitigation and monitoring.

6.2.1.5 Meath County Council

37 A meeting was held with Meath County Council on 5th November 2013. During this meeting the following topics were considered; access requirements, water quality protection measures and management of soils in relation to excavation of tower foundations. It was confirmed to Meath County Council that a number of ecological data sources available for County Meath including Anon (2010), Martin J (2006) and Smith *et* al., (2011) were considered in the evaluation.

6.2.1.6 **Cavan County Council**

38 A meeting was held with Cavan County Council on 17th October 2013. It was outlined to Cavan County Council that the approach in the development design was to locate towers off hedgerows and to avoid other sensitive habitats such as wetlands. It was also highlighted that an extensive six years of winter bird studies has been conducted to inform the assessment of impacts on Whooper Swans and other bird species. Water quality protection was outlined by Cavan County Council as a key consideration for the construction phase of the proposed development.

6.2.1.7 **An Bord Pleanála**

39 The scoping opinion received from An Bord Pleanála (Appendix 1.3, **Volume 3B Appendices** of the EIS) identified the following issues as being relevant to this chapter of the EIS:

- Baseline data should include an ecological survey of all works sites at an appropriate time of the year. Where ex-situ impacts are possible survey work may be required outside of the development sites.

- Assess the impacts on flora, fauna and habitats with particular regard to:
  - Natura 2000 sites and other (proposed) sites;
  - Habitats and species listed on Annexes I, II and IV of the Habitats Directive;
  - Birds listed on Annex I of the Birds Directive and important habitats for birds including nesting, feeding / wintering areas and flight corridors;
  - Habitats that can be considered to be corridors or stepping stones for the purpose of article 10 of the Habitats Directive;
  - Other species protected under the Wildlife Acts, Red Data Book species; and biodiversity in general; and
  - The assessment should include the indirect effects of construction activity, including construction access, as well as long term impacts in terms of fragmentation and severance.

- An assessment of potential impacts on the aquatic environment during construction and operation, including impacts on water table levels or groundwater flow which may impact on wetland sites some distance away.

- Any proposed mitigation measures should be identified in a construction management plan which must be included as part of the EIS / NIS.

- The EIS should address the issue of invasive alien plant and animal species, and methods to ensure they are not introduced or spread.

- An assessment of the extent and cumulative impact of hedgerow removal or linear woodland loss along the route. Mitigation should include suitable planting of native species and timing of works outside the nesting season.

- Identify any requirement for licenses or derogations arising.

40 Consultees who informed this response as relevant to the flora and fauna section of the MSA included: Minister for Arts, Heritage and the Gaeltacht (Development Applications Unit), EPA, Meath County Council, Cavan County Council and Inland Fisheries Ireland. Key relevant information (relating to flora and fauna) detailed in this response, is considered in this section of the EIS.

6.2.2 Project Design Approach

41 Key project design approaches to avoid or minimise impacts (informed by a combination of: consultation outcomes, a review of known impacts of overhead electricity lines, and best practice) recommended by the project design team included:

- Avoidance of OHL development within European sites (i.e. cSACs or SPAs) and Natural Heritage Areas (NHAs) and proposed NHAs (pNHAs), except where oversailing is unavoidable at river crossings.

- Avoidance of notable semi-natural areas (non-designated – e.g. raised bogs and other wetlands, semi-natural woodland areas identified in published ecology datasets, field surveys and aerial imagery).

- Identification of non-designated ecological sites where targeted field survey was advised. Where such surveys were not possible, mitigation by avoidance was adopted.

- Minimising the development footprint and avoidance of locating towers within woodland type habitats (of some local ecological value) e.g. mature demesne woodland, linear mature semi-natural woodland.

- Sensitive location of towers with respect to hedgerows and treelines. The location of towers along hedgerows has only been considered where field survey allowed for adequate consideration of hedgerow quality in terms of ecological value and where impacts were quantitatively assessed.

- A minimum buffer zone of 5m to be retained between tower sites and all natural watercourses. Distances of over 20m are to be retained between tower locations and larger streams and rivers. Such buffer zones aim to minimise risks to water quality and associated sensitive aquatic receptors (e.g. salmonids and otter). A minimum buffer zone of 60m will be retained between tower sites and the River Boyne and River Blackwater. In the case of some minor drains / highly modified stream banks a minimum of 5m buffer will be retained.

- Avoidance of potential badger sett habitat (hedgerows / treelines and other woody habitat) and maintenance of a buffer zone (5m from outer extent of tree crown) which minimises significant risk of disturbance.

- Avoidance of known badger setts (identified during field surveys or in the DAFM dataset.

- Minimise cutting of mature trees to accommodate the OHL. Where possible impacts to mature deciduous tree lines and more extensive mature woodland in particular in demesne estates are avoided or minimised where possible.

6.2.3 Desk Study

42 As part of the overall project development and preparation of the EIS, a desktop literature review was carried out. This included a review of documented evidence regarding the effect of OHL developments on ecology as well as a review of material (published and un-published reports and datasets) to identify features of ecological importance within the wider MSA and surrounding region, including a review of sites designated for nature conservation. This involved the following:

- Identification of all sites designated for nature conservation (cSAC, SPA, NHA, pNHA) within 30km of the proposed development and a review of their site synopses, other available information and identification of potential linkage to effects from the proposed development.

- Review of Ordnance Survey maps, aerial photography and other available GIS datasets (subsoils, contour mapping etc.) to assist in identifying habitats and features of potential ecological interest that occur within the MSA.

- A review of detailed LiDAR imagery – which allowed accurate tree-line / hedgerow identification in addition to heights. A detailed description of LiDAR and its capabilities are summarised in Section 1.5 of **Volume 3B** of the EIS. This information facilitated a quantification of hedgerow / treeline impact.

- Review of EPA water quality data and river catchment water quality information (Water Framework Directive).

- Review rare and protected species records within the MSA including relevant information sources for protected flora, bats, otter, birds and badger (including the National Biodiversity Data Centre records).

- Review of ecological reports, literature and extensive database of existing ecology survey data (referenced throughout this text and listed in the bibliography) conducted for NPWS and Meath County Council (Meath Wetlands and Coastal Habitat Survey 2010). This includes relevant information for the MSA including woodland, semi-natural grasslands and wetland datasets. Sources reviewed are listed in **Appendix 6.1, Volume 3D Appendices** of the EIS.

- Detailed review of published and unpublished literature on interactions of birds and powerlines in particular, and other potential impacts of OHLs on wildlife and natural habitats.

- Consultation with interested birdwatchers / landowners regarding bird species of conservation concern, in particular Whooper Swans.

- An evaluation of impacts to hedgerows and treelines was undertaken using available GIS datasets. This study entitled *Hedgerow Impact Study*, (September 2011) assisted in informing the evaluation and informed the line design. This report is presented in **Appendix 6.3**, **Volume 3D Appendices** of the EIS.

- An evidence based study on actual impacts of electricity lines on hedgerows / treelines in other similar habitats / areas in Ireland. This was undertaken to inform the impact assessment and inform best mitigation practice. This study entitled *Intervening Hedgerow Impact* is presented in **Appendix 6.4, Volume 3D Appendices** of the EIS.

6.2.4 Field studies

43 Extensive field surveys have been carried out throughout the MSA over a seven year period (2007-2014). These included multidisciplinary ecology surveys (habitats, flora and fauna), winter and breeding bird surveys and bat surveys as presented in **Table 6.1**.

44 During these surveys, areas of scientific and / or conservation interest, as well as the presence of protected plant and faunal species, in the vicinity of the proposed development were investigated. Relevant survey reports are included as appendices (refer to **Appendices 6.3 – 6.6, Volume 3D Appendices** of the EIS) and the main findings are summarised in the body of this section of the EIS. Further details of the survey methodology is presented in the following paragraphs.

Table 6.1: Survey Works and Periods Conducted

Survey Period	Surveys Conducted
November 2007 - March 2008	Monthly winter bird surveys were conducted in the wider study area (including all route corridors). A focused flightline study was conducted on the route corridor of the final alignment (Corridor 3 and 3B).
July - September 2008	Baseline ecology surveys (habitats, breeding birds and protected mammals and flora) conducted at alignment road crossings.
October 2008 - April 2009	Monthly winter bird surveys were conducted in the wider study area (including all route corridors). A focused flightline study was conducted on the route corridor of the final alignment (Corridor 3 and 3B).
April - June 2009	Baseline ecology surveys (habitats, breeding birds and protected mammals and flora) conducted at alignment road crossings.
October 2009 - April 2010	Monthly winter bird surveys were conducted in the wider study area (including all route corridors). A focused flightline study was conducted on the route corridor of the final alignment (Corridor 3 and 3B).
March - July 2010	Walkover surveys were conducted on specific landholdings where consent was granted. These surveys included an evaluation of hedgerow ecological value, bird survey, habitat description including botanical identification, assessment of bat roost potential and recording of other mammal evidence (otter and badger signs). Bat activity surveys were conducted at alignment road crossings.
October 2010 - April 2011	Monthly winter bird surveys were conducted in the wider study area (all route corridors). A focussed flightline study was conducted at identified relevant locations on the route corridor of the final alignment.
May - June 2011	An evidence based study was conducted to assess actual impacts of locating towers on hedgerows in summer 2011 by examining existing electrical infrastructure. This report looked at the longer-term impacts of locating towers in hedgerows and informed approaches for minimising impacts with future developments.
October 2011 - April 2012	Monthly winter bird surveys were conducted in the wider study area (all route corridors). A focussed flightline study was conducted at identified relevant locations on the route corridor of the final alignment.
July 2012	A study on potential impacts caused by lopping of trees / hedgerows under the then indicative line route was conducted in summer 2012.
April - July 2012	Breeding bird surveys were conducted from the extensive road network crossed by the alignment and noteworthy habitats up to 2km away. These surveys targeted key relevant and sensitive ground nesting bird species including Lapwing, Snipe and Curlew.
October 2012 - April	Monthly winter bird surveys were conducted in the wider study area (including all

Survey Period	Surveys Conducted
2013	route corridors). A focused flightline study was conducted at identified relevant locations on the route corridor of the final alignment.
March-July 2013	Breeding bird surveys were conducted from the extensive road network crossed by the alignment and noteworthy habitats up to 2km away.
August, September and October 2013	Bat activity surveys were conducted at alignment road crossings.
July - September 2013	Multi-disciplinary walkover surveys were conducted on specific landholdings where consent was granted. These surveys included an evaluation of hedgerow ecological value, identification of larger treelines potentially impacted (for checking accuracy of LiDAR tree height evaluation), bird survey, habitat description including botanical identification, consideration of bat roost potential, recording of other mammal evidence (otter and badger signs).
July - October 2013	Multi-disciplinary walkover surveys (habitats, birds and protected mammals and flora) were conducted at alignment road crossings. Specific bat surveys were conducted at alignment road crossings.
October 2013 - April 2014	Monthly winter bird surveys were conducted in the wider study area A focused flightline study was conducted at identified relevant locations on the route corridor of the final alignment.
June, July and September 2014	Bat activity surveys were conducted at alignment road crossings.
Late March - August 2014	Breeding bird surveys were conducted from the extensive road network, crossed by the alignment and noteworthy habitats up to 2km away.

6.2.4.1 Habitats

45 A multi-disciplinary walkover survey following the methodology outlined by the NRA (2009) was undertaken in areas along the proposed alignment where access for surveying was permitted by landowners. This included a survey of the proposed location of towers, temporary access routes, stringing areas and areas beneath the proposed conductors (intervening hedgerows and habitats). A visual survey of the proposed route was also undertaken from the extensive network of public roads throughout the MSA and at all locations where the alignment crosses public roads. This allowed a large proportion of the route to be surveyed in the field. These visual surveys were deemed to be adequate to assess habitats of low ecological interest (following methodology outlined in Smith *et al,* 2011). These surveys aimed to record the habitats, flora and fauna present within the survey area as described in the following paragraphs.

46 Where land access was available, surveys were undertaken of all semi-natural habitats encountered along the alignment including the collection of data on dominant vegetation, qualitative consideration of plant species diversity, vegetation structure, topography, drainage, disturbance and management. The data was recorded and the habitats encountered during site visits were classified in accordance with Fossitt (2000) and where appropriate, reference was made to the EU Habitats Directive classification. Specific surveys of hedgerows and treelines were undertaken with a view to assessing their importance based on species composition, structure and management. The methodology used during the survey of hedgerows broadly followed those proposed by Murray (2003). Walkover surveys along watercourses in the vicinity of the proposed development were also undertaken. Watercourse characteristics including bankside vegetation, substrate, and flow rate were recorded. An evaluation was made on the suitability of the habitat for aquatic species of conservation concern.

47 Species identification and nomenclature follows Parnell and Curtis (2012) for higher plants, Watson (1981) for bryophytes and Fitter *et al.* (1984) for grasses and sedges.

48 In addition to habitat surveys, fauna surveys were conducted to assess usage of the areas by birds and mammals (see below).

49 Following the completion of desktop analysis and field surveys, habitat maps of the entire proposed alignment were prepared according to the methodology outlined in Smith *et al*. (2011). The habitat maps detail habitats and habitat complexes recorded within the alignment including a general 40m buffer zone either side of the centre line and the extent of LiDAR imagery (dated November 2013). The mapping takes account of whether the habitat determination was made by detailed field survey, visual field inspection from a distance or from remote sensing techniques as recommended by Smith *et al.* (2011).

50 Faunal surveys were conducted to evaluate usage of the areas by birds and mammals (see below regarding extent of survey). Considering the characteristics of the habitats present and the nature of the proposed development, it was considered unnecessary to carry out evaluations of more specialised groups such as invertebrate species although incidental records of Lepidoptera (Butterflies and Moths) and Odonata (Dragonflies and Damselflies) were made.

6.2.4.2 **Birds**

51 Early scoping was informed by extensive consultation (NPWS and public consultation) and a detailed literature review (e.g. Lack 1986; Gibbons *et al*. 1993; Crowe 2005; Lynas *et al.* 2007; Colhoun and Cummins 2013 and EirGrid 2012). Scoping studies identified birds and specifically Whooper Swans as a faunal group requiring consideration in the study area.

Whooper Swans are listed on Annex I of the EU Birds Directive and are known to occur in significant numbers throughout the wider study area. The species is also reported as being vulnerable to potential collision as they lack agile flight (EirGrid 2012).

52 Extensive multi-year and seasonal bird surveys were conducted to take into account all bird species likely to be present throughout the year within the MSA and their activities (i.e. breeding, wintering and passage migrant bird species) focusing on identified sensitive species and in particular species of conservation significance (Lynas *et al.* 2007 & Colhoun and Cummins 2013) and Annex I of the EU Birds Directive identified as occurring in the study area. These species were the 'Target Species' upon which bird survey efforts focused. The main aim of these studies was to determine the distribution and abundance of species of conservation significance throughout the wider study area that are likely to be sensitive to the proposed development.

53 A full year of bird surveys (undertaken as monthly surveys) was conducted in 2009, 2012, 2013 and 2014. In addition to these full annual surveys, winter bird surveys were undertaken in 2008, 2010 and 2011. These are discussed below under Breeding and Wintering birds.

6.2.4.2.1 Breeding Birds

54 Annual breeding bird surveys were conducted (refer to **Table 6.1**). The appraisal was also informed by a desk study, consultation and public feedback. The final 2014 report (which includes both the Cavan Monaghan Study Area (CMSA) (refer to **Volume 3C** of the EIS) and MSA) considers all survey years to date and is presented in **Appendix 6.5, Volume 3D Appendices** of the EIS.

55 The breeding bird surveys were carried out during the recommended period for conducting breeding bird surveys (late March to end of July inclusive, with more focussed surveys in April, May and June). The methodology broadly followed BirdWatch Ireland countryside breeding bird survey methodologies and appropriate methods detailed in Gilbert *et al.* (1998). A section of road / track at all alignment road crossings was walked and all birds were recorded by sight and call. In addition, fields and other habitats off the road were surveyed for bird activity using binoculars (10 x 42 magnifications) or telescope as required. Lakes, ponds, rivers and woodlands were surveyed for wildfowl, waders and passerines (as relevant). Such surveys were also undertaken within lands that were accessed elsewhere along the alignment.

56 The surveys were conducted early to mid-morning (between 5.30am and 12pm). Further surveys were conducted from suitable vantage points for birds of prey during the afternoon period, to determine presence / absence of these species. Evening surveys were also conducted when daily bird activity increased again. Suitable habitat for breeding birds including

scrub, cutaway bog, rivers (e.g. Boyne and Blackwater) and lakes (e.g. Whitewood Lough) were surveyed in the general area of the proposed alignment (within 1km). Particular attention was paid to lakes and ponds where species prone to collision with OHL including Mute Swan, Great Crested Grebe, Coot, Grey Heron and Cormorant may potentially breed.

57 All bird species were recorded by call and sightings and based on the summary findings of the two repeat surveys conducted per season, bird breeding was categorised as:

- Probable / confirmed breeder (B);
- No breeding evidence though possibly breeding (NC); and
- Non-Breeder i.e. wintering, passage migrant or habitat unsuitable (NB).

58 A list of bird species was detailed for each location and signs of breeding activity were recorded in the field. Based on the findings of the early and late season survey (overall year), a summary list of target breeding bird species was compiled. Location and comments on general abundance and habitat association are provided for all target species of conservation significance. Weather conditions during all of the site visits were deemed to be suitable for carrying out bird survey work.

59 Any nocturnal bird activity was recorded during bat surveys to determine presence of species such as Woodcock.

6.2.4.2.2 Wintering Birds - Whooper Swans

60 Whooper Swans were identified at an early stage in the project as a key target species requiring survey to inform the overall appraisal and mitigation for the proposed development. Other less significant target species identified were wildfowl such as: Mute Swan, Cormorant and duck species.

61 Surveys were conducted based on Wetland Bird Survey (Webs) Core Counts methodology detailed in Gilbert *et al.* (1998) and Vantage Point flightline surveys were based on Scottish Natural Heritage (2013) methods as appropriate. Surveys focused on target species identified during scoping and in consultation with NPWS. However, the survey allowed for identification of other potentially relevant species that may occur based on suitable habitats present e.g. Hen Harrier Winter Roosts (CMSA relevant only - refer to **Volume 3C** of the EIS).

62 As detailed in **Table 6.1**, seven years of extensive surveys were conducted within the study area including all route corridors considered in earlier stages of the project development and the wider landscape including up to 5km east and west of the outer corridors focussing on key sites and target species. **Appendix 6.6, Volume 3D Appendices** of the EIS details the most recent (2013 / 2014) *Winter Bird Report* which includes a summary of previous survey findings.

63 Extensive drive round surveys were conducted of known winter bird sites (sourced from BirdWatch Ireland I-Webs database) and numerous other potential sites in the vicinity of the proposed development. All sites were scanned using binoculars and telescopes as appropriate, from vantage points on public roads. Likely habitats close to these sites were also checked, as were areas deemed suitable for Whooper Swans that were seen whilst driving between sites. Records were taken of numbers of Whooper Swans, weather conditions and habitat type. Other species of conservation concern were also recorded if observed.

64 In order to determine flight lines, dawn and dusk vantage point surveys were conducted. These vantage point locations were chosen based on known areas utilised by Whooper Swans, observed flocks (during drive around) and known roost sites nearby in which potential for flight lines and hence collision risks are most likely to arise. Potential sites (lakes and identified forage areas) were checked before commencement of watches (before dusk) to determine where Whooper Swans were located and hence observe the direction and locations to which these birds flew. Dawn watches generally commenced half an hour before sunrise and continued for a further hour after. Similarly, dusk watches generally started half an hour before sunset and continued for a further hour after to detect night flying birds which was possible as they are very vocal. Daylight surveys of Whooper Swans were also conducted (although Whooper Swans do not generally move much during daytime feeding periods). Based on changes in numbers of individuals at key sites between survey dates and overnight, it was determined if unrecorded flights had occurred.

65 In addition to standard terrestrial survey methods, aerial survey from light aircraft was undertaken. Two aerial surveys per year were conducted of the entire MSA in winters 2010 / 2011, 2011 / 2012 and 2013 / 2014. Three surveys per year were conducted in 2012 / 2013. The survey methodology followed the NPWS approach for monitoring extensive and relatively inaccessible SPAs such as the Shannon Callows. A four seat, single engine light aircraft was used for the survey. The surveys were undertaken in conditions of good light and visibility, when flocks of Whooper Swans were detectable up to at least 10km either side of the aircraft. To minimise disturbance, the plane avoided flying below 1000 feet (approximately 300m) as much as possible. Two experienced ornithologists undertook the Whooper Swans census.

66 These aerial surveys allowed confirmation of total numbers of Whooper Swans and locations utilised within the MSA, including areas that could not easily be surveyed during terrestrial surveys. This survey methodology also had the added benefit of verifying the accuracy of standard terrestrial surveys. It also indicated any sites where more survey work would have been beneficial regarding potential flight lines and allowed accurate counts of birds at specific sites and the overall survey area.

6.2.4.3 Terrestrial Mammals

67 A terrestrial mammal survey was carried out on all sites (lands where permission to survey was granted) targeting particular potential breeding habitat (i.e. hedgerows / treelines) in the vicinity of the proposed tower locations. The key target mammals potentially occurring within habitats which may be potentially affected by the proposed development are badger, bat species and, to a much lesser extent, otter and deer species. Other species as detailed in **Table 6.12** are also considered in the evaluation. Potentially suitable bat roost trees and foraging habitat were also noted (see bat survey methodology in **Section 6.2.4.3.3**).

68 Badgers setts and otter holts tend to be located in unmanaged woody vegetation associated with hedgerows / treelines and in the case of otters, drains and streams linked to more significant foraging habitat e.g. rivers and lakes (Hayden and Harrington 2000). Outside these areas, in managed farmland (where the towers are mostly located) the risk of disturbance to breeding sites is very low. In this regard mitigation by avoidance was adopted in those areas not subject to walkover surveys by ensuring that tower locations are removed from areas that provide suitable badger or otter habitat as described above. The presence of other protected species including Irish Hare, Pine Marten and Red Squirrel were recorded if signs were observed. Other common mammal species were also noted.

69 All signs and tracks were evaluated as they were encountered in the field (Bang and Dahlstrom, 2004). Suitable mammal habitat and incidental records of other common faunal groups were also noted e.g. deer species, Irish Hare and rabbits.

70 Survey methods adopted during the target species surveys, for otter and badger are outlined as follows.

6.2.4.3.1 Otter

71 Dedicated otter surveys were conducted at river and bridge crossings within or close to the alignment and a minimum 100m upstream and downstream (where access was possible) to confirm otter presence in the area.

72 In addition, all drains and watercourses at lands accessed were checked for signs of otter presence and activity such as holts (breeding and temporary), slides and territorial marking points (spraints), with each sign recorded.

6.2.4.3.2 Badger

73 Badger activity was determined by surveys for setts, trails, latrines and feeding signs. Surveys for badger activity were undertaken at those lands that were subject to field survey (landholdings where permission was granted and alignment road crossings) paying particular attention to suitable habitat in proximity to the alignment (proposed tower locations, temporary access routes and habitat traversed by the alignment). The DAFM provided information as to whether proposed towers and associated works areas were likely to be located in close proximity to badger setts based on their available data. Based on this information, all proposed tower and works locations were located at a suitable location so as to avoid disturbances to badger setts.

6.2.4.3.3 Bats

74 No known bat roosts or sites with significant potential for bat roosts such as old buildings, souterrains, caves, houses or other buildings will be impacted by the proposed development. Potential tree roost sites were identified along the proposed alignment. The confirmation of bat roosts in trees is very difficult, even with regular bat activity surveys at potential tree roost sites, as noted by Kelleher and Marnell (2006). The approach to the bat survey is outlined below:

- Trees which have potential as bat roosts were identified with reference to Andrews *et al*. (2013). These generally consist of trees with cavities, splits, cracks, knotholes and under loose bark. These features are consistent with old mature or dying trees. Mature trees with potential as temporary bat roosts may be impacted due to tree lopping required. An evaluation was conducted of potential tree roost sites from alignment road crossings. Where land access was facilitated, tower locations and sections where tree lopping is likely to be required were examined.

- Where treelines could not be accessed or viewed; GIS mapping of larger / mature treelines was reviewed to identify very mature treelines where precautionary mitigation is proposed. This appraisal was based on detailed aerial imagery (including LiDAR). This allowed more mature treelines consistent with possible bat roost sites to be identified.

- During late Summer and Autumn 2013 and Summer 2014, dusk and night bat activity surveys were conducted at all alignment road crossings, using a bat detector in dual mode (heterodyne and frequency division). This allowed the detection of bat presence, evidence of roosts from bat emergence at dusk and song perches, habitat associations, and relative abundance. Bats were identified by their ultrasonic calls coupled with behavioural and flight observations. The bat survey was conducted from dusk to dark and into night. The survey involved spot surveys (generally 5 to 10 minute duration) at all road crossings focussing on mature treelines. In addition, a drive round survey at and between all road crossings was conducted based on detection and car speed detailed outlined in Roche et al. 2012. All rivers and lakes in the vicinity of the proposed alignment were surveyed.

75 The bat surveys conducted allowed for the:

- Determination of any evidence of bat roosts (to support visual assessment);
- Confirmation of key habitats where bats congregate e.g. taller mature hedgerows;
- Identification of bat species present in the area;
- Identification of tree lines / mature deciduous woodland areas where precautionary mitigation is recommended; and
- The findings of the survey within a large subsample of possible bat roost habitat (treelines/ hedgerows at road crossings) provided data on the likelihood of bat roosts being present in trees across the entire route.

6.2.4.4 **Fisheries and Aquatic Ecology**

76 Ponds and lake habitats will be avoided by the proposed development. A number of streams and larger rivers will be oversailed by the proposed development. Visual surveys of these watercourses in the vicinity of the alignment were undertaken. Watercourse characteristics including bankside vegetation, substrate and flow rate were recorded. An assessment was made on the suitability of the habitat for aquatic species of conservation concern (e.g. freshwater crayfish and Atlantic Salmon). Watercourses were mapped according to Fossitt (2000).

77 Given that direct impacts are avoided to streams and rivers it was considered that no instream sampling was required.

78 Towers are not located in or along watercourse riparian zones. In this regard the potential for direct impacts to water courses and associated protected species is avoided.

79 For more information on water quality protection and the approach to minimise impacts to associated fisheries and aquatic ecology refer to **Chapter 8** of this volume of the EIS.

6.2.4.4.1 Other Fauna

80 The Common frog (*Rana temporaria*), the Smooth newt (*Triturus vulgaris*) and the Common lizard (*Lacerta vivipara*) are all protected species under the *Wildlife Act 1976 and 2000* (as amended) and have a widespread distribution in Ireland. Each of these species are likely to occur within the MSA. Pools, ponds, drainage ditches and wet grasslands provide suitable habitat for amphibians in the area. The Common lizard is widespread in suitable habitats such as dry banks, heathland and bog habitats. These species and potential breeding habitat were noted if seen.

81 Other species such as Marsh fritillary (*Euphydryas aurinia*) may potentially occur within the MSA. Signs of this species were searched for during field surveys based on Northern Ireland Environmental Agency (2011) methods.

82 Taking into consideration the ecology of the MSA coupled with the characteristics of the proposed development it was considered unnecessary to carry out field surveys of other more specialised faunal groups including fungi, invertebrates and moths.

6.2.5 Evaluation of Ecological Significance

83 The significance of any particular predicted impact is a combined function of the value of the affected feature (its ecological importance), the type of impact and the magnitude of the impact. It is necessary, therefore, to determine the value of ecological features within the MSA in order to evaluate the significance and magnitude of possible impacts.

84 The method of evaluating ecological significance used in this study is based on a standard approach developed by the NRA (2009b), in the Ecological Assessment of National Road Schemes and has been adopted for use in electricity transmission projects (EirGrid, 2012). The results of desktop and field surveys were used to evaluate the significance of identified ecological sites located in the MSA on an importance scale ranging from international (A) - national (B) - county importance (C) - local importance, high value (D) - local importance, low value (E). Those features identified as being of high local importance or greater, are then given particular mention in the ecological evaluation as ‗Key Ecological Receptors' when considering the potential for significant impacts and subsequent requirement for appropriate mitigation. The criteria shown in **Table 6.2** have been used in evaluating ecological value within the MSA. In addition, to the criteria listed in **Table 6.2** the evaluation of habitats and species also considers other factors such as potential ecological value, secondary supporting values where habitats may perform a secondary ecological function and the social values of an ecological feature such as educational, recreational and economic value.

85 Specific habitat and species (non sites) identified were evaluated based on protected status and in the case of specific habitats they are identified if they are potentially of high local ecological value.

86 Individual hedgerow and treeline habitat at tower locations were summarised into one of three evaluation categories (high, moderate or low) broadly based on NRA (2006a) – *Ecological Criteria for Evaluation of Hedgerows* and also with reference to Smith *et al.* (2011).

87 This evaluation for each hedgerow surveyed can be summarised briefly as follows:

- High Value – These hedgerows are relatively rare. They are generally a species rich, robust and relatively wide hedgerow dominated by native species and generally include old 'standard' trees and or associated watercourses. Woodland ground flora indicator species will typically be well represented. Protected mammal breeding sites (e.g. bats, badger, otter) are more likely to be present. These hedgerows tend to be old semi-natural linear woodland habitats and many are associated with old townland boundaries. Many will have streams associated.

- Moderate Value – These hedgerows are the typical hedgerows common in the Irish landscape, variably managed to the requisite criteria (refer to NRA 2006).

- Low Value – These are generally the most managed hedgerows and relatively species poor. Many have an overgrazed field layer and will have low to moderate woody species diversity. Many of these hedgerows will be remnant hedgerows. This type of hedgerow is also relatively common.

Table 6.2: Criteria used in Assessing the Ecological Importance of Sites

Ecological Evaluation Scheme (NRA 2009b)

International Importance:
• ‗European Site‘, including candidate Special Area of Conservation (cSAC) or Special Protection Area (SPA);
• Site that fulfils the criteria for designation as a ‗European Site‘ (see Annex III of the Habitats Directive, as amended);
• Features essential to maintaining the coherence of the Natura 2000 Network;
• Site containing ‗best examples‘ of the habitat types listed in Annex I of the Habitats Directive;
• Resident or regularly occurring populations (assessed to be important at the national level) of the following:
    - Species of bird, listed in Annex I and / or referred to in Article 4(2) of the Birds Directive; and / or
    - Species of animal and plants listed in Annex II and / or IV of the Habitats Directive;
• Ramsar Site (Convention on Wetlands of International Importance Especially Waterfowl Habitat 1971);
• World Heritage Site (Convention for the Protection of World Cultural & Natural Heritage, 1972);
• Biosphere Reserve (UNESCO Man & The Biosphere Programme);
• Site hosting significant species populations under the Bonn Convention (Convention on the Conservation of Migratory Species of Wild Animals, 1979);
• Site hosting significant populations under the Berne Convention (Convention on the Conservation of European Wildlife and Natural Habitats, 1979);
• Biogenetic Reserve under the Council of Europe;
• European Diploma Site under the Council of Europe; and
• Salmonid water designated pursuant to the European Communities (Quality of Salmonid Waters) Regulations, 1988, (S.I. No. 293 of 1988).

National Importance:
• Site designated or proposed as a Natural Heritage Area (NHA);
• Statutory Nature Reserve;
• Refuge for Fauna and Flora protected under the Wildlife Acts;
• National Park;
• Undesignated site fulfilling the criteria for designation as a Natural Heritage Area (NHA); Statutory Nature Reserve; Refuge for Fauna and Flora protected under the Wildlife Acts; and / or a National Park;
• Resident or regularly occurring populations (assessed to be important at the national level) of the following:
    - Species protected under the Wildlife Acts; and / or
    - Species listed on the relevant Red Data list; and
• Site containing ‗viable areas‘ of the habitat types listed in Annex I of the Habitats Directive.

County Importance:
• Area of Special Amenity;
• Area subject to a Tree Preservation Order;
• Area of High Amenity, or equivalent, designated under the County Development Plan;
• Resident or regularly occurring populations (assessed to be important at the County level) of the following:
    - Species of bird, listed in Annex I and / or referred to in Article 4(2) of the Birds Directive;
    - Species of animal and plants listed in Annex II and / or IV of the Habitats Directive;
• Species protected under the Wildlife Acts;
• Species listed on the relevant Red Data list;
• Site containing area or areas of the habitat types listed in Annex I of the Habitats Directive that do not fulfil the criteria for valuation as of International or National importance;

Ecological Evaluation Scheme (NRA 2009b)
• County important populations of species, or viable areas of semi-natural habitats or natural heritage features identified in the National or Local BAP, if this has been prepared; • Sites containing semi-natural habitat types with high biodiversity in a county context and a high degree of naturalness, or populations of species that are uncommon within the county; and • Sites containing habitats and species that are rare or are undergoing a decline in quality or extent at a national level.
Local Importance (higher value): • Locally important populations of priority species or habitats or natural heritage features identified in the Local BAP, if this has been prepared; • Resident or regularly occurring populations (assessed to be important at the Local level) of the following: - Species of bird, listed in Annex I and / or referred to in Article 4(2) of the Birds Directive; - Species of animal and plants listed in Annex II and / or IV of the Habitats Directive; - Species protected under the Wildlife Acts; and - Species listed on the relevant Red Data list. • Sites containing semi-natural habitat types with high biodiversity in a local context and a high degree of naturalness, or populations of species that are uncommon in the locality; and • 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; and • Sites or features containing non-native species that are of some importance in maintaining habitat links.

[Source: *Guidelines for Assessment of Ecological Impacts of National Road Schemes* (2009) – page 16.]

cSAC = candidate Special Area of Conservation; SPA = Special Protection Area; NHA = Natural Heritage Area

BAP = Biodiversity Action Plan (these have been published for many local authority areas)

6.2.6 Assessment of Impacts and Impact Significance

88 The evaluation of impacts is broadly based on guidance offered by the Institute of Environmental and Ecological Management (IEEM) in the published *Guidelines for Ecological Impact Assessment* (2006) with reference to national guidance provided in EirGrid (2012), NRA (2009) and EPA (2002). Impacts are discussed and evaluated in relation to impact type (positive, neutral or negative), character and sensitivity of the affected feature, magnitude, duration, reversibility, timing and frequency.

89 Criteria for describing and assessing impact and magnitude are presented in **Tables 6.3** and **6.4**.

Table 6.3: Criteria Used in Ecological Impact Assessment

Positive or Negative:	Is the impact likely to be positive or negative? International and national policy now pushes for projects to deliver positive outcomes for biodiversity.
Character:	The type of habitat (e.g. natural or highly modified woodland; mature or recently established, wet or dry) is important, as is the quality of the site (e.g. undamaged active blanket bog).
Significance:	State whether a site has a designation, such as a SAC or NHA, or contains a listed (Annex I) habitat. The ecological value of a site can be assigned a rating using an evaluation scheme (e.g. undesignated areas of semi natural broadleaved woodland are normally rated as high value, locally important).
Sensitivity:	Indicate changes that would significantly alter the character of an aspect of the environment (e.g. changes in hydrology of a wetland due to construction of access road).
Magnitude and extent:	A scheme may effect only a small part of a site but the area of habitat affected in that location (in hectares) should be given in the context of the total area of such habitat available (e.g. 1ha of a woodland which measures 30ha in total.)
Duration:	Indicate the time for which the impact is expected to last prior to recovery or reinstatement of impacted habitats and / or species. The duration of an activity may differ from the duration of the resulting impact caused by the activity (e.g. short term construction activities may cause disturbance to birds during the breeding season, however, there may be longer term impacts due to a failure to reproduce in the disturbed area during that season). EPA (2002) timescales used as follows: • Temporary (0-1 years) • Short term (1-7 years) • Medium term (7-15 years) • Long term (15-60 years) • Permanent (60+ years)
Reversibility:	Identify whether an ecological impact is permanent (non-reversible) or temporary (reversible – with or without mitigation).
Timing and Frequency:	Some changes may only cause an impact if they happened to coincide with critical life-stages or seasons (for example, the bird nesting season). This may be avoided by careful scheduling of the relevant activities.

(Sources: IEEM, (2006); EPA (2002))

Table 6.4: Criteria for Assessing Impact Magnitude

Impact Magnitude	Definition
No change:	No discernible change in the ecology of the affected feature.
Imperceptible Impact:	An impact capable of measurement but without noticeable consequences.
Minor Impact:	A change in the ecology of the affected site which has noticeable ecological consequences outside the development boundary, but these consequences are not considered to significantly affect the distribution or abundance of species or habitats of conservation importance.
Moderate Impact:	A change in the ecology of the affected site which has noticeable ecological consequences outside the development boundary. These consequences are considered to significantly affect the distribution and / or abundance of species or habitats of conservation importance.
Substantial Impact:	A change in the ecology of the affected site which has noticeable ecological consequences outside the development boundary. These consequences are considered to significantly affect species or habitats of high conservation importance and to potentially affect the overall viability of those species or habitats in the wider area.
Major Impact:	A change in the ecology of the affected site which has noticeable ecological consequences outside the development boundary. These consequences are considered to be such that the overall viability of species or habitats of high conservation importance in the wider area is under a very high degree of threat (negative impact) or is likely to increase markedly (positive impact).

(Source: Gittings, (1998); EPA (2002))

90 A separate evaluation of impacts procedure is detailed specifically for collision risks to Whooper Swans. The evaluation is more relevant to bird species. It is based on sensitivity of populations and magnitude of possible impacts, as outlined in **Table 6.5**. The magnitude of possible impact considers the proposed development in the context of the survey findings and likely impacts from a development of this nature based on existing information and evidence of co-existence.

91 This approach follows standard assessment criteria based on Percival (2003) with additional consideration of NRA (2009b). Sensitivity and magnitude risk is determined based on:

- Seven years of information gathered on winter bird distribution, known wintering bird concentrations, significance of these concentrations and flight line surveys conducted;
- Desk study / literature review on potential impacts and mitigation approaches; and

- Evidence of actual impacts determined through ongoing studies / observations by surveyors.

Table 6.5: Criteria for Assessing Impact on Bird Species

Components	Definition
Sensitivity factor	**VERY HIGH:** Species that form the cited interest of SPAs and other statutorily protected nature conservation areas. Cited in this case means mentioned in the citation text for the site as a species for which the site is designated. **HIGH:** Species that contribute to the integrity of an SPA but which are not cited as species for which the site is designated. Ecologically sensitive species including the following: divers, common scoter, hen harrier, golden eagle, rednecked phalarope, roseate tern and chough. Species present in nationally important numbers (>1% Irish population). **MEDIUM:** Species on Annex 1 of the EC Birds Directive Species present in regionally important numbers (>1% regional (county) population), other species on BirdWatch Ireland's red list of Birds of Conservation Concern. **LOW:** Any other species of conservation interest, including species on BirdWatch Ireland's amber list of Birds of Conservation Concern not covered above.
Magnitude of Possible Impact	**VERY HIGH:** Total loss or very major alteration to key elements / features of the baseline conditions such that the post development character / composition / attributes will be fundamentally changed and may be lost from the site altogether. Guide: < 20% of population / habitat remains. **HIGH:** Major loss or major alteration to key elements / features of the baseline (pre-development) conditions such that post development character / composition/ attributes will be fundamentally changed. Guide: 20-80% of population / habitat lost. **MEDIUM:** Loss or alteration to one or more key elements / features of the baseline conditions such that post development character / composition / attributes of baseline will be partially changed. Guide: 5-20% of population / habitat lost. **LOW:** Minor shift away from baseline conditions. Change arising from the loss/alteration will be discernible but underlying character / composition / attributes of baseline condition will be similar to predevelopment circumstances / patterns. Guide: 1-5% of population / habitat lost. **NEGLIGIBLE:** Very slight change from baseline condition. The change is barely distinguishable, approximating to the 'no change' situation. Guide: < 1% population / habitat lost.

92 The considerations of magnitude and sensitivity are brought together in order to determine the significance of the potential impact. This is achieved by cross-tabulating the magnitude and sensitivity, using **Table 6.6**, to give a prediction of the significance of each potential impact on bird species.

Table 6.6: Significance Matrix: Combining Magnitude and Sensitivity to Assess Significance of Potential Impact on Bird Species

SENSITIVITY (→) / MAGNITUDE OF EFFECT (↓)	Very High	High	Medium	Low
Very High	Very High	Very High	High	Medium
High	Very High	Very High	Medium	Low
Medium	Very High	High	Low	Very low
Low	Medium	Low	Low	Very low
Negligible	Low	Very low	Very low	Very low

93 The following is a summary description of each category of significance, as outlined in **Table 6.6**:

- **Very low** and **low** should not normally be of concern and there is no requirement for further mitigation.
- **Medium** represents a potentially significant impact that requires careful individual evaluation. It may be of a scale that can be resolved by revised design and /or appropriate mitigation.
- **Very high** and **high** represent a highly significant impact on bird populations.

6.2.7 Appropriate Assessment

94 Article 6(3) of the EU Habitats Directive requires an ‗Appropriate Assessment' to be carried out by a competent authority where a plan or project is likely to have a significant impact on a designated European Site (commonly referred to as a Natura 2000 site). In Ireland, European Sites include cSACs and SPAs.

95 The EU Commission's methodological guidance (2002) promotes a four stage process to undertaking Appropriate Assessment with the outcome of each successive stage determining if a further stage in the process is required. The first stage is referred to as Screening, and this is carried out to determine the potential for significant impacts from the plan or project, alone and or in combination with other plans or projects on European Sites. The outcome determines the necessity for undertaking a more detailed (Stage 2) Appropriate Assessment and preparation of

a Natura Impact Statement (NIS) where potential impacts are deemed to be of significance. It is the responsibility of the competent authority (or consenting authority) to undertake the Appropriate Assessment.

96 In the case of the proposed development (MSA and CMSA), a NIS was prepared (refer to **Volume 5** of the application documentation) as the potential for significant impacts on two European sites (River Boyne and Blackwater cSAC, and the River Boyne and Blackwater SPA) could not be ruled out through Screening.

97 Having considered the issue of Stage 1 Screening (for Appropriate Assessment) without reference to mitigation measures, in conducting a Stage 2 Appropriate Assessment, mitigation measures should be tested to ensure they are effective and capable of implementation. Hence, a series of mitigation measures have been developed to ensure that the proposed development will not adversely affect the integrity of the European sites concerned. These measures are detailed in the NIS where it is concluded that the conservation interests of the relevant European sites will not be compromised and that the development will have no adverse impact on the integrity of the relevant sites.

6.3 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

98 The potential impacts on flora and fauna in the MSA occur during both the construction and operational phase. Details of the potential impacts are included in **Section 6.5**. Overall, the construction programme is anticipated to last approximately three years. The proposed development entails the construction of towers as individual sites separated on average by a distance of approximately 340m. In general the construction phases can be broken down into the following: site preparation works (including minor civil works, such as laying of temporary access tracks, removal of fences and erection of temporary fencing where required), installation of tower foundations, erection of towers, guard poles, tree lopping, stringing of conductors, commissioning of the line and reinstatement of land.

99 The following activities and ecological features in particular warrant specific attention in the consideration of potential impacts:

- Construction Phase:
  - Permanent and Temporary habitat loss during site clearance / construction;
  - Disturbance to Fauna; and
  - Pollution runoff risks to surface and groundwater quality (aquatic receptors).
- Operational Phase:

- Presence of OHL (conductors and earth wire) may present a collision risk to sensitive bird species; and
- Ongoing maintenance activities.

6.4 EXISTING ENVIRONMENT

6.4.1 Designated Conservation Areas

100 The location of designated sites within 30km of the alignment are illustrated in Figure 6.1, **Volume 3D Figures** of the EIS. The extensive buffer zone 30km is used to ensure adequate consideration is given to all sites potentially linked to the development. Sites detailed include candidate cSAC, SPA for Birds, NHA and pNHA.

101 Further details of those designated sites within 5km of the alignment is presented in **Table 6.7**. Considering the scale and characteristics of the proposed development, it is considered highly unlikely that sites further than 5km would be impacted. However, due consideration is given to sites outside of this 5km radius where there is potential for the following impacts:

- Designated sites known to support important populations of wintering birds; and
- Designated aquatic sites located downstream of the alignment.

102 Where it is deemed that the conservation interests of such sites could potentially be impacted, they are also included within **Table 6.7**, which lists designated sites in order of increasing distance from the alignment.

103 Further detail regarding cSAC and SPA (European) sites is provided in the NIS, (refer to **Volume 5 of this application)**.

Table 6.7: Designated Sites for Nature Conservation within 5km of the Alignment within the MSA

Site Code	Site	Designation	Site Description	Approximate Distance to the Alignment
002299	River Boyne and River Blackwater	cSAC	The site is designated for the following; River Lamprey *Lampetra fluviatilis,* [1106] Salmon *Salmo salar* (only in fresh water), [1355] Otter *Lutra lutra,* [7230] Alkaline fens, [91E0] Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*).	0km (oversailed)
04232	River Boyne and River Blackwater	SPA	The river site is designated for breeding Kingfisher *Alcedo atthis.*	0km (oversailed)
001558	Breakey Loughs	pNHA	This lough contains lakes, wetlands and associated semi natural shoreline woodland.	1.3km
001357	Trim	pNHA	This site is included in the River Boyne and Blackwater SAC / SPA.	2.3km
001324	Jamestown Bog	NHA	This site is designated for protection of raised bog.	2.9km

104 There are 3 designated areas for conservation within 5km of the development. Of these, the River Boyne and Blackwater (cSAC and SPA) is oversailed by the alignment twice, with conductors the only element of the development proposed to be located within the site boundary. The River Boyne and Blackwater cSAC is selected for habitats including alkaline fen and alluvial woodlands, both listed on Annex I of the EU Habitats Directive. This cSAC is also selected for Atlantic salmon, otter and River / Brook Lamprey, all listed on Annex II of the EU Habitats Directive. This river is also designated as an SPA for breeding Kingfisher. SPAs for birds are designated based on the presence of internationally significant populations of listed bird species. Kingfisher is listed on Annex I of the EU Birds Directive.

105 The point where the alignment crosses the Boyne section includes the river channel. The northern side is a steep bank with scattered mature hawthorn, elder and ruderal vegetation. Immediately adjacent to the northern river bank are taller ash trees. The closest tower, Tower 355 is located in farmland close to the cSAC boundary (approximately 6m). However it is located 60m from the actual river watercourse. The southern bank is flatter and consists of

improved grassland with no significant woody vegetation. Tower 356 is approximately 160m from the cSAC boundary and river watercourse.

106 The point where the alignment crosses the River Blackwater section consists of the main river channel with improved grassland fields up to within approximately 5m of the edge of the channel either side. A narrow riparian fringe consisting of wet grassland vegetation and a few scattered low willow trees adjacent to the river channel. Three towers are relatively close to the cSAC boundary as follows. Tower 311 is located in farmland approximately 191m south of the SAC boundary (195m from the river edge). Tower 310 is located in farmland approximately 88m north of SAC boundary (100m from the river edge) in farmland. Tower 309 is located in a hedgerow with associated wet grassland 84m north-west of the SAC boundary (105m from the river edge).

107 Jamestown Bog (NHA) is the next closest designated site (2.9km) and it is considered that no impacts will arise to this site due to distance from the development and absence of direct connections to the designated site from areas within the development footprint.

108 No other European sites occur within 5km of the development and no other sites will be measurably affected by the development.

109 Breaky Lough is a pNHA which is avoided by the development and hence will not be affected.

110 Trim pNHA is avoided by the development and hence will not be affected.

6.4.2 Non-Designated Sites of Conservation Interest

111 A number of non-designated sites of varying ecological value that occur in proximity to the alignment were identified during the desktop studies. These sites together with a brief description and evaluation are listed in **Table 6.8.**

Table 6.8: Non Designated Sites of Ecological Value in Proximity of the Alignment within the MSA

Site Name	Description	Evaluation	Location (with reference to alignment)
Cutover Bog at Emlagh	Remnant raised bog and extensive cutover bog. Extensive bog woodland fringe. Large Heath Butterfly.	County	Area identified is a minimum 500m from nearest Towers 294 to 290.
Brittas Estate Woodlands	Key core areas identified in NSNW Woodland Habitats 2010 data set - consist of mature demesne woodland.	Local Importance (Higher Value)	Areas identified > 50m from closest Tower 266 and alignment.
Newcastle Lough	Managed as a Nature Reserve by the Irish Wildlife Trust[19] This site is used regularly by Cormorant and Mute Swan and irregularly by Whooper Swan as a roost site.	County	Newcastle Lough is located > 2km east of nearest Tower 250 and alignment
Miltown Crossroads	NSNW Woodland Habitats 2010 data set - consist of riparian oak –ash-hazel woodland.	Local Importance (Higher Value)	Areas identified > 850m from closest Tower 246 and alignment
Wetland in townland Balloughly	Wetland habitats including marsh, dense willow scrub and associated habitats.	Local Importance (Higher Value)	Wetland 125m north of nearest Tower 240 and alignment

112 All non-designated sites of high conservation value located in proximity of the alignment have been avoided through careful selection of the final route.

6.4.3 Rare and Protected Flora

113 **Table 6.9** presents the protected (*Flora Protection Order, 1999)* or rare plant species with records occurring in grid squares N85, N86, N87, N88 and N89 (from Preston *et al*., 2002). The habitat requirements of these species are also presented (Webb *et al* 1996) and the likelihood of any impacts. No rare or protected flora were recorded during the course of field surveys in the vicinity of the proposed development. Bog Rosemary *Andromeda polifolia* was recorded at the Cutover Bog area at Emlagh (refer to **Table 6.9**) which is avoided by the proposed development.

[19] http://iwt.ie/what-we-do/reserves/newcastle-lake-co-meath/.

Table 6.9: Rare and Protected Plant Species Previously Recorded in the Study Area

Common name	Latin name	Status	Category	Habitat Requirements	10km Square	Likelihood of Impact
Small Cudweed	*Filago minima*	Protected	Data Deficient Species. Not recently recorded (Martin, 2006)	Sandy and gravelly places, mainly in South and East; rare.	N79	None
Cowslip	*Primula veris*	Scarce	Species not Considered Threatened in the Republic of Ireland but protected in NI.	Pastures; frequent in the centre	N79 N88 N87 N86 N85 N95 N94	Possible at Tower locations in grassland
Betony	*Stachys officinalis*	Protected	Endangered. Not recently recorded (Martin, 2006)	Woods and bushy places	N88	Possible in mature woodland habitat crossed
Bog-rosemary	*Andromeda polifolia*	(NI)	Species not Considered Threatened in the Republic of Ireland but protected in NI	Bogs, mostly lowland; frequent in the Centre; rare elsewhere.	N79 N87 N86	None towers avoid this habitat
Shepherd's-needle	*Scandix pecten-veneris*	Protected	Extinct	Tilled fields	N86	None
Hairy St John's-wort	*Hypericum hirsutum*	Protected	Endangered	Woods and shady places; locally frequent in the Liffey valley, very rare elsewhere.	N86	Unlikely towers avoid this habitat
Red Hemp-nettle	*Galeopsis angustifolia*	Protected	Endangered. Not recently recorded (Martin, 2006)	Calcareous gravels, especially on eskers in the East -Centre; rare.	N85	None towers avoid this habitat

Source: Preston *et al* 2002

6.4.4 Habitats

6.4.4.1 **General Ecological Character of the Route**

114 The route is described to introduce the ecological character along sections and also to illustrate the context of recognisable ecological features of high local value. The description of the line route is from south to north. The line route is broken into two broad regions – Southern and Northern section. Within each of the two regions, subsections based on groups of towers are described with details of key ecological features.

6.4.4.1.1 Southern Region – (Woodland Substation - Tower 280)

Woodland - Bogganstown (existing transmission line to New Tower 402)

115 Land use along the route of the existing towers consists predominantly of intensively managed mixed farmland with dense linear hedgerow / woodland field boundaries.

116 Hedgerow field boundaries are the key ecology features identified as they are traversed by the alignment.

Bogganstown - Branganstown (crossing of R154): Towers 402 – 374

117 Land use along this route consists predominantly of large fields of intensively managed arable and cattle grazed farmland, typically with mature hedgerows and treelines at field boundaries. New forestry planting (2012/2013) is evident in the townland of Culmullin.

118 Noteworthy ecological habitats are mature linear woodland and hedgerows at field boundaries and the Derrypatrick and Boycetown River crossings. The Boycetown River crossing in particular includes a less managed floodplain with unimproved grassland / scrub / linear hedgerow - riparian habitat. No towers will be located in this area.

R154 (Branganstown) - R161 crossing (South-west of Bective Abbey): Towers 374 – 353

119 The landscape is relatively flat and dominated by large arable fields with smaller fields used for cattle, sheep and horse grazing. Mature linear woodland is typical on field boundaries. Between Tower 356 and 355 the line route crosses Boyne River cSAC / SPA. Scrub and a line of ash trees occur adjacent to the northern side of the river channel. A stream crossing, which is a tributary of the River Boyne but located outside the cSAC, is crossed between Towers 364 and 365. The proposed OHL oversails an esker feature with low scrubby semi natural woodland with taller immature ash between Towers 364 and 363. Roadside grassland verges are notably species rich in this area. In addition, a number of scarcer farmland breeding bird species were recorded in this area including Yellowhammer, Tree sparrow and Skylark. Kingfishers are a common breeding bird species along the River Boyne and tributaries.

R161 crossing (South-west of Bective Abbey) - Durhamstown: Towers 353 - 324

120 The landscape is relatively flat and dominated by mixed farming with mature hedgerow / treeline field boundaries. There is a large demesne estate (Dunderry area) which has mature treelines and woodlands. The main wooded area and the most robust treelines at Dunderry estate are avoided. The line will cross several mature linear woodland field boundaries between Towers 342 and 340. The Clady River (which is a tributary of the River Boyne) is crossed between Towers 350 to 351. Between Tower 332 and 330 an extensive area of conifer plantation woodland is traversed.

Durhamstown - Teltown: Towers 324 - 308

121 The landscape is relatively flat and dominated by arable farming with some livestock grazing. Field boundaries are typically hedgerows / mature linear woodland. The line crosses the M3 road between Tower 319 and 320. A tributary of the River Blackwater is crossed between Towers 318 and 317. The line crosses the River Blackwater SAC / SPA between Towers 311 and 310. Tree cover is limited at this location. Conductors also cross a drainage channel of the River Blackwater floodplain and an isolated area of less improved wet grassland / tall herb habitat between Tower 309 and 308. This general area is used by Whooper Swans and a flightline occurs at the River Blackwater crossing point.

Teltown – N52 road: Towers 308 – 280

122 The landscape is relatively flat and managed principally for livestock grazing with some arable fields. Mature trees in field boundaries are typical in this area. Areas of forestry and less managed farmland are traversed in places. A large area of degraded raised bog / bog woodland is avoided to the west of Tower 290 in the townland of Emlagh. The land north of Mountainstown Demesne is more open with very large arable / dairy farms. This area is used occasionally by foraging and roosting Whooper Swans. At the N52 road the land starts to rise into rolling drumlin country. Noteworthy areas of local ecological interest crossed include:

- Mature forestry between Towers 301 and 300 and between Towers 298 and 297;
- Less managed farmland with breeding Lapwing west of Towers 296 and 295 in the townland of Oristown;
- Mature treelines with associated wet ditches between Towers 289 and 288 at Mountainstown Demesne; and
- Whooper Swan foraging and roosting areas at Cloony and Drakerath townlands.

6.4.4.1.2 Northern Region – (North of N52 road: Towers 280 – 237)

Clooney - West Kilmainhamwood Village: Towers 280 – 251

123 The landscape in this area is dominated by long low hills with large improved pasture fields and some arable land. The main features of ecological value are limited to hedgerows and woodland at Brittas Estate Whitewood Lough is an important local ecological feature located, at its closest point, approximately 600m east of the alignment.

124 Key features of ecological value in this area are:

- Mature deciduous woodland at Brittas Estate: Between Towers 269 and 267 the edge of one block of mature deciduous woodland is crossed while a wider block is also crossed between Towers 268 and 267. Tree species include mature beech, oak, ash, holly and non-native laurel.
- Three stream crossings with associated semi natural woodland (low growing) between Towers 260 and 261, Towers 259 and 258 and Towers 252 and 251 (Kilmainhamwood River). These woodland habitats will be crossed but impacts to trees avoided.
- Whooper Swans use the area west of the alignment in particular at Cruicetown. A flightline also crosses this section to Whitewood Lough though the bulk of Whooper Swan activity was recorded to the west of the alignment.

West Kilmainhamwood Village – Start Cavan Monaghan Study Area (CMSA): Towers 251 - 237

125 This area is dominated by low drumlin hills. Habitats typically consist of improved pastures with scattered fields of semi improved species poor, wet grassland. Fields are relatively small and lined with lower hedgerows which include scattered semi mature trees dominated by Ash. This area has been extensively drained and planted with new forestry in 2012 / 2013 on former species poor wet grassland.

6.4.4.2 Habitat Descriptions

126 This section describes habitats identified within an 80m corridor centred on the proposed line route. It also considers habitats traversed by temporary access routes, many of which extend beyond 80m.

127 This section of the report should be read in conjunction with Figures 6.2.1 - 6.2.21(Habitat Maps), **Volume 3D Figures** of the EIS which details all habitats identified within the 80m corridor including the alignment. A cover sheet indicates all habitat types and mosaic identified in habitat mapping.

128 A list of flora species recorded is detailed in **Appendix 6.8, Volume 3D Appendices** of the EIS.

129 In addition**, Appendix 6.7** Flora & Fauna Plates of Survey Area), **Volume 3D Appendices** (of the EIS illustrates the typical habitats recorded within the wider MSA.

130 Habitat types recorded at and adjacent to the development site are summarised below (Fossitt 2000). The vast majority of these habitats described are crossed by the alignment (conductor only) but not necessarily directly impacted by tower locations or construction activity areas.

- Freshwater: Other artificial lakes and ponds (FL8);
  Eroding / upland Rivers (FW1);
  Depositing / Lowland rivers (FW2); and
  Drainage ditch (FW4).
- Grassland: Improved agricultural grassland (GA1);
  Dry calcareous and neutral grassland (GS1);
  Dry meadow and grassy verge (GS2); and
  Wet grassland (GS4).
- Woodland & scrub: Oak-ash-hazel woodland (WN2);
  Broadleaved woodland (WD1);
  Conifer plantation (WD4);
  Scrub (WS1);
  Immature woodland (WS2);
  Hedgerows (WL1); and
  Treelines (WL2).
- Cultivated & built land: Arable crops (BC1);
  Stonewalls and other stonework (BL1); and
  Buildings and artificial surfaces (BL3).

6.4.4.2.1 Other Artificial Lakes and Ponds

131 Several small ephemeral ponds with no fringing wetland vegetation were located in improved grassland within the MSA. These ponds are not considered to be of high ecological value and will be avoided by site works.

6.4.4.2.2 Rivers (FW1) and (FW2)

132 The proposed alignment crosses 41 identified watercourses including 2 along the existing section of line. Larger identified rivers crossed are detailed in **Table 6.10**.

Table 6.10: Larger Rivers and Streams Crossed by the Proposed Alignment and Distance of Closest Towers

River Name	Nearest Tower	Distance to River (m)[20]
Derrypatrick River	390 387	38 25
Boycetown River	377	55
Bective River	364	17
Boyne River (cSAC / SPA)	355 356	60 (6) 160 (160)
Clady River	347	12
Blackwater (cSAC / SPA)	309 310 311	105 (84) 100 (88) 195 (191)
Moynalty River	297	20
Altmush Stream	261	30
Kilmainham River	251 252	90 60

133 Water courses include relatively slow flowing large rivers including the Rivers Boyne and Blackwater. Most river edge habitat traversed by the proposed alignment is modified by past drainage works such as the Office Public Works (OPW) arterial drainage schemes which have impacted flood plain habitats and natural flooding regimes. The Boycetown River crossing is an exception with some evidence of former natural riparian floodplain and associated less modified habitats. Impacts will be avoided to habitats and species at this location.

134 Riparian habitats along the alignment are variable in extent and type and include; improved grassland, isolated trees and lines of trees / hedgerow.

[20] Distance to SAC / SPA boundary in brackets where relevant.

135 The key ecological receptors at watercourses considered are riparian vegetation (in particular, habitats listed on Annex I of the Habitats Directive), fish species (Atlantic salmon and lamprey), Crayfish, otter and breeding Kingfisher.

136 The Boyne and Blackwater Rivers are considered to be of international importance based on cSAC designation. Tributaries of the Boyne and Blackwater such as the Boycetown River are linked to these sites and are considered of similar status as they are spawning streams for salmonids and often host habitats utilised by Kingfisher and otter for feeding, breeding and / or nursery areas. Other rivers and smaller streams crossed by the alignment are also of high ecological value, being important for fisheries and associated riparian habitats.

6.4.4.2.3 Drainage Ditch (FW4)

137 This habitat is not mapped as it is associated with field boundaries and associated hedgerows and treelines habitats which are mapped. Drainage ditches are typically regularly maintained and contain a variety of wetland and weed species such as Reed canary-grass (*Phalaris arundinacea)*, Nettles, Broad-leaved dock (*Rumex obtusifolius*) and grass species. Aquatic plants such as Fools watercress (*Apium nodiflorum*), Water cress (*Rorippa nasturtium-aquaticum*), Duckweed (*Lemna* spp.) and Brooklime (*Veronica beccabunga*) were also noted. These habitats are not typically of high ecological value except where protected species may occur. These habitats will largely be avoided except where towers are proposed to be located in hedgerows / linear woodland.

6.4.4.2.4 Improved Agricultural Grassland (GA1)

138 This habitat occupies the majority of the MSA and is where the vast majority of towers are proposed to be located and where temporary access tracks will pass through. It is managed for agricultural purposes and consists of grassland which has been reseeded and / or regularly fertilised and is either heavily grazed, used for silage making or planted as part of an arable rotation. This habitat is principally dominated by Perennial rye grass (*Lolium perenne*) and is species poor. More semi improved grassland types also occur scattered along the proposed alignment in particular along the more northern sections. Agricultural herb species are common namely, Creeping buttercup (*Ranunculus repens*) and Dandelion (*Taraxcum officinale*), with Nettles, docks (*Rumex* sp.) and umbeliferae species more frequent at field edges. Rushes (*Juncus* spp.) occur on poorly drained soils and areas of reduced management intensity, but rush pasture is not a dominant feature of the study area. This is a highly modified habitat of low ecological value and the species recorded within the habitat are common throughout the wider countryside. The habitat is generally of low value to wildlife species although Whooper Swan may use the habitat as foraging grounds during winter months at certain locations.

6.4.4.2.5 Dry Calcareous and Neutral Grassland (GS1)

139 Several relatively unimproved fields were noted during the survey including at Tower Locations; 261, 256 and 249. Herb species are more dominant (relative to grass species) and include Knapweed (*Centaurea nigra*), Hawkbit (*Leontodon* spp.) Yellow Rattle (*Rhinanthus minor*) and Narrow leafed plantain (*Plantago lanceolata*). While not recently re-seeded these fields are not species rich examples of this habitat. They are subject to some agricultural management including addition of fertilisers. The examples of the habitat recorded within the study area do not correspond with habitats listed on Annex I of EU Habitats Directive such as *important orchid sites* (6210) and in all cases are not considered to be of significant ecological value.

6.4.4.2.6 Dry Meadow and Grassy Verge (GS2)

140 This habitat is well developed at roadsides particularly in the Trim area. These areas are dominated by tall grass species and are associated with hedgerows. A diversity of herb species occur including Field scabious (*Knautia arvensis*), Cow parsley (*Heracleum sphondylium*), Vetches (*Vicia* spp.), Common valerian (*Valeriana officinalis*), False oxlip (*Primula x polyantha*), Ladies bedstraw (*Galium verum*), Horsetails (*Equisetum* spp.), Wall lettuce (*Mycelis muralis*), Meadow vetchling (*Lathyrus pratensis*), Knapweed (*Centaurea nigra*), Thistle (*Cirsium* spp.), Cowslip (*Primula veris*), Meadow buttercup (*Ranunculus acris*) and Creeping buttercup. This habitat is avoided by the proposed development and will be oversailed at road crossings.

6.4.4.2.7 Wet Grassland (GS4)

141 This habitat is found in several fields scattered principally along the northern half of the proposed development. Many areas have recently (in 2012 / 2013) been drained and planted with forestry. This grassland habitat is poorly drained and typically managed for cattle grazing. They have been subject to some land improvements and general low levels of fertiliser input. Consequently species diversity is affected and they are not considered good examples of this habitat. Species composition varies and is dominated by abundant rushes, mainly Soft rush (*Juncus effusus*), and broadleaved herbs such as Broad leaved plantain (*Plantago major*), Lady‘s smock (*Cardamine pratensis*), Creeping buttercup, Marsh ragwort (*Senecio aquaticus*), Selfheal (*Prunella vulgaris*), Compact rush (*Juncus conglomeratus*) and Daisy (*Bellis perennis*). This habitat is not of significant ecological value.

142 Noteworthy GS4 habitat includes an isolated more species rich area close to the River Blackwater (beside Tower 309). Species noted here include Reed canary-grass, occasional sedges (*Carex* spp.) and flowering herb species including Yellow flag iris (*Iris pseudacorus*), Wild Angelica (*Angelica sylvestris*) and Meadowsweet (*Filipendula ulmaria*).

143 Examples of Wet grassland habitat recorded within the MSA do not correspond with the more species rich Annex I habitat ‗Molinia meadows (6410)'.

6.4.4.2.8 Oak-Ash-Hazel Woodland (WN2)

144 Semi natural woodland dominated by hazel (a low growing species) is crossed at three locations in the northern section of the proposed development (between Towers 261 and 260, 259 and 258 and 252 and 251). These woodlands are relatively species rich and tree species noted include Alder (*Alnus* glutinosa), Hazel (*Corylus avellana*), Ash (*Fraxinus excelsior*), Hawthorn (*Crataegus monogyna*), Blackthorn (*Prunus spinosa*), Willow (*Salix* spp.) and occasional Holly (*Ilex* spp). Ground flora is relatively diverse and includes Lords-and-ladies (*Arum maculatum*), Bluebells (*Mertensia virginica*), Wood anemone (*Anemone nemorosa*), Lesser celandine (*Ranunculus ficaria*), Dog violet (*Viola canina*), Honeysuckle (*Lonicera periclymenum*) and Ivy (*Hedera helix*). These wooded areas have associated streams and are locally important for breeding birds and potentially mammals such as badger. These habitats are considered to be of high (local) ecological value. While these areas are traversed by the alignment, impacts will be avoided as no tree lopping is likely to be required here.

6.4.4.2.9 Broadleaved Woodland (WD1)

145 Blocks of mature intact broadleaved woodland are avoided by the alignment where possible. The exceptions are: Brittas Estate where a section is crossed between Towers 267 and 269 and a number of smaller pockets of woodland identified in Habitat Maps. Species noted include mature Beech (*Fagus sylvatica*), Oak (*Quercus* spp.), Ash and Cherry laurel (*Prunus laurocerasus*). Woodland described at Brittas Estate is considered to be a site of Local Importance (Higher Value).

146 Within the Brittas Estate new deciduous plantations have been established adjacent to mature woodlands consisting of deciduous trees including Beech.

147 Broadleaved woodland is locally important for common breeding birds, foraging bats and potentially badgers.

6.4.4.2.10 Conifer Plantation WD4

148 Several blocks of coniferous plantation are crossed by the proposed alignment. Tree species planted include Sitka spruce (*Picea sitchensis*), Larch (*Larix* spp.) and Alder at the block boundary. These plantations are predominantly closed canopy and are typically greater than 10m high. Tree trimming will be required in these areas as they will potentially interfere with the conductors. Conifer plantations are highly modified habitats of low botanic value though they are locally important for common wildlife including breeding birds and deer species.

6.4.4.2.11 Scrub (WS1)

149 Gorse and Hawthorn scrub with some immature Ash trees were noted on an esker between Towers 363 and 364. This habitat is also scattered along the alignment and is evaluated as moderate local value.

6.4.4.2.12 Immature Woodland (WS2)

150 There is extensive evidence of recent drainage and planting of species poor wet grassland in particular around the northern end of the route and at Culmullin townland at the extreme south. This habitat is evaluated as low ecological value.

6.4.4.2.13 Hedgerows (WL1)

151 Hedgerows form field and road boundaries along the alignment. They are typically relatively low growing linear woodland features often with scattered trees mainly Ash (*Fraxinus excelsior*) and Hawthorn (*Crataegus monogyna*). The most common species are Hawthorn, Blackthorn (*Prunus spinosa*), Bramble (*Rubus fruticosus*), Elder (*Sambucus nigra*), Honeysuckle and Dog rose (*Rosa canina*). Common tree species include Ash, Sycamore (*Acer pseudoplatanus*), and occasional Oak. Hedgerows are managed typically at most roadsides though many hedges, especially in the northern section of the alignment, are unmanaged and overgrown. Hedgerows are important nesting areas for birds and are utilised by bats as foraging corridors. Badger setts may potentially exist in some hedgerows.

152 For the purposes of defining potential impacts, hedgerows (WL1) are subdivided into two categories‘ as follows:

- WL1 A = More managed / low hedgerows typically dominated by Hawthorn. These are generally less than 6m high and no significant tree trimming will be required; and

- WL1 B = Overgrown / unmanaged hedgerows typically with immature or semi mature trees (dominated by Ash). There may be isolated mature standard trees. These are generally less than 12m high and in many cases tree lopping and/ or trimming will be required.

153 Hedgerows are locally important for wildlife and as corridors for linking semi natural areas in a managed agricultural landscape.

6.4.4.2.14 Treelines (WL2)

154 There are numerous examples of mature treelines within the MSA. They consist of dense well-structured mature linear woodland with infrequent gaps. The linear woodlands are predominantly species rich with Ash, Oak, Beech (*Fagus sylvatica*), Willow (*Salix* spp.), Hawthorn, Sycamore, Hazel (*Corylus avellana*), Blackthorn and occasional Holly (*Ilex aquifolium*) and Spindle (*Euonymus europaeus*). Typical associated vegetation includes fern species (e.g. Harts tongue (*Phyllitis scolopendrium)*, male (*Dryopteris filix-mas*) and occasional polypody (*Polypodium* spp.) fern species) and creepers including Ivy, Honeysuckle and Brambles. Herbs noted include Herb-robert (*Geranium robertianum*), Dog violet, Stitchwort (*Stellaria* spp.), Cleavers (*Galium aparine*), Nettle, Primrose (*Primula vulgaris*) and ruderal weeds at the woodland edge (Nettle, dock and thistle). Linear woodland habitat acts as refuge for plant diversity in an intensively managed region. These habitats are important breeding habitats for most common birds noted and provide foraging networks for bats. They may also be utilised by badgers as suitable sett locations.

155 Identified WL2 habitat is typically greater than 13m in height with trees > 20m in height recorded in some cases. These will be areas where tree lopping will definitely be required and hence impacts will arise.

156 Treelines are of local ecological value being important for wildlife and as corridors for linking semi-natural areas in a managed agricultural landscape.

6.4.4.2.15 Arable Crops (BC1)

157 This habitat is included as GA1 in habitat maps. It occupies a large part of the southern half of the MSA and is intensively managed for the production of arable crops including cereals and potatoes. ‘Weed' species noted include Chickweeds (*Stellaria* spp.), Fumitory (*Fumaria* spp), occasional Poppy (*Papaver rhoeas*) and Oat grass species (*Avena* spp.). This habitat is of low ecological value botanically, though several specific bird species of conservation interest including Yellowhammer and Whooper Swan use this habitat.

6.4.4.2.16 Stonewalls and Other Stonework (BL1)

158 This habitat is associated with hedgerows in parts of the northern section. These habitats are considered under WL1 habitat and impacts will be avoided.

6.4.4.2.17 Buildings and Artificial Surfaces (BL3)

159 The alignment crosses a large number of tracks and roads. Temporary access tracks follow existing tracks and roads as much as possible. The alignment avoids crossing buildings, bridges etc. This is a highly modified habitat.

6.4.5 Fauna

6.4.5.1 Birds

160 The main findings of the bird surveys are summarised in this section under breeding and wintering birds. The focus is on bird species identified as being at potential risk from impacts associated with the development (Target species). Sensitivity to potential effects of the OHL development is based on the extensive desktop study conducted, consultation with relevant stakeholders and field studies. Sensitivity factors include one or more of the following – known collision risk (with transmission lines), risk of disturbance (during site clearance works), displacement (permanent outcome of development) and species distribution within the study area. EirGrid Guidelines (2012) detail vulnerability of bird species in Ireland to collision with electricity transmission lines and this has also informed the evaluation. This evaluation is detailed as appropriate for individual species detailed below.

161 Target species were identified as species sensitive to this type of development. They are species listed on Annex I of the EU Birds Directive (79/409/EEC)[21] and birds listed as being of high (Red listed) and medium (Amber listed) conservation concern (as identified by Colhoun and Cummins (2013)). Also considered are common species which have been identified as relatively sensitive to potential collision impacts from this type of development (EirGrid, 2012).

6.4.5.1.1 Breeding Birds

162 A detailed survey of breeding birds in the MSA has been undertaken to inform the ecological impact evaluation. This survey report is presented in **Appendix 6.5, Volume 3D Appendices** of the EIS. Key species of conservation significance identified are summarised below into potentially sensitive and relatively non sensitive to potential impacts from the development.

[21] The species listed in Annex I of the EU Birds Directive are those in danger of extinction, rare, vulnerable to specific changes in their habitat requiring particular attention for reasons of the specific nature of their habitat.

163 **The** species accounts presented below relate to those species of conservation concern that are considered to be sensitive to the OHL development as per rationale described in Section 6.4.5.1 above.

6.4.5.1.1.1 Sensitive Species of Conservation Significance

164 **Lapwing** (Red Listed) is a scarce breeding species in the overall study area. During 2014 a pair of Lapwing was recorded in the early part of the breeding season (23rd April) at a regular breeding site (see below) in the townland of Oristown (within 500m of the alignment). These birds were displaced by land reclamation works soon after (before 7th May). A pair noted actively displaying at a new site beside Cloony Lough (c. 750m from the alignment) on 7th May may have been these birds. No Lapwing were recorded at both these sites during following surveys including that of the 28th May. During 2013, two pairs of Lapwing were noted as probably breeding in the townland of Oristown at the same location where recorded in early 2014. Two pairs of Lapwing were noted here also in 2012, while in 2011 two non-breeding individuals were located close by in the townland of Clongill (approximately 1km north). This general area is locally important for breeding Lapwing. Based on NRA (2009) evaluation criteria (>1% county breeding population) this area is evaluated as being of County importance for breeding Lapwing specifically. This is a moderately collision prone species and is sensitive species to disturbance at breeding sites and potential displacement.

165 **Kingfisher** (Annex I EU Birds Directive and Amber Listed) is strongly associated with river, riparian habitats and lakes in the overall MSA where it is relatively common. It was recorded during surveys regularly in the MSA at the Rivers Boyne and Blackwater. These rivers are crossed by the proposed alignment. The main river channel of the Rivers Boyne and Blackwater are designated as an SPA (site code 004232) specifically for breeding Kingfisher. Kingfishers were also recorded regularly at Whitewood Lough (approximately 500m from proposed alignment). Kingfishers are likely to breed / forage around lakes and rivers throughout the study area. This is not a collision prone species but is sensitive to disturbance of breeding habitat where the alignment crosses potential breeding areas (rivers and associated riparian areas).

166 **Woodcock** (Red Listed) were not recorded as a breeding species within the MSA. This species is a cryptic species active at night which likely breeds in scrub, overgrown wetland edges and forestry in the study area. This species is considered a moderately collision prone species. This skulking sedentary species is not considered sensitive to the development.

167 **Cormorant** (Amber Listed) frequent at the larger rivers and lakes. Cormorants are regularly recorded on Whitewood Lough and this is a probable breeding site. Newcastle Lough in MSA is another potential breeding site and regular roost site. This is considered a highly collision prone

species. The larger Boyne and Blackwater River crossings are potentially sensitive collision risk locations for this species.

168 **Great Crested Grebe** (Amber Listed) is a local breeding species associated with lakes. One to three pairs typically breed annually on Whitewood Lough which is located c. 600m from the proposed alignment at its nearest point. This species also recorded and probably breeding on suitable lake habitats at Lough Ervey (approximately 1.3km from the alignment); Breakey (approximately 2.88km from the alignment) and probably Newcastle Loughs (approximately. 2.2km from the alignment). This is a relatively sedentary species that nevertheless is highly susceptible to collision with powerlines.

169 **Little Grebe** (Amber Listed) occasionally breeds on small lakes removed from the development including Ervey Lough, Breakey Lough Little, Clooney Lough, Newcastle Lough and possibly Whitewood Lough. This species is considered a highly collision prone species.

170 **Mute Swan** (Amber Listed) are a widespread breeding species on waterbodies from small ponds to large lakes throughout the MSA. In MSA this species regularly breeds on a number of sites within 2km of the proposed alignment including; Whitewood Lough, Ervey Lough Newcastle Lough and Breakey Lough. They also utilise larger rivers such as the River Boyne and Blackwater and the Tara Mines Tailing Ponds.

171 Mute Swan are considered a highly collision prone species. The Boyne and Blackwater River crossings are potentially sensitive collision risk locations for this species

172 **Snipe** (Amber Listed) are a scarce breeding species in the MSA as suitable breeding habitat (wet grassland and wetlands) is rare. To date, this species was only recorded in the townland of Oristown (same area as Lapwing) in 2013 only. This species is considered a medium collision prone species. Suitable habitat is largely avoided and this species is not considered sensitive to the development.

173 Common species which are moderately or highly vulnerable to collision are summarised below. Most of these species listed are associated with water bodies which will not be impacted by the proposed development, the exception being Pheasant which is breed for recreational hunting.

- Duck species and Moorhen;
- Grey Heron; and
- Pheasant.

6.4.5.1.1.2 Non-sensitive Species of Conservation Significance

174 **Peregrine Falcon** (Annex I EU Birds Directive) was the only other species noted as possibly breeding in the wider MSA, though no potential nest areas were determined and breeding habitat is unsuitable in the vicinity of the development.

175 **Yellowhammer** (Red Listed) is a small passerine species common in mixed (tillage and livestock) farmland in the MSA and was regularly recorded in all surveys. This species is not considered a collision prone species. It may be susceptible to disturbance during woody vegetation clearance prior to construction.

176 **Barn Owl** (Red Listed) is a nocturnal bird of prey species which potentially breeds in the MSA. This species typically breeds in old uninhabited buildings and outhouses though they may possibly use hollows in large old trees. This species is very rare in the study area (Balmer *et al*., 2013). None were recorded during surveys in MSA and impacts to typical nesting areas are avoided. No significant potential nest sites (old trees with large cavities) were determined at any alignment roadside crossings or lands accessed. The likely absence of breeding sites in proximity to the alignment coupled with the relatively rare occurrence of the species throughout the MSA suggests that collision risk would be negligible

177 The following passerine species of high conservation concern were recorded which are considered to have low susceptibility to collision with powerlines (EirGrid, 2012); Meadow Pipit and Grey Wagtail. Meadow Pipit are widespread along the alignment in wet grassland and semi-improved pasture. Grey Wagtail was recorded along watercourses and associated riparian habitat.

178 The following passerine species of moderate conservation concern were recorded which are considered to have low susceptibility to collision with powerlines (EirGrid, 2012); House Sparrow, Kestrel, Skylark, Linnet, Sand Martin, Starling, Swallow, Swift, Tree Sparrow, and Stock Dove. Some woody vegetation nesting species may be susceptible to disturbance during woody vegetation clearance prior to construction.

6.4.5.1.1.3 Wintering Birds

179 Detailed multi-annual surveys have been conducted on wintering birds to inform the ecological impact consideration with particular focus on Whooper Swan. These surveys have been conducted annually since 2007 / 2008.

180 The most recent survey report which covers 2012 / 2013 winter survey period, considers all previous surveys and is presented in **Appendix 6.6, Volume 3D Appendices** of the EIS. The key findings of this study, in relation to sites and inter year usage by Whooper Swan is detailed

in Figure 6.3.1, **Volume 3D Figures** of the EIS. Identified and probable flight lines based on surveys conducted are detailed in Figure 6.3.2, **Volume 3D Figures** of the EIS.

181 A summary of the key findings of the annual winter survey from 2007 / 2008 to 2013 / 2014 are detailed below.

Whooper Swans (Annex I EU Birds Directive)

182 Whooper Swans were highlighted in the An Bord Pleanála (the Board) scoping opinion and also during consultation with BWI and NPWS, as a species extensively using the MSA, in numbers that regularly exceed nationally significant levels (greater than 150 birds (Boland *et al*., 2010)). This species is considered highly susceptible to collision with powerlines. In this regard it was identified as a key target species for consideration regarding potential effects of the development. Given that collision risk is an identified issue for this key target species, a more appropriate method was utilised in the evaluation, refer to **Tables 6.5** and **6.6**. This approach differs from the procedure implemented for all other identified potential impacts to all ecological features including other identified impacts to Whooper Swans (e.g. displacement and disturbance).

183 Over a period of seven years, surveys for Whooper Swan and other wintering birds were undertaken monthly during the period of October to April. 46 sites have been identified in the MSA as being utilised by Whooper Swans, during the study (desk and field survey) and historically. Six of these sites are historical records only i.e. despite being regularly surveyed during the current study, no Whopper Swans were recorded. These sites include Fordstown, Black Lough, Barfordstown, Liscartan, Tara Mines and Tankardstown. All Whooper Swans are very widespread relative to the alignment. It should be noted that the wider study area has been subject to continual winter surveys between 20010 and 2014 inclusive as highlighted in Figure 6.3.1, **Volume 3D Figures** of the EIS.

184 Overall, a number of Nationally Important sites or sites close to being of National Importance have been identified relatively close to the proposed alignment. These include; Tara Mines Tailings Ponds (roost Site), River Blackwater Valley (various foraging sites), Headford Estate (roost Site), Yellow river (foraging site) and more recently, Balrath estate (foraging and roost site). Recent land reclamation works at a roost site at Cruicetown means this formerly evaluated nationally important site is now less utilised and by lower numbers. All these sites are located between 0.9km (Cruicetown) and 16km (Balrath) of the alignment.

185 The key findings of the study, as presented in **Appendix 6.6, Volume 3D Appendices** of the EIS, include:

- A regular nationally important population of Whooper Swans, overwinter in the Blackwater Valley area.
- The alignment crosses the Blackwater River between various foraging sites in the Blackwater Valley and an important roost site at Tara Mines Tailings Ponds.
- Overwintering sites in the Blackwater Valley include Sedenrath, Fyanstown and Bloomsbury, and the outlying sites at Grange.
- The Whooper Swans in the River Blackwater Valley mostly roost at Headford Estate (away from the alignment) and Tara Mines Tailing Ponds (alignment bisects flightline).
- An irregularly used foraging site is over sailed by the alignment between Towers 309 and 310 at Teltown. Numbers at this site never exceeded national importance.
- Whooper Swans use arable farmland along the Yellow River in numbers which can reach close to National Importance. This area is located between 1 and 2km east of the closest towers (Towers 296 to 293). Flight lines noted in this area flew to Tara Mines Tailings Ponds roost site which avoids crossing the alignment.
- South of Cloony Lough, a more recent Whooper Swan site (2012/2013 surveys) was identified in the townland of Drakerath (approximately 500m west of Tower 286). No birds were recorded here in previous and most recent (2013 / 2014) surveys. The Drakerath site consists of a flooded potato field which was utilised as a foraging and roosting site. No flightlines were recorded crossing the alignment in this area and observed Whooper Swans were noted foraging and roosting only at this location.
- Smaller flocks of Whooper Swans were noted as regularly foraging in various fields west of Cloony Lough. A roost site (temporary flooding) was noted adjacent to the foraging area. The distance of observed foraging and roost areas was approximately 300 to 500m west of Towers 280 and 281. A flightline was observed crossing the alignment in this area.
- The northern section of the proposed development passes close to Cruicetown, a foraging and roosting site for Whooper Swan. While the birds concentrate at Cruicetown, varying numbers spread out from this site to different foraging areas, and to Whitewood Lough (which specifically requires flights across the alignment). This area includes a flight line which was recorded in some years as crossing the alignment including in 2013 / 2014.

Golden Plover

186 Golden Plover occur in occasional nationally important numbers, foraging in the wider Blackwater River Valley and roosting at Tara Mines Tailings Ponds. In this regard, flocks cross the line route and lower numbers (not nationally significant) have been observed feeding in the River Blackwater Valley area during each year of survey. This area includes a flight line which crosses the alignment. This species has been highlighted as being of medium susceptibility to collision with transmission lines.

Other Species

187 Small numbers of potentially sensitive species including Curlew, Lapwing, Shelduck and other duck species roost on Tara Mines Tailings Ponds, though none were noted ever leaving / returning to this area during survey. No flight lines for these species were observed crossing the alignment. In this regard no significant impacts are expected.

188 Large flocks of gulls (dominated by Lesser Black Backed Gulls) roost at Tara Mines Tailings Ponds and spread out at dusk and dawn to farmland including the Blackwater River Valley. These are considered to have low susceptibility to collision with powerlines (EirGrid Gudielines, 2012).

189 No other waterfowl / wader species were recorded crossing the line route.

6.4.5.1.1.4 Summary Bird Evaluation:

190 A summary evaluation of the key bird species determined and key areas are detailed in **Table 6.11.** For sites with flight lines refer to Figure 6.3.2, **Volume 3D Figures** of the EIS.

Table 6.11: A Summary and Evaluation of Key Bird Areas and Species within the MSA

Key Bird Species to consider	Key Areas and Evaluation	Description of Location / Flight lines
Whooper Swan	River Blackwater Valley (includes various sites) Regular National Importance (Irregular International Importance)	Whooper Swan sites are concentrated between 2.5 and 4km away from alignment. A regular flight line was confirmed as crossing the alignment.
Whooper Swan	Cruicetown Area County important	Whooper Swan roost and forage site identified at Cruicetown. Birds also use sites south of here all located between 0.5 and 1.5km away from alignment. . The drop in numbers in recent years may be a result of drainage works on the lake roost site. A flight line was confirmed as crossing the alignment to Whitewood Lough.
Whooper Swan	Yellow River. County important	No flight line was confirmed or is likely relevant to the proposed development. However this area is close to the alignment (500m - 1km east of the alignment).
Whooper Swan	Teltown Locally important (Higher value)	An irregular forage site for low numbers of Whooper Swan (locally significant) is crossed at Teltown. This area is oversailed by alignment between Towers 309 and 310.
Whooper Swan	Cloony Lough (area) Locally important (Higher value)	Whooper Swan sites are concentrated between 0.3 and 0.6km away from alignment. A flight line was confirmed as crossing the alignment.
Whooper Swan	Drakerath Area and red island (area) Locally important (Lower value).	This Whooper Swan site (noted in 2012 only) is located 0.5km west of the alignment. No flight line was confirmed as crossing the alignment.
Cormorant	River Boyne and Blackwater Locally important	These rivers are traversed by the alignment presenting a localised collision risk for this species.
Lapwing	Oristown townland County important	Nest areas are avoided by alignment. The alignment is located between 200m and 400m of core Lapwing territories (2014, 2013, 2012 and 2011 data). The breeding habitat was partly affected by land reclamation works in April 2014, and breeding birds were displaced. This may affect future use of this area.

Key Bird Species to consider	Key Areas and Evaluation	Description of Location / Flight lines
Golden plover	Tara Mines Tailings Ponds (roost site). River Blackwater Valley also used by lower numbers. Nationally important	Sites detailed are bisected by the alignment presenting a localised collision risk for this species. While not observed flying across the alignment, it is likely that flights do occur.
Great crested grebe	Lough Ervey, Lough Breaky and Newcastle Lough Locally important	Sites where this species breeds are avoided being located >500m from the alignment.
Mute Swan	Lough Ervey, Lough Breaky and Newcastle Lough Locally important (Higher value)	Loughs where this species breeds are avoided being located >500m from the alignment.
Mute Swan	River Boyne and Blackwater crossing Locally important (Higher value)	These rivers are traversed by the alignment presenting a localised collision risk for this species.
Little Grebe	Lough Ervey, Lough Breaky and Newcastle Lough Locally important (Higher value)	Loughs detailed are avoided being located >500m from the alignment.
Snipe	Oristown townland Locally important (Lower value)	The alignment is located approximately 400m east of an irregularly used (2013 record only Snipe breeding area impacted partly by land reclamation works in April 2014.
Common collision prone species: Grey Heron, Common duck species, Moorhen and Pheasant	Throughout study area concentrated at rivers and hedgerow crossings Locally important (Lower value)	Numerous locations are traversed which will present localised collision risks to common species.
Kingfisher	River Boyne and Blackwater crossing. Internationally important	Rivers traversed by proposed alignment are used by Kingfisher. Kingfisher fly at low heights are not at significant risk of collision with transmission lines.
Kingfisher	Other River Crossings, Lakes (Whitewood Lough). Locally important (Higher value)	Rivers traversed by the proposed alignment are used by Kingfisher. Lakes utilised by Kingfisher are avoided (>500m) by the alignment.
Yellowhammer	Hedgerow field boundaries between Towers 401 and 280	Hedgerow nest areas and arable land (field edge) forage areas are traversed by the proposed alignment.

Key Bird Species to consider	Key Areas and Evaluation	Description of Location / Flight lines
	Locally important (Higher value)	

Note: River Blackwater Valley sites include Sedenrath, Fyanstown, Bloomsbury and Fyanstown 2.

6.4.5.2 **Mammals**

191 Mammal surveys were undertaken in areas where potentially suitable habitat (hedgerows, scrub and treelines) occurred at proposed tower locations.

192 Based on a review of the National Biodiversity Data Centre (NBDC) database, BCI website and field survey findings, the following protected mammals utilise the MSA and require consideration regarding potential impacts: badger, otter, Irish hare, deer (species) and bat (species). **Table 6.12** lists the mammals identified within the study area and potentially occurring within the alignment based on this review.

Table 6.12: Protected Mammals Occurring in the MSA and Legal Status

Common Name	Latin Name	Protected Status
Irish hare	*Lepus timidus subsp. hibernicus*	Habitats Directive Annex V *Wildlife Amendment Act, 2000*
European otter	*Lutra lutra*	Annex II of EU Habitats Directive Annex IV of Habitats Directive *Wildlife Amendment Act, 2000*
Eurasian badger	*Meles meles*	*Wildlife Amendment Act, 2000*
Myotis Bat species	*Myotis*	Annex IV of Habitats Directive *Wildlife Amendment Act, 2000*
Daubenton's Bat	*Myotis daubentonii*	Annex IV of Habitats Directive *Wildlife Amendment Act, 2000*
Natterer's Bat	*Myotis nattereri*	Annex IV of Habitats Directive *Wildlife Amendment Act, 2000*
Leislers Bat	*Nyctalus leisleri*	Annex IV of Habitats Directive *Wildlife Amendment Act, 2000*
European rabbit	*Oryctolagus cuniculus*	Annex IV of Habitats Directive *Wildlife Amendment Act, 2000*
Pipistrelle bat species	*Pipistrellus*	Annex IV of Habitats Directive *Wildlife Acts*
Common pipistrelle	*Pipistrellus pipistrellus sensu lato*	Annex IV of Habitats Directive *Wildlife Amendment Act, 2000*
Soprano pipistrelle	*Pipistrellus pygmaeus*	Annex IV of Habitats Directive *Wildlife Amendment Act, 2000*
Brown long-eared bat	*Plecotus auritus*	Annex IV of Habitats Directive *Wildlife Amendment Act, 2000*
Red deer	*Cervus elaphus*	Wildlife Amendment Act, 2000
Hedgehog	*Erinaceus europaeus*	Wildlife Amendment Act, 2000

Source: National Biodiversity Data Centre (NBDC) 2013

193 The findings of surveys for these species are summarised below.

6.4.5.2.1 Bats

194 All Irish bat species are protected under the *Wildlife Act 1976* (as amended in 2000) and Annex IV of the EU Habitats Directive 1992. Bats are further protected across Europe under the Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention, 1982) and the Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention 1979, enacted 1983).

195 No site with significant potential for bat roosts such as old buildings, souterrains, caves, houses and other buildings will be impacted by the development. In addition all known bat roosts provided by NPWS and Biodiversity Ireland) are avoided.

196 The MSA contains a large network of hedgerow, treeline and scattered patches of woodland habitat, which provide abundant foraging routes for bat species throughout the area. River corridors also provide foraging and commuting potential. An evaluation of potential tree roost sites conducted from the roadside and on lands accessed for survey, confirmed that very old mature decaying trees suitable as temporary summer bat roosts and possible maternal roosts, are very scarce in the study area. No trees were identified with bat signs or as having potential as maternity roosts.

197 Bat activity surveys confirmed abundant bat foraging activity along mature hedgerows, rivers and linear woodland throughout the alignment. Bat species recorded included foraging and commuting Common pipistrelle (*Pipistrellus pipistrellus*), Soprano pipistrelle (*Pipistrellus pygmaeus*), Leisler's (*Nyctalus leisleri*) and Daubenton's (*Myotis daubentonii*).

198 An unidentified (*Myotis* sp) song perch, indicatory of a roost site (locally), was recorded on 4th August 2014 at Ballybrigh townland (Grid Reference: N 840 606) near mature trees and an old building. This territorial activity (male bat) indicates a probable roost site in the old building which is avoided by the proposed alignment route (70m to south).

199 No sites showing high potential as a maternity bat roost were identified under the route of the alignment.

200 Treelines with potential of being at least temporary bat roosts are identified as mature treelines (WL2) in habitat maps. In this regard a standard mitigation approach will be implemented which is to identify potential suitable tree roosts requiring appropriate precautionary mitigation (based

on NRA Guidelines[22]) to be implemented as appropriate for tree cutting activities during the construction phase.

6.4.5.2.2 Otter

201 The otter is fully protected in Ireland under the *Irish Wildlife Act 1976* (as amended 2000). It is also listed on the Irish Red Data book as ‗International Important'. The otter is also protected under Annex II of the EU Habitats Directive giving it strict protection as a species of community interest for which EU nations must designate cSAC. The otter is also listed on Appendix II of the Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention, 1982) of which Ireland has ratified.

202 Otter signs (spraints and trails) were noted at the Rivers Boyne and Blackwater close to the proposed line route crossing points, as would be expected based on the known distribution of this species.

203 Evidence of an otter breeding site was recorded at one river draining into the River Blackwater. This site is approximately 100m from Tower 309 (50m from the alignment).

204 A number of areas with suitable breeding habitat will be traversed by the OHL (riparian river corridors). The location of all works areas associated with the development away from potential breeding habitat means risks of disturbance to otter breeding sites is very low.

6.4.5.2.3 Badger

205 Badgers are listed on Appendix III of the Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention, 1982) as a species to be protected and whose exploitation must be regulated. It is protected in Ireland under the *Irish Wildlife Act 1976* (as amended 2000). The line design avoids known and potential badger breeding areas. Where towers are to be located in hedgerows, these areas have been surveyed and no badger setts were observed at the location or in the vicinity.

206 Field surveys conducted at roadsides and fields accessed found limited evidence of badgers and no breeding, outlier or other setts were found. No setts were recorded at tower locations or within wider landholdings surveyed. Well-worn wildlife tracks, noted widely, are utilised by badgers and hair and other signs were detected.

[22]http://www.nra.ie/environment/environmental-construction-guidelines/Guidelines-for-the-Treatment-of-Bats-during-the-Construction-of-National-Road-Schemes.pdf

207 Recent published data received from the Department of Agriculture indicates a relatively widespread number of breeding badger sites in the MSA. Setts are typically located in hedgerows / linear woodland rather than in scrub or woodlands. Badger populations have likely decreased considerably in Ireland in recent years (Source: Department of Agriculture), and the population in County Meath is likely to be lower than that recorded in Smal (1995). That report detailed 122 setts as being confirmed in 28 x 1km squares in County Meath and badgers were considered common therein.

208 Based on current Department of Agriculture datasets, the location of towers has avoided known badger sett locations. The Department ERAD manager advised that in Meath known badger setts are almost entirely located in field boundary habitat. The avoidance of field boundaries (except where surveyed) means all known badger setts are avoided. In addition, the potential for an unknown badger sett to be disturbed by the development is very low given un-surveyed hedgerows / tree-lines and unmanaged areas are avoided as tower locations.

6.4.5.2.4 Other Protected Mammals

209 Other protected mammals noted included Irish hare (*Lepus timidus hibernicus*). This species was noted on several occasions in grassland throughout the MSA.

210 The Irish hare is a quarry species (may be hunted under licence) and has limited protection under domestic legislation. It is listed in the Irish Red Data book as internationally important and in Appendix III of the Bern Convention as a protected species. It is also listed under Annex V of the Habitats Directive as a species which may be exploited but not to the extent that it's favourable conservation status is compromised (Hayden & Harrington, 2000).

211 Deer (red deer and red deer / Sika hybrids) are relatively common in wooded areas particularly plantation woodland. Signs and sightings were made at several areas where access was permitted. These areas tend to be managed habitats subject to ongoing management / disturbance.

212 Other protected species which may occur in the study area include red squirrel (*Sciurus vulgaris*) however it is largely absent in the MSA as grey squirrel are now common. Red squirrel is rapidly declining as grey squirrel outcompete and displace red squirrel from the midlands and eastern side of Ireland (NPWS / EHS 2008).

213 The red squirrel occupies a variety of woodland types across much of Ireland. It is protected under the Fifth Schedule of the *Irish Wildlife Act 1976* (as amended 2000) and is on Schedule III of the Bern Convention.

214 No other protected mammal species were noted.

6.4.5.3 Other Mammals

215 Common mammal species noted included grey squirrel (*Sciurus carolinensis*), rabbit (*Oryctolagus cuniculus*), fox (*Vulpes vulpes*). Irish stoat (*Mustela erminea*), wood mouse (*Apodemus sylvatica*), pygmy shrew (*Sorex minutus*), hedgehog (*Erinaceus europaeus*) and brown rat (*Rattus norvegicus*) are also likely to be common in the MSA.

6.4.5.4 Fisheries and Aquatic Species

216 The majority of the route south of Whitewood Lough is within the Boyne River catchment. Whitewood Lough is within the River Dee catchment.

217 A total of 39 river and stream crossings were identified (as detailed in the OSi 1:50,000 Discovery Data Maps) as being crossed by the new section of the alignment (Towers 237 to 401). An additional two river crossings are traversed by the existing line linking Tower 402 to the Woodland Substation.

218 The Rivers Blackwater and Boyne are the largest rivers crossed by the alignment. In addition a number of drainage channels are crossed, which drain into these rivers. The Blackwater River is a major tributary of the River Boyne. It has a good stock of Brown trout *Salmo trutta* and spawning Atlantic salmon (*Salmo salar)* (O'Reilly, 2004). The Boyne is the main river draining County Meath and is considered as one of Ireland's premier game fisheries both for Salmon (spring) and Brown trout fishing. Salmon are considered scarce (except in late summer with floods) on the section of the River Boyne near Trim at the line route crossing point (O'Reilly, 2004).

219 Other protected aquatic species which may occur in rivers crossed by the alignment include white-clawed crayfish *(Austropotamobius pallipes)* and lamprey species, in particular River lamprey *(Lampetra fluviatilis)*.

220 No known Freshwater Pearl Mussel (*Margaritifera Margaritifera)* populations exist in the rivers crossed and habitat is unsuitable (NPWS 2013 data – from website).

221 Whitewood Lough located approximately 0.5km from the alignment is a noted coarse fishery (Inland Fisheries Ireland - consultation). Species include Roach (*Rutilus rutilus*), Bream (*Abramis brama*) and Pike (*Esox lucius*).

6.4.5.5 **Other Fauna**

222 Common frogs were recorded in wet habitat in proximity to the line route. Drainage ditches and ponds within the study area provide potential breeding sites for common frog and smooth newt. These habitats will be avoided.

223 No reptile species were noted during the survey.

224 Marsh fritillary was not recorded. Typical habitat of marsh fritillary (breeding and feeding wetland sites) will be avoided by the proposed development.

225 Habitats such as wetlands, species rich grassland, known marsh fritillary sites and to a large degree wooded habitats are avoided.

6.4.6 Invasive Alien Species

226 The spread of alien species (both flora and fauna) is recognised as a major threat to biodiversity in Ireland (Stokes *et al.* 2006). The only terrestrial invasive alien plant species recorded was Japanese Knotweed (*Fallopia japonica*). The species was regularly recorded growing in dense stands along the public road network in the wider study area. The species was not recorded during field surveys conducted along the alignment (walkover or visual surveys).

227 Aquatic and riparian habitats crossed by the alignment have the greatest potential to support invasive species and facilitate their dispersal. Works associated with the construction of towers avoid these areas.

6.4.7 Key Ecological Receptors

228 Following a review of the existing environment presented above, it is possible to determine key ecological (site) receptors that occur within the MSA requiring consideration regarding potential impacts and mitigation. These include specific sites that have been identified as being of local Importance (Higher Value) or greater.

229 Also detailed are specific habitats and species with high protection or conservation status.

230 These identified key ecological receptors may potentially be impacted by works associated with the proposed development and are therefore taken forward in this report for evaluation and appropriate mitigation (as required). Details of the key ecological receptors within the study area are presented in **Table 6.13**.

Table 6.13: Summary Evaluation of Key Ecological Receptors and Locations within the MSA

Site / Feature	Evaluation [1]	Brief Description of Ecological Receptor	Relevant Location
River Boyne cSAC / SPA	International	Riparian habitat, aquatic fauna including lamprey species, salmon and white clawed crayfish.	Between Towers 355 and 356
River Blackwater cSAC / SPA	International	Riparian habitat, aquatic fauna including lamprey species, salmon and white clawed crayfish	Between Towers 310 and 311
Larger streams draining into River Boyne and Blackwater	International * (Cumulatively)	Riparian habitat. Potential spawning areas for salmon and main breeding sites for otter. Potential Kingfisher breeding sites. All species detailed are qualifying interests for the River Boyne and Blackwater cSAC / SPA	Boycetown River between Towers 376 and 377. Between Towers 358 and 359. Between Towers 350 and 351. Clady River 3 crossings between Towers 344 and 347. Blackwater River - natural flood plain drainage ditch between Towers 308 and 309 Small stream between Tower 313 and 314 Small stream between Tower 317 and 318
Whooper Swans	Annex I of EU Birds Directive Nationally significant population (Boland *et al* , 2010)	Refer to Table 6.11 above	Towers 307 and 314 (River Blackwater Crossing) – Whooper Swan West of Yellow River Area (Towers 291 and 295) Towers 279 to 283 (Whooper Swan feeding and roost at Cloony). Tower 268 to 257 (Whooper Swan feeding and roost area near Cruicetown / Whitewood Lough)
Golden Plover	Annex I of EU Birds Directive Nationally significant population (Boland *et al*, 2010)	Refer to Table 6.11 above. Nationally significant numbers of Golden Plover were observed 2008 / 2009. In more recent years numbers are much lower.	Flightline crosses River Blackwater (Towers 307 to 314) Cloony Lough Area (east of Towers 281 and 282) Yellow River Area (west of Towers 293 to 295)
Lapwing (breeding sites)	Red Listed breeding species of high conservation concern. Area identified supports > 1% Co Meath breeding population. County Important Site. Recent land reclamation works and disturbance (April 2014) may reduce this evaluation in future years though	The Oristown area is a county (Meath) important breeding site for Lapwing with a minimum 2 – 3 pairs in addition to occasional breeding snipe.	Nest areas will be avoided. Alignment (Towers 294 to 296) is located between 200m and 400m east of core territories (2014, 2013 and 20112012 data).

Site / Feature	Evaluation [1]	Brief Description of Ecological Receptor	Relevant Location
	habitat is still partly suitable.		
Treelines (WL2)	Cumulatively these habitats are of County Importance as habitats and for wildlife	Lines of mature tree standards occur at specific field boundary locations described. These consist predominantly of very old probably planted trees and some are likely to be semi natural habitats.	41 treelines were identified as crossed along the alignment
Hedgerows with mature trees (WL1 – Type B)	Cumulatively these habitats are of County Importance as habitats and for wildlife	Very overgrown hedgerows with trees.	113 crossings of hedgerow type B identified along the alignment
Other river crossings	Cumulatively these habitats are of County Importance for fisheries, habitats and protected fauna.	Riparian habitat, aquatic fauna including lamprey species, salmon and white clawed crayfish.	Including specific rivers detailed above there is a requirement to cross 41 rivers in total.
Mature deciduous woodland (WD1)	Cumulatively these habitats are of Local Importance (Higher Value)	Mature demesne woodland. The area impacted is beside woodland surveyed in the National Woodlands monitoring survey also located within Brittas estate [23]	Brittas Estate woodland (WD1) is the largest block of mature deciduous woodland identified and is located between Towers 267 and 269. Other mature deciduous woodland patches are crossed between Towers 262 - 263, 272 - 273, 291 - 292, 321 - 322, and 336 – 337
Bats	Annex IV of Habitats Directive Wildlife Acts	Mature linear woodland (WL2) and deciduous woodland blocks (WD1) affords possible roost sites.	Various possible (at least temporary) roost sites are identified – refer to WL2 habitat highlighted in Habitat maps. An *Myotis* sp. song perch indicatory of a roost site (locally) was recorded in 2014 at Ballybrigh townland (Grid Reference: N 840 606) near mature trees not crossed by the alignment. No sites with high potential as a maternity bat roost were identified under the route of the alignment.
Otter	Annex IV of Habitats Directive Wildlife Acts	Rivers streams and associated riparian habitats crossed by the alignment provide possible breeding and actual foraging areas for otter.	41 river crossings identified as possible otter breeding sites. In particular the following rivers are linked to the River Boyne and Blackwater SAC: Between Towers 355 and 356; and Between Towers 310 and 311.

[23] http://www.npws.ie/researchprojects/woodlands/

Site / Feature	Evaluation [1]	Brief Description of Ecological Receptor	Relevant Location
			Boycetown River between Towers 376 and 377. Between Towers 358 and 359. Between Towers 350 and 351. Clady River three crossings between Towers 347 and 344. Blackwater River - natural flood plain drainage ditch between Towers 308 and 309. Small stream between Towers 313 and 314. Small stream between Towers 317 and 318 Kilmainham River between Towers 251 and 252.
Badger	Wildlife Acts	Breeding sites (setts) usually occur along base of hedgerows or amongst scrub or woodland habitat.	Badger setts are likely to occur at low densities in the vicinity of hedgerow habitat crossed by the alignment. Towers are located away from suitable breeding habitat
Kingfisher	Annex I of EU Birds Directive Nationally significant population reason for River Boyne and Blackwater designation as SPAs	Rivers streams and associated riparian habitats crossed by the alignment provide possible breeding and foraging areas.	41 river crossings identified as possible Kingfisher breeding sites. In particular the following rivers are linked to the River Boyne and Blackwater SPA: Between Towers 355 and 356. Between Towers 310 and 311. Boycetown River between Towers 376 and 377. Between Towers 358 and 359. Between Towers 350 and 351. Clady River three crossings between Towers 344 and 347. Blackwater River - natural flood plain drainage ditch between Towers 308 and 309 Small stream between Towers 313 and 314. Small stream between Towers 317 and 318.
Breeding birds (including Yellowhammer)	Identified locally significant populations of in particular Yellowhammer a red listed species of high conservation concern	Hedgerows and treelines (potential nesting areas)	Mixed arable farmland between Towers 280 and 401.
Semi natural oak-ash-hazel woodland	Local Importance (Higher Value)	This low growing woodland will be spanned by the towers without requirement for significant trimming.	Low growing semi natural woodland and associated streams crossed at three locations between Towers 260 and 261, Towers 258 and 289 and Towers 251

Site / Feature	Evaluation [1]	Brief Description of Ecological Receptor	Relevant Location
			and 252. Habitat will be avoided.

Note: 1. The evaluation for birds and mammals is informed by protection status and observed numbers (in some cases identified). Birds are evaluated based on Lynas *et al.* (2007) and protection status. Wintering birds' sites which regularly exceed 1% of national population are evaluated as being nationally important (Boland et al (2010)).

[*] Streams draining into the Rivers Boyne and Blackwater are considered as internationally important specifically because of their importance to mobile species (salmon, Kingfisher and Otter) crucial to maintenance of populations in the River Boyne and Blackwater SAC / SPA.

6.5 POTENTIAL IMPACTS

231 The identification and description of impacts presented below takes account of the characteristics of the receiving environment as described throughout **Section 6.4** with particular reference to the Key Ecological Receptors identified in **Section 6.4.5**. Impacts are presented in relation to each phase of the project (construction and operation).

232 The impacts described in this section are those ecological impacts predicted due to the proposed development prior to the consideration of any appropriate mitigation measures, refer to **Section 6.6**. Residual impacts describe potential impacts following implementation of mitigation measures, refer to **Section 6.7**.

6.5.1 Do Nothing Scenario

233 In the case of no development occurring, there would continue to be changes in biodiversity or potentially the ecological value of habitats and species as a result of on-going land management within the MSA. It is most likely that most of the area would continue to be managed intensively for agriculture. Possible changes in management could include further land drainage, scrub clearance and afforestation - the majority of which may have a localised negative impact on ecological value / biodiversity of the area. It is not expected that changes in land-use would be influenced by whether the proposed development proceeds or not.

234 The potential ecological impacts of the proposed development are detailed in **Section 6.5.2** (construction phase impacts) and **Section 6.5.3** (operational phase impacts) below. Residual impacts are described under **Section 6.7** post mitigation being implemented.

6.5.2 Construction Impacts

235 Based on the nature of the proposed development and the baseline ecological data collected on the proposed development site, the following activities warrant specific attention in the consideration of ecological impact:

- Permanent habitat loss to hedgerows, treelines and grasslands associated with construction activity including woody vegetation clearance, site access, tower foundation excavation, tower construction and line stringing within the defined works area for each tower location;

- Permanent / temporary habitat loss / disturbance associated with stockpiling of material on vegetation outside the works area (if required);

- Temporary habitat loss / disturbance associated with the laying of temporary access tracks and trimming of vegetation to widen existing access gaps in the hedgerows, if necessary;
- Temporary habitat disturbance associated with guard locations (at road and other OHL crossings) and areas used for machinery required during stringing of conductors;
- Temporary noise and physical presence disturbance impacts from machinery and staff at work area locations to fauna (birds and mammals);
- Pollution runoff risks to surface water quality through drains and other watercourses close to the works area, potentially linked to more ecologically important streams, rivers and lakes;
- Pollution runoff risks to ground water quality in the vicinity of works area potentially linked to ground fed wetlands and other surface water features;
- Tree lopping of more mature treelines under the proposed alignment for conductor clearance and or installation of towers;
- Tree lopping and clearance in managed plantation woodland areas crossed by the alignment for construction and ongoing maintenance of the way-leave;
- Tree and hedgerow trimming under the proposed alignment; and
- Tree lopping of mature deciduous woodland in particular at Brittas Estate.

236 Potential ecological receptors of impacts:

- Habitats that occur within the footprint of the development;
- Watercourses surrounding and downstream of the alignment;
- Bird and mammal activity; and
- Identified Key Ecological Receptors (see **Table 6.13**).

6.5.2.1 Direct Impacts (Habitats)

237 Direct impacts upon habitats of highest ecological value have been minimised by constraint identification and avoidance and subsequently careful consideration to tower locations, stringing locations and temporary access routes. While other factors influence the siting of towers, ecological constraints have been addressed to the extent that the layout avoids the most

important and sensitive habitats in the wider study area. In addition, due to the nature of the proposed development it is possible to span certain habitats of conservation interest and therefore avoid direct impacts. In the following paragraphs habitat loss and disturbance is assessed in relation to tower locations, along the alignment beneath conductors, and at stringing areas (where machinery used during stringing process will be stationed).

6.5.2.1.1 Habitat Loss and Disturbance – Tower Locations

238 In following the precautionary principle, all towers have been carefully positioned to ensure that there will be no direct impacts on habitats of high ecological value. No towers are located in higher value habitats or sites that are identified as Key Ecological Receptors. Due to the nature of the proposed development, with careful design it has been possible to span or oversail the key ecological sites. Furthermore, habitats of ecological value outside of these sites have largely been avoided.

239 The greatest impact is associated with the locating of towers on hedgerows / treelines of moderate to low value (approximately 400m impacted). The maximum level of impact here will typically be 30m of hedgerow or treeline per tower location. Therefore, the overall impact will be 390m of hedgerow removal for the construction of the 13 towers identified.

240 Post construction, hedgerow habitat will naturally re-generate under towers. This is based on observations of towers along existing transmission lines, and protection of these habitats from livestock grazing; refer to **Appendix 6.3, Volume 3D Appendices** of the EIS. Hedgerow re-growth can be hampered by livestock grazing and or excessive damage to the soil structure around towers.

241 Stockpiling of spoil material has the potential to cause additional short term habitat loss should it be placed in a manner that would smother vegetation. Works areas located adjacent or close to hedgerows / treelines may disturb these habitats through inappropriate soil management or damage by heavy machinery.

242 The overall impact of direct habitat loss resulting from the construction of the towers in hedgerow treeline habitat is deemed to be a temporary moderate impact. This evaluation is based mainly on the ecological value of the habitats and the overall area of habitat involved.

243 **Table 6.14** indicates the number of towers that are located in various habitats, evaluation of impact and the potential area impacted.

Table 6.14: Impact of Locating Towers in Each Habitat Type within the MSA

Habitat [1]	Number of Towers	% of all Towers	Maximum Area / length habitat impacted (worst case) [2]	Assessment of Impact [3]
Improved agricultural grassland (GA1) – includes BC1 (arable farmland)	142	86.1	14.2ha	Imperceptible
Dry calcareous and neutral grassland (GS1)	3	1.8	0.3ha	Imperceptible
Wet grassland (GS4)	2	1.2	0.2ha	Imperceptible
(Mixed) conifer woodland (WD3) / dry meadow and grassy verge (GS2)	1	0.6	0.1ha	Imperceptible
Hedgerows (WL1A)	7	4.2	210m	Minor
Hedgerows (WL1B)	4	2.4	120m	Minor
Treelines (WL2)	2	1.2	60m	Minor
Immature woodland (GS2)	4	2.4	0.4ha	Imperceptible

Note: assumptions in evaluation:
1. All tower bases in linear woodland habitats (WL1A, WL1B and WL2) extend into grassland habitats detailed above. Assuming an area of $900m^2$ impacted at each structure location and, where relevant 30m of linear habitat impacted.
2. Magnitude of impacts on hedgerows and treelines informed by NRA (2006) evaluation. Evaluation for other habitats based on Table 6.2.

6.5.2.1.2 Habitat Loss and Disturbance – Under Conductors

244 The habitats identified as being potentially impacted are mature hedgerow with trees, mature treelines and mature woodland. The requirement for a minimum 74m corridor (tree removal) within woodland areas is also considered.

Hedgerows and Treelines

245 There will be a requirement for cutting / trimming of woody vegetation including mature tree lopping at many of the linear woodland field boundaries (WL1 (Type B) and WL2 habitat) and areas of deciduous woodland areas (WD1) traversed by the alignment. This is to provide a minimum 6m clearance beneath the lowest conductors and main sections of woody vegetation.

246 The number of linear habitats crossed and estimated number of mature tree lopped is summarised in **Table 6.15**. For the purposes of description, lopping is where an obvious tree above 6m height (typically much more) will be cut. Trimming is the removal of boughs or reduction in height but retention of much of the tree structure.

247 The degree of tree lopping will vary based on factors including tower heights, closeness of hedgerow to towers, lowest point of conductor sag and topography.

248 Based on observed typical hedgerow heights under existing transmission lines, hedgerows with a height of up to 9m on flat terrain typical of the MSA, are unlikely to be lopped. Therefore, significant tree lopping and trimming will only be required on overgrown hedgerows (over 9m) with semi mature and mature trees (WL1 Type B) and mature treelines (WL2) occurring in the MSA at least on flatter topography.

249 The number of hedgerow and treeline crossings of the alignment is identified in **Table 6.15**. Based on the 5m woody vegetation clearance requirements below the lowest conductor, an estimate of the total number of treeline (WL2) and overgrown hedgerows (WL1 – Type B) requiring minor trimming and more extensive tree cutting / pollarding is detailed.

Table 6.15: Number of Linear Woodland Habitat Features Oversailed by the Alignment and Assessment of Impact

Habitat [1 2]	Number of linear woody habitat features oversailed by alignment [3]	Impact	Assessment of Impact
Hedgerows (WL1 – Type A)	161	No impact predicted	None
Hedgerows (WL1 - Type B	113	Tree lopping required at most alignment crossings. Tree trimming required.	Moderate
Treelines (WL2)	41	Tree lopping and trimming required at all alignment crossings	Moderate

Note:
1. Hedgerows Type A - hedgerows that do not include mature trees and therefore should not require tree lopping or significant trimming as vegetation is typically below the heights where woody vegetation cutting is required.
2. Hedgerows Type B – Overgrown hedgerows that typically include at least 1 mature tree and therefore will likely require tree lopping or bow cutting and / or hedgerow trimming.
3. Estimate is based on interpretation of LiDAR imagery coupled with field observations.

250 Tree height will be permanently reduced at WL2 and WL1 (Type B) habitats under the alignment. The linear woodland habitat structure will be retained.

251 No tree cutting is required at riparian areas of the River Boyne and Blackwater cSAC / SPA crossings.

252 The overall impact of direct habitat loss resulting from the lopping of trees in hedgerow / treeline habitat over sailed by the conductors is deemed to be a moderate construction phase impact. This evaluation is based mainly on the ecological value of the habitats and retention of the lower tree structure and overall linear woodland habitat structure.

Woodland Areas

253 Long term habitat loss is foreseen in woodland areas that the OHL will traverse. Specifically, tree felling will be required at:

- Mature deciduous woodland at Brittas Estate;
- Smaller blocks of deciduous woodland identified in **Table 6.16** and on habitat maps; and
- Six other separate blocks of coniferous plantation woodlands.

254 In a worst case scenario there may be a requirement for a clearway corridor of up to 74m in woodland areas identified. An estimate of total area of this habitat impacted (trees will be permanently cleared) is detailed in **Table 6.16**. Locations indicated by tower locations are outlined in Habitat Maps.

Table 6.16: Areas of Woodland Crossed by the Proposed Alignment

Location	Woodland Type	Evaluation	Extent of Woodland loss	Assessment of Impact
Brittas Estate (Towers 267 to 269)	Mature Deciduous Woodland (WD1)	Local Importance (Higher Value)	1.1 (2.8% of the wider mature woodland - c.a. 39ha) [1]	Moderate
Between Towers 291 and 292	Mature Deciduous Woodland (WD1)	Local Importance (Higher Value)	<0.1ha [2]	Minor
Between Towers 336 and 337	Mature Deciduous Woodland (WD1)	Local Importance (Higher Value)	<0.1ha [2]	Minor
Between Towers 321 and 322	Mature Deciduous Woodland (WD1)	Local Importance (Higher Value)	<0.1ha [2]	Minor
Between Towers 262 and 263	Mature Deciduous Woodland (WD1)	Local Importance (Higher Value)	<0.1ha [2]	Minor
Between Towers 272 and 273	Mature Deciduous Woodland (WD1)	Local Importance (Higher Value)	<0.1ha [2]	Minor
Brittas Estate (Towers 267 to 269)	Immature Deciduous Woodland (WD1)	Local Importance (Lower Value)	1.2ha [1]	Minor

Location	Woodland Type	Evaluation	Extent of Woodland loss	Assessment of Impact
Between Towers 246 and 247 Between Towers 247 and 248 Between Towers 296 and 299 Between Towers 300 and 301 Between Towers 330 and 332 Between Towers 391 and 392	Mature Coniferous/ Mixed plantation Woodland (WD3 / WD4)	Local Importance (Lower Value)	10ha [1]	Minor

Note:
1. 74m corridor likely required
2. 74m corridor not likely to be required

255 This level of impact will be much reduced at detailed design stage (in consultation with the landowner) as tree clearance will only be carried out if strictly required. The clearing of trees in Brittas Estate means WD1 habitat will change to scrub / immature woodland. This woodland type habitat, while managed to keep tree vegetation height low, will still be contiguous with the wider deciduous woodland area within Brittas Estate. Typical flora and fauna will be retained.

256 The overall impact of direct habitat loss resulting from the lopping of trees in deciduous woodland habitat over-sailed by the conductors is deemed to be a long term moderate impact. This evaluation is based mainly on the ecological value of the overall woodland habitat.

257 While no invasive species were recorded during surveys there is a potential that site works and associated soil disturbance could lead to spread of invasive species which requires mitigation consideration.

258 Low oak ash-hazel woodland is crossed by the alignment at three locations (refer to Habitat Maps **Volume 3D Figures** in the EIS). Given the low growth of this woodland no tree cutting is likely required.

6.5.2.1.3 Habitat Loss and Disturbance –Temporary Access Routes

259 In selecting appropriate temporary access routes, wet areas and areas comprising semi-natural habitat have largely been avoided.

260 Some clearance of woody vegetation to facilitate site access may be required to widen existing access points. However, in choosing suitable temporary access routes, potential adverse ecological impacts have been largely avoided by using existing farm tracks and gaps in hedgerows wherever possible. All temporary access routes were assessed by an ecologist and

no significant potential impacts were identified. Given that farm scale type machinery will be utilised during construction only minimal vegetation clearance is likely to be required at existing gaps. No temporary access routes cross habitats of high ecological value such as wetlands or semi natural woodland areas.

261 Potential localised impacts are determined to be imperceptible and short term.

6.5.2.1.4 Habitat Loss and Disturbance – Stringing and Guarding Locations

262 Stringing areas have been identified in the vicinity of all angle towers for locating machinery required for the process of stringing conductor cables. These are all located in habitats of low ecological interest and avoid those sites identified as Key Ecological Receptors (see **Table 6.13** and Habitat Maps presented in Figures 6.2.1 - 6.2.19, **Volume 3D Figures** of the EIS). These areas will be reinstated post works and standard pollution controls (as detailed below) implemented.

263 Some minor temporary habitat disturbance may occur at those sites where guard poles are to be temporarily erected during the stringing of conductors. A number of these areas identified include hedgerows in close proximity (see Habitat Maps presented in Figures 6.2.1 - 6.2.21, **Volume 3D Figures** of the EIS). Hedgerows will be avoided by site works and all works will take place within improved grassland. These areas will be reinstated post works and standard pollution controls (as detailed below) will be implemented.

6.5.2.2 Secondary (Indirect) Impacts to Habitat

6.5.2.2.1 Hydrological Impacts to Wetlands

264 No wetland of conservation importance occur in the vicinity of the development in MSA. The key consideration for the development in MSA is protection of water quality and associated aquatic receptors in streams and rivers located in the vicinity of the development (see below).

6.5.2.2.2 Water Quality (Aquatic Receptors)

265 Water quality perturbations associated with construction activity have potential to impact upon the ecologically sensitive River Boyne and Blackwater cSAC and other non-designated waterways in the vicinity of the development. Key river sites are identified in **Table 6.10**. However smaller streams and drainage ditches require water quality protection measures.

266 For tower locations in proximity to watercourses, works that could give rise to impacts would be associated with sediment release during the erection of towers or potential contamination of surface water from concrete and / or fuels used during construction.

267 No substantial or major impacts are likely from the development given the very localised scale of works located away from rivers and.

268 Potential impacts on freshwater habitats arising from the construction phase include, in the absence of mitigation, deterioration of water quality due to sediment release during the excavation of tower foundations or potential contamination of water from concrete and / or fuels during construction. Such potential impacts in the absence of mitigation could cause direct and indirect impact on aquatic ecology as follows:

- Sedimentation – temporary smothering of gravel beds with consequent loss of fish and spawning habitat.
- Sediment deposition can also provide a base for growth of filamentous algae on gravel beds, leading to a build up of sediment and loss of suitable habitat for crayfish and spawning habitat for lamprey and salmonids.
- Sedimentation impacts in the absence of mitigation include smothering fish eggs and causing mortalities in fish of all ages, reducing abundance of food and impeding movement of fish.
- Sedimentation impacts in the absence of mitigation also include smothering of food prey for juvenile salmonids i.e. macro invertebrates.
- Localised construction phase reduction of surface and groundwater quality in wetlands removed from, but linked to the proposed development.
- Accidental leakage / spillage of oil and fuels from construction vehicles can have indirect impacts on fish, fish food and fish habitats and other aquatic species.
- There is no requirement for in-stream works which has significantly reduced both direct and indirect impacts to the aquatic systems and their flora and fauna.

269 The sources of such impacts have been identified as tower locations where works are proposed in proximity to watercourses and surface and ground water dependant habitats. These locations are illustrated on the Habitat Maps presented in Figures 6.2.1 - 6.2.21**, Volume 3D Figures** of the EIS. All tower locations are located away from sensitive natural watercourses and permanent drainage features and therefore the risk of pollution of surrounding watercourses is low. Best practice construction techniques that will be adhered to during the construction of the proposed development will also minimise the potential for these impacts to occur.

270 It is concluded that in the absence of mitigation, possible deterioration of water quality of surrounding surface water during the construction phase may result in temporary, moderate, negative impacts to aquatic receptors.

271 Felling of conifer plantations required to facilitate the development also has the potential to impact water quality of downstream watercourses due to the possible release of sediments and nutrients. Considering the limited extent of forestry felling (10ha WD3/WD4 at six locations as shown in Table 6.16) and an absence of sensitive watercourses in this area, no impacts of significance are foreseen as a result of this activity.

272 Further details on the potential impacts on water quality (post mitigation) are addressed in **Chapter 8** of this volume of the EIS.

6.5.2.2.3 Direct and Indirect Impacts on Fauna (Mammals and Birds)

273 Noise associated with construction works and traffic activity may disturb resident birds and mammals. However, in most cases, mammals and birds within the MSA are thought to be sufficiently mobile so as to temporarily relocate from works areas. Construction noise will not be significantly different from current agricultural activities, so is unlikely to cause undue disturbance. Therefore this temporary negative impact is deemed to be minor. In addition nesting areas for common birds (hedgerows / treelines) will mostly be avoided.

274 Breeding Lapwing in the townland of Oristown may potentially be disturbed should development works be carried out close to this site during the bird breeding season. This disturbance impact is considered be short term in duration and minor. This evaluation is informed by the fact that works will be located at least 200m from the core breeding area (despite recent 2014 disturbance due to land improvement). Lapwing typically continue to breed in areas adjacent to farmland used for intensive agriculture and associated machinery disturbance, as will be the case for the development works.

275 It is considered that imperceptible impacts will arise to Whooper Swans and Golden plover as sites where these species were recorded are generally removed from the development. This evaluation is informed by the fact that Whooper Swans typically use areas in the vicinity of noise and other disturbance e.g. roads, farm management activities etc.

276 Trees occur along the boundary of many of the streams traversed by the alignment. In this regard tree lopping may be required. This has potential to result in disturbance to kingfisher breeding areas. Disturbance impacts have potential to result in unlikely temporary moderate impacts. This species requires particular consideration at streams linked to the River Boyne and Blackwater SAC / SPA.

277 Bat species may roost in large mature trees that provide suitable crevices and hollows. Surveys have confirmed that such large mature trees are very rare throughout the zone of potential impact. Felling or trimming of such trees that function as transient bat roosts will cause displacement or death if not felled using appropriate techniques (‗soft‘ felling). It is concluded therefore that there is potential that temporary tree roosts will be lost during the construction phase. This is considered an unlikely, temporary, moderate negative impact.

278 The potential for disturbance impacts on otter and their breeding sites has been minimised by the placement of towers (and sections of temporary access routes) away from potentially suitable habitat (significant watercourses and associated semi-natural habitat). As detailed in **Table 6.10** works areas are sufficiently removed from potential otter breeding areas. It is determined that the potential disturbance can be classed as an unlikely temporary moderate negative impact.

279 There are no confirmed badger sett entrances within 50m of any works area and therefore this impact is not foreseen. However, it is possible that unidentified badger setts occur in proximity (within 50m) to works areas and therefore this potential impact can be described as a possible temporary moderate negative impact. The risk of disturbance to badger breeding sites is considered to be very low based on:

- Locating towers away from hedgerows / treelines where badger setts typically occur;
- The highly managed farmland nature of tower locations confirmed using LiDAR as managed farmland regularly driven over by farm machinery;
- Avoidance of known badger setts from desktop data and field studies; and
- General scarcity of badgers in the study area as noted during field surveys.

280 In summary, key mammal and bird receptors requiring mitigation consideration regarding potential construction phase disturbance impacts include: otter; bats; badgers; Lapwing; Kingfisher and other breeding bird species.

6.5.2.2.4 Construction Impacts on Key Ecological Receptors.

281 A summary of potential impacts associated with the construction phase is presented in **Table 6.17**. The magnitude of potential impacts range from temporary imperceptible to permanent moderate in significance.

Table 6.17: Summary of Potential Construction Phase Impacts on Identified Key Ecological Receptors within the MSA

Site/ Feature	Evaluation	Area	Description Impact Source	Assessment of Potential Impact
River Boyne cSAC / SPA	International	River Boyne crossing	Temporary Indirect water pollutant impacts, disturbance to riparian habitats, disturbance to qualifying species in European sites.	Temporary moderate
River Blackwater cSAC / SPA	International	River Blackwater crossing	Temporary Indirect water pollutant impacts, disturbance to riparian habitats, disturbance to qualifying species in European sites.	Temporary moderate
Larger Streams draining into River Boyne and Blackwater	International (Cumulatively)	Boycetown River between Towers 376 and 377. Between Towers 358 and 359. Between Towers 350 and 351. Clady River three crossings between Towers 347 and 344. Blackwater River - natural flood plain drainage ditch between Towers 308 and 309. Small stream between Towers 314 and 313. Small stream between Towers 318 and 317.	Indirect water pollutant impacts, disturbance to riparian habitats, disturbance to qualifying species European sites.	Temporary moderate
Whooper Swan and Golden Plover	Annex I of EU Birds Directive. Nationally significant population.	All sites identified	Temporary disturbance from forage areas during construction.	Temporary imperceptible
Lapwing (breeding sites)	Red listed breeding species of high conservation concern. Area identified supports > 1% County Meath breeding population. County Important Site.	Oristown townland	Temporary disturbance and displacement associated with noise from works area and other construction related disturbances in identified areas used by breeding Lapwing.	Temporary minor
Treelines (WL2)	Cumulatively these habitats are of County Importance as habitats and for wildlife.	Refer to **Table 6.15**. 41 crossings along alignment identified.	Tree lopping is required at 41 tree lines crossed by the alignment. Permanent reduction in height and retention of habitat.	Moderate
Hedgerows with mature trees (WL1 – Type B)	Cumulatively these habitats are of County Importance as habitats	Refer to **Table 6.15.** 113 crossings along alignment identified.	Tree lopping required at 113 Hedgerows with mature trees crossed by the alignment. Permanent reduction in height and retention	Moderate

Site/ Feature	Evaluation	Area	Description Impact Source	Assessment of Potential Impact
	and for wildlife.		of habitat	
Linear woodland habitat (WL1A, WL1B, and WL2)	Cumulatively these habitats are of Local Importance (Higher Value) as habitats and for wildlife.	Refer to **Table 6.15**. Towers located in 13 locations of WL1A, WL1B, and WL2 habitat.	390m of hedgerow / treeline vegetation removed at for locating 13 towers.	Permanent minor
Other River Crossings	Local Importance (Higher Value).	Including specific rivers detailed above there is a requirement to cross 41 rivers in total.	Indirect water pollutant impacts, disturbance to riparian habitats and aquatic species.	Temporary moderate
Mature deciduous woodland (WD1)	Cumulatively these habitats are of Local Importance (Higher Value).	Refer to relevant areas including Brittas Estate in **Table 6.16.**	Mature tree clearance may be required within a maximum 74m wide corridor.	Moderate
Bats	Annex IV of Habitats Directive *Wildlife (Amendment) Act, 2000*	Towers in hedgerows, 41 mature treelines crossed, 113 hedgerow with trees (crossed) and mature woodland identified at Brittas Estate and other mature deciduous woodland locations afford possible temporary bat roost sites. No significant sites identified in surveys.	Disturbance and displacement to bat roosts in mature trees lopped (WL2, WD1 and WL1 B habitats).	Temporary moderate
Otter	Annex IV of Habitats Directive *Wildlife Acts*	41 river crossings identified as possible otter breeding sites. Sites with more potential are larger river crossings.	Very low disturbance and displacement risk to possible otter breeding sites associated with tree cutting where the line traverses streams/ rivers (possible breeding areas).	Temporary moderate
Badger	*Wildlife (Amendment) Act, 2000*	All tower locations, 41 mature treelines, 113 hedgerows with trees and mature woodland identified at Brittas Estate and other mature deciduous woodland locations afford possible bat roost sites.	Very low disturbance risk to possible badger breeding sites	Temporary moderate
Kingfisher	Annex I of EU Birds Directive Nationally significant population reason for River Boyne and Blackwater designation as SPAs	41 river crossings identified as possible Kingfisher breeding sites.	Very low disturbance risk to possible Kingfisher breeding sites associated specifically with tree cutting where the line traverses streams / rivers.	Temporary moderate
Breeding birds (including	Identified locally significant populations of	All areas where potential disturbance to woody vegetation	Localised disturbance risk associated specifically with tree cutting to common	Temporary minor.

Site/ Feature	Evaluation	Area	Description Impact Source	Assessment of Potential Impact
Yellowhammer)	in particular Yellowhammer a red listed species of high conservation concern		breeding birds' sites in treelines / mature hedgerow vegetation	
Semi natural oak-ash-hazel woodland	Local Importance (Higher Value)	Low growing semi natural woodland and associated streams crossed at three locations between Towers 260 and 261, Towers 289 and 258 and Towers 252 and 251. Habitat will be avoided.	Woody vegetation trimming is unlikely to be required given the low heights (<6m) of woody vegetation.	Temporary imperceptible

6.5.3 Operational Impacts

282 Key identified impacts during the operational stage are discussed throughout this section. The main features of the operational phase of the proposed development that could give rise to ecological impacts include:

- The presence of the line (conductors and earthwires) presents a collision risk to vulnerable bird species;
- Ongoing trimming of tall vegetation where the line crosses hedgerows; and
- Ongoing maintenance of equipment as may be required.

6.5.3.1 Direct Impacts (Habitats)

6.5.3.1.1 Habitat Loss and Disturbance

283 There will be a requirement for ongoing trimming of hedgerow, treeline and woodland vegetation that occur between towers over a cycle of approximately five years. This is to ensure adequate clearance beneath the OHLs is maintained throughout the operational phase of the proposed development. Such trimming will only be carried out on individual trees identified, that may interfere with the alignment, at each crossing point, therefore trimming will only be carried out at a selection of sites during each cycle. The value of hedgerows as wildlife corridors for dispersing and feeding birds and mammals, and as commuting corridors for bats, will not be adversely affected. This impact is therefore deemed to be an ongoing (every 5 years), short term imperceptible impact.

284 There may also be minor disturbance impacts to mammals and birds associated with vegetation management. This impact is deemed to be a temporary imperceptible negative impact.

6.5.3.2 Secondary (Indirect) Impacts to Habitats

6.5.3.2.1 Habitat Alteration

285 The operational phase will lead to potential localised ecology changes around tower locations, including alteration of habitat types by management factors including how much grazing by livestock will be allowed. Where towers are located in woody vegetation, the removal of livestock grazing post construction may result in scrub extension into these areas which were formerly managed. In this regard, there is a potential positive increase in semi natural habitat.

286 Towers in grazed areas tend to be targeted by grazing animals for shelter and scratching. In this regard increased grazing and soil poaching can permanently affect habitats locally. In this regard habitat recovery, for example hedgerow re-establishment may be reduced if a tower is located in a hedgerow gap. This is considered a permanent imperceptible impact.

6.5.3.2.2 Water Quality (Aquatic Receptors)

287 There is potential for impacts to water quality in particular where works are proposed close to streams and rivers during operational maintenance works. Potential impacts may arise to downstream aquatic receptors. This is predicted as a short term, minor, localised impact.

6.5.3.3 **Direct and Indirect Impacts on Fauna (Birds and Mammals)**

6.5.3.3.1 Birds

288 Electrocution has been highlighted in literature as a potential issue for large raptors (e.g. Golden Eagles). The design of the proposed transmission line has removed this possible issue as raptor species in the study area (e.g. Buzzard and Kestrel) are too small to reach the distance between phase to phase or conductor to conductor. These distances are significantly greater than the wing length of any species of bird in the study area. Therefore the development is not considered a significant electrocution issue for birds generally. Electrocution is not an identified significant issue for Whooper Swan and wildfowl generally.

6.5.3.3.1.1 Whooper Swans

289 The assessment of potential impacts on Whooper Swans were informed by the following;

- An extensive desktop study was conducted to inform this evaluation (refer to Winter Bird Study in **Appendix 6.6, Volume 3D Appendices** of the EIS, and the reference list in the **Bibliography** in this volume of the EIS).

- Seven years of winter bird studies conducted to gather evidence on flightlines, numbers, local concentrations and evidence of ringed birds (which can be used to identify bird movements).

- Potential displacement and collision impacts were informed by observed interactions of Swans (Mute, Whooper and Bewick) and Geese (species) with powerlines and wind turbines, existing published scientific information, Environmental Impacts Statements for similar type developments and consultation with relevant experts (including Royal Society for Protection of Birds and BirdWatch Ireland).

- Swans are identified as a species group susceptible to collision with powerlines (EirGrid (2012); Becker & Lichtenberg (2005)). There are likely to be increased collision risks to juvenile and less experienced birds in particular during poor visibility (e.g. at night and during misty conditions).

- Geese species including Greylag and Pink footed were subject of a specific transmission line interaction study by the author, refer to MBEC[24] (2006b). The impact assessment in this chapter was informed by surveys conducted of bird collision mortalities along an existing 400 kV line in Scotland. The sites surveyed were locations where geese (species) concentrated, and fly regularly over 400 kV and 220 kV transmission lines. Sites surveyed support internationally important numbers of Greylag and Pink footed Geese (relatively similar species in terms of potential susceptibility to collision with transmission lines). No signs were ever noted of geese or indeed swans (present in the area) colliding with transmission lines, despite regular flights observed across transmission lines in this study. Species observed as colliding with transmission lines during these surveys included common species such as Grey Heron or species not recorded in the MSA e.g. Guillimot (sea bird).

- Whooper Swan (and Mute Swan) interactions with existing transmission lines have been recorded by the author in counties Mayo, Monaghan and at Toome Bridge in Northern Ireland. Whooper Swan have been observed flying over and foraging close by, beside and under transmission lines. These observations and surveys serve as an indication that Whooper Swan may habituate to transmission lines.

- A number of observed sites in Northern Ireland support internationally important numbers of Whooper Swan (e.g. Toome Bridge area – near Lough Neagh SPA). Toome Bridge in particular supports internationally important numbers of Whooper Swan which regularly forage and flyover a 275 kV transmission line which was constructed between 1963 and 1978 (source Northern Ireland Electricity). While occasional collisions occur, these areas have been recently marked with flight diverters and the area continues to support a thriving population of Whooper Swan (Hall et al, 2012).

- Studies conducted in the Netherlands (Fijn et al., 2012) on wintering swans found low levels of collision mortality within wind farm developments (and associated electricity infrastructure), even in sites with a high degree of transit flights through operational wind farms and relatively high numbers (>500) of birds regularly present. In a review of

[24] The author of this chapter of the EIS was a co-author of the MBEC McKenzie Bradshaw (2006b). *Bird - Power Line Collision Field Study.* Prepared for Scottish and Southern Energy plc.

swan and goose fatalities at wind farms only 2 Whooper Swan were recorded as fatalities from monitoring undertaken at 46 different wind farms across 8 countries (Rees 2012). Wind farms similarly to transmission lines present an identifiable collision risk to birds including Whooper Swan. The research data above indicates that actual collision risk from wind farms is low even where wintering swans concentrate and regularly fly over.

- During the course of the Whooper Swan study conducted in Meath and Monaghan (2007 – 2014), signs of Whooper Swan and or Mute Swan collisions with distribution lines were observed at various locations (including two sites near Ballybay and the Cruicetown site in MSA). This is consistent with general (non published) observations that low and mid voltage lines close to concentrations of wintering swans are a localised collision hazard.
- The Icelandic Whooper Swan population (population which winters in Ireland) is considered to be at favourable conservation status (source: JNCC) and populations in Ireland have increased between 2000 and 2005 by 11% (Crowe et al., 2005) and by 6% between 2005 and 2010 (Boland et al., 2010) notwithstanding the already extensive transmission and distribution line infrastructure which they may potentially collide with.
- Observations of Whooper Swan flocks (between 2007 and 2014) in MSA and CMSA noted good recruitment of juveniles to flocks observed with regular observations of adults with larger broods (3+ fledged juveniles) in recent years indicating that the population is recruiting. Whooper Swan continue to concentrate in areas even where distribution and transmission line infrastructure cross nationally or county important sites.
- A submission received from NPWS, for the previous oral hearing on the development, identified that collision impacts on Whooper Swan may arise at a local level and it is unlikely that the national population nor any Special Protection Area (SPA) will be impacted, refer to **Appendix 6.2, Volume 3D Appendices** of the EIS.

290 In summary the impact assessment is informed by:

- High conservation importance of the species;
- Likely habituation to the proposed development;
- Occurrence in small scattered flocks (sub populations) at specific locations identified; and

- Scientific and anecdotal observations of Whooper Swan interactions with transmission lines (and other similar developments).

291 It is considered highly unlikely that the proposed development will give rise to substantial or profound impacts to Whooper Swan populations and sub populations in the MSA during the operational phase. The key approach therefore in the assessment is to identify local areas where a moderate or less adverse impact could arise.

Collision Impacts

292 The approach in this evaluation was to identify areas with relatively regular yearly and inter-year Whooper Swan flight lines which are bisected by the route of the proposed alignment and also to consider the location of observed flocks relative to the proposed alignment. Typical observed flight heights during surveys were generally at heights at or just above hedgerow / treeline height (under 15m). This height would be at the typical height of the lowest conductors. Based on the scientific literature Whooper Swan flight behaviour is such that they will fly over the highest conductors, and in this regard the greatest risk of collision is associated with collision with the earth (shield) wire (APLIC 2012). This is located above the highest conductors.

293 APLIC, 1994 cites that collisions with transmission lines *“are not a biologically significant source of mortality for thriving bird populations”.* The Whooper Swan population in Ireland is increasing based on current data and can be considered as being at favourable conservation status.

294 Based on the field survey conducted potential collision risk are identified as being at specific key areas along the proposed development. These areas include;

- The River Blackwater Crossing - The alignment bisects a regularly used flightline between Tara Mines Tailings Pond (roost site) and foraging areas in the River Blackwater valley.

- The area near Cloony Lough – The alignment passes through an extensive open agricultural landscape where potatoes are grown, at scattered locations, which attracts Whooper Swan. The locations used and hence flightlines are highly variable and depend on crop rotation (farm management), flooding and alternative food source availability. Roost sites are limited and were observed to be primarily local flooding, Cruicetown and unknown areas to the east of the alignment.

- The alignment east of Cruicetown – The alignment bisects a relatively regularly used flightline (observed most years including 2013/2014) between Whitewood Lough (roost site) and foraging / roost area at Cruicetown.

- The Yellow River area is relatively regularly used (not every year) by large flocks of Whooper Swan. These birds were observed to roost at Tara Mines Tailings Ponds and flightlines observed did not cross the alignment. This important foraging area is quite close to the alignment and in this regard it is likely that some birds may cross the alignment.

- A number of other sites close to the alignment are irregularly used including in the town lands of Red Island and Drakerath (2012 records only). Impacts are likely to be imperceptible at these locations though occasional collisions could arise if Whooper Swan are again attracted to these areas.

295 Figure 6.3.2, **Volume 3D Figures** of the EIS details a summary of all flight lines observed over the course of the baseline studies including those at these locations which are considered relevant for consideration of potential impacts. The key locations where a collision risk is identified are highlighted below for further consideration. The assessment is based on the methodology described in Section 6.2.6. The assessment of impact significance is detailed below for identified sub-populations of Whooper Swan at relevant locations identified:

- ***River Blackwater Valley (Whooper Swan):***

  Sensitivity = Very High. Annex 1 listed, site regularly utilised (every year 2007 – 2014). A regularly recorded Nationally important population (occasional International) requires consideration in this area.

  Magnitude Description = Low. The alignment presents a barrier across regularly used flightline between Tara Mines Tailings Ponds and foraging sites in the Blackwater valley. The alignment is removed (>2km) from the main roost site at Tara Mines Tailings Ponds. Whooper Swan will continue to use area and will habituate (fly over) the alignment. Some collisions may occur with conductors / earth wire in particular during the short term.

  Significance = Medium.

- ***Cloony Lough (Whooper Swan):***

  Sensitivity = High. Annex 1 listed, wider area utilised and sites where recorded to date are irregular (inter year) and change based on available forage habitat / roost opportunities. A regularly recorded County important population requires consideration in this area.

  Magnitude Description = Low (Minor shift away from baseline). The alignment presents a barrier across irregularly used flightline in this area. Whooper Swan will continue to use area and will habituate. Some collisions may occur with conductors / earth wire in particular during the short term

Significance = Low.

- ***Cruicetown (Whooper Swan):***

  Sensitivity = High. Annex 1 listed, important (former) roost and existing forage site, Staging area during spring migration for numbers which do not now reach National Importance. A regularly recorded County important population requires consideration in this area.

  Magnitude Description = Low. Whooper Swan regularly fly from Cruicetown to roost at Whitewood Lough. The alignment presents a barrier across this regularly used flightline. Whooper Swan will continue to use the area and will habituate. Some collisions may occur with conductor s/ earth wire in particular during the short term,

  Significance = Low.

296 In this regard, site-specific mitigation is required to reduce this identified collision risk as much as possible, refer to **Section 6.6.2**.

297 Other locations where relatively regular flocks of Whooper Swan occur close by (within 1km) include Yellow River Area and Drakerath. The Yellow River site is a regularly used site by numbers which reach (at least close to) National Importance. Flight lines observed at Yellow River were generally away from the alignment (towards Tara Mines Tailings Ponds) while observed Whooper Swan at Drakerath stayed for an extended period in 2012 foraging and roosting without requirement for long flights across the alignment. In this regard Whooper Swan at these locations are unlikely to collide with the alignment and impacts are considered imperceptible. Given the importance of the Yellow River Area (National Importance) and closeness to the alignment, precautionary mitigation is detailed.

<u>**Displacement Impacts**</u>

298 The route of the alignment avoids the vast majority of observed foraging and roost sites. Most sites regularly used are located at a distance from the alignment including the most regularly used and most important sites, refer to **Table 6.18** for sites and distance to the alignment.

Table 6.18: Important Whooper Swan sites relative to the proposed alignment

Whooper Swan Site	Distance from alignment (km)
Cruicetown (roost and forage site)	>1
Balrath (area) (roost and forage site)	16
Blackwater Valley (forage area predominantly – less regular roost site)	3-4
Headford Estate (roost Site)	6
Tara Mines Tailings Ponds (roost site)	3

299 The alignment crosses one site used by Whooper Swan for foraging at Teltown (adjacent to the River Blackwater crossing). This is a relatively irregularly used site, used by low numbers especially in more recent years (maximum = 15 No. between winter 2009 and 2014). In 2008 and 2009 counts of 38 swans were recorded here in March. This site will be crossed by the alignment and hence there is a risk that Whooper Swan will be displaced from this location during the operational stage. This impact is considered unlikely and of low significance given that Whooper Swan continue to use sites close to existing transmission line infrastructure and it is not a significant area for Whooper Swan based on the winter bird study. Abundant alternative foraging areas are located in the wider area and Teltown is not considered a significant roost site.

300 No other measurable impacts (e.g. loss habitat) are likely to arise to Whooper Swan.

6.5.3.3.1.2 Other Birds

301 A number of bird species are identified in **Table 6.11** which may also potentially collide with the OHL. The key species requiring consideration are those with high susceptibility to collision. These include Mute Swan, Cormorant and Great Crested Grebe. The key areas where a potential collision impact may arise are large river crossings as a suitable buffer zone (>500m) exists between the development and breeding sites (lakes). Given the very low numbers of these species observed in the study area and no flight lines observed, it is considered that outside of larger river crossings impacts will be imperceptible. At the Boyne and Blackwater River crossing, collision impacts are considered minor for Cormorant and Mute Swan.

302 Golden Plover were recorded in nationally important numbers in the River Blackwater area. This species regularly flies over transmission lines throughout its range and low numbers of

individuals have been recorded in one study (Bevanger 2004) as colliding with power lines. This is not considered a species at significant risk of collision with the development and potential impacts to this species are considered imperceptible.

303 Breeding Lapwing at Oristown may be impacted by indirect impacts from the development associated with increased predation / disturbance from Buzzard and Corvid (Hooded Crow and Raven). The new towers will afford increased perching opportunities afforded for these predatory species close to a county important Lapwing nesting area. This will potentially increase current predation / disturbance risks to breeding Lapwing. Lapwing are rapidly declining as a breeding species in Ireland, and as a ground nesting species they are very vulnerable to disturbance. Transmission lines have been highlighted in studies as causing potential indirect predatory or disturbance impacts to ground nesting bird species throughout the world including Lammers & Collopy (2007). The land reclamation works observed at the breeding site in 2014 may have permanently displaced / removed this local breeding site. However based on previous regular usage and some suitable breeding habitat remaining, this area is evaluated as still being of County Importance.

304 A worst case scenario is that due to the new transmission line, there is increased opportunity for predation by corvids and buzzard (additional perching location for observing potential prey) which leads to breeding Lapwing populations abandoning this area due to predation and or additional disturbance. Displacement of Lapwing from this area would result in as a long-term moderate adverse impact at a county level as there are few other alternative sites in the nearby area.

305 Tree trimming may cause temporary disturbance to birds that utilise the hedgerows. This impact is deemed to be an on-going, temporary imperceptible negative impact with trimming works likely to recur at intervals of c. 5 years.

6.5.3.3.1.3 Mammals

Disturbance

306 No significant disturbance impacts are expected to protected mammals including otter, badger or bat species.

307 The level of operational traffic and ongoing maintenance is expected to be sufficiently low so as to avoid any disturbance impacts on birds and mammals that utilise the MSA.

6.5.3.4 Operational Impacts on Key Ecological Receptors

308 A summary of potential impacts associated with the operational phase is presented in **Table 6.19**. The magnitude of the predicted impacts range from imperceptible to moderate in significance.

6.5.3.5 Operational Impacts on Key Ecological Receptors

309 A summary of potential impacts on key ecological receptors identified during the operational phase is detailed in **Table 6.19**.

Table 6.19: Summary of Potential Operational Phase Impacts on Identified Key Ecological Receptors within the MSA

Site / Feature	Evaluation	Area	Description Impact source	Assessment of Potential Impact
Whooper Swan	Annex I of EU Birds Directive. Nationally / County significant population.	River Blackwater	Collision with conductors and earth wire	Permanent medium[1]
Whooper Swan	Annex I of EU Birds Directive County significant population	Cruicetown Cloony Lough Area.	Collision with conductors and earth wire	Permanent low[1]
Whooper Swan	Annex I of EU Birds Directive. Nationally significant population.	West Yellow River	Collision with conductors and earth wire.	Permanent low[1]
Whooper Swan	Annex I of EU Birds Directive	Other Sites identified	Collision with conductors and earth wire	Permanent negligible[1]
Whooper Swan	Annex I of EU Birds Directive	Teltown	Displacement from the foraging area at Teltown.	Permanent low
Cormorant and Mute Swan	Local Importance	River Boyne and Blackwater	Collision with conductors and earth wire	Permanent low
Lapwing (breeding sites)	Red Listed breeding species of high conservation concern. Area identified supports > 1% County Meath breeding population. County Important Site.	Oristown townland	Displacement of breeding Lapwing as a result of indirect impacts associated with increased predation / disturbance by perching corvids / buzzard in the townland of Oristown.	Permanent moderate
All River Crossings	International [*] (Cumulatively)	41 rivers crossed in total	Water pollution associated with maintenance works.	Temporary imperceptible
Linear woodland habitat (WL1A, WL1B, and WL2)	Cumulatively these habitats are of Local Importance (Higher Value) as habitats and for wildlife.	Towers located in 13 linear woodland habitat type locations	No / poor hedgerow re-growth at tower location in hedgerow gap due to trampling by livestock (indirect impact).	Permanent minor
Treelines (WL2	Cumulatively these habitats are of County Importance as	41 crossings along alignment identified	Irregular woody vegetation trimming under alignment.	Temporary imperceptible

Site / Feature	Evaluation	Area	Description Impact source	Assessment of Potential Impact
	habitats and for wildlife.			
Mature deciduous woodland	Cumulatively these habitats are of Local Importance (Higher Value).	Refer to **Table 6.16**	Irregular woody vegetation trimming under alignment.	Temporary imperceptible
Hedgerows with mature trees (WL1 – Type B)	Cumulatively these habitats are of County Importance as habitats and for wildlife.	113 crossings along alignment identified	Irregular woody vegetation trimming under alignment.	Temporary imperceptible
Other Birds	Identified locally significant populations of in particular Yellowhammer a red listed species of high conservation concern.	Throughout	Collision with transmission line.	Permanent imperceptible
Protected mammals	Annex IV of Habitats Directive. *Wildlife Acts.*	Throughout	Disturbance during maintenance.	Temporary imperceptible

Note 1: Collision risk assessment for Whooper Swan based on Percival (2003)

6.5.4 Decommissioning

310 The proposed development will become a permanent part of the transmission infrastructure. The expected lifespan of the development is in the region of 50 to 80 years. This will be achieved by routine maintenance and replacement of hardware as required. There are no plans for the decommissioning of the OHL. In the event that part of, or the entire proposed infrastructure is to be decommissioned, all towers, equipment and material to be decommissioned will be removed off site and the land reinstated. Impacts would be expected to be less than during the construction phase and would be of short term duration.

6.6 MITIGATION MEASURES

6.6.1 Mitigation by Avoidance

311 Consideration of various design options has led to the current proposed design that is deemed to have the least ecological impact taking account all other location factors and constraints.

312 The line route has been selected to avoid designated areas as far as possible. No towers will be located within any European Sites, however, the alignment conductors will cross the River Boyne and River Blackwater cSAC and SPA at two locations.

313 Tower 355 is the closest tower to the River Boyne crossing. It is located approximately 6m from the boundary of the cSAC and 56m from the SPA site boundary of the European site.

314 Tower 309 is the closest tower to the River Blackwater crossing. It is located approximately 84m from the cSAC boundary and 97m from the SPA site boundary of the European site.

315 Where possible, towers, temporary access routes, guard pole structures and stringing areas have been located away from habitats and sites of ecological importance. Furthermore, where possible, access to tower locations will be via existing tracks used by farm machinery on a regular basis. Existing field access points (e.g. gaps / farm gates) to local roads will be used to avoid creating additional hedgerow gaps.

316 The line has been routed at least 600m from the closest lakes and associated sensitive habitats and species.

317 No towers are located in high (local) value habitats and all are located in habitats not evaluated as key ecological receptors and typically of low ecological value. Only semi-natural habitats, including hedgerow field boundaries, which were adequately surveyed, were considered as tower locations.

318 The alignment has avoided areas where Whooper Swans concentrate for foraging. Key roost sites are generally at least 2.5km from the alignment except at Cruicetown which is less than 1km away.

319 The alignment avoids crossing a core breeding area for Lapwing of County importance though it is located within 200m. It also avoids locally important breeding bird habitats such as semi natural woodlands, wetlands and the vast majority of hedgerow / treelines.

320 The tower locations and access routes will avoid potential breeding sites that protected mammals such as otter, badger, bats and birds (specifically Kingfisher) typically use including; field boundaries (treelines / hedgerows), stream / rivers and associated riparian habitats, old buildings, caves, bridges and souterrains etc.

321 All towers are located a minimum of 50m from major rivers and at least 5m from other water features including small streams.

322 During the construction phase as part of the construction management plan, aquatic monitoring will take place by a suitably qualified Ecological Clerk of Works (ECoW) to confirm that pollution control measures are effective. Following detailed design consideration, and as required, temporary silt screens will be installed in drains / small streams deemed to be possibly at risk of water pollutant discharge.

323 Suitable breeding sites for amphibians such as drainage ditches will be avoided as far as possible.

324 The location of towers will avoid identified wetlands habitats.

325 It is intended that excavated material will be used on site for landscaping or for re-instatement measures within managed farmland only. Semi-natural habitats such as wetlands and hedgerows will be avoided. Other wastes will be removed for disposal at an appropriate licensed waste disposal facility (refer to **Chapter 12** in this volume of the EIS).

326 The spread and introduction of invasive species and noxious weeds will be avoided by adopting appropriate mitigation measures as per guidance issued by the NRA (2010). Any invasive plant material noted on site will be removed off site and disposed of at appropriate licensed waste disposal facility. Any invasive species found to occur within 15m of working areas will require a specialist method statement for its eradication to avoid the spread of invasive species, this will ensure compliance with the *European Communities (Birds and Natural Habitats) Regulations 2011* [S.I. No. 477 of 2011]. The presence of non-native species and requirement for actions will be confirmed by the ECoW.

327 For any landscaping or tree planting works only native species will be utilised. All invasive species should be avoided, as per Birds and Natural Habitats Regulations 2011.

6.6.1.1 Specific Additional Mitigation by Avoidance (River Boyne and Blackwater cSAC / SPA)

328 At designated site crossings, the construction works area will be located so as to avoid disturbance to riparian vegetation and river banks potentially used by breeding Kingfisher, otter, Lamprey, White-clawed crayfish, fish species including salmonids and freshwater invertebrates.

329 The following precautionary mitigation will be implemented for the River Boyne and River Blackwater cSAC / SPA:

- Tower bases and all associated construction activity will be located at least 50m from the designated site river bank. Riparian semi-natural habitat will be retained undisturbed.
- Towers and all associated construction activity will be located in managed habitats relative to larger streams draining into designated river sites.
- The transmission line crossing point, has been selected at relatively narrow points of the cSAC / SPA at each of the two river crossings.
- No in-stream or bankside works will take place within the cSAC /SPA or in drains and rivers draining into these rivers.
- The design of the tower and sag of the lowest conductor wire has been designed in a manner which rules out potential interference from vegetation at designated site boundaries, in particular at the River Boyne crossing. Thus no woody vegetation cutting/associated disturbances are required.
- Stringing of the transmission line will be conducted without a requirement to conduct work within the designated site boundary. Access will be avoided by machinery and personnel to habitats contained within the designated site boundary, such as the rivers and associated riparian habitats.
- A minimum buffer zone of 20m will be retained between tower sites and significant streams and rivers to minimise risks to sensitive aquatic receptors (e.g. salmonids and otter).

6.6.2 Mitigation by Reduction

330 The potential impacts detailed in **Section 6.5** can be reduced through careful mitigation. The key approach for minimising risks such as disturbance to wildlife and protection of water quality is the appointment of an appropriately experienced ECoW on site during construction, to advise on the detailed design approach and implement ecological mitigation as detailed in this EIS and as will be detailed in the Construction and Environmental Management Plan (CEMP) (refer to Appendix 7.1, **Volume 3B Appendices** of the EIS, for an outline CEMP).

331 The role of the ECoW will include:

- Supervision of construction works and ensure compliance with legislation;
- Monitoring habitats and species during the course of construction works and effectiveness of mitigation;
- Provision of advice regarding the avoidance and minimisation of potential disturbance to wildlife;
- Provide recommendations on appropriate responses / actions to site specific issues (e.g. identification of previously unrecorded breeding sites during construction works); and
- Liaison with NPWS, IFI and other prescribed authorities, when required.

332 In addition to the construction phase, it is recommended that the ECoW will be appointed during the pre-construction (landowner liaison stage) and post construction phases (minimum two years) in particular to monitor mitigation measures, refer to **Section 6.7.1**.

6.6.2.1 **Construction Phase Mitigation**

333 A CEMP will be implemented for the construction phase of the project with respect to all mitigation detailed in this EIS (refer to Appendix 7.1**, Volume 3B Appendices** of the EIS for an outline CEMP).

334 The mitigation measures to be included in the CEMP in relation to flora and fauna will be implemented as part of the construction management.

335 Work method statements will be developed by construction and site contractors, agreed with statutory authorities and ECoW (where appropriate) and implemented by construction crews for all construction activities, these will be detailed in the CEMP.

6.6.2.1.1 Habitats

336 The works area will be clearly marked / fenced. Hedgerow, tree and scrub vegetation that are to be retained which are located in close proximity to working areas will be clearly marked and fenced off to avoid accidental damage during excavations and site preparation. No materials will be stored within 5m of hedgerows / trees / scrub. Materials, especially soil burden can prevent air and water circulating to the roots of trees / shrubs.

337 Where towers are to be located on field boundaries comprised of hedgerows, the vegetation will be removed to ground level. Works will be implemented in a manner to minimise soil disturbance and compaction outside of the tower foundations and in particular where the root structures of the hedgerow remain. Post construction a wooden fence will be installed around the tower base to prevent livestock access and replanting carried out with low growing woody species of local provenance including Blackthorn, Hawthorn and Hazel. This will allow re-establishment of the hedgerow in the gap where the tower is located. Where required, disturbed areas of grassland will be appropriately prepared and reseeded with a locally sourced grass mix, similar to that already occurring within the surrounding fields. Reseeding works will be undertaken within 3 weeks of construction works to avoid flushing of exposed soil downstream.

338 Tree cutting and lopping at linear woodland features under conductors will be undertaken in a manner which minimises the requirement for extensive tree lopping. Large mature trees will be pollarded by qualified foresters / tree surgeons so as to retain as much of the treeline / linear habitat structure and in a manner which retains ground flora species and which does not kill the tree. The trimming regime will involve a scalloping or profiling effect which will minimise the effect on vegetation. Overall, it will not change the structure and ecological function of these linear woodland features, and will not measurably affect associated fauna post construction.

339 There will potentially be a requirement of 74m corridors in the woodland identified in **Table 6.15**. Machinery access to these areas will be minimised as much as possible to minimise soil compaction and damage to woodland ground flora. In consultation with landowners areas of dead wood will be retained so as to improve local biodiversity. Low growing scrub (woodland vegetation) habitat will be retained under the conductors.

340 Where construction work is required close to mature trees, the National Joint Utilities Group *Guidelines for the Planning Installation and Maintenance of Utility Services in Proximity to Trees*“(NJUG 10) will be followed so as to minimise damage.

341 Tree cutting will be undertaken by a qualified forester / tree surgeon aimed at minimising the degree of cutting. The ECoW will provide input where necessary, to minimise the impact on surrounding habitats and/or species e.g. through suggesting the direction of tree fall. As part of this the ECoW will also advise on sensitive areas to avoid in particular at river crossings.

342 As noted, impacts to hedgerows and linear woodland caused by access requirements will be avoided by the selection of temporary access routes via existing farm access points and gaps in hedgerows. Existing gates onto local roads will be used, rather than creating additional hedgerow gaps. Any alteration to temporary access tracks will be agreed with the ECoW in advance to ensure avoidance of impacts to ecologically sensitive receptors.

343 Any temporary material used to allow machinery access will be removed post works to allow habitat regeneration.

6.6.2.1.2 Water Quality

344 A drainage and sediment control plan will be implemented by contractors during site works. The plan will detail specific mitigation measures (taken from mitigation measures, outlined in this chapter and **Chapter 8** of this volume of the EIS) to address site specific issues. This will be implemented as part of the CEMP.

345 Risks of significant amounts of potential pollutants from construction activities reaching local watercourses are considered minimal due to the strict pollution control measures which will be taken. A CEMP will be prepared at detail design stage which will include measures for works in the vicinity of watercourses based on mitigation measures detailed in **Chapter 8** of this volume of the EIS. This approach has referred to relevant requirements for the *Protection of Fisheries Habitats during Construction and Development Works at River Sites* (Eastern Regional Fisheries Board, 2006).

346 Potential impacts caused by spillages, drip and or spills during the construction phase will be reduced by the maintenance of an adequate supply of spill kits and hydrocarbon adsorbent packs at labelled stations at all working areas, with all vehicles on-site carrying spill kits. All personnel will be fully trained in the use of the equipment. Any used spill kits will be disposed of appropriately off-site.

347 As part of the CEMP a spill method statement will be drawn up which all personnel willadhere to.

348 A 24 hour, 7 day per week Emergency Response protocol for leaks / spill of hydrocarbons and / or chemicals will be drawn up and implemented. This must be implementable in the unlikely event of an accidental spillage of chemicals, hydrocarbons or release of sediment to the surface or ground water system.

349 No infilling or storage of soil cleared for construction works will take place within 5m of drainage ditches and other identified wetlands or other habitats of ecological value as identified by the ECoW. Excavated materials from construction works will be deposited within the works area where there is no significant risk of run-off into local watercourses.

350 During the excavation and removal of soil for construction works, fuel oil interceptors and silt traps or sedimentation ponds will intercept surface water run-off in particular at tower locations close to (within 5m of smaller streams and drainage ditches). As part of their environmental and works requirements, the contractor will establish a maintenance schedule and operational procedure / method statement for silt and pollution control measures during the construction period. This will be monitored for effectiveness by the contractor and ECoW.

351 Oil, petrol and other fuels containers will be double-skinned and bunded to be able to contain 110% volume. Bund specification will conform to the current best practice for oil storage such as Enterprise Ireland's *Best Practice Guide BPGCS005 Oil Storage Guidelines*. All waste oil, empty oil containers and other hazardous wastes will be disposed of in conjunction with the requirements of the *Waste Management Acts 1996 to 2008*, as amended.

352 Pouring of concrete will only take place in designated locations and concrete washings will be treated off site following current best practice guidelines including *Pollution Prevention Guidelines for Northern Ireland and Scotland SEPA PPG 5* (2007). Concrete washings will not be discharged to surface water and poured concrete will be allowed to cure for a minimum of 48 hours in the dry.

353 Raw or uncured waste concrete or similar will be disposed of by removal to approved / licensed disposal site. It is noted that there will be a concrete truck wash out at the batching plant area. This washout will be directed to the three bay water recycler provided at this location.

354 Water courses which have been identified as potentially at risk of pollution from construction activities (e.g. drains and smaller streams linked to the River Boyne and Blackwater) will have appropriately designed silt traps (based on drain and potential runoff characteristics) installed in consultation with IFI (where necessary).

355 Refuelling of machinery, will be carried out on level, hard surfaced designated areas where possible, at least 20m from watercourses and drainage ditches. In the event that refuelling is

required outside of this area, fuel will be transported in a mobile double skinned tank and a spill tray will be employed during refuelling operations.

356 All machinery will be regularly refuelling maintained and checks from leaks. Services will not be undertaken within 50m of aquatic features, including dry drainage ditches. Servicing must be undertaken on level, hard surfaced designated areas where possible.

357 Construction materials such as hydrocarbon, cement and grout will be stored in bunded areas or silos which will be regularly inspected by the site manager. General construction practices will adhere to the requirements for the protection of fisheries habitat during construction and development works at river sites published by IFI (*2006*).

358 Weather conditions will be taken into account when planning construction activities to minimise risk of extreme runoff from works areas.

6.6.2.1.3 Fauna (Birds and Mammals)

359 Scrub, hedgerow or tree removal / trimming should be undertaken outside of the bird nesting period, which begins on March 1st and continues until August 31st, in order to protect nesting birds. All birds and their nesting places are protected under the *Irish Wildlife Act 1976* (as amended 2000), though there are exceptions for exempted developments.

360 Given the intervening timescale between planning approval and actual site clearance and construction, and once exact felling requirements of the proposed development are known, bat surveys of specific mature trees identified for felling will be undertaken by a bat specialist prior to tree cutting in order to verify and update the conclusion set out in this EIS. This pre-construction survey will aim to re-confirm the number and location of bat roosts that would be impacted by felling (no bat roosts were confirmed as part of field surveys for the proposed development). In order to proceed with the felling of trees that may be identified as bat roosts, it will be necessary to acquire a derogation licence from NPWS. NRA, (2006a) guidance in relation to tree felling and hedgerow removal will be followed throughout the site clearance phase of the proposed development. These measures will be outlined in detail in the CEMP that is to be drawn up for the construction phase of the proposed development.

361 Pre-construction surveys will be undertaken at watercourses and adjacent habitats that occur in close proximity to tree felling areas to confirm presence / absence of otter breeding sites to confirm the conditions which have been anticipated to be encountered in the EIS. This is required due to the strict legal protection of otters (and their resting or breeding places) and given the likely timescale between planning consent and development (likely to be greater than 2 years). Details of the preconstruction survey methodology and the approach to be taken will

be outlined in the CEMP that is to be drawn up for the construction phase of the development with reference to relevant guidance documents (NRA 2006c). No direct impacts are expected to arise as works will require an agreed method statement and be monitored by the ECoW.

362 Pre-construction surveys for badger setts will be conducted at woody vegetation required for cutting to confirm the conditions which have been anticipated to be encountered in the EIS. This is required to inform site clearance activities given the legal protection of badger breeding sites and likely extensive timescale between planning consent and construction (likely to be greater than 2 years). A buffer zone will be established around any known badger setts through the erection of temporary posts and wires with 'no entry' signs erected. No direct impacts are expected to arise as works will require an agreed method statement and be monitored by the ECoW based on relevant guidelines (NRA 2006b).

6.6.2.2 Specific Additional Mitigation by Reduction (River Boyne and River Blackwater cSAC/SPA)

363 The following specific precautionary mitigation will be implemented for the River Boyne and River Blackwater cSAC / SPA.

364 To ensure no disturbance arises to breeding Kingfisher and otter, no tree trimming will take place prior to completion of pre-construction surveys which will be carried out to confirm the conditions which have been anticipated to be encountered in the EIS. These will be carried out at an appropriate time of year, at locations identified where there is a potential for these species to breed. These locations include:

- Boycetown River between Towers 376 and 377;
- Stream between Towers 358 and 359;
- River Boyne (cSAC / SPA) between Towers 355 and 356;
- Stream between Towers 350 and 351;
- Clady River three crossings between Towers 344 and 347;
- Small stream between Towers 317 and 318;
- Small stream between Towers 313 and 314;
- River Blackwater (cSAC / SPA) between Towers 310 and 311; and
- Kilmainham River between Towers 251 and 252.

365 Confirmatory pre-construction surveys will be undertaken at described watercourses where tree felling may lead to disturbance risks to Kingfisher breeding sites. This is required given the likely timescale between planning and construction and the dynamic nature / changes in Kingfisher breeding site locations. If tree cutting is required at a breeding Kingfisher site than this work will only take place once Kingfisher have finished breeding (as confirmed by ECoW) or outside the breeding Kingfisher season (typically March to end August). Tree cutting will be conducted in a manner which does not damage the breeding site / river bank through careful pollarding of tree limbs and retention of tree root structures and lower vegetation under which this species typically breeds.

366 Confirmatory pre-construction surveys will also be undertaken for otter breeding sites. If an otter breeding site is determined that may possibly be disturbed than tree trimming activities will be suspended until such time that the otter breeding site is vacated and breeding activity is finished, as confirmed by ECoW. Tree trimming will be conducted in a manner which does not damage the breeding site / river bank through careful pollarding of tree limbs and retention of tree root structures and lower vegetation under which this species typically breeds.

367 Stringing of the powerlines will be conducted manually at river crossing points to avoid any requirement for access by machinery, and associated disturbance impacts on European Sites.

6.6.2.3 **Operational Phase Mitigation**

6.6.2.3.1 Water Quality

368 During maintenance works, consideration will be given regarding works to ensure ongoing protection of water quality. Depending on the nature of proposed maintenance works, there will be a requirement for risk assessments of potential impacts to surface waters and appropriate mitigation will be implemented where a risk is identified.

6.6.2.3.2 Fauna (Birds)

369 The key operational impacts identified are potential collision risks to Whooper Swans at locations identified in **Table 6.19**.

370 Mitigation by avoidance of feeding and roosting sites has been implemented as far as possible in the selection of the alignment. However given the geographic spread of Whooper Swans in this area and other significant non-ornithological constraints, it will not be possible to avoid crossing regular Whooper Swan flight lines between roost and feeding sites. In this regard there is potential for collisions in particular with the earth wire component of the alignment.

371 Mitigation to reduce impacts at specific sites is required in the form of earth wire marking with bird flight diverters. Based on available information and research based studies reviewed, this will reduce potential collision risks associated with the new alignment. Studies where a reduction in swan collisions was observed on transmission lines include Frost (2008) and Slater (2006). Barrientos *et al.* (2011) in a review of 21 line marking studies concluded that line marking reduced bird mortalities by 55-94% where an observed effect was noted pre-line marking. In this regard precautionary line marking is a best practice approach to minimise the collision risk of the new alignment. Swan flight diverters type, effectiveness and configuration are discussed in detail in APPLIC (2012) and this informed the proposed mitigation. As with all line marking mitigation, the success of this will require ongoing monitoring, as specified in **Section 6.7.2**.

372 The type of flight diverters recommended are swan flight diverter markers constructed from high-impact grey PVC (UV stabilised) fitted approximately 5m apart along each earth wire, see **Figure 6.1**. This line marking is proposed for the earth wires to increase visibility of the earth wires to flying birds.

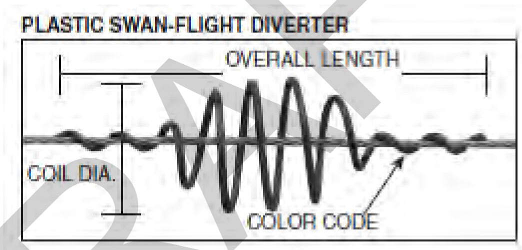

Figure 6.1: Swan Flight Diverters

373 Areas identified as requiring line marking are defined as; ~~“~~*Locations in which the alignment bisects observed relatively regular flight paths by Whooper Swan between feeding and roosting areas*”, larger river crossings (including the River Boyne) or nationally important concentrations in close proximity (<1km) i.e. the Yellow River area.

374 Areas and lengths of alignment proposed for marking with flight diverters are highlighted in Figures 6.3.3 and 6.3.4, **Volume 3D Figures** of the EIS and described as follows:

- Between Towers 307 and 312 at the River Blackwater crossing point it is recommended that a minimum of 1.63km of the earth wires are marked with swan flight diverters. Key target bird species identified which may collide with the alignment include Whooper Swan, Golden Plover, Cormorants and Mute Swan.

- West of the Yellow River foraging area between Towers 291 and 295. The main identified flightline <u>does not cross</u> the alignment. However there is potential that

Whooper Swan could move towards the area of the alignment. This is a regular nationally important area for Whooper Swan located within 1km of the alignment. Given that high numbers occur in this area precautionary line marking is proposed.

- Between Towers 279 and 283 west of Cloony Lough; it is recommended that a minimum of 1.6km of the earth wires are marked with swan flight diverters. Key target bird species identified which may collide with the alignment include Whooper Swan.

- Between Towers 257 to 268 near Cruicetown / Whitewood Lough; it is recommended that a minimum of 3.32km of the earth wires are marked with swan flight diverters. Key target bird species identified which may collide with the alignment include Whooper Swan.

375 In addition, between Towers 355 and 357 (including the River Boyne Crossing), 60cm diameter marker spheres will be added to the earth wire to increase visibility. These will be placed at 30 metre intervals alternating orange and white, see **Figure 6.2**. Key target bird species identified which may collide with the alignment include Cormorants and Mute Swan.

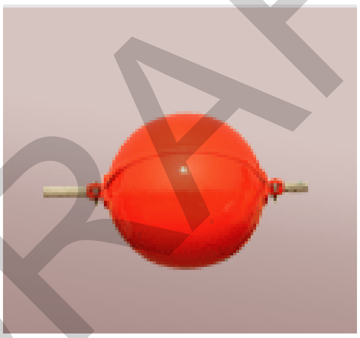

Figure 6.2: Marker Spheres

376 Mitigation in the form of ‘Bird Perch Deterrents” is proposed for cross arms of Towers 295 and 296 in the townland of Oristown to assist in deterring perching corvid species and Buzzard which may potentially disturb or predate breeding Lapwing in the townland of Oristown. Suitable bird perch deterrents for transmission line metal crossarms are available with appropriate design specifications. These are designed to deter perching predatory birds hence reducing potential predation / disturbance impacts to ground nesting Lapwing.

377 Scrub, hedgerow or tree trimming should be undertaken outside of the bird nesting period, which begins on March 1st and continues until August 31st, in order to protect nesting birds. All birds and their nesting places are protected under the *Irish Wildlife Act 1976* (as amended 2000), though there are exceptions for exempted developments.

6.6.3 Mitigation by remedy

378 The following remedial mitigation is proposed:

- Hedgerow re-establishment success will be checked two years after construction at tower locations by the ECoW. Where poor or no hedgerow re-growth has occurred, replanting with similar native hedgerow species will be carried out so as to ensure linear habitats are retained / re-established. If new fencing is required or maintenance then this will be implemented in consultation with the landowner.

379 Monitoring will be undertaken to confirm the effectiveness of proposed flight diverter mitigation (see Section 6.7.1 for further information).

6.7 RESIDUAL IMPACTS

380 The post mitigation residual impacts for each Key Ecological Receptor identified as potentially impacted during the construction and operational phases are detailed in **Tables 6.20** and **6.21** respectively**.** **Table 6.20** deals with the construction phase and **Table 6.21** deals with the operational phase.

381 In summary the residual adverse impacts of the proposed development on ecological receptors identified within the study area range from imperceptible to minor (Low – in the case of Whooper Swan collision risk) in significance.

Table 6.20: Summary of Residual Impacts (following adoption of mitigation) relevant to Specific Key Ecological Receptors Associated with the Construction Phase

Site / Feature	Area	Description of Impact Source	Potential Impact	Mitigation	Residual Impact
Whooper Swans and Golden Plover	All sites identified	Temporary disturbance from foraging sites.	Temporary imperceptible	CEMP to outline construction stage monitoring by ECoW so as to confirm impacts as detailed and implement approaches for minimising impacts if relevant.	Imperceptible
River Boyne and Blackwater cSAC / SPA and associated tributaries	River Boyne crossing	Surface water pollution (aquatic receptors). No disturbance to riparian area.	Temporary moderate	CEMP to include measures to control water pollution. Pre-construction monitoring by ECoW to monitor works activity so as to confirm impacts as detailed.	Imperceptible

Site / Feature	Area	Description of Impact Source	Potential Impact	Mitigation	Residual Impact
All other river crossings (41 rivers in total)	There is a requirement to cross 41 No. rivers.	Indirect water pollutant impacts, disturbance to riparian habitats, disturbance to qualifying species European sites.	Temporary moderate	CEMP to include measures to control water pollution. Pre-construction monitoring by ECoW to monitor works activity so as to confirm impacts as detailed.	Imperceptible
Linear woodland habitat (WL1A, WL1B, and WL2) 13 towers located in Hedgerows	Towers located in hedgerows.	390m of linear woodland removal during construction at tower locations.	Temporary minor	CEMP to include measures to minimise works area and soil compaction. Fence area post works so gap with Tower is not accessible to livestock. Replant with low growing native woody species similar to surrounding species. Monitor success re-growth and additional replanting as required.	Imperceptible
Treelines (WL2)	Refer to **Table 6.14**. 41 crossings along alignment identified. Two towers located in treelines.	Tree lopping and trimming. Treeline removal at tower locations.	Permanent moderate	CEMP to include measures to minimise works area. Pollard rather than completely lop trees. Pre-construction-monitoring by ECoW to inform if timing constraints on works activity regarding protected species breeding sites (see below).	Minor
Mature deciduous woodland	Refer to **Table 6.16.**	Tree lopping.	Permanent moderate	CEMP to include measures to minimise works area. Pollard rather than completely lop trees where possible. Pre-construction monitoring by ECoW to inform if timing constraints on works activity regarding protected species breeding sites (see below).	Minor

Site / Feature	Area	Description of Impact Source	Potential Impact	Mitigation	Residual Impact
Hedgerows with mature trees (WL1 – Type B)	Refer to **Table 6.14**. 113 crossings along alignment identified. 11 towers located in Hedgerows.	Tree lopping and trimming. Hedgerow removal at tower locations.	Permanent moderate	CEMP to include measures to minimise works area. Pollard rather than completely lop trees. Pre-construction monitoring by ECoW to inform if timing constraints on works activity regarding protected species breeding sites (see below).	Minor
Lapwing (breeding sites)	Oristown townland.	Disturbance and displacement.	Temporary minor	CEMP to include measures to monitor Lapwing breeding status and inform construction manager regarding approaches for minimising impacts if relevant.	Imperceptible
Bats	Towers in hedgerows, 41 mature treelines crossed, 113 hedgerow with trees (crossed) and mature woodland identified at Brittas Estate and other mature deciduous woodland locations afford possible temporary bat roost sites. No significant sites identified in surveys.	Disturbance and displacement to bat roosts in mature trees lopped (WL2, WD1 and WL1 B habitats)	Temporary moderate	CEMP to include mitigation measures detailed herein.	Imperceptible
Otter	41 river crossings identified as possible otter breeding sites. Sites with more potential are larger river crossings	Very low disturbance and displacement risk to possible otter breeding sites associated with tree cutting where the line traverses	Temporary moderate	CEMP to include mitigation measures detailed herein.	Imperceptible

Site / Feature	Area	Description of Impact Source	Potential Impact	Mitigation	Residual Impact
		streams / rivers (possible breeding areas).			
Badger	All tower locations, 41 mature treelines, 113 hedgerow with trees and mature woodland identified at Brittas Estate and other mature deciduous woodland locations afford possible bat roost sites.	Very low disturbance risk to possible badger breeding sites associated specifically with tree cutting where the line traverses mature hedgerows, treelines and woodland habitats.	Temporary moderate	CEMP to include mitigation measures detailed herein.	Imperceptible
Other Bird Species	All areas where potential disturbance to woody vegetation.	Localised disturbance risk associated specifically with tree cutting to common breeding birds sites in treelines/mature hedgerow vegetation.	Temporary minor	CEMP to include mitigation measures detailed herein.	Imperceptible
Oak-ash-hazel woodland	Low growing semi-natural woodland and associated streams crossed at three locations between Towers 260 and 261, Towers 289 and 258 and Towers 252 and 251. Habitat will be avoided.	Woody vegetation trimming is unlikely to be required given the low heights (<6m) of woody vegetation.	Temporary imperceptible	Monitor by ECoW	Imperceptible

Table 6.21: Summary of Residual Impacts (following adoption of mitigation) Relevant to Specific Key Ecological Receptors Associated with the Operational Phase

Site / Feature	Area	Description of Impact Source	Potential Impact	Mitigation	Residual Impact
Whooper Swans	River Blackwater.	Collision with conductors and earth wire.	Permanent medium[1]	Earth wire marked with flight diverters. Monitoring (operational management plan).	Low
Whooper Swan	Cruicetown Cloony Lough Area	Collision with conductors and earth wire.	Permanent low[1]	Earth wire marked with flight diverters. Monitoring (operational management plan)	Negligible[1]
Whooper Swan	West of Yellow River	Collision with conductors and earth wire.	Permanent negligible[1]	Earth wire marked with flight diverters. Monitoring (operational management plan)	Negligible[1]
Whooper Swan	Other Sites identified	Collision with transmission line.	Permanent imperceptible	Monitoring (operational management plan)	Negligible[1]
Whooper Swan	Teltown	Displacement from the foraging area at Teltown.	Permanent negligible[1]	Monitoring (operational management plan).	Minor
Cormorant and Mute Swan	River Boyne and Blackwater.	Collision with transmission line.	Permanent low	Earth wire marked with flight diverters (River Boyne and River Blackwater).	Imperceptible
Lapwing (breeding sites)	Oristown townland.	Increased predation risk associated with perch opportunities associated with new towers at Oristown.	Permanent moderate	Perch deterrents at Oristown area. Monitoring.	Minor
All River Crossings	41 rivers crossed in total.	Water pollution associated with maintenance works.	Temporary imperceptible	Standard water pollution controls depending maintenance works.	Imperceptible
Linear woodland habitat (WL1A, WL1B, and WL2)	Towers located in 13 linear woodland habitat type locations.	No / poor hedgerow re-growth at tower location in hedgerow gap due to trampling by livestock (indirect impact).	Permanent low	Implement mitigation and monitoring.	Imperceptible

Site / Feature	Area	Description of Impact Source	Potential Impact	Mitigation	Residual Impact
Treelines (WL2	41 crossings along alignment identified.	Ongoing trimming under alignment	Temporary imperceptible	None specific to habitat (see below re fauna)	Imperceptible
Mature deciduous woodland	Refer to **Table 6.16.**	Ongoing trimming under alignment.	Temporary imperceptible	None specific to habitat (see below re fauna).	Imperceptible
Hedgerows with mature trees (WL1 – Type B)	113 crossings along alignment identified.	Ongoing trimming under alignment.	Temporary imperceptible	None specific to habitat.	Imperceptible
Other Birds	Blackwater Valley Area and throughout.	Collision with transmission line.	Temporary imperceptible	Hedgerow cutting to be implemented outside the bird breeding season.	Imperceptible
Protected mammals	Throughout	Disturbance during maintenance.	Temporary imperceptible	None	Imperceptible

Note: 1 Collision risk assessment for Whooper Swan based on Percival (2003)

6.7.1 MONITORING

382 The effectiveness of mitigation will require monitoring, specifically regarding Whooper Swan bird flight diverters success. This monitoring will be conducted by an appropriately qualified and experienced ornithologist in consultation with NPWS.

383 A clearly defined monitoring programme will be developed and implemented for Whooper Swans to assess effectiveness of line marking. All locations where flightlines were identified will be surveyed during the pre-planning stage, construction and operation stages (up to 5 years). Surveys will be conducted at all sites identified, monthly between October and April when Whooper Swans are present in the area. Throughout the lifetime of proposed monitoring works, additional areas where flightlines or collisions are recorded will be added to the list of areas to be surveyed. Landowners with towers on their land will be engaged with and encouraged to get in touch with the bird surveyor regarding observed Whooper Swan or other bird species collisions. The results of winter monitoring and engagement with landowners will inform further actions to minimise risks as highly transient species (in terms of distribution and flightlines) like Whooper Swans require ongoing consideration after the planning stage. Yearly monitoring reports for the construction and operational phases will detail required actions and will be drafted in consultation with NPWS or other relevant experts as appropriate.

384 Hedgerow re-establishment at all tower location will be monitored to ensure robust hedgerow re-establishment. Further replanting of hedgerow species and fencing will be implemented in consultation with landowners as required.

6.8 INTERRELATIONSHIPS BETWEEN ENVIRONMENTAL FACTORS

385 Interrelationships have been identified between impacts on flora and fauna and impacts on human beings and land use (see **Chapter 3** of this volume of the EIS). The approach of locating towers in areas of low ecological interest (mostly managed grassland) has had the effect of minimising the impacts on ecology while at the same time potentially increasing the impact on agricultural production. Some towers located, in particular, on arable farmland will lead to small permanent areas under towers where intensive agriculture will not take place.

386 There is a potential for interactions between EMF (see **Chapter 5** of this volume of the EIS**)** and fauna species. However, the operating conditions for the proposed development will ensure that EMF will remain below the restriction levels specified in EMF guidelines for Ireland and the EU. A review of scientific research on topics relating EMF to health of humans and other species did not show that EMF at these levels would have adverse effects on these populations.

387 Interrelationships have been identified between flora and fauna and soils, geology and hydrogeology (see **Chapter 7** of this volume of the EIS) and between flora and fauna and water (see **Chapter 8** of this volume of the EIS). This chapter should be read in conjunction with both these chapters for a full understanding of the main interrelationships between these environmental topics.

388 The transport of soil or vegetative material during construction works could potentially facilitate the spread of invasive alien species such as Japanese Knotweed (*Fallopia japonica*). Appropriate controls will be in place to ensure that the proposed works do not result in the spread of invasive alien species. The mobilisation and transport of soil via surface water runoff could potentially impact ecologically sensitive receptors that occur within watercourses downstream of the proposed development. Soil water runoff controls during construction are also a key consideration relevant to downstream aquatic species and habitats and suitable mitigation controls are detailed. Construction works will not be undertaken within wetland sites and no significant impacts on the eco-hydrology of wetlands are foreseen.

389 The conclusions of the water chapter (see **Chapter 8** of this volume of the EIS) are that based on a review of the construction methodology, flora and fauna and soils, geology and hydrogeology chapters; there are no significant cumulative (interrelated) impacts as a result of the proposed development. Any impacts on surface or ground water quality could impact on water dependant habitats and species that occur within the MSA. In this regard appropriate mitigation is detailed to protect water quality which is adequate for protecting such water dependant ecological receptors.

390 There are also interrelationships between ecological impacts and landscape (see **Chapter 11** of this volume of the EIS) in the case where the removal or trimming of wooded features (including woodlands, hedgerows and treelines) may have adverse effects on both flora and fauna and landscape. As mentioned throughout this chapter, the impacts on such wooded features has been minimised by, where possible, locating towers away from hedgerows and other wooded areas. The use of bird flight diverters may also increase the visual impact of the alignment at specific locations.

6.9 CONCLUSIONS

391 This chapter presents an evaluation of the potential ecological impacts (direct, indirect and cumulative) of the proposed development on the flora and fauna of the MSA and details appropriate mitigation where an impact is predicted.

392 The project design has sought to minimise ecology impacts as far as possible insofar as not locating towers in semi-natural habitats of ecological value (including hedgerows) and away from rivers / streams (and associated riparian habitats). This is a key approach and best practise for minimising impacts to ecology receptors. The context of the study area, a highly managed landscape dominated by habitats of low ecological value is a key fact which has informed the overall evaluation. The key ecological features considered are rivers (including the River Blackwater and Boyne – European sites), boundary hedgerows / treelines and Whooper Swans. The EIS has carried out extensive studies to inform the consideration of impacts and appropriate general and site specific mitigation has been identified.

393 The development and implementation of a CEMP, which will include monitoring of construction by an ECoW, is a key instrument in ensuring the implementation of all mitigation measures during construction. Operational phase monitoring is a key recommendation regarding the success of mitigation of impacts on Whooper Swans.

394 It is concluded that the impacts of the construction and operation of the proposed development on the ecology of the study area are likely to range from imperceptible to minor provided construction, reinstatement and management follow best practice procedures, and the proposed mitigation measures are adopted.

7 SOILS, GEOLOGY AND HYDROGEOLOGY

7.1 INTRODUCTION

1 This chapter evaluates the impacts on soils, geology and hydrogeology arising from the proposed development as set out in Chapter 6, **Volume 3B** of the EIS. The information contained within this chapter is concerned with the description of the geological and hydrogeological character of the Meath Study Area (MSA).

2 The soils, geology and hydrogeology evaluation of the MSA considers an area in excess of 500m either side of the proposed route alignment. The geological material existing along the alignment has been generated by the deposition of detritus over millions of years. The geological material underlying the study area, both the glacial mineral subsoil and the bedrock are concealed below ground. The nature, extent and complexity of the geological material are detailed, from the surface downwards through the mineral subsoil to the bedrock.

3 The potential impacts on the ground conditions and on the existing soil, geology and groundwater conditions are considered for both the construction, operational and decommission phases of the proposed development. Mitigation measures that will form part of the development are described and any residual environmental impacts identified and their significance evaluated.

4 Chapter 6**, Volume 3B** of the EIS describes the full nature and extent of the proposed development including elements of the overhead line (OHL) design and the towers. It provides a factual description, on a section by section basis, of the entire line route. The principal construction works proposed as part of the development are set out in Chapter 7, **Volume 3B** of the EIS and are included in the outline Construction Environment Management Plan (CEMP) (refer to Appendix 7.1, **Volume 3B Appendices** of the EIS).

7.2 METHODOLOGY

5 This chapter has been prepared using the recommendations set out in the Environmental Protection Agency's (EPA) *Guidelines on the Information to be contained in Environmental Impact Statements* (March 2002). The guidelines and recommendations of the Institute of Geologists of Ireland (IGI) publication *Geology in Environmental Impact Statements – A Guide (*IGI 2002) and *Guidelines for the Preparation of Soils, Geology and Hydrogeology Chapters of Environmental Impact Statements (*IGI 2013) were also taken into account in the preparation of this chapter.

6 The information contained in this chapter has been divided into sub-sections, so as to describe the various aspects pertaining to soil, geology and hydrogeology. In the preparation of this chapter, relevant information was collated and evaluated. The information sources are detailed further in this chapter.

7 The principal objectives of this chapter are to identify:

- Geological and groundwater factors which might affect the technical viability of the proposed development;
- Impacts that the proposed development may have on soils, geology and groundwater geological heritage and on contaminated land along the proposed development route and in the adjacent area;
- Constraints that these features may place on the proposed development;
- Mitigation measures which may be required to minimise any adverse impacts related to the proposed development; and
- Evaluation of significance of any residual impacts.

8 The information included in this chapter is considered to meet the data requirements suggested in the EPA *Guidelines on the Information to be contained in Environmental Impact* (2002).

9 The following is a list of published geological references and data used in this chapter:

- An Foras Talúntais (1980). *General Soil Map of Ireland;*
- An Foras Talúntais (1983). *Soils of County Meath;*
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- Meehan, R.T., (2000). *Kells and adjacent areas, County Meath, Ireland;*
- MCOS / RPS Clonee – North of Kells M3 EIS (2002);
- OSI 1:50,000 scale maps, Sheets 35, 42, 43, 49 and 50; and
- Rudland, D.J., Lancefield, R.M. and Mayell, P.N. (2011). *Contaminated Land Risk Assessment, A Guide to Good Practice.* CIRIA C552 London.

10 For a list of reports referenced in this chapter refer to the bibliography in this volume of the EIS. Numerous online datasets were referenced in relation to the soil, subsoil and geology in the MSA including data from the Geological Survey of Ireland (GSI), Department of Communications, Energy and Natural Resources (DCENR) and the EPA. Consultation was undertaken with statutory and non-statutory organisations and include details on consultation with the GSI (refer to Chapter 3, **Volume 3B** of the EIS for details on scoping and statutory consultation).

11 The scoping opinion received from An Bord Pleanála (refer to Appendix 1.3, **Volume 3B Appendices** of the EIS) identified the following issues as being relevant to this chapter of the EIS:

- An assessment of potential soil erosion, particularly where it affects priority habitats, designated conservation areas, and in the vicinity of surface water bodies;
- Submission of a construction method statement, identifying areas of particular sensitivity which require specific construction mitigation measures, including areas of peat; and
- Identification and assessment of potential impacts on sites of geological heritage interest, including Altmush Stream and Galtrim Moraine.

12 Site visits of the MSA were conducted in February 2009, July 2009, April 2011, and June 2013 to September 2013. Site walkover and site investigation surveys were conducted where access was granted by the landowner. Fieldwork focused on verifying the accuracy of national

datasets. Site specific details were recorded and included logging of subsoil types, vegetation indicators, springs, drainage details and general trafficability of soils. Where access was granted to proposed tower locations, subsoil deposits and selected exposures / sections were logged according to the British Standard Institute *Code of Practice for Site Investigations* (BS 5930:1999).

13 Whilst all projects and developments that require an EIA are of a scale or nature that they have the potential to have an impact on the environment, with respect to the construction of a transmission line and the use of temporary access routes and stringing areas, the impact on the soils, geology and hydrogeological environment is considered low in comparison to other linear projects such as road or pipeline developments.

14 In this chapter, the potential impact on the geological environment resulting from the proposed development is evaluated and mitigation measures are proposed to reduce any significant impacts. Based on the mitigation measures proposed the significance of the predicted impact on the geological environment is determined.

15 Criteria for evaluating impact level are shown in **Table 7.1**. Terminology for impact significance and duration follows that set in the EPA's *Guidelines on the Information to be contained in Environmental Impact Statements* (March 2002). The magnitude of any effects considers the likely scale of the predicted change to the baseline conditions resulting from the predicted effect and takes into account the duration of the effect i.e. temporary or permanent. Definitions of the magnitude of any effects are provided in **Table 7.1**.

Table 7.1: Impact Magnitude Definitions[25]

Magnitude	Criteria
Very High	An impact, which obliterates sensitive characteristics of the soil or geology environment
High	Fundamental change to ground conditions, groundwater quality or flow regime
Moderate	Measureable change to ground conditions, groundwater quality or flow regime
Low	Minor change to ground conditions, groundwater quality or flow regime
Negligible	No measureable impacts on ground conditions, groundwater quality or flow

Source: EPA's *Guidelines on the Information to be contained in Environmental Impact Statements* (March 2002)

[25] NRA, 2009

16 Impact ratings may have negative, neutral or positive application where:

- Positive impact – A change which improves the quality of the environment;
- Neutral impact – A change which does not affect the quality of the environment; and
- Negative impact – A change which reduces the quality of the environment.

17 Terms relating to the duration of impacts are as described in the EPA's *Guidelines on the Information to be contained in Environmental Impact Statements* (March 2002) as:

- Temporary Impact - lasting one year or less;
- Short term Impact - lasting one to seven years;
- Medium term Impact - lasting seven to fifteen years;
- Long term Impact - lasting fifteen to sixty years; and
- Permanent Impact - lasting over sixty years.

18 A qualitative approach was used in the evaluation generally, following the significance classification in **Table 7.2** and through professional judgement. The significance of a predicted impact is based on a combination of the sensitivity or importance of the attribute and the predicted magnitude of any effect. Effects are identified as beneficial, adverse or negligible, temporary or permanent and their significance as major, moderate, minor or not significant (negligible).

Table 7.2: Assessment of Criteria

Sensitivity	**Magnitude**				
	Very High	**High**	**Medium**	**Low**	**Negligible**
High	Major	Major	Moderate	Moderate	Minor
Medium	Major	Moderate	Moderate	Minor	Negligible
Low	Moderate	Moderate	Minor	Negligible	Negligible
Negligible	Minor	Minor	Negligible	Negligible	Negligible

19 In order for a potential impact to be realised, three factors must be present. There must be a source or a potential effect, a receptor which can be adversely affected and, a pathway or connection which allows the source to impact the receptor. Only when all three factors are present can an effect be realised.

7.2.1 Legislative and Policy Context

20 An evaluation of the proposed development was carried out in relation to the relevant European and National legislation and other statutory policies and guidance. The following legislation was considered as part of this impact evaluation.

- Consolidated EIA Directive 2011/92/EU;
- *European Communities (Water Policy) Regulations 2003* [S.I. No. 722/2003]*;*
- *Waste Management Acts 1996-2013;*
- *European Communities Environmental Objectives (Groundwater) Regulations 2010* [S.I. No. 9/2010]; and
- *European Communities (Environmental Impact Assessment) (Amendment) Regulations, 2001* [S.I. No. 538/2001].

7.3 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

21 The main potential impacts on the soils, geology and hydrogeology in the MSA occur during the construction phase. Details of the potential impacts are included in **Section 7.5**. Overall the construction programme is anticipated to last approximately three years. The proposed development entails the construction of towers as individual sites separated by approximately 340m. In general, the construction phase can be broken down into the following: site preparation works (including the laying of temporary access tracks, removal of fences and erection of temporary fencing where required); installation of tower foundations and works at the existing Woodland Substation; erection of towers; guard poles, tree looping, stringing of conductors, commissioning of the line and reinstatement of land.

7.4 EXISTING ENVIRONMENT

7.4.1 Topography and Geomorphology

22 Refer to Figures 7.1 – 7.4, **Volume 3D Figures** of the EIS. The topography along the alignment varies approximately from:

- 50m to 160m Above Ordnance Datum (AOD) in the northern section (Towers 237 - 257);
- 50m and 100m AOD in the central area (Towers 257 - 395); and
- 90m and 130m in the southern section (Towers 395 - 410).

23 The morphology is shaped principally during the last glacial age (the Midlandian), with subsequent modification throughout the post glacial Holocene period. Most of the Quaternary sediments in the MSA were deposited during the last glaciation, directly from the huge ice sheets that moved from north-west to south-east.

24 The geomorphology of the MSA is divided between the northern drumlin landscape and the southern Carboniferous Limestone lowland area. The drumlin region is situated to the north of the alignment (north of Moynalty and Castletown Towers 237 – 251). Drumlins take a variety of forms with the majority elongated in the direction of ice flow. Some drumlins have sharp crests, whereas others are more whaleback in profile. Although most drumlins are composed of glacial or tills, a small number are rock-cored. Some of ridges are aligned transverse to the ice flow direction (known as Rogen ‗ribbed moraines‘) and were streamlined and overprinted by subsequent drumlin development, while others remained unaffected.

25 Elevations above sea level (OD) here range from approximately 60m along the Altmush Stream to approximately 160m to the north-west of Kilmainhamwood. Kames and outwash deposits occur in several places in north Meath, notably around Kilmainhamwood at the base of the Kingscourt Valley and Castletown / Clongill.

26 The southern limestone lowland is generally characterised by gently undulating lowlands underlain by diamictons[26], with occasional gravel hillocks, eskers and alluvial flats. Moraine deposits at Galtrim and Kells are considered to be the remains of a pause in ice retreat.

[26] tills

7.4.2 Soils

27 The MSA varies in terms of its soil, subsoil and bedrock geology. General information concerning soil types is contained in *General Soil Map of Ireland* (An Foras Talúntais 1981), *Soils of Co. Meath; (*An Foras Talúntais 1983), *Geology of County Meath* (GSI, 2001) and on the EPA website www.epa.ie. There are a range of soils in the MSA between Clonturkan and Woodland Substation.

28 The principle soil groups are:

- AminPD – Deep poorly drained mineral soil, derived from mainly non-calcareous parent materials. Surface water gleys and groundwater gleys are included in this category;
- AminDW – Deep well drained mineral soil, derived from mainly non-calcareous parent materials. Acid brown earths and Brown podzolics will be included in this category;
- BminDW - Deep well drained mineral soil derived from mainly calcareous parent materials. Grey brown podzolics and brown earths (medium high base status) are included in this category; and
- BminSW - Shallow well drained mineral soil, derived from mainly calcareous parent material. Renzinas and lithosols are included in this category.

29 The following soil groups also occur but are less widespread and found in minor formations:

- BminPD – Deep poorly drained material soil derived from mainly calcareous parent materials. Surface water gleys and ground water gleys are included in the category;
- BminPDPT – Poorly drained mineral soils with peaty topsoil, derived from mainly calcareous parent materials. Peaty gleys are included in this category;
- AminSW – Shallow well drained mineral soil, derived from mainly non-calcareous parent materials. Lithosols and regosols are included in this category;
- AminSP – Shallow poorly drained mineral soil, derived from mainly non-calcareous parent materials. Surface water and groundwater gleys are included in this category;
- BminSP – Shallow poorly drained mineral soil, derived from mainly calcareous parent materials. Surface water gleys and ground water gleys are included in this category;
- AlluvMIN – Alluvial undifferentiated;
- AminSW - Shallow well drained mineral, derived from mainly non-calcareous parent materials. Lithosols and regosols are included in this category; and

- Lac – Lacustrine Deposits (undifferentiated).

30 Alluvial soils are evident along the course of the main surface water features in the MSA. In particular, alluvial soils are evident along the River Boyne and its tributaries. Minor areas of cutover peat (Cut) are evident in the MSA. An area of cutover peat and lacustrine deposits are located near Carlanstown, approximately 5km north-east of Kells (west of Towers 286-297).

7.4.3 Geology

7.4.3.1 **Quaternary Geology**

31 General information concerning the Quaternary (Subsoil) Geology is contained in *Geology of County Meath* (GSI, 2001) and on the EPA website (www.epa.ie). Most of the Quaternary sediments were deposited during the Ice Age itself, either directly from the huge ice sheets that moved from north-west to south-east or from the meltwater following the slowly melting ice sheets. Refer to Figures 7.1– 7.4, **Volume 3D Figures** of the EIS.

32 With reference to the EPA online mapping (http://maps.epa.ie/), the subsoils comprise primarily of Carboniferous limestone till (TLs) and Namurian shales / sandstone tills (TNSSs) while Glaciofluvial sands and gravels (GLs / GNSSs) are also present. Bedrock at the surface was noted by the EPA and the GSI in a small area along the alignment.

33 Till derived from various rock formations is the principal material encountered along the alignment. Till is an unsorted sediment derived from the transportation and deposition of by or from a glacier. Glacial till is composed of a heterogeneous mixture of clay, sand, gravel and boulders.

34 The following four subsoil groups are dominant along the alignment:

- TNSSs – Tills derived from Shales and Sandstones (Namurian);
- GLS – Sands and Gravels derived from Limestone (Carboniferous);
- TLS – Till derived from Limestone (Carboniferous); and
- TLPSsS – Till derived from Sandstone and Shale (Lower Palaeozoic).

35 The following subsoil groups also occur along the alignment, but are less dominant:

- A – Alluvial undifferentiated;
- Rck – Bedrock at Surface;
- L – Lake Sediment Undifferentiated;

- GNSSs - Sands and Gravels derived from Shales and Sandstones (Namurian);
- BASESK – Basic Esker Sands and Gravels;
- CUT – Cutover Peat; and
- GLPSsS –Gravel derived from Sandstone and Shales (Lower Palaeozoic).

36 A summary of the proposed tower locations within each subsoil group is outlined in **Table 7.3** and shown in Figures 7.1 – 7.4, **Volume 3D Figures** of the EIS.

Table 7.3: Subsoil Classifications at Tower Locations

Subsoil Group[27]	**No. of Towers within subsoil category**	**% of Towers within subsoil category**
Alluvium (Undifferentiated)	5	3.0%
Glaciofluvial sands and gravels	26	15.8%
Glaciolacustrine deposits (undifferentiated)	2	1.2%
Bedrock at or near surface	4	2.4%
Peat	3	1.8%
Till	125	75.8%
TOTAL	**165**	100%

7.4.3.2 **Bedrock Geology**

37 Refer to Figures 7.5 – 7.8, **Volume 3D Figures** of the EIS. Reference to the relevant geological information in *Geology Map of County Meath* (GSI, 2001) and *Geology Map of Monaghan – Carlingford* (GSI, 1997) indicates that the bedrock geology along the alignment is varied.

[27] Based on GSI Data www.gsi.ie

38 Reference to the published geological map for this area, the 1:100,000 scale *Sheet No. 13 – Bedrock Geological Map of County Meath* (GSI, 2001) and the 1:100,000 scale *Sheet 8 – Bedrock Geological Map of Monaghan – Carlingford* (GSI, 1997), indicates that this area is principally underlain by Namurian Deposits (320-290 million years ago) between Towers 387-404. Namurian (undifferentiated) (NAM) beds are composed of sandstones, siltstone and shales with thin coal bands and occur south-west of the town of Dunshaughlin.

39 Ordovician-Silurian age deposits (Towers 237-259 and 290-303) are located to the north of Navan with Carboniferous aged (355 million years to 290 million years ago) deposits located between Towers 260-290, 304-386 and 404-410. The mid-section of the proposed development (Towers 260-386 and 403-410) is predominantly underlain by the Lucan ‗Calp' Formation (Lu). The undifferentiated Navan beds (SD), Cruicetown Group (undifferentiated) (CRT), Fingal Group (undifferentiated) (FNG), which are found all north of Navan, County Meath.

40 The distribution of geological units, along the proposed route alignment is based on published information from the GSI; it is shown on Figures 7.5 – 7.8, **Volume 3D Figures** of the EIS. The composition and the characteristics of the various rock units are discussed herein.

41 Ordovician / Silurian Deposits (Salterstown Formation, Clontail Formation and Castlerahan Formation). The Ordovician deposits along the alignment are comprised of greywackes, sandstones and mudstones. These rocks were formed from sands, muds and silts deposited by turbiditic currents in deep marine setting at the edge of the ancient Iapetus Ocean. These rocks were partially metamorphosed by subsequent folding, faulting and subduction events.

42 The different geological formations that make up the MSA include the following formations:

- Navan Beds. The Navan Group is primarily comprised of argillaceous limestones, shales and sandstones. Within the Navan Group a number of members are present including the Rockfield Sandstone Member.

- Meath Formation. The Meath Formation is typically comprised of varied lithologies including micrite, oolite, sandstone, argillaceous limestone, and shale. The Meath Formation is the main host ore body to the Tara Mines Lead Zinc ore body.

- Calp Limestone (Lucan Formation). Underlying the mid-section of the proposed development area, the bedrock is comprised of the Calp Limestones. The term ‗Calp' is used to refer to the various basinal limestone and shales occurring in these successions. The Calp units generally consist of dark grey, fine grained, impure limestone with interbedded shales and veins of white calcareous spar. The variation in bed thickness, grain size, colour and proportion of shale is a feature of the depositional environment.

- Cruisetown Group & Fingal Group. The Cruisetown Group and Fingal group occur in the Moynalty Basin (between Moynalty, Carlanstown and Nobber). The Cruisetown and Fingal Group are structurally controlled by a syncline present within the Moynalty Basin trending north-east / south-west. The Cruisetown Group is primarily comprised of Ballysteen and Waulsortian Limestones. The Fingal Group is primarily comprised of Calp limestones.

- Namurian Sandstones and Shales. Thick sequences of sandstones, siltstones and marine shales were deposited later during the Upper Carboniferous Period (approximately 340 million years ago). Several different lithologies are present within the Namurian Sandstones and Shales, but due to poor exposure in the area, a general classification is given to the rocks in the area. The Namurian shales typically consist of siltstones, mudstones interbedded with fine – medium grained sandstones, calcareous mudstone / siltstone and argillaceous limestone.

43 The distribution of geological units, along the alignment is based on published information from the GSI. They are shown in Figures 7.5 – 7.8, **Volume 3D Figures** of the EIS. The composition and the characteristics of the various rock units are discussed herein.

7.4.3.3 Karst Features

44 The muddy limestones of the Lucan ‗Calp' Formation and the Ballysteen Formation are less susceptible to karst solution than pale, purer limestones (present in East Meath, Navan Beds and the Drogheda Platform). Exposures in the Fingal Group and Calp Limestones do not indicate any major Karst solution features. The Karst database held by the GSI was consulted. This database holds records of locations and types of reported Karst features. No recorded karst features from the GSI database exist within 1km of the proposed route alignment. Karst features were noted at former Gibstown Castle (Gibstown House) located approximately 1.2km from the proposed route alignment. Anthropogenic sources have modified the original setting at Gibstown House. Within the Navan group occasionally paleokarst features are present, with, some dolomitisation and fracturing.

7.4.3.4 Depth to Bedrock

45 A small fraction of the surface of the area (<2%) comprises bedrock outcrop, with a deep cover of Quaternary deposits in the MSA. Subsoil depths in the Bohermeen area to the west of Navan above the Tara Mines SWEX B extension vary from 10m to 70m below ground level (bgl). Bedrock outcrop are mainly confined to the streams along the proposed line route

including Kilmainham Stream and Altmush Stream. Bedrock outcrops are more prevalent above the Namurian bedrock in the Culmullin area to the south of the proposed alignment. Additional information was obtained from the GSI well database which is included in **Appendix 7.1, Volume 3D Appendices** of the EIS.

7.4.4 Hydrogeology

46 The evaluation of the groundwater environment is concerned with water contained below the ground surface, within the soil and bedrock environment. Soils and bedrock along the MSA are widely variable in their hydrogeological characteristics. Ordovician greywackes and Namurian shales beneath the northern end of the OHL route are generally of low permeability, and lack groundwater except at shallow depth in the transition zone / upper weathered bedrock. The impure limestones, alluvial and sand and gravel parent materials that occur along parts of the MSA are moderate to high permeability. Glacial clays are generally of low permeability, although they may be locally interspersed with more permeable granular deposits.

47 Groundwater is present in these strata and groundwater generally is limited to fractures and to the upper weathered zone of the strata. There are no existing public water supply boreholes in close proximity to the proposed development. Information was obtained from the GSI well database which is included in **Appendix 7.1, Volume 3D Appendices** of the EIS.

7.4.4.1 Aquifer Classification

48 The section of the proposed development near the town of Trim, is composed of Dinantian Upper Impure Limestones and is classified as a Locally Important Aquifer, which is generally moderately productive. The same formation south-west of Kells is classified as a Locally Important Aquifer - moderately productive in local zones only. Silurian Metasediments and Volcanics between Navan and Ardee and north-west of Kells are classified mainly as Poor Aquifers (Pl) – unproductive except for local zones and Poor Aquifers (Pu). An aquifer classification by the GSI describes the Lucan Formation as a Locally Important Aquifer, bedrock which is Generally Moderately Productive (Lm). According to the GSI, the Calp is dominated by moderate permeability, fine grained and argillaceous limestones and shales. A summary of the aquifer classification is included in **Table 7.4**. Refer to **Figures 7.9 – 7.12, Volume 3D Figures** of the EIS for aquifer maps.

49 The Quaternary sediments play an important role in the groundwater flow regime of the region. The permeability of the glacial tills, which occur along the alignment, is variable but generally moderate. The high permeability gravels and sands and moderate permeability till allow recharge of the bedrock unit and provide additional storage to the underlying bedrock aquifer.

7.4.4.2 Groundwater Flow Direction

50 In general terms the groundwater gradient follows the topographic variation in an area. Flow paths and distance is dependent on the characteristics of the aquifer type. Most groundwater flow is confined to the upper 10m of weathered bedrock and will discharge to the nearest watercourse. An evaluation of the topographic contours displayed on the Ordnance Survey 1:50,000 scale Discovery Series Map for the region, indicates that the predominant groundwater flow direction in the MSA is likely to be towards:

- The River Tolka and its tributaries (Towers 410-400);
- The Boyne River and its tributaries (Towers 400-276); and
- The Dee River and its tributaries (Towers 273-237).

51 It is noted that a catchment divide is located between Towers 274 and 275 and groundwater flow direction may vary seasonally, however based on topography and subsoil mapping data, groundwater flow is likely towards the River Boyne and its tributaries.

7.4.4.3 Water Usage

52 Water usage within the MSA is primarily supplied by Meath County Council from their surface water abstractions at the River Boyne (Trim and Dowdstown supplies) and supplemented by Meath County Council groundwater abstraction boreholes. There are no public water supplies within 200m of the proposed line route.

53 Along the alignment a number of private wells are used by individual landowners. A search of the GSI well database shows there are a number of wells in the area with uses varying from private to agricultural use. The GSI Well Database is a record of reported wells drilled in Ireland. Refer to **Appendix 7.1, Volume 3D Appendices** of the EIS.

Table 7.4: Aquifer Definitions

Aquifer Code[28]	Aquifer Description	% of Towers located within Aquifer type
Pl	Poor Aquifer Bedrock which is generally unproductive except for local zones	30.9%
Ll	Locally important aquifer, which is Moderately Productive only in Local Zones	34.6%
Lm	Locally Important Aquifer - Bedrock which is Generally Moderately Productive	26.6%
Pu	Poor Aquifer - Bedrock which is Generally Unproductive	7.9%

7.4.4.4 Groundwater Vulnerability

54 The (formerly titled) DoEHLG, EPA and GSI have produced guidelines on groundwater vulnerability mapping that aim to represent the intrinsic geological and hydrogeological characteristics that determine how easily groundwater may be contaminated by human activities. Vulnerability depends on the quantity of contaminants that can reach the groundwater, the time taken by water to infiltrate to the watertable and the attenuating capacity of the geological deposits through which the water travels.

55 The DoEHLG, EPA and GSI vulnerability mapping guidelines allow for the assignment of vulnerability ratings from ‗extreme' to ‗low', depending upon the subsoil type and thickness. With regard to sites where low permeability subsoils are present, the following thicknesses of unsaturated zone are specified in **Table 7.5**.

[28] Based on GSI Data www.gsi.ie

Table 7.5: Groundwater Vulnerability Categories

Vulnerability Rating	Hydrogeological Conditions				
	Subsoil Permeability (Type) and Thickness			Unsaturated Zone	Karst Features
	High Permeability (Sand and Gravel)	Medium Permeability (Sandy Subsoil)	Low Permeability (Clayey Subsoil/ Peat)	Sand and Gravel aquifers only	<30 radius
Extreme	0 – 3.0m	0 – 3.0m	0 – 3.0m	0 – 3.0m	-
High	>3.0m	3.0 -10.0m	3.0 – 5.0m	> 3.0m	N/A
Moderate	N/A	>10.0m	5.0-10.0m	N/A	N/A
Low	N/A	N/A	>10m	N/A	N/A

Notes: N/A Not Applicable; Precise Permabilities values cannot be given at present; Release point of contamination is assumed to be 1-2m below ground surface. The principal vulnerability classes included are High and Moderate. All sand and gravel subsoils are classified as high.

56 The principal vulnerability class is extreme. Refer to Figures 7.13– 7.16, **Volume 3D Figures** of the EIS.

Table 7.6: Groundwater Vulnerability along the Line Route

Groundwater Vulnerability[29]	Number of Towers	% towers per Vulnerability category
Extreme	9	5.5%
Extreme Vulnerability with rock at Surface (<1m)	3	1.8%
High	75	45.5%
Moderate	72	43.6%
Low	6	3.6%
TOTAL	**165**	**100**

7.4.5 Areas of Geological Heritage Importance

57 The GSI provides scientific appraisal and interpretative advice on geological and geomorphological sites and is responsible for the identification of important sites that are capable of being conserved as Natural Heritage Area (NHA). The National Parks and Wildlife Service (NPWS) of the Department of Arts, Heritage and the Gaeltacht (DAHG) has the responsibility of designation and management of sites, with appropriate advice from GSI. Refer to Figures 7.17– 7.20, **Volume 3D Figures** of the EIS.

58 At present, the GSI has compiled a list of sites proposed for designation as Natural Heritage Areas (pNHAs). The GSI has also determined a secondary list of County Heritage Areas, which may be considered for protection at local authority functional control level (i.e. maybe included in county development plans). The Meath County Geological Sites (CGS) are incorporated into the Meath County Development Plan 2013-2019.

59 The GSI was consulted as part of the route selection process with regard to areas that may have geological and geomorphological importance. There are five sites identified by the GSI located along the route alignment, all five are proposed as CGS. Refer to **Table 7.7** for details.

[29] Based on GSI Data www.gsi.ie

Table 7.7: Geological Heritage Areas along the Line Route

Site Name[30]	Location	Distance from Tower location	IGH Theme
Altmush Stream (CGS)[31]	(NGR E278770 N286830)	Tower 261 located in CGS boundary	IGH8 Lower Carboniferous and IGH9 Upper Carboniferous Theme
Gibstown Castle (CGS)	(NGR 283100 273100	1.4km east of line route	IGH1 Karst theme
Boyne River (CGS)	(NGR 284350 258560)	<50m from Towers 355 and 356	IGH14 Fluvial / Lacustrine Geomorphology theme
Galtrim Moraine (CGS)	(NGR 286000 256000)	Tower 381 located in CGS boundary	IGH7 Quaternary theme
Trim Esker (CGS)	NGR 285000 253100)	0.8km west of Tower 381	IGH7 Quaternary theme

60 **Altmush Stream** comprises a continuous section of natural rock outcrops of the Lower Carboniferous (Visean) to Upper Carboniferous (Namurian) limestone, and shale of the Fingal Group and Ardagh Shale Formation respectively along the banks of a stream over a distance of 1.5km, and has been proposed under IGH8 Lower Carboniferous and IGH9 Upper Carboniferous Themes as a CGS. The potential impact on the CGS is low and is discussed further in **Section 7.5**. The line route passes over the CGS, with Tower 261 located on the boundary of the CGS.

61 **Gibstown Castle** comprising a natural rock outcrop of Lower Carboniferous (Courceyan) Limestone of the Ballysteen Formation and spring, has been proposed under the IGH1 Karst theme for designation as a CGS site as there are very few naturally exposed karst features seen within the limestone of Meath. No towers are located in the CGS. Gibstown Castle is located 1.4km from the proposed line route.

62 **Boyne River** a section of the Boyne River comprising one of the few examples of anatomising (distributary) channel system in Meath, has been proposed under IGH14 Fluvial / Lacustrine Geomorphology theme for designation as a CGS site as anatomizing channels are not common nationally. The line route passes over the CGS. No towers are located in the CGS. The nearest towers, Towers 355 and 356, are located outside the eastern boundary of the Boyne CGS.

[30] Based on GSI Data www.gsi.ie.

[31] Currently Altmush is categorised as a County Geological site but may be upgraded to NHA status at a later date.

63 **Galtrim Moraine** comprising an example of an esker crossing a moraine. The site has been proposed under the IGH7 Quaternary theme for designation as a CGS as it is unique in Ireland. The deposition of the Galtrim Moraine is considered to be the remains of a prolonged pause in ice retreat during the Midlandian age. The Galtrim Moraine is comprised of fans and deltas of gravel built at the ice margin into glacial Lake Summerhill. This lake formed when water was trapped between the ice front and the high shaly ground at Summerhill. The building outwards of successive deposits is evident and above them, a later horizontal layer. Tower 381 is located on Galtrim Moraine.

64 **Trim Esker** comprising a 14.5km long section of a predominately wooded esker ridge made of Quaternary sand and gravel deposits. It was formed by a sub-glacial river which flowed beneath an ice sheet, covering this area during the last ice age. As this subglacial river flowed beneath the ice it deposited material which remained to form a long linear ridge, which stands out from the surrounding landscape. No towers are located in the CGS.

7.4.6 Current and Historical Mining Sites

65 The main mining area adjacent to the proposed development is Tara Mines, near Navan, County Meath. Tara Mines have been actively mining Lead and Zinc for over 30 years. The current mining area extends to west of Navan and is present beneath the alignment particularly in the Irishtown, Betaghstown and Ongenstown area. This area is referred to as the SWEX B extension. The SWEX B mineralisation is a significant depth below surface approximately 650m to 900m below ground level (mbgl). The geology of this area has been extensively investigated as a consequence of mining. A geological summary is given in **Table 7.8**.

Table 7.8: Soil / Bedrock Profile at SWEX B

Horizon[32]	Depth (mbgl)	Unit Thickness (m)
Overburden (glacial till)	5 -70	5-70m
Upper Dark Limestones	10-650	<600
Pale Beds / Ore	650 -c900	<10

66 No other major mines were noted in the MSA. The alignment does not cross the Kingscourt Gypsum Formation, which is located approximately 1km to the east of the alignment. There are no active quarries or sand and gravel pits located under the alignment.

7.4.7 Contaminated Land

67 An evaluation was undertaken to determine the presence and extent of potentially contaminated land in the MSA is based on the identification of potential sources pathways and receptors along the line route. If all three elements (source, pathway and receptor) are present, there is a contaminant linkage and there is a potential for the contamination to represent a risk to the receptor(s) and for the site to be considered as contaminated.

68 A number of sites have been identified as having a potential for land contamination in the immediate area of the alignment. The identified sites have not been fully validated and it is considered likely that they represent worst case conditions, where a potential for contamination has been identified but no evidence of actual contamination has been confirmed, such as a pits / quarries which may or may not have been infilled. The evaluation has been undertaken on the assumption that all of the sites are contaminated unless there is evidence to the contrary.

69 The distance to the nearest tower has been used, as the OHLs would have no impact on the underlying ground conditions. On a precautionary basis, only sites within 200m of the route of the proposed development have been considered; refer to **Table 7.9**.

[32] Based on Tara mines data.

Table 7.9: Potential Contaminated Land Sites within 200m of the Proposed Overhead Line Route

Tower and Associated Development	Approximate Distance (m) and Direction from Nearest Tower	Description
393	60m south-west of Tower 393	Reclaimed land (borrow pit)
389	120m south-east of Tower 389	Reclaimed land (borrow pit)
363	80m south of Tower 363	Railway land (Athboy Branch of Midland Great Western Railway)
350	120m east south of Tower 350	Reclaimed land (gravel pit)
344	20m north-west of Tower 344	Reclaimed land (borrow pit)
327	50m east of Tower 327	Reclaimed land (borrow pit)
316	15m north-east of Tower 316	Railway land (Athboy Branch of Midland Great Western Railway)
262	200m east of Tower 262	Reclaimed land (quarry)
261	100m west of Tower 261	Reclaimed land (quarry)
256	80m north to Tower 256	Reclaimed land (quarry)
245	150m south south-west of Tower 245	Reclaimed land (borrow pit)

Source: Aerial Photos and historical maps.

70 A review was undertaken of potentially contaminated land sites located in close proximity to the route of the proposed development. The detailed reviews are based on an evaluation of historical Ordnance Survey plans of the sites; LiDAR (Light Detection and Ranging) and aerial photographs of all the sites listed in **Table 7.9** and, a site walkover in July / August 2013 where access was granted.

71 In addition to specific sites, it should be noted that there is a general potential for pollution from agricultural chemicals on present and past agricultural land, and from buried material which may occur almost anywhere along the proposed development.

7.4.8 Former Railways

72 Tower 316 is located at approximately 1km south of Finnegan‘s Cross roads and the N3 Navan-Kells Road. The tower is located close to an abandoned railway embankment which runs south-east to north-west, 15m north of this proposed tower location. The embankment is slightly raised above the local topography by approximately 0.5m. The former railway ran between Kells and Navan.

73 The geological map shows that the site is underlain by superficial deposits consisting of alluvium and boulder clay (till). The superficial deposits are underlain by Carboniferous Limestones. The thickness of the superficial deposits as mapped by the GSI is >10m in this location (moderate vulnerability, moderate permeability).

74 The earliest OS 6” plan for 1841 shows the site undeveloped. The railway was not constructed until 1853. The OS 25” map dated 1927 shows that the line had been developed as a single track railway. The Navan to Kells line was decommissioned in 1963.

75 Tower 363 is located at approximately 2.6km west of Kilmessan. The tower is located close to an abandoned railway embankment which runs south-west to north-east, less than 70m south of the proposed tower location. The railway is marked as level with the surrounding topography and the former railway has since been removed from the field. The former railway was a branch off the Dublin Meath Railway at Kilmessan serving the Athboy area.

76 The geological map shows that the site is underlain by superficial deposits consisting of till derived from limestone. The superficial deposits are underlain by Carboniferous Limestones. The thickness of the superficial deposits as mapped by the GSI are >3m in this location (high vulnerability, moderate permeability).

77 The earliest OS 6” plan for 1841 shows the site undeveloped. The railway was not constructed until 1864. The OS 25” map dated 1927 shows that the line had been developed as a single track railway. The Navan to Athboy section was decommissioned in 1953.

78 Contaminants associated with railway lines typically include ash (heavy metals), hydrocarbons, creosote from sleeper treatment and sulphates from track ballast and herbicides. Many of the contaminants associated with railway land are volatile and are likely to have evaporated, and the heavier fractions such as metals and (Polycyclic Aromatic Hydrocarbons) PAHs are sealed within the track route by organic matter.

79 Whilst there are plausible contaminant linkages, such linkages have existed ever since the railway was constructed in the 1860s. Since the closure of the railways in the 1950s and 1960s there have been no additional contaminant sources and impacts, if any, would be limited to residual contaminants present from the operation of the railway. It is likely that the majority of the mobile contaminants would have migrated from the site over the past 50 years and that any residual contaminants are present in immobile forms. Accordingly, it is considered unlikely that there are any sources of significant residual contamination associated with the former railway line remaining on the site.

80 Towers 316 and 363 will be located to the south of the former railway lines and the footprint of the tower will not include the former railway line.

7.4.9 Disused Quarries and Soil Excavation areas

81 As outlined in **Table 7.9**, a number of disused quarries and soil excavation works occur along the line route. The excavations appear to be minor and have been largely undertaken in the last 20 years for use in construction activities in the local area. Excavations appear to be localised and limited in area / extent (<0.5 acres). The soil excavations shown appear to be disused and due to the distance from the tower locations, it is considered that they will not be disturbed by tower excavation works. Potential sources of contaminants include the disposal of agricultural related waste material in the excavations. Significant contamination has occurred in Ireland where open excavations were backfilled with waste materials. Based on the site visits, where feasible, LiDAR imagery and a review of aerial photographs there is no visual evidence of contamination.

82 In the absence of excavation of the former quarries / pits (the potential ‗source‘ of any contamination) it is concluded that the construction works will not disturb any potential contamination and that the works will not alter the existing ground conditions. As the construction of the tower would not affect the excavations, it is considered that any contaminant pathways will not be realised as part of the proposed development.

7.5 POTENTIAL IMPACTS

7.5.1 Do Nothing

83 The ‗Do Nothing‘ alternative describes the circumstance where no development occurs. Under a ‗Do Nothing‘ scenario, no likely significant implications arise in respect of soil, geology or hydrogeology.

7.5.2 Construction Phase

84 During the preparation of the EIS, there were a number of constraints in terms of site access, however, notwithstanding these constraints, a robust evaluation of the likely significant effects of all aspects of the proposed development, both in respect of the line and the towers, has been undertaken for the purpose of this EIS. This section should be read in conjunction with the construction methodology as outlined in Chapter 7, **Volume 3B** of the EIS. The proposed development will have potential impacts on the soil, geology and hydrogeology of the MSA. Impacts of the construction works on the surface water environment in relation to silt runoff are considered in **Chapter 8** in this volume of the EIS.

85 The significance of potential impacts associated with contaminated land has been evaluated broadly based on guidelines in *Contaminated Land Risk Assessment, A Guide to Good Practice (CIRIA,* 2011). Potentially contaminated land has been identified along the proposed development. No significant potential contamination risk was identified along the line route. The potentially contaminated land sites identified along the line route of the proposed development do not pose a significant risk of contamination or a constraint to the proposed development. Accordingly, it is concluded that the sites of potentially contaminated land in proximity to the proposed development would not be disturbed by the construction process and do not pose a constraint to the proposed development. If contamination is unexpectedly encountered mitigation measures are incorporated into **Section 7.6**.

86 The construction phase of the proposed development will impact on the ground and geological conditions through the use of temporary access routes and excavations required for the tower bases and the substation. The extent of the excavations required for the tower bases will vary depending on the precise geological conditions at each tower. The working area for construction of a 400 kV tower will extend to 30 x 30m all around the footprint of the base of the tower. As noted in Chapter 7, **Volume 3B** of the EIS, tower foundations typically range from 2m to 3.5m in depth to the invert level of the foundation and anywhere from 2 x 2 metres squared to 9 x 9 metres squared, in plan area depending on tower type. Each of the four corners of the tower stubs (i.e. lower part of the tower leg) will be separately anchored below ground in a block of concrete. The standard ESB practice is to use a concrete pipe lining in the foundation holes as an integral part of the foundation. Approximately 14,200m^3 of material will be excavated as part of the line route and approximately 3,500m^3 of material will be excavated as part of the substation development.

87 It is considered that the construction works only would have minor effects on the geomorphology of the area, as the tower construction would not materially change the local slopes and topography.

88 The tower locations have been selected to avoid known areas of lacustrine deposits, intact peat and cutover peat where possible. Intact peat was not identified at any tower location along the line route. Accordingly, it is considered that the excavations required for the construction of the principal elements of the proposed development (towers and the substation) will have no adverse impacts on the more-sensitive peat ecosystem. Cutover peat is mapped at three tower locations (Towers 269, 287 and 292). Lacustrine deposits are mapped at two tower locations (Towers 297 and 379). In the unlikely event that piled foundations may be required at these locations, the potential impacts are not significant. Mitigation measures are incorporated in **Section 7.6**.

89 It is considered that the vast majority of excavated material will consist of sub soil and naturally excavated soils and rock. The surplus excavated material from substation excavations will be approximately 3,500m^3 and tower excavations will be approximately 14,200m^3. Assuming a worst case scenario, all material will be taken off-site and recovered / deposited at an appropriately licensed / permitted waste management site. As it is anticipated that the excavated materials would comprise natural uncontaminated soils, there would be no contamination restrictions on the ability of licensed / permitted waste management sites to accept the materials. Mitigation measures will be in place should contamination be encountered as outlined in **Section 7.6**.

90 The ground conditions in the vicinity of the proposed development are considered to be of low sensitivity with one Groundwater Dependent Terrestrial Ecosystem (GWDTE), the Boyne and Blackwater cSAC located along the line route. No tower is within 70m of the Boyne / Blackwater rivers and mitigation measures incorporated into **Section 7.6** and **Chapter 6,** Section 6.6 of this volume of the EIS.

91 Impacts on existing ground conditions will be restricted to the tower locations, temporary access tracks, guarding locations and stringing locations. The magnitude of the impacts at the tower locations is considered to be low. Temporary access tracks will comprise of aluminium tracks or rubber matting. Placing of temporary access tracks will be required at a number of tower locations. Potential impacts arise where temporary access routes cross areas of cutover peat and alluvial soils. Approximately 5 temporary access tracks will be required on the MSA line route, where temporary access tracks traverse cutover peat, lacustrine soils or alluvial soils and if weather conditions are very poor (refer to Chapter 7, **Volume 3B** of the EIS). It is not proposed to use stone roads or wooden sleepers as part of the proposed development. Mitigation measures are detailed in **Section 7.6**.

92 The line route will utilise the existing substation at Woodland thereby minimising the potential impact on the soils, geology and hydrogeology environment.

93 During the construction phase, the digging of foundations for the towers may lead to an increase in soil erosion. In addition topsoil, subsoil removal and rock excavation will be required. Topsoil removal has the potential for silt and clay to be removed by rainfall and surface water runoff. Siltation of nearby watercourses may be a potential impact and careful removal and storage of subsoil should be considered. Any topsoil that is removed will be used for regrading at a later stage. Potential impacts and mitigation measures in relation to soil erosion are addressed in **Sections 7.6** and **7.7**.

94 During the construction phase, machinery on site will include diesel powered trucks, excavators and the use of either a derrick or mobile crane. The potential impacts to the underlying soil and geology from the proposed development could derive from accidental spillages of fuels, oils and solvents which could impact the soil, bedrock and groundwater quality, if allowed to infiltrate to ground during construction.

95 The proposed development has the potential to impact locally on groundwater flow and quality. All impacts that are realised would be of a temporary nature for the construction period. The principal potential impacts include a reduction in groundwater level and modification in groundwater flow as a result of dewatering; deterioration in groundwater quality as a result of suspended solids and contaminant (oils and chemicals) spills / leaks during construction and operation.

96 The evaluation of the significance of potential impacts on groundwater is based on the source-pathway-receptor approach and is determined from a combination of the sensitivity of the receptor and the magnitude of any impact. Groundwater receptors include poorly productive aquifers, GWDTE and water abstraction boreholes. No tower is located within 200m of a public water supply or the inner source protection of public groundwater supply schemes.

97 The tower excavations will vary between approximately 2m and 3.5m in depth, subject to the precise ground conditions at each tower location. In low lying areas groundwater may be encountered in excavations. If excavations for tower bases encounter groundwater, such inflows may need to be pumped, resulting in short term localised drawdown of the water table and discharges to the surface water channels.

98 Due to the limited drawdown and pumping required, it is considered that any significant impacts on the groundwater level will be realised only in close proximity to the point of abstraction. Any impacts will be restricted to the short period of pumping. Drawdown decreases exponentially away from the point of abstraction. The majority of the tower locations are remote from properties and hence it is unlikely that any dewatering of the excavations would impact on existing wells and boreholes as these tend to be located in close proximity to the user's property however, a precautionary approach will be followed where groundwater is encountered in excavations. The need for dewatering to construct the tower footings will be confirmed at the construction stage. Where groundwater is identified in excavations within 100m of houses, monitoring and evaluation of groundwater and water levels will be undertaken.

99 Water pumped from the excavations may contain suspended solids and contaminants. In the absence of any treatment, the disposal of this water to ground or to the surface water system could cause deterioration in water quality of the receiving system. Mitigation measures are outlined in **Section 7.6.**

100 There will be a risk of soil and groundwater pollution from site traffic through the accidental release of oils, fuels and other contaminants from vehicles. Mitigation measures are outlined **Section 7.6**.

7.5.2.1 Geological Heritage Impacts

101 Potential short term impacts during the construction phase include activities associated with the movement, excavation and disposal of soils, contaminated materials (if present) and bedrock, compaction of soils.

102 The alignment passes close to five sites identified as CGS or pNHAs. These have been identified as Altmush Stream, Gibstown Castle, Boyne River, Galtrim Moraine and Trim Esker.

103 The alignment does not go through the following two sites: Gibstown Castle or Trim Esker. Hence these sites will not be affected by the proposed development.

104 The alignment passes close to the Boyne River CGS but no towers are present within the CGS boundaries. Two towers will be located towards the boundary of the Boyne CGS and over 60m from the Boyne River. Hence the Boyne CGS will not be affected by the proposed development. The potential impacts were discussed with the GSI and mitigation measures are proposed in **Section 7.6**. No significant impact was identified in consultation with the GSI.

105 It is proposed to locate one tower within the Altmush Stream CGS boundary. This tower is located over 30m from the Altmush Stream within an agricultural field. The geological interest at the Altmush site is the bedrock exposures within and along the banks of the stream, which expose rocks of the Carboniferous period. The potential impacts were discussed with the GSI and mitigation measures are proposed in **Section 7.6**. No significant impact was identified in consultation with the GSI.

106 It is proposed to locate Tower 381 within the Galtrim Moraine CGS boundary. This tower is located in an agricultural field towards the centre of the Galtrim Moraine section. The main geological interest at the Galtrim site is the cross section. The potential impacts were discussed with the GSI and mitigation measures are proposed in **Section 7.6**. No significant impact was identified in consultation with the GSI Operational Phase.

107 The proposed development will connect into the existing substation at Woodland thereby minimising the impact on the existing environment (compared to the requirement for a new additional substation build).

7.5.3 Operational Phase

108 Due to the nature of the development, there will be machinery periodically on the site at a given time. This may lead to occasional accidental emissions, in the form of oil, petrol or diesel leaks, which could cause contamination if they enter the soil and bedrock environment.

109 It is not proposed to discharge wastewater to groundwater as part of this development.

7.5.4 Decommissioning

110 The proposed development will become a permanent part of the transmission infrastructure. The expected lifespan of the development is in the region of 50 to 80 years. This will be achieved by routine maintenance and replacement of hardware as required. There are no plans for the decommissioning of the OHL. In the event that part of, or the entire proposed infrastructure is to be decommissioned, all towers, equipment and material to be decommissioned will be removed off site and the land reinstated. Impacts would be expected to be less than during the construction phase and would be of short term duration.

7.6 MITIGATION MEASURES

111 In identifying the route of the proposed development, ‗avoidance of impact' measures were employed. Due to the nature of the proposed development, the scale of impact on the soils, geology and hydrogeology is low.

7.6.1 Construction Phase

112 Measures to minimise the impact of the proposed development on local geology include reuse of in situ material and importation of additional material from local sources. The placement of towers has avoided areas of intact peat, therefore the hydrology of peat masses in the general vicinity of the alignment will not be affected.

113 It is proposed to mitigate the potential impacts on the Altmush CGS, Galtrim CGS and the Boyne CGS. Soils and bedrock will be encountered during the site investigation works / construction of the towers. The GSI have been consulted at all stages of the application. The mitigation measures include the following:

- Continued consultation with the GSI;
- Limiting excavation by only excavating the required footprint at Galtrim moraine;
- Maintaining an adequate distance from the Altmush Stream; and

- The GSI will be notified by the developer about any significant new section / feature that is exposed within the tower footprint.

114 All construction waste will be stored, managed, moved, reused or disposed of in an appropriate manner by appropriate contractors in accordance with *Waste Management Acts 1996-2013* (refer to Chapter 7, **Volume 3B** of the EIS). Excess soils / subsoils will be disposed of at licensed / permitted waste management facilities. Excess steel will be disposed of / recovered offsite at a licensed facility. All waste material will require the necessary waste permits and documentation as part of the construction programme and the CEMP.

115 Excavated soil and subsoil will be stored adjacent to the excavation area. Excavated material will be reused in situ where possible. Typically $34m^3$ of soil / rock will be excavated at each intermediation tower location with approximately $230m^3$ of soil / rock excavated from angle towers. In the event no material is suitable / wanted for reuse by landowners, subsoil will be disposed of at a licensed / permitted facility in accordance with the *Waste Management Act 1996 (as amended)* and associated regulations. Where subsoil is retained, an evaluation by the onsite ecologist is required to minimise potential ecological impacts. Typically subsoil is reused by landowners however, assuming a worst case scenario, surplus material will be disposed of at licensed/permitted facility. Further details of the facilities considered are provided at **Appendix 7.2, Volume 3D Appendices** of the EIS.

116 All excavated materials will be visually evaluated for signs of possible contamination such as staining or strong odours. In the event that any unusual staining or odour is noticed, samples of this soil will be analysed for the presence of possible contaminants in order to ensure that historical pollution of the soil has not occurred. Should it be determined that any of the soil excavated is contaminated, this will be dealt with appropriately as per the *Waste Management Act 1996 (as amended)* and associated regulations.

117 To minimise any potential impact on the underlying subsurface strata from any material spillages, all oils and fuels used during construction will be stored on temporary proprietary bunded surface (i.e. contained bunded plastic surface). These will be moved to each tower location as construction progresses. Refuelling of construction vehicles and the addition of hydraulic oils or lubricants to vehicles will take place away from surface water gullies or drains. No refuelling will be allowed within 50m of a stream / river. Spill kits and hydrocarbon absorbent packs will be stored in this area and operators will be fully trained in the use of this equipment.

118 Controlling working practices by, for example, minimising land take, avoiding repetitive handling of soils, minimising vehicle movements off road and limiting the size of stockpiles will reduce the compaction and erosion of material. Once all works are complete, the temporary access route

and the construction areas which have been disturbed around the towers during the tower foundation installation and tower erection phases will be reinstated. Any impacts are considered likely to be minor and of short term nature.

119 The presence of the 400 kV in Bohermeen will not impact on the operation of Tara mines. All mining in the SWEX 2 deposit is at >750m below ground level. The significance of effect for the line is predicted to be negligible. Liaison will be undertaken with Tara mines during the construction / operational phases to ensure no conflicts arise.

120 Any vehicles utilised during the operational phase will be maintained on a weekly basis and checked daily to ensure any damage or leakages are corrected. The potential impacts are limited by the size of the fuel tank of the largest plant / vehicles used on the site. Precautions will be taken to avoid spillages. These include:

- Use of secondary containment e.g. bunds around oil storage tanks;
- Use of drip trays around mobile plant;
- Supervising all deliveries and refuelling activities; and
- Designating and using specific impermeable refuelling areas isolated from surface water drains.

121 The majority of the tower locations are remote from dwellings and hence it is unlikely that short term dewatering of the excavations will impact on existing wells and boreholes. Where it is necessary to dewater to construct the tower foundations in close proximity of wells, monitoring will be carried out of wells within 100m of the tower locations.

122 Water pumped from the excavations may contain suspended solids. Standard methods of dewatering including ejectors, wellpoints or submersible pumps will be used. Settlement may be required to reduce the suspended solids concentrations to protect the quality of the receiving water system. Settlement will be undertaken by a standard water filtration system to control the amount of sediment in surface water runoff. Direct discharge to stream or rivers will not be permitted.

123 The mitigation measures outlined in relation to soils, geology and hydrogeology will be implemented as part of the CEMP. This plan will incorporate the mitigation measures indicated in the EIS, and any others deemed necessary, and shall provide details of intended construction practice for the proposed development. An outline CEMP can be found in Appendix 7.1, **Volume 3B Appendices** of the EIS.

7.7 RESIDUAL IMPACTS

124 The nature of the development dictates that the greatest potential impact for geological impact (including soil, subsoil and bedrock) associated with the proposed development will be in the construction phase. It is predicted that the geological impact associated with the construction phase of the development is negligible and short term.

125 With regard to the operational phase of the development, no significant impacts on the local geological or hydrogeological environment are predicted with the implementation of the prescribed mitigation measures. The predicted impact on soils, geology and hydrogeology is considered negligible.

7.8 INTERRELATIONSHIPS BETWEEN ENVIRONMENTAL FACTORS

126 The potential for interrelationships arises with the environmental topics of water and flora and fauna. Soils, geology and hydrogeology have an important interrelationship with the water and ecological environment, as a determinant of water chemistry, river flow regimes, water storage capacity and watercourse location. It also has an impact on water quality through the ability of bedrock and surface deposits to filter potential pollutants. Potential ecological impacts could occur through the mishandling of soils or through the deposition of excavated soils in ecologically sensitive areas. These potential impacts have been identified and mitigations proposed in **Sections 7.5** and **7.6** above.

127 An evaluation was undertaken based on the identification of potential sources pathways and receptors along the line route. If all three elements (source, pathway and receptor) are present, there is a linkage and there is a potential impact to the receptor(s). In term of surface water and ecology, a groundwater dependent terrestrial ecosystems (GWDTE), the Boyne and Blackwater cSAC is oversailed by the line route, no towers are located in the cSAC. No significant predicted impacts are likely to occur as part of this proposed development.

128 This chapter should be read in conjunction with **Chapters 6** and **8** of this volume of the EIS and Chapter 7, **Volume 3B** of the EIS.

7.9 CONCLUSIONS

129 The subsoil underlying the alignment is primarily composed of unsorted till deposits, while glaciofluvial sands and gravels are also present. Minor quantities of soft sediments including peat and alluvial deposits are also located along the proposed alignment. The construction phase of the proposed development will impact on the geological conditions through the use of temporary access routes and excavations required for the tower bases and the substation.

130 The nature of the transmission line development dictates that the greatest potential impact for geological impact (including soil, subsoil and bedrock) associated with the development will be in the construction phase. During construction the potential impacts to the underlying soil and geology from the proposed works could derive from accidental spillages of fuels, which could impact the soil, bedrock and groundwater quality, if allowed to infiltrate to ground. Sensitive receptors include the Boyne / Blackwater SAC.

131 The tower locations have been selected to avoid known areas of lacustrine deposits, intact peat and cutover peat where possible. Intact peat was not identified at any tower location along the line route. Accordingly, it is considered that the excavations required for the construction of the principal elements of the proposed development will have no adverse impacts on the more-sensitive peat ecosystem.

132 No significant adverse effects are predicted on the geological or hydrogeological environment as a result of the construction and operational phase of the proposed development.

133 The predicted impact on the soils and geology is considered to be imperceptible.

8 WATER

8.1 INTRODUCTION

1 This chapter of the Environmental Impact Statement (EIS) evaluates the impacts on the water environment arising from the proposed development as set out in Chapter 6, **Volume 3B** of the EIS. The information contained within this chapter is concerned with the description of the hydrological character of the Meath Study Area (MSA) as defined in Chapter 5, **Volume 3B** of the EIS.

2 The evaluation for the MSA considers an area in excess of 500m either side of the line route.

3 The potential impacts on the surface water (rivers, lakes, etc.) conditions and on the environment are considered for both the construction and operational phases of the proposed development. Mitigation measures that will form part of the proposed development are described and any residual environmental impacts identified and their significance evaluated.

4 Chapter 6, **Volume 3B** of the EIS describes the full nature and extent of the proposed development including elements of the overhead line (OHL) design and the towers. It provides a factual description, on a section by section basis, of the entire line route. The principal construction works proposed as part of the development are set out in Chapter 7, **Volume 3B** of the EIS, along with the outline *Construction Environmental Management Plan* (CEMP) in Appendix 7.1, **Volume 3B Appendices** of the EIS.

5 This chapter should be read in conjunction with **Chapters 6** and **7** of this volume of the EIS.

8.2 METHODOLOGY

6 This chapter has been prepared using the recommendations set out in the Environmental Protection Agency's (EPA) *Guidelines on Information to be contained in Environmental Impact Statements* (March 2002). The guidelines and recommendations of the National Roads Authority (NRA) *Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes* (2009) were also considered in the preparation of this chapter.

7 The information contained in this chapter has been divided into sub-sections, so as to describe the various aspects pertaining to the water environment. In the preparation of this chapter the following sources of information were used in order to evaluate the regional and site specific context and character of the MSA:

- EPA water quality monitoring data for watercourses in the area, www.epa.ie;
- EPA (2006). *Water Framework Directive Monitoring Programme* (WFD);
- EPA (2005). *The Characterisation and Analysis of Ireland"s River Basin Districts* (RBDs);
- *Eastern River Basin District* (2010) and *Eastern River Basin Management Plan* (2009-2015);
- *Neagh Bann International River Basin District* (2012) and *River Basin Management Plan (*2009-2015);
- Inland Fisheries Ireland (IFI) *Sampling Fish for the Water Framework Directive (2008-2012);*
- Office of Public Works (OPW) flood mapping data *www.floodmaps.ie*;
- OPW (2009). *Guidelines for Planning Authorities, The Planning System and Flood Risk Management;*
- JBA consulting (2011). *Strategic Flood Risk Assessment for County Meath*;
- Natura Environmental Consultants in association with the NRA (2005). *Guidelines for the Crossing of Watercourses During the Construction of National Road Schemes;*
- OPW (2009). *Guidelines for Planning Authorities, The Planning System and Flood Risk Management;*
- CIRIA 532, (London, 2001). *Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors;*
- CIRIA 648 (London 2006). *Control of Water Pollution from Linear Construction Projects;*
- Site visits in the MSA*;* and
- Consultation with statutory and non-statutory organisations.

8 The evaluation of the MSA is considered detailed and sufficient to adequately evaluate the hydrological setting.

9 All projects and developments that require an EIS are of a scale or nature that they have the potential to have an impact on the environment. With respect to the construction of a transmission line the impact on the water environment is considered to be low in comparison to other linear projects such as road or pipeline developments.

10 In this chapter the potential impacts on the water environment resulting from the proposed development is evaluated and mitigation measures are proposed to reduce any significant impacts. Based on the mitigation measures proposed the significance of the residual impact on the water environment is determined.

11 Criteria for evaluating impact level have been derived and are shown in **Table 8.1.** Terminology for impact significance and duration follows that set out in the EPA's *Guidelines on Information to be contained in Environmental Impact Statements* (March 2002). The magnitude of any effects considers the likely scale of the predicted change to the baseline conditions, resulting from the predicted effect and takes into account the duration of the effect i.e. temporary or permanent. Definitions of the significance and magnitude of any effects are provided in **Tables 8.1** and **8.2**.

Table 8.1: Significance Criteria and Examples

Importance	Criteria	Selected Examples
Very High	Attribute has a high quality and rarity on a regional or national scale.	Site protected under EU / Irish legislation (SAC, cSAC, SPA, NHA, pNHA).
High	Attribute has a high quality and rarity on a local scale.	Large rivers, important social or economic uses such as water supply or navigation. Good quality rivers (Q4 to Q5). May be designated as a local wildlife site.
Medium	Attribute has a medium quality and rarity on local scale.	May support a small / limited population of protected species. Limited social or economic uses. Regionally important aquifer. Inner source protection for locally important water source.
Low	Attribute has a low quality and rarity on a local scale.	No nature conservation designations. Low aquatic fauna and flora biodiversity and no protected species. Minimal economic or social uses.

Table 8.2: Magnitude Criteria and Examples

Magnitude	Criteria	Examples
Major Adverse Impact	Fundamental change to water quality or flow regime.	Calculated risk of serious pollution incident >2% annually[33]. Loss of protected area. Pollution of potable sources of water abstraction. Deterioration of water body leading to a failure to meet Good Status[34] under the WFD and reduction *in class (or prevents the successful implementation of mitigation measures for heavily* modified or artificial water bodies).
Moderate Adverse Impact	Measureable change to water quality or flow regime.	Loss in production of fishery. Discharge of a polluting substance to a watercourse but insufficient to change its water quality status (WFD class) in the long term. No reduction in WFD class, but effect may prevent improvement (if not already at Good Ecological Status) or the successful implementation of mitigation measures for heavily modified or artificial water bodies. Calculated risk of serious pollution incident >1% annually[35].
Minor Adverse Impact	Minor change to water quality or flow regime.	Measurable changes in attribute but of limited size and / or proportion, which does not lead to a reduction in WFD status or failure to improve. Where the proposed development provides an opportunity to enhance the water environment but does not result in an improvement in class, status, output or other quality indicator.
Neutral or Negligible Impact	No measureable impacts on water quality or flow.	Calculated risk of serious pollution incident <0.5% annually. No effect on features, or key attributes of features, on the Protected Areas Register. Discharges to watercourse but no significant loss in quality, fishery productivity or biodiversity. No effect on WFD classification or water body target.

[33]NRA guidelines (2009).

[34]Good Status as defined under the Water Framework Directive (2000/60/EC).

[35]NRA guidelines (2009).

12 Impact ratings may have negative, neutral or positive application where:

- Positive impact – A change which improves the quality of the environment;
- Neutral impact – A change which does not affect the quality of the environment; and
- Negative impact – A change which reduces the quality of the environment.

13 Terms relating to the duration of impacts are as described in the in the EPA's *Guidelines on Information to be contained in Environmental Impact Statements* (March 2002) as:

- Temporary Impact - lasting one year or less;
- Shortterm Impact - lasting one to seven years;
- Mediumterm Impact - lasting seven to fifteen years;
- Longterm Impact - lasting fifteen to sixty years; and
- Permanent Impact - lasting over sixty years.

14 A qualitative approach was used in the evaluation, generally following the significance classification in **Table 8.3** and through professional judgement. The significance of a predicted impact is based on a combination of the sensitivity or importance of the attribute and the predicted magnitude of any effect. Effects are identified as beneficial, adverse or negligible, temporary or permanent and their significance as major, moderate, minor or not significant (negligible).

Table 8.3: Impact Assessment of Criteria Matrix

Importance / Sensitivity	**Magnitude**			
	Major Adverse	**Moderate Adverse**	**Minor Adverse**	**Negligible**
High / Very High	Major / profound	Major	Moderate	Negligible
Medium	Major	Moderate	Minor	Negligible
Low	Moderate	Minor	Minor	Negligible
Negligible	Minor	Minor	Negligible	Negligible

15 In order for a potential impact to be realised, three factors must be present. There must be a source or a potential effect; a receptor which can be adversely affected; and a pathway or connection which allows the source to impact the receptor. Only when all three factors are present can an effect be realised.

16 Baseline conditions have been established through a detailed desktop study and consultation with relevant prescribed bodies, including the EPA, Meath County Council and the Inland Fisheries Ireland. (Refer to Chapter 3, **Volume 3B** of the EIS for details on scoping and statutory consultation).

17 The scoping opinion received from An Bord Pleanála (refer to Appendix 1.3, **Volume 3B** of the EIS) identified the following issues as being relevant to this chapter of the EIS:

- Identification and assessment of the potential water quality impacts of excavation and construction activities proximate to or across watercourses along the route corridor, inclusive of the effects of nutrient release from site clearance or vegetation decomposition;
- An assessment of the potential hydrogeological impacts, including potential impacts on wetlands and drinking water sources; and
- Submission of a construction method statement and management plan addressing potential impacts on water quality, including measures to protect water quality when diverting field drains or pumping groundwater which may impact on watercourses some distance away.

8.2.1 Legislative Context

18 The following legislation was considered as part of this impact evaluation:

- Consolidated EIA Directive 2011/92/EU;
- *Environmental Liability Directive* (2004/35/EC);
- *European Communities (Quality of Salmonid Waters) Regulations, 1988* [S.I. No. 293/1988]*;*
- *European Communities (Drinking Water) Regulations 2014* [S.I. No. 122/2014];
- *European Communities (Water Policy) Regulations 2003* [S.I. No. 722/2003]*;*
- *European Communities (Good Agricultural Practice for Protection of Waters) Regulations 2014* [S.I. No. 31 /2014]*;*

- Fisheries *(Consolidation) Act, 1959-2003*;
- The *Local Government (Water Pollution) Acts 1977-2013* provide for the prevention of water pollution in Ireland;
- *Waste Water Discharge (Authorisation) (Amendment) Regulations 2010* [S.I. No. 231/2010]*; and*
- *Water Framework Directive* (2000/60/EC).

8.2.2 Scope of Evaluation

19 This water impact evaluation focuses principally on the construction phase, as it is during this phase of the proposed development that there is the greatest potential for adverse effects to occur to surface water bodies. The evaluation has considered the construction methodology associated with the installation of each tower together with any associated temporary infrastructure, including temporary access routes, stringing activities, guard poles and tree lopping. The evaluation has also considered the construction associated with the existing Woodland Substation.

20 Although the ecological sensitivity of watercourses has been considered in this chapter, **Chapter 6** of this volume of the EIS provides an evaluation of interrelationships with ecological sensitive receptors which includes information on European sites and protected habitats.

21 Determining the appropriate spatial study area is important to ensuring that this water quality impact evaluation is robust and accurately predicts the potential effects on surface water bodies. There is no formal published guidance on this matter and thus the zone within which there is the potential for significant effects has been determined based on the description of the development and the construction methodology outlined in Chapter 7, **Volume 3B** of the EIS and professional judgement.

22 Due to the nature of the hydrological environment, it is necessary to consider the upstream and downstream effects of the proposed development, with particular attention on the main surface water streams in the area.

8.2.3 Design Summary

23 Construction working areas and stringing areas are all relevant design details when determining the risk posed to any nearby water features. Wherever possible, temporary access routes, tower locations and stringing areas have been located away from watercourses, or the working

area orientated to avoid watercourses. Where this is not possible, recommendations have been proposed to prevent pollutants running off into the watercourse.

24 Chapter 7, **Volume 3B** of the EIS details how the proposed development will be constructed and outlines the phasing of construction. The result of this phasing is that multiple towers may be constructed simultaneously close to the same watercourse or within the same river catchment. The construction of the OHL will be undertaken in five general stages, according to the following sequence, on a rolling programme of estimated durations:

- Stage 1 – Preparatory Site Work (1 – 7 days);
- Stage 2 – Tower Foundations (3 – 10 days);
- Stage 3 – Tower Assembly and Erection (3 – 4 days);
- Stage 4 – Conductor / Insulator Installation (7 days); and
- Stage 5 – Reinstatement of Land (1 – 5 days).

25 All site works including temporary access routes, substation and tower foundations, guarding locations, tree looping and stringing will be conducted in an environmentally responsible manner so as to minimise any adverse impacts to watercourses that may occur as a result of works associated with the construction phase. A CEMP will be prepared to ensure adequate protection of the water environment (incorporating all mitigation measures detailed in this chapter).

26 Where possible, existing farm and field access routes will be used to avoid disruption to local land owners as outlined in Chapter 7, **Volume 3B** of this EIS. Where these pass close to watercourses or drainage ditches, mitigation will be required to ensure that the water body is protected from erosion or pollution. The principal concern regarding temporary access routes with respect to water quality are the physical effects that may occur during any stream crossings that are required and the potential for particulates and oils to runoff into watercourses. This evaluation adopts a precautionary approach so, where there is a risk, appropriate mitigation measures are provided.

27 It is not proposed to construct a new substation in the MSA. The existing substation at Woodland will be extended and utilised as part of the proposed development. There is a potential to generate wastewater during the operational phase at Woodland. However it is not proposed to discharge wastewater from Woodland Substation. Foul drainage will be collected and treated offsite during both the operational and construction stages.

8.3 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

28 The main potential impacts on the water environment occur during the construction phase. Details of the potential impacts are included in **Section 8.5**. Overall the construction programme is anticipated to last approximately 3 years. The proposed development entails the construction of individual towers separated by 340m on average. In general the phases of construction can be broken down into the following: site preparation works (including minor civil works such as placing of temporary access routes, removal of fences and erection of temporary fencing) installation of tower foundations and works at the existing Woodland Substation, erection of towers, guard poles, tree looping and stringing of conductors and reinstatement of land.

8.4 EXISTING ENVIRONMENT

29 The regional setting of the proposed development in relation to the surface water environment is shown in Figures 8.1-8.4**, Volume 3D Figures** of the EIS.

30 Baseline conditions have been established through a detailed desk study, field study and consultation with relevant prescribed bodies, including the EPA, Meath County Council and the IFI (Refer to Chapter 3**, Volume 3B** of the EIS for details on scoping and statutory consultation). Where such information has been available, the desk study included the following:

- Review of Ordnance Survey Ireland (OSi 1:50,000 Discovery Mapping Series) maps to identify the locations of surface water bodies;
- Review and collation of EPA (www.epa.ie) and WFD (www.wfdireland.ie) quality data in relation to surface water close to the proposed development;
- Identification of surface waters containing salmonid and / or cyprinid fish species; and
- Identification of sensitive waters.

31 Site visits of the MSA were carried out between March 2009 and July 2009, in April 2011 and between July and September 2013 by TOBIN Consulting Engineers (by suitably qualified scientists/engineers) in order to visually evaluate the water environment in the vicinity of the proposed development in the MSA. The site visits comprised recording of drainage patterns, drainage ditches, recording of hydrological conditions and visual evaluation of watercourses and watercourse crossings.

8.4.1 Hydrology

32 The River Boyne, River Blackwater and River Dee dominate the natural surface water of the MSA. The River Dee flows in an easterly direction from Nobber in County Meath to Ardee in County Louth. The River Dee along with its tributary, the Kilmainham River, forms a large element of the drainage network towards the northern section of the MSA. The River Kilmainham flows through the central section of the proposed development (between Towers 251 and 252) in a west north-west to east south-east direction towards Kilmainham.

33 The River Blackwater flows through the central section of the proposed development (between Towers 310 and 311) in a north-west to south-east direction from Kells, before entering the River Boyne at Navan. The Yellow River joins the Blackwater River approximately 4km north-west of Navan.

34 The River Boyne crosses the southern section of the proposed alignment between Towers 355 and 356. It flows in a south-west to north-east direction between the towns of Trim and Navan.

35 A number of small streams comprising of the Clady River, Bective River, Skane River, Derrypatrick River, Boycetown River and River Tolka are located in the southern section of the MSA.

36 North of Nobber in County Meath the drainage density decreases as the relief and the number of lakes increase. There is a high drainage density throughout the central and southern regions of the MSA.

37 **Table 8.4** lists the hydrometric areas and associated rivers with proposed tower numbers.

Table 8.4 Surface Water Features and Hydrometric Areas along MSA Alignment

Hydrometric Area[36]	River	Tributaries	Towers	% of Route Towers in each hydrometric area
Hydrometric Area 06	River Dee (and tributaries)	Dee Upper	273-286	31
		Kilmainham	274-257 and 240-248	
		Ervey	237-239 and 256-249	
Hydrometric Area 07	River Boyne (and tributaries)	Boycetown/ Derrypatrick	374-397	65
		River Skane	370-372	
		River Boyne	373 and 354-369	
		Clady	333-349	
		Blackwater	303-332	
		Owenroe/ Moynalty tributaries	273-288	
		Yellow River	289-302	
Hydrometric Area 09	River Tolka (and tributaries)	River Tolka (and tributaries)	398-402	4

[36] Based on EPA data www.epa.ie

38 All existing towers (Towers 402 and 410) near Woodland Substation, which will be utilised as part of the proposed development, are located in the River Tolka catchment. Woodland Substation is also located in the Tolka Catchment.

8.4.2 Water Framework Directive Requirements

39 European Communities Directive 2000/60/EC, which established a framework for community action in the field of water policy (commonly known as the WFD), requires ‗good status' for European waters by 2015. This is to be achieved through a system of river basin management planning and extensive monitoring. In 2004, a characterisation and analysis of all River Basin Districts (RBD) in Ireland was undertaken as required by Article 5 of the WFD. In this characterisation study, the impacts of a range of pressures were evaluated including diffuse and point pollution, water abstraction and morphological pressures (e.g. water regulation structures). The purpose of this exercise was to identify water bodies at risk of failing to meet the objectives of the WFD by 2015, 2021 and 2027. Measures to address and alleviate these pressures are to be included in a formal programme of measures to be submitted to the European Commission.

Table 8.5: Selection of WFD classifications for the Major Rivers along the Alignment

EPA River Name EPA River Code	**River RBD Status**	**If not at good status, the reason for not achieving good status**	**RBD Surface Water Catchment Name**	**Good Status by**
Batterstown EA_09_549	Moderate	Overall ecological status	EA_Tolka167_TolkaTRIB_Batterstown	2027
Dunboyne EA_09_1487	Moderate	Overall ecological status	EA_Tolka167_TolkaTRIB_DunboyneStream	2027
Boycetown1 EA_07_909	Moderate	Overall ecological status including macroinvertebrate status	EA_Boyne159 Boycetown_Boycetown1	2015
Skane EA_07_174	Poor	Overall ecological status	EA_Boyne159Skane_SkaneTRIB_Lamberts town	2027
Boyne_Lower EA_07_1894_2	Moderate	Overall ecological status	EA_Boyne159Main_Boyne1_Lower_2	2021
Bective EA_07_335	Poor	Overall ecological status	EA_Boyne159Main_BoyneTRIB_Bective	2027

EPA River Name EPA River Code	**River RBD Status**	**If not at good status, the reason for not achieving good status**	**RBD Surface Water Catchment Name**	**Good Status by**
CladyLwr EA_07_312	Moderate	Overall ecological status including general physico -chemical status	EA_Boyne159Main_BoyneTRIB_Clady1_Lower	2021
Clady Mid EA_07_311	Moderate	Overall ecological status including general physico-chemical status	EA_Boyne159Main_BoyneTRIB_Clady2_Mid	2021
Blackwater EA_07_1536_3	Moderate	Overall ecological status including general physico-chemical status	EA_Boyne159BlackwaterKells_Blackwater1_Lower_3	2021
Yellow River EA_07_886	Poor	Overall ecological status	EA_Boyne159BlackwaterKells_YellowTRIB_Gibstown	2027
Moynalty EA_07_1356	Moderate	Overall ecological status	EA_Boyne159BlackwaterKells_MoynaltyTRIB_Drakestown1_Lower	2021
Moynalty EA_07_1725	Moderate	Overall ecological status	EA_Boyne159BlackwaterKells_MoynaltyTRIB_Drakestown2_Upper	2021
Dee_Upper NB_06_50	Moderate	Overall ecological status including macroinvertebrate status, general physico-chemical status and Diatoms/Phytobenthos status	NB_Dee96_Dee2_Upper	2021
Kilmainhamwood NB_06_610	Good	-	NB_Dee96_DeeTRIB_KilmainhamWoodStream	2015
Ervy Lough Stream NB_06_733	Poor	Overall ecological status including macroinvertebrate status and Hydromorphology status	NB_Dee96_DeeTRIB_ErvyLoughStream	2021

NOTE –**Status:** By Status it is meant the condition of the water in the waterbody. It is defined by its chemical status and its ecological status, whichever is worse. Waters are ranked in one of 5 status classes: High, Good, Moderate, Poor, Bad. However, not all waterbodies have been monitored, and in such cases the status of a similar nearby waterbody has been used (extrapolated) to assign status.

40 In relation to protected areas under the WFD, it indicates the following:

- There are no ‗Registered Protected Areas‗ (RPA) nutrient sensitive rivers along the proposed alignment;
- There are RPA habitat rivers (Boyne and its tributaries) along the proposed alignment;
- There are no RPA nutrient sensitive lakes and estuaries along the proposed alignment; and
- There are no RPA shell fish areas along the proposed alignment.

41 Based on the available information, the majority of the Tolka, Boyne and Dee catchments are ‗at Risk of not achieving Good Status' in relation to Surface Water (1a status).

42 The Tolka, Boyne and Dee catchments are located in predominantly agricultural land. The catchments are comprised primarily of pastureland with substantial areas of arable crops.

43 The causes of the high number of ‗At Risk' Category Rivers on the Tolka, Boyne and Dee catchments are due to the following areas:

- Diffuse Pollution (i.e. Agriculture);
- Point Source Pollution (Wastewater);
- Morphological Pressures;
- Water Abstraction; and
- Tourism and Recreation.

44 Agriculture Wastewater Treatment Plants (WWTP) and septic tanks are thought to contribute over 90% of the total polluting matter to the Boyne catchment.

8.4.3 Surface Water Quality

45 The EPA monitors the quality of Ireland's surface waters and assesses the quality of watercourses in terms of four quality categories; ‗unpolluted', ‗slightly polluted', ‗moderately polluted', and ‗seriously polluted'. These water quality categories and the water quality monitoring programme are described in the EPA publication W*ater Quality in Ireland, 2001-2003* (2005).

46 The water quality assessments are largely based on biological surveys. Biological Quality Ratings or Biotic Indices (Q values) ranging from Q1 to Q5 are defined as part of the biological river quality classification system. The relationship of these indices to the water quality classes defined, are set out in **Table 8.6.**

Table 8.6: Relationship between Biotic Indices and Water Quality Classes

Biotic Index	Quality Status	Quality Class
Q5, 4-5, 4	Unpolluted	Class A
Q3-4	Slightly Polluted	Class B
Q3, 2-3	Moderately Polluted	Class C
Q2, 1-2, 1	Seriously Polluted	Class D

47 A review of monitoring station results suggests that, in general, the majority of the rivers along the alignment are slightly to moderately polluted.

48 Overall, there are 15 No. EPA monitoring stations along the River Boyne with the majority of these stations classifying the surface water in the River Boyne as slightly to moderately polluted. Examples of these stations closest to the alignment are included with water quality results from 1997-2012. Refer to **Appendix 8.1, Volume 3D Appendices** of the EIS**.**

49 The EPA reports 13 No. monitoring stations along the River Blackwater. Similar to the River Boyne, the majority of these stations are classified as slightly polluted, although some are classified as unpolluted. Examples of these stations are included in **Table 8.7** with the water quality results from 1997-2012.

50 The rivers to the north of the MSA, the River Dee and its tributary, the Kilmainham River had a higher proportion of unpolluted stretches of waterways when surveyed by the EPA in 2012, compared to the rivers in the southern part of the MSA.

Table 8.7: Selection of Biotic Indices (1997-2012) for the Major Rivers along the Proposed Alignment

River	Monitoring Location	Biotic Index					
		1997	2000	2003	2006	2009	2012
River Boyne	u/s Knightsbrook River confluence 1400	4	3-4	3-4	4	3-4	-
	Bective Bridge 1500	3	3	3-4	3-4	3-4	-
	u/s Knightsbrook R confl (RHS)	3	3-4	3-4	4-	3-4	3-4
	Bective Bridge	3-4	3-4	3-4	3-4	3-4*	3-
	Broadboyne Bridge	3	3-4	3-4	3-4	3-4	4
Skane	Br. NE of Balgeeth	3	3	3-4	3-4	3*	3-4*
Moynalty	Fyanstown Bridge	4	3	3-4	4	4	3
Yellow River	Br. u/s Blackwater River confluence	3	3	3	3	3	3
River Blackwater	Donaghpatrick Br.	4	3-4	4	4	4	3-4
	100m d/s New Bypass Bridge	-	3-4	3-4	-	3-4	3-4
Boycetown River	Br. N of Martinstown	3-4	3	3*	3-4	3-4*	3
	Scurlockstown Bridge	3-4	3	3*	4	3-4	3-4
Killary Water	Rosehill Bridge	3-4	3-4	3-4	-	-	-
Kilmainham River	Bridge North of Kilfannana	4	4	4	-	-	-
	Br. u/s Whitewood L	3-4	4	4	4	4	3-4

River	Monitoring Location	Biotic Index					
		1997	2000	2003	2006	2009	2012
Dee River	Tom's Bridge	-	3	3-4	3	3-4	3

*Silt at this location

Source EPA www.epa.ie

51 Outlined below is a summary of the recent water quality data from the EPA website (www.epa.ie):

- *"The Blackwater (Kells) River was in a generally unsatisfactory ecological condition at nine of the thirteen stations surveyed in 2012. A slight improvement to moderate ecological conditions was noted at station 0170 (Lear Br) downstream of Baileboro. The macroinvertebrate fauna indicated an unwelcome decline from good to moderate ecological conditions at Donaghpatrick Bridge (1500) downstream of Kells & the Moynalty River confluence. The dominance of pollution tolerant macroinvertebrate taxa continues to indicate unsatisfactory ecological conditions in the Baileboro area (0170) and downstream (0200, 0280, 0420), downstream of Lough Ramor (1000, 1100, 1200) and downstream of Kells (1500) and at Navan (1790)."*

- *"The Boycetown River was in an unsatisfactory ecological condition when surveyed in 2012. The complete lack of sensitive macroinvertebrate fauna indicated unsatisfactory poor ecological conditions at Derrypatrick Bridge (0100) and at Boycetown Bridge (0200). Excessive siltation was noted at both stations. Enriched conditions were also evident at Scurlockstown (0300) where the macroinvertebrate fauna indicated unsatisfactory moderate ecological conditions."*

- *"The majority of the fifteen stations surveyed on the Boyne River remain in an unsatisfactory ecological condition in 2012. The macroinvertebrate fauna indicated satisfactory ecological conditions at six of the stations examined. An unwelcome decline in ecological status was noted at three stations. The macroinvertebrate fauna indicated a decline from good to moderate ecological conditions in the upper reaches at Boyne Bridge (0200) and at Scarriff Bridge (0900) and a decline from high to good ecological conditions at Inchamore Bridge (0800). A welcome improvement from moderate to good ecological conditions was noted downstream of Broadboyne Bridge (2010). Unsatisfactory ecological conditions continue downstream of Edenderry (0300), at Ashfield Bridge downstream of the Glash River confluence (0600), downstream of the Blackwater (Longwood) confluence (0900), at Trim and downstream (1200, 1400), at Bective Bridge downstream of the Knightsbrook and Boycetown confluences (1500), Kilcarn Old Bridge, downstream of the Clady and Skane river confluences (1700) and at Obelisk Bridge, upstream of Drogheda (2200)."*

- *“The dominance of pollution tolerant macroinvertebrate taxa and complete lack of pollution sensitive taxa indicated poor ecological conditions on the Clady (Meath) River in June 2012.”*

- *“The absence of pollution sensitive macroinvertebrate taxa indicated continuing unsatisfactory ecological conditions on the lower reaches (1100) of the Yellow (Blackwater) River in September 2012.”*

- *“The Moynalty River was in an unsatisfactory ecological condition when surveyed in 2012. Good ecological conditions persist in the upper reaches (0070) however some signs of enrichment were evident with enhanced macrophyte and algal growth. The paucity of sensitive macroinvertebrate fauna continues to indicate moderate ecological conditions at Annesbrooke Bridge (0100) and Rosehill Bridge (0200). The complete lack of pollution sensitive macroinvertebrate fauna indicated a decline from moderate to poor ecological conditions at Mullagh Bridge (0300). The complete lack of any sensitive macroinvertebrate species coupled with dominance of pollution tolerant leeches and worms indicated a significant decline to poor ecological conditions at Moynalty Bridge (0600), Carlanstown Bridge (0800) and at Fryanstown Bridge (0900).”*

- *“The macroinvertebrate communities at all three stations surveyed on the River Skane indicated continuing unsatisfactory ecological conditions in June 2012. Poor ecological conditions persist in the upper reaches at Athronan Bridge (0300) while a slight improvement to moderate ecological conditions was noted downstream of Kilmessan (0510) and at Dowdstown Bridge (0600).”*

- *“A disappointing decline in ecological condition from good to moderate was recorded at both sites assessed on the Kilmainham River in September 2012.”*

- *“The macroinvertebrate fauna indicated unsatisfactory conditions at all sites assessed on the River Dee in September 2012, with the exception of Rockfield Bridge (0360) where satisfactory ecological condition was recorded.“* Source: Data taken from online EPA Water Quality data 1997-2013 and EPA website www.epa.ie.

52 A review of monitoring station results suggests that, in general, the majority of the rivers along the existing alignment (Towers 402 to 410) are moderately polluted.

Table 8.8: Selection of Biotic Indices (1996-2013) for the Major Rivers along the Alignment

River	Monitoring Location	Biotic Index						
		1996	1998	2002	2005	2007	2010	2013
Tolka	Br. at Black Bull	3	3	3-4	3-4	-	3	3
	Loughsallagh Br	3	3-4	3-4	3-4	-	3	3
Dunboyne	Rusk Bridge	2	2	2-3	3	3	3	3-4

Source: EPA www.epa.ie

53 The Tolka River rises near Batterstown and flowing for 30km through an extremely built up area of the city before entering Dublin harbour at Fairview Park. The Dunboyne River and the Tolka are moderately polluted / poor ecological status at all locations. Surface water quality is under pressure due to sewer discharges and household detergents.

54 **Water Quality Summary** - Most rivers (with the exception of the Kilmainham River) along the proposed alignment are suffering from water quality problems, principally eutrophication from suspected agriculture sources and WWTP. Calcification and siltation are a problem on the River Boyne and a number of tributaries. The Boyne river remained in a slightly less than satisfactory condition due to widespread eutrophication, the most obvious symptom of which was the abnormally luxuriant growth of filamentous algae which can seriously upset the dissolved oxygen (DO) regime and stimulate the precipitation of calcium carbonate (marl) on the river bed thus obliterating essential niches for a variety of mayfly and stonefly indicator species. Most of the rivers in the Tolka Catchment are moderately to highly polluted.

8.4.3.1 Lakes

55 The proposed alignment is within the catchment of a number of lakes. No lakes are present within 0.5km of the proposed alignment within the MSA. The nearest lake to the alignment is Whitewood Lough. Whitewood Lough is located over 0.6km from Tower 241. The EPA carried out water quality monitoring on Irish lakes between 2007 and 2009, however Whitewood Lough was not monitored as part of the national monitoring programme.

8.4.3.2 **Protected Areas and Fisheries**

56 The River Boyne and Blackwater cSAC (site code 002299) is the only designated site for conservation which may potentially be impacted by the proposed development. A full description of the River Boyne and Blackwater cSAC (site code 002299) is detailed in the Natura Impact Statement (NIS) (refer to **Volume 5** of the application documentation). Consultation was undertaken with the National Parks and Wildlife Service (NPWS) and IFI (designations department) regarding the proposed development. No specific conservation management plan has been published for the site to date. The site is selected for species listed on Annex II of the European– Atlantic Salmon, otter and River Lamprey. In addition, Atlantic Salmon and Trout use the tributaries of the Boyne / Blackwater as spawning grounds. Parts of the river system have been arterially dredged. In 1969 an arterial dredging scheme was carried out. The dredging altered the character of the river completely and resulted in many cases in leaving very high banks. Ongoing maintenance dredging is carried out along stretches of the river system where the gradient is low.

8.4.3.3 **Importance of Surface Water Features**

57 The importance of the relevant surface water bodies within the MSA has been evaluated, applying the criteria presented in the methodology in **Section 8.2** to the baseline information presented throughout this section. The level of importance for each water receptor within the MSA and the justification for their classification is set out in **Table 8.9**.

Table 8.9: Importance of Surface Water Features

Surface Water Feature	**Justification**	**Level of Importance**
River Blackwater and River Boyne,	River Blackwater and River Boyne are designated as a salmonid rivers and cSACs. The River Boyne and Blackwater in stretches it is of Moderate Ecological Status. The River Boyne and Blackwater are 3^{rd} Order Streams and above.	Very High
Kilmainhamwood River NB_06_610[37]	Q4 Rivers. Q4-5 and Q5 Rivers.	High
Moynalty, River Clady River, Boycetown River Bective River, Tributaries of the Tolka River Blackwater, Yellow River and Dee River	2^{nd} Order River and 1^{st} Order River.	Moderate

[37]Numbered as per EPA numbering code for sub-catchments.

Surface Water Feature	Justification	Level of Importance
Streams	1st, 2nd and 3rd order streams	Low
Drainage ditches and field drains	No data is available for these minor watercourses, some of which are ephemeral or have very limited flow. None are designated under the WFD, although they may contribute a small amount of flow to larger watercourses within the study area as identified above. In addition, although these minor watercourses may have some local importance in terms of land drainage and water supply for farm animals, during the site visit many were observed to be dry, heavily poached or eutrophic.	Negligible

8.4.3.4 **Flooding Data**

58 Substantial areas of the River Boyne and Dee catchments have been artificially drained from the 1960's to 1980's to drain agricultural lands and reduce local flood frequency. An estimated 656km of stream channels in the Boyne catchment have been modified to prevent flooding, improve agricultural fields and allow for urban development. During this period, one tributary, and a section of the River Boyne itself, on average, were drained annually, O'Connor (2006). The River Dee and its tributaries have been artificially drained since the 1950's. Areas historically prone to flooding include areas of mapped alluvial sediments however OPW flood relief works have decreased the frequency of flood events.

59 The OPW ‗Flood Hazard Database' was used in order to obtain information on historical flooding events in the MSA. This information was used to establish the current baseline conditions in terms of what sections of the area are liable to flood. Additional sources of information including internet searches, historical maps, data from Catchment Flood Risk Assessment and Management Studies (CFRAMs) and flood risk assessments were also consulted. No incidents of flooding were noted at Woodland Substation. The substation is not located in a flood prone area (Flood Zone C) based on the preliminary flood risk assessment (PFRA) maps.

60 Data on historical flooding are limited but the records indicate that flooding has occurred in the following areas:

- Flooding of the River Boyne Banks at Bective (1km downgradient of line route);
- Flooding at Kilmainhamwood along Kilmainham River (1km to the east of the line route);

- Flooding at Culmullin Cross Roads (0.8km to the north-east of the line route); and
- Flooding along the Derrypatrick to Grange Road (0.7km to the north of the line route).

61 The proposed towers are not located on any major flood plain and will not interfere with either the water levels or flow of the Boyne River and its tributaries or Dee River, therefore, the impact will be negligible.

8.5 POTENTIAL IMPACTS

8.5.1 Do Nothing

62 In the case of no development occurring, there would continue to be changes in water environment as a result of on going land management within the MSA. It is most likely that the area would continue to be managed intensively for agriculture and commercial forestry. Possible changes in management could include further land drainage and land use change, all of which would have a potential impact on water quality of the MSA. However, it is not expected that these changes in land use would be influenced by whether the proposed development proceeds or not.

8.5.2 Construction Phase

63 Further details on the proposed construction methodology which will directly influence potential construction impacts to water environment are discussed in Chapter 7, **Volume 3B** of the EIS. Based on the nature of the proposed development and the baseline water data collected, the following activities warrant specific attention in the water impact evaluation and hence in the design of the proposed scheme:

- Felling of forestry;
- Placing of temporary access tracks;
- Construction of tower foundations and towers;
- Works near watercourses;
- Construction materials;
- Stockpiling material; and
- Stringing of conductors.

64 These activities may impact on the water environment by having the potential to cause:

- Flow Alterations;
- Sediment Discharges; and
- Contaminant Discharges.

65 The installation of guard poles and tree lopping activities will not have a significant impact on the water environment based on methodologies outlined.

8.5.2.1 Flow Alterations

66 During construction there is potential for increased runoff due to the introduction of temporary access routes and soil disturbance, soil compaction and stockpiling of soils. This may increase the rate and volume of direct surface runoff. The potential environmental impact of this is to increase flow rates, leading to increases in channel erosion and sediment loading reaching watercourses. It may be necessary to divert sections of dry drains / drainage ditches or underground services where encountered thereby increasing potential sediment runoff. If excavations for tower bases encounter groundwater, such inflows may need to be pumped, resulting in short term localised drawdown of the water table and discharges to the surface water channels.

67 A review of baseline information on historical flooding and flood risk has been presented in **Section 8.4**. The proposed development oversails a number of major watercourses with floodplains and known areas of historical inundation, however, the towers are located away from these floodplains and it is not predicted to have significant adverse effects on flooding. Tower foundations and temporary access routes are not predicted to significantly affect the capacity of floodplains through which they pass or the hydrological character of these areas.

68 Temporary flooding, either pluvial or fluvial, at the base of the towers will not have a detrimental effect on the operation of the proposed development. Areas prone to flooding include areas of mapped alluvial sediments.

8.5.2.2 Sediment Discharge

69 Suspended solids can potentially impact on surface water quality by clogging the gills of fish, covering spawning sites, leading to loss of habitats on the riverbed and stunt aquatic plant growth by limiting oxygen supplies, shelter and food sources.

70 The proposed substation extension will take place entirely within the existing Electricity Supply Board (ESB) lands. Excavation works will be undertaken to lower the ground level and install foundations. Sediment may be released during the excavation works. Disturbance of sediment may result in siltation of adjacent watercourses.

71 Site preparation works for OHL construction include the use of temporary access routes to the tower positions (refer to Chapter 7, **Volume 3B** of the EIS for further details) and may include minor civil works around the tower location including *inter alia*:

- Clearing the site works area;
- Levelling of the tower foundation area (if required);
- Diversion of field drains where existing drainage is present at the location of a tower foundation;
- Delineation of any on site working area (e.g. erection of temporary fencing etc.);
- Diversion of any existing utilities (e.g. underground water pipes, cables etc.); and
- Erection of guarding positions.

72 Additionally, felling of commercial forestry will be undertaken along the line route. During elements of the construction works, the potential exists for discharge of sediment and nutrients from the works areas (including felling areas) adjacent to watercourses. Tower foundations (per tower leg) typically range from 2m to 3.5m in depth to the invert level of the foundation and anywhere from 2 x 2 metres squared, to 9 x 9 metres squared, in plan area depending on tower type. Details of foundation types are included in Chapter 7, **Volume 3B** of the EIS.

73 There is the potential for the release of sediments into watercourses as a consequence of the following activities:

- Soil stripping for tower foundation work areas and other infrastructures;
- Felling of forestry where necessary;
- Soil excavation for tower foundations;
- Run-off and erosion from soil stockpiles (prior to reinstatement); and
- Dewatering of excavations for tower foundations.

74 Areas of new forestry exist scattered throughout the alignment including several recently planted areas (2012 / 2013) predominantly in former grassland areas. Mature / Immature forestry is located in several areas outlined in **Table 8.10**. Given that there is a requirement for a maximum corridor of 74m in forest plantation areas, the total area of these habitats and impact during the construction phase is detailed in **Table 8.10**.

Table 8.10: Forestry potentially affected by Tree Felling along MSA route

Woodland Type / Evaluation	Location	Area Impacted – Hectares
Mature Deciduous Woodland	Between Towers 262 and 263 Brittas Estate (Towers 267 to 269) Between Towers 272 and 273 Between Towers 291 and 292 Between Towers 321 and 322 Between Towers 336 and 337	<0.1 1.1 <0.1 <0.1 <0.1 <0.1 Total – ~1.73 hectares
Immature Deciduous (plantation woodland)	Brittas Estate (Towers 267 to 269)	1.2 hectares
Mature Coniferous / Mixed plantation Woodland	Between Towers 246 and 247 Between Towers 247 and 248 Between Towers 296 and 299 Between Towers 300 and 301 Between Towers 330 and 332 Between Towers 391 and 392	10 hectares in total

75 It is considered that the vast majority of this material will consist of subsoil and naturally excavated soils and rock. The excavated material from tower excavations and substation is approximately 14,200m^3 and 3,500m^3 respectively.

76 The potential result of increased sediment (suspended solids) loading to watercourses is to degrade water quality of the receiving waters and change the substrate character. Potential impacts relate to the following sensitive locations and where towers are located near rivers:

- River Blackwater (River Boyne and River Blackwater cSAC) – Towers 309, 310 and 311;
- River Boyne (River Boyne and River Blackwater cSAC) – Towers 355 and 366; and
- Q4 Rivers – Kilmainham River - NB_06_610 - Towers 251 and 252.

77 The nearest tower to the River Boyne is located in an agricultural field 60m from the river edge. The tower is located outside the Riparian Zone and the boundary of the cSAC. The nearest tower to the River Blackwater is located in an agricultural field 100m from the river edge and is located outside the Riparian Zone and the boundary of the cSAC. The nearest tower to the Kilmainham River is located in an agricultural field 60m from the river edge and is located outside the Riparian Zone.

78 Chapters 6 and 7, **Volume 3B** of the EIS and **Chapter 13** of this volume of the EIS outline the approach to be taken to the widening of access points. Existing accesses could be temporarily enlarged to accommodate the larger types of construction vehicles. Widening of these crossings may require increasing the length of existing bridges. If temporary structures are required, IFI approval will be sought regarding the specification and timing of installation. Short sections of drainage ditches may need to be temporarily culverted with the potential for sediment discharge. It is not proposed to ford any streams or rivers as part of this development.

8.5.2.3 **Contaminant Discharge**

79 It is not proposed to discharge wastewater from Woodland Substation. The proposed development will utilise the existing substation facilities at Woodland thereby minimising the impact on the existing environment.

80 During the construction of the proposed development, there is a risk of accidental fuel pollution incidences. The potential impact of accidental spillages is limited by the size of machinery used and the limited scale of construction at any location. Potential sources include the following:

- Spillage or leakage of oils and fuels stored on site;
- Spillage or leakage of oils and fuels from construction machinery / vehicles;
- Spillage of oil or fuel from refuelling machinery on site; and
- The use of concrete and cement for the tower foundation.

81 Concrete (specifically, the cement component) is highly alkaline and any direct spillage to a local watercourse could impact on water quality and flora and fauna in the short term. There is potential for runoff from concrete into drains and other watercourses close to the works area which are potentially linked to more ecologically important streams, rivers and lakes.

82 Stringing is a non intrusive operation and the only risk to watercourses is from a spillage of plant oil or fuel. This will be limited by the size of the fuel tank of the largest plant / vehicles used on the site, thus there is a relatively low potential impact from these works.

83 A review of baseline information on historical flooding and flood risk has been presented in **Section 8.4**. The proposed alignment oversails a number of major watercourses with floodplains and known areas of historical inundation, however the towers are located away from these floodplains and it is not predicted to have significant adverse effects on flooding. Tower foundations and temporary access routes are not predicted to significantly affect the capacity of floodplains through which they pass or the hydrological character of these areas.

84 Temporary flooding, either pluvial or fluvial, at the base of the towers will not have a detrimental effect on the operation of the proposed development.

8.5.2.4 Summary Construction Impacts on Key Water Receptors

85 Key water receptors will largely be avoided by the development. Potential impacts during the construction phase of the proposed OHL may arise from surface water runoff from tree felling activities and excavation works. Accidental spillage of material such as fuel oil has the potential to pollute water features. At the most sensitive locations, such accidental spillage could result in a temporary localised moderate adverse potential impact as there is also an associated pollution risk. The temporary potential impact however can be managed with appropriate mitigation measures as outlined in this EIS. **Table 8.11** summarises the impact evaluation of the construction phase (pre-mitigation):

Table 8.11: Summary of Construction Effects

Impact	Receptors	Evaluation of Impact with Mitigation		
		Duration of Effect	Magnitude of Effect	Potential Impact
Potential Impacts (unmitigated)	Woodland Substation	Short term	Negligible	Negligible
	River Boyne and River Blackwater crossing River Kilmainham crossing	Short term	Minor adverse	Localised Minor / Moderate Adverse
	All other tower locations	Short term	Negligible	Negligible
	Forestry Felling	Short term	Minor adverse	Local Minor Adverse

8.5.3 Operational Phase

86 There will be no direct discharges to the water environment during the operational phase. It is not proposed to discharge wastewater from Woodland Substation. Potable water and wastewater facilities will be delivered to the Woodland Substation site, during the construction phase. No other potentially significant impacts are anticipated during the operational phase.

8.5.4 Decommissioning

87 The proposed development will become a permanent part of the transmission infrastructure. The expected lifespan of the development is in the region of 50 to 80 years. This will be achieved by routine maintenance and replacement of hardware as required. There are no plans for the decommissioning of the OHL. In the event that part of, or the entire proposed infrastructure is to be decommissioned, all towers, equipment and material to be decommissioned will be removed off site and the land reinstated. Impacts would be expected to be less than during the construction phase and would be of short term duration.

8.6 MITIGATION MEASURES

88 The design of the proposed development has taken account of the potential impacts of the proposed development and the risks to the surface water environment. Measures have been developed to mitigate the potential effects on the water environment. These measures seek to avoid or minimise potential effects in the main through the implementation of best practice construction methods and adherence to all relevant legislation.

8.6.1 Construction Phase

89 In order to mitigate potential impacts during the construction phase, all works associated with the construction of the proposed development will be undertaken with due regard to the guidance contained within CIRIA Document C650 *Environmental Good Practice on Site*. In addition mitigation measures will be incorporated into the CEMP.

90 All site works including temporary access routes, tower foundations and stringing will be conducted in an environmentally responsible manner so as to minimise any adverse impacts on water that may occur as a result of works associated with the construction phase. A CEMP will be employed to ensure adequate protection of the water environment. All personnel working on the proposed development will be responsible for the environmental control of their work and will perform their duties in accordance with the requirements and procedures of the CEMP. In terms of wastewater generated during the construction phase, wastewater facilities on site will

include self contained chemical toilets. Foul drainage will be collected and treated off site. Potable water will be delivered to the site during the construction period.

91 To minimise any impact on the underlying subsurface strata from material spillages, all oils and fuels used during construction will be stored on temporary proprietary bunded surface (i.e. contained bunded plastic surface). These will be moved to each tower location as construction progresses. Refuelling of construction vehicles and the addition of hydraulic oils or lubricants to vehicles will take place away from surface water gullies or drains. No refuelling will be allowed within 50m of a stream / river. Spill kits and hydrocarbon absorbent packs will be stored in this area and operators will be fully trained in the use of this equipment.

92 Any vehicles utilised during the operational phase will be maintained on a weekly basis and checked daily to ensure any damage or leakages are corrected. The potential impacts are limited by the size of the fuel tank of the largest plant / vehicles used on the site. Precautions will be taken to avoid spillages. These include:

- Use of secondary containment e.g. bunds around oil storage tanks;
- Use of drip trays around mobile plant;
- Supervising all deliveries and refuelling activities;
- Designating and using specific impermeable refuelling areas isolated from surface water drains; and
- Oil water separators will be used at construction compounds.

93 Implementing the design standards of the GDSDS, the surface water drainage system takes into account the recommendations of the GDSDS and utilises SuDs (sustainable urban drainage) devices where appropriate. Runoff from the hardstand areas at Woodland Substation will be limited to greenfield runoff rates. The surface cover at the Woodland Substation will be gravel covered and will not be hardstanding. French drains will be installed around the substation bay.

8.6.2 Felling of Forestry

94 Details of forestry areas are outlined in **Table 8.10**. While the quantity of commercial forestry is limited along the line route to <13 hectares, the clearance of forested areas should take place, in accordance with the *Forestry and Water Quality Guidelines* (Department of the Marine and Natural Resources, 2000). In areas where tree felling is to be undertaken, the use of buffer zones and drainage ditches will be employed during felling, particularly on sloping ground, in

order to mitigate the effects of increased surface runoff and associated sedimentation. Less than five hectares in each sub catchment will require felling.

95 Consultation will be undertaken with IFI and NPWS before commencing felling operations in areas of importance to fisheries and wildlife. Sediment traps will be installed prior to felling and maintained on a daily basis throughout felling operations. Trees will be felled away from the aquatic zone. Machine extraction will not occur in the riparian zone.

96 On sites where risk of erosion is high (steep slopes and /or adjacent to rivers), brash mats will be used to avoid soil damage, erosion and sedimentation. Brash mat renewal will take place when they become heavily used and worn. Provision should be made for brash mats along all off-road routes, to protect the soil from compaction and rutting. Felling will not occur during periods of high rainfall to prevent runoff. No refuelling or machinery maintenance will occur within 50m of an aquatic zone. Timber will be stored on dry areas away from the riparian zones. The forest felling effects of the overhead transmission line will be short term during construction phase.

8.6.3 Works Near Watercourses

97 The line route has been designed in order to locate temporary access routes and tower locations away from sensitive rivers, where possible. In relation to the River Boyne and River Blackwater the towers are located a minimum of 60m and 100m respectively from these rivers. It is not proposed to undertake any in-stream works along the line route. Existing access tracks, where present, will be utilised. No refuelling or machinery maintenance will occur within 50m of an aquatic zone. Excavated material will be stored on dry areas away from the riparian zones.

98 In general, all site works have the potential to pollute watercourses. Sediment and pollution control measures will be undertaken in all work areas but, in particular, where towers are located near rivers. Stockpiles will be located away from the watercourses and drainage ditches. Stockpiles will be graded to a <1:4 profile. Topsoil and subsoils will be stored separately. Stockpiles of mineral soils and peat will be <2m and <1m respectively. Geotechnical supervision in combination with monitoring will ensure that peat is stored in suitable areas. Stockpile top surfaces shall be shaped and profiled to prevent erosion from runoff. Erosion protection mats will to be applied to stockpile surfaces, as required.

Table 8.12: Distance from Towers to Sensitive Stream / Lakes

River Name	Nearest Tower	Distance to River (m)[38]
Derrypatrick River	390 387	38 25
Boycetown River	377	55
Bective River	364	17
Boyne River	355 356	60 (6) 160 (160)
Clady River	347	12
Blackwater River	309 310 311	105 (84) 100 (88) 195 (191)
Moynalty River	297	20
Altmush Stream	261	30
Kilmainham River	251 252	90 60

[38] Distance where relevant to River Boyne and Blackwater cSAC in brackets.

99 Silt barrier / silt curtains will be used where towers or works are undertaken near watercourses. Correct installation of silt fences is vital and will be supervised by the construction manager and on site ecologist. The silt barrier / silt curtain should be shaped and installed so that it will catch runoff, without the water flowing underneath or around the edge. The silt barrier will be located downgradient of the works and inspected on a regular basis as well as during and after rainfall events. For steep slopes, more than one silt curtain will be used. The edges of the silt curtain will be turned upslope to prevent water going around the edges. Grips, sumps, straw bales and sediment traps can be installed to capture silt where applicable. Each of these should be maintained daily by the contractor to ensure that they remain effective and do not increase the likelihood of an incident occurring[39]. Rainfall can have a significant impact on the pollution of watercourses. Certain site activities including concrete pouring near water courses will be postponed during heavy rainfall events (<5mm/hr) to prevent pollution entering watercourses.

100 Where groundwater dewatering is required the resultant water will be filtered before discharge. Dewatering if required will be limited in duration. Groundwater can be filtered using bunds / tanks filled with filter material. Single sized aggregates 5–10mm, geotextiles or straw bales can be used as a filter. Monitoring will be undertaken on the discharge water quality, so as to confirm the nature of the predicted residual impacts.

101 Precautions will be taken to avoid spillages. These include:

- Use of secondary containment e.g. bunds around oil storage tanks;
- Use of drip trays around mobile plant;
- Supervising all deliveries and refuelling activities; and
- Designating and using specific impermeable refuelling areas isolated from surface water drains.

102 With regard to on site storage facilities and activities, any raw materials and fuels, will be stored within bunded areas, if appropriate to guard against potential accidental spills or leakages. All equipment and machinery will have regular checking for leakages and quality of performance.

103 All site personnel will be trained and aware of the appropriate action in the event of an emergency, such as the spillage of potentially polluting substances. Spill kits are retained to ensure that all spillages or leakages are dealt with immediately and staff are trained in their

[39] CIRIA document 650.

proper use. Any servicing of vehicles will be confined to designated and suitably protected areas. In the extremely unlikely event of any pollution incident or spill, the incident will be reported to the appropriate regulator and the receiving watercourse will be remediated to its original condition.

8.6.4 Provision of Temporary Access Routes and Tower Foundations

104 It is not envisaged, that the provision of extensive temporary access tracks will be required for the construction of the proposed development. Low bearing pressure vehicles are primarily used along with using the Derrick pole to erect the metal structure. Over good quality land the use of tracked machinery usually means that access to tower sites can be achieved with relative ease. Maximum use will be made of both existing farm entrances and also farm tracks or roads. Temporary access tracks will comprise of aluminium tracks or rubber matting (refer to Chapter 7, **Volume 3B** of the EIS).

105 At certain locations, where very poor soft ground is encountered, a temporary access track (type 2) may have to be laid. Temporary access tracks will be no greater than 4m wide and routed away from drains where possible. In sensitive locations silt barriers will be used to prevent direct runoff to local watercourses.

106 All temporary access routes will be removed at the end of the construction phase and the land will be restored to its original condition. Further details are provided in Chapter 7, **Volume 3B** of the EIS. The solution to maintaining low suspended solids is preventing silt / clay from entering the surface water at source. Preventative measures will ensure that input suspended solids concentrations will be minimised at source. This will be achieved by ensuring that all silt / clay and topsoil is properly stored during the construction phase of the development and so a major source of fines, due to runoff will have been reduced.

107 Wash down and washout of concrete transporting vehicles will not be permitted at the location of construction. Such wash down and washout activities will take place at an appropriate facility offsite or at the location where concrete was sourced. The washing down area should be contained and washings channelled into a batcher washings treatment facility. For smaller machinery, local wash down areas should be created. These will take the form of a steel skip or tank. All approved washing areas will be documented with training provided for site workers.

108 Water quality monitoring will be undertaken prior to the commencement of construction to confirm baseline data and ensure there is no deterioration in water quality. This will be targeted on watercourses considered to be at a higher risk of pollution (i.e. towers where there are watercourses within 20m of the construction works). Water quality monitoring will include daily inspection of adjacent watercourses. Regular sampling for pH and conductivity will be

undertaken, with sampling for suspended solids and hydrocarbons if any change in the appearance is identified. Daily observations of watercourses close to construction works will be taken and detailed records of observations including photographs will be made. If pollution is suspected, samples will be collected upstream and downstream of this point, and sent to an appropriately accredited laboratory for analysis. All works will halt until the source has been identified, controlled and any remediation undertaken.

8.6.5 Stringing of Conductors

109 In general it is not envisaged that temporary access tracks will be required for the stringing of conductors. Low bearing pressure vehicles are primarily used for the stringing of the line. Mitigation measures will be incorporated for the proper use of fuel on site. In addition, the risk can be effectively controlled by good working practices and conditions and the implementation of an effective pollution prevention plan all as will be outlined in the CEMP.

8.7 RESIDUAL IMPACTS

110 The nature of the proposed development dictates that the greatest potential impact for the water environment will be in the construction phase. With the implementation of the mitigation measures set out in this EIS, a negligible impact on the aquatic environment is predicted for the construction phase of the proposed development. With regard to the operational phase of the development, a negligible impact on the local water environment is predicted.

8.8 INTERRELATIONSHIPS BETWEEN ENVIRONMENTAL FACTORS

111 Water has an important interrelationship with the soils and ecological environment, as a determinant of water chemistry, river flow regimes, water storage capacity and watercourse location. It also has an impact on water quality through the ability of bedrock and surface deposits to filter potential pollutants. Potential ecological impacts could occur through the mishandling of soils or through the deposition of excavated soils in ecologically sensitive areas.

112 An evaluation was undertaken based on the identification of potential sources pathways and receptors along the line route. If all three elements (source, pathway and receptor) are present, there is a linkage and there is a potential impact to the receptor(s). In terms of water, the Boyne and Blackwater cSAC and groundwater dependent terrestrial ecosystems (GWDTE) are crossed by the line route, however no significant predicted impacts are likely to occur as part of this development at the crossing locations or at towers adjacent to the cSAC.

113 These potential impacts and mitigation measures have been identified in **Chapters 6** and **7** of this volume of the EIS. This chapter should be read in conjunction with Chapters 1, 6, , and 7, **Volume 3B** of the EIS.

8.9 CONCLUSIONS

114 The River Boyne, River Blackwater and River Dee dominate the natural surface water of the MSA. The River Dee flows in an easterly direction from Nobber in County Meath to Ardee in County Louth. The River Dee along with its tributary, the Kilmainham River, forms a large element of the drainage network towards the northern section of the MSA. The River Kilmainham flows through the central section of the proposed development. Sensitive receptors include the Boyne / Blackwater cSAC.

115 The construction phase of the proposed development could impact on the water environment through the use of temporary access routes and excavations required for the tower bases.

116 The nature of the transmission line development dictates that the greatest potential impact associated with the development will be in the construction phase. During construction the potential impacts to the underlying water environment from the proposed works could derive from accidental spillages of fuels.

117 The tower locations have been selected to avoid known areas of flood plains and river banks where possible.

118 Negligible impacts are predicted on the water environment as a result of the construction phase of the proposed development.

119 With regard to the operational phase of the development, a negligible impact on the local water environment is predicted.

9 AIR – NOISE AND VIBRATION

9.1 INTRODUCTION

1 This chapter evaluates the noise and vibration impacts arising from the proposed 400 kV overhead line (OHL) and associated development including the extension of Woodland Substation as set out in Chapter 6, **Volume 3B** of the Environmental Impact Statement (EIS). That chapter describes the full nature and extent of the proposed development, including elements of the OHL design and the towers. It provides a factual description, on a section by section basis, of the entire line route, including that portion within the Meath Study Area (MSA). The proposed line route is described in that chapter using townlands and tower numbers as a reference. The principal construction works proposed as part of the proposed development are set out in Chapter 7, **Volume 3B** of the EIS.

2 The information contained within this chapter is concerned with noise and vibration in the MSA as defined in Chapter 5, **Volume 3B** of the EIS. This evaluation deals with ‗audible' noise and vibration.

3 This evaluation considers an area in excess of 100m either side of the proposed alignment. The evaluation focuses on the construction, operation and decommissioning aspects of the proposed development.

4 This evaluation was prepared in accordance with the Environmental Protection Agency's (EPA) *Guidelines on the information to be contained in Environmental Impact Statements (*March 2002) and *Advice Notes on Current Practice in the preparation of EIS* (September 2003).

5 This chapter should be read in conjunction with Chapter 7, **Volume 3B** of the EIS and **Chapter 13** in this volume of the EIS.

9.2 METHODOLOGY

6 This section of the EIS has been prepared in accordance with relevant EU and Irish Legislation and guidance, including the requirements of Annex IV of the Environmental Impact Assessment (EIA) Directive and in accordance with Schedule 6 of the *Planning and Development Regulations 2001* (as amended) and conforms to the relevant requirements as specified therein. The scope of the evaluation is based on a review of legislation, guidance documents, other EISs, feedback from public consultation, consultation with prescribed bodies, consultation with An Bord Pleanála (the Board) and on a consideration of the likelihood for significant impacts arising, having regard to the nature of the receiving environment and the nature and extent of the proposed development.

7 The scoping opinion received from the Board (refer to Appendix 1.3, **Volume 3B Appendices** of the EIS) identified the following issues as being relevant to this chapter of the EIS:

- Description and assessment of the noise environment at construction and operational phases, clearly measurable against the existing ambient noise environment.

8 A number of factors can influence the potential for noise impact from any proposed development such as the duration of the works, noise characteristics and perception. The impact and its effects is a subjective consideration. In order to minimise the impact on sensitive receptors, the potential for noise and vibration impact has been evaluated, and a range of mitigating measures, which will ensure that acceptable noise limits are met, have been provided.

9 Extensive background noise measurements were recorded in 2013 at 17 locations along the proposed line route, during daytime and night time. The locations of the noise monitoring surveys on the line route are shown in Figures 9.1 - 9.4, **Volume 3D Figures** of the EIS. The locations chosen are receptor locations near to the towers and OHLs along the proposed route to represent the quiet rural area. The results from the 2013 background noise survey are presented in **Tables 9.2** and **9.3**. In addition, baseline noise measurements taken in 2013 under the existing 400 kV OHL at Bogganstown, County Meath and at the existing Woodland Substation, being the southern end of the proposed development are provided in **Tables 9.4** and **9.5**.

10 All measurements were recorded in suitably calm conditions using appropriately calibrated Type 1 instrumentation which is in line with current appropriate standards and methodology (i.e. the British Standard BS4142 *Method of Rating Industrial Noise Affecting Mixed Residential and Industrial Areas* (1997)). The sound level meter and the acoustic calibrator were at the time of measurement calibrated to the appropriate standards. No significant drift was noted during the field calibration process.

11 Potential for noise and vibration impact in both the construction and operational phases of the proposed development have been evaluated and specific noise and vibration mitigation measures have been presented (refer to **Section 9.6**).

12 Various standards and guideline documents covering the impact of external noise sources and the introduction of industrial and construction noise have been used in this evaluation. The standards and guidelines appropriate for this appraisal are the World Health Organisation's (WHO) *Guidelines for Community Noise* 1999, BS5228 *Code of Practice for Noise and Vibration Control on Construction and Open Sites* – Part 1: Noise (2009), and BS4142 *Method of Rating Industrial Noise Affecting Mixed Residential and Industrial Areas* (1997).

9.3 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

13 The characteristics of the proposed development as relating to the potential for noise and vibration impacts to sensitive receptors will occur in the construction and operational phases of the proposed development. These potential impacts are considered in detail below (see **Section 9.5**). A description of the proposed development and how it will be constructed is presented in Chapters 6 and 7**, Volume 3B** of the EIS

9.4 EXISTING ENVIRONMENT

14 The proposed development is located in a predominantly rural area. **Tables 9.2** and **9.3** quantify the typical noise levels encountered in the ambient environment. The values in **Tables 9.2** and **9.3** can be used to compare the predicted and measured noise levels presented in this chapter. Ambient noise levels at the properties located close to the majority of the route are characterised by rural environmental noise (i.e. wind in trees, agricultural activities and livestock) and transportation noise on the local supply roads. However, there are sections of the proposed route, near to busier roads, where transportation noise becomes the predominant noise source.

9.4.1 Baseline Noise Survey

15 The measurement locations along the proposed line route represent individual properties or clusters of residential properties along the route. The dB L_{A90} noise levels presented in **Tables 9.2** and **9.3** represent the existing ‗background‘ noise levels within the area. The levels presented in terms of ‗dB L_{A90}‘ are defined as the background noise level at a location according to BS4142 (*Method of Rating Industrial Noise Affecting Mixed Residential and Industrial Areas*, British Standards Institute (1997)). A typical guide to environmental noise levels is presented in **Table 9.1**.

16 The baseline noise evaluation surveys were carried out along the proposed line route and at the existing 400 kV Woodland Substation in order to establish expected noise levels for the operational phase. Baseline noise surveys were also carried out under the existing 400 kV OHL at Bogganstown County Meath. The locations of the noise monitoring surveys on the line route are shown in Figures 9.1-9.4, **Volume 3D Figures** of the EIS.

17 Attended measurements were recorded during daytime and during night time at each noise monitoring location. The measurements taken were deemed to be representative of typical noise levels in the vicinity of the noise monitoring locations. The equipment used during this survey was a Bruel and Kjaer, 2250, Type 1 sound level meter.

Table 9.1: Guidance Note for Noise in relation to Scheduled activities, 2nd Edition, EPA 2006

Typical noise levels in our Environment	
Sound levels in decibels dB	**Description of Activity**
0	Absolute silence
25	Very quiet room
35	Rural night time setting with no wind
55	Day time, busy roadway 0.5km away
70	Busy restaurant
85	Very busy pub, voice has to be raised to be heard
100	Disco or rock concert
120	Uncomfortably loud, conversation impossible
140	Noise causes pain in ears

18 All measurements were carried out in accordance with the International Organization for Standardization's (ISO) ISO 1996: *Acoustics - Description and Measurement of Environmental Noise.* Measurements were made placing the microphone at a height of 1.5m above ground level, were free field and were measured >2m from reflecting surfaces.

19 Before and after surveys the measurement apparatus was checked and calibrated using a calibrator to an accuracy of +/- 0.3dB. Weather conditions during all surveys conducted for the purposes of this evaluation were in line with the conditions described within ISO 1996, *Acoustics Description and Measurements of Environmental Noise* and the Environmental Protection Agency 2003, *Environmental Noise Guidance Document,* as follows:

- An average wind speed of less than 5m / sec; and
- No precipitation was present during survey periods.

20 The measurement results were logged onto survey record sheets immediately following each measurement and also stored in the instrument's internal memory for subsequent analysis. Notes were taken in relation to the primary contributors to audible noise at each monitoring location.

21 The environmental noise parameters measured are defined below:

- L_{Aeq} is the A-weighted equivalent continuous steady sound level during the measurement period and effectively represents an average ambient noise value;
- L_{Amax} is the maximum A-weighted sound level measured during the measurement period;
- L_{Amin} is the minimum A-weighted sound level measured during the measurement period;

- L_{A10} is the A-weighted sound level that is exceeded for 10% of the measurement period and is used to quantify road traffic noise;
- L_{A50} is the A-weighted sound level that is exceeded for 50% of the measurement period and in this evaluation is used to quantify noise from OHLs; and
- L_{A90} is the A-weighted sound level that is exceeded for 90% of the measurement period and is used to quantify background noise level.

22 A-weighting is the process by which noise levels are corrected to account for the non-linearity of human hearing. All noise levels quoted are relative to a sound pressure of 2×10^{-5} Pa.

23 No tangible vibration was observed at any of the noise survey locations evaluated as part of the proposed development.

9.4.2 Noise Survey Results

24 The 2013 baseline noise levels recorded for both daytime and night time at each of the 17 locations are presented in **Tables 9.2** and **9.3,** with noise monitoring locations shown in Figures 9.1-9. 4, **Volume 3D Figures** of the EIS. These are the same locations as were monitored in the 2009 planning application (Reference PL02 VA0006, subsequently withdrawn). The results of the 2009 survey are presented in **Appendix 9.1, Volume 3D Appendices**. The results of noise monitoring at the existing Woodland Substation in 2013 are detailed in **Table 9.4**.

Table 9.2: 2013 Baseline Noise Levels Daytime

Baseline Noise Survey Results Daytime							
Location	**Date**	**Duration**	L_{Aeq}	L_{Amax}	L_{Amin}	L_{A10}	L_{A90}
N1	12/08/2013 12:31	15:00	47.0	68.3	35.6	48.6	38.8
N2	10/09/2013 12:28	15:00	46.6	72.2	33.0	43.9	35.3
N3	12/08/2013 13:00	15:00	60.1	85.2	39.1	57.1	42.9
N4	10/09/2013 12:54	15:00	57.1	78.8	33.9	53.4	37.0
N5	12/08/2013 13:28	15:00	67.5	84.1	34.6	70.5	37.4
N6	10/09/2013 13:15	15:00	47.4	71.8	30.4	47.7	38.0
N7	12/08/2013 14:07	15:00	41.7	73.8	30.0	43.5	32.2
N8	10/09/2013 13:43	15:00	68.0	86.4	33.6	67.8	37.0
N9	12/08/2013 14:34	15:00	63.1	83.7	42.3	60.2	45.8
N10	10/09/2013 14:08	15:00	67.2	86.7	40.8	67.2	46.3
N11	12/08/2013 15:01	15:00	76.7	88.8	45.8	80.9	55.5
N12	10/09/2013 14:34	15:00	62.9	85.6	38.5	60.9	42.1
N13	12/08/2013 15:34	15:00	76.0	91.8	39.1	80.8	45.9

Baseline Noise Survey Results Daytime							
Location	Date	Duration	L_{Aeq}	L_{Amax}	L_{Amin}	L_{A10}	L_{A90}
N14	10/09/2013 15:06	15:00	40.8	57.4	31.1	44.1	33.8
N15	12/08/2013 16:05	15:00	59.3	81.7	39.4	54.6	42.3
N16	10/09/2013 15:31	15:00	65.5	88.6	32.2	63.0	35.5
N17	12/08/2013 16:33	15:00	68.8	92.6	35.0	65.1	38.8

Table 9.3: 2013 Baseline Noise Levels Night Time

Baseline Noise Survey Results Night time							
Location	Date	Duration	L_{Aeq}	L_{Amax}	L_{Amin}	L_{A10}	L_{A90}
N1	20/08/2013 22:27	10:00	46.8	61.6	40.3	49.8	42.6
N2	10/09/2013 22:06	10:00	56.3	80.5	21.5	42.3	24.8
N3	20/08/2013 22:56	10:00	47.9	69.0	38.0	48.4	40.5
N4	10/09/2013 23:31	10:00	52.3	75.1	20.7	40.9	23.8
N5	20/08/2013 23:17	10:00	43.9	50.4	37.4	46.4	40.7
N6	10/09/2013 23:52	10:00	49.4	72.7	20.0	48.7	23.2
N7	20/08/2013 23:38	10:00	40.3	48.9	33.4	43.0	35.7
N8	11/09/2013 00:21	10:00	55.6	81.7	18.2	39.6	21.3
N9	20/08/2013 23:59	10:00	39.9	49.0	33.5	42.6	35.9
N10	11/09/2013 00:47	10:00	36.5	53.3	21.5	40.1	25.0
N11	21/08/2013 00:35	10:00	42.9	57.0	31.5	47.2	34.6
N12	11/09/2013 01:16	10:00	29.1	50.8	26.7	29.4	27.7
N13	21/08/2013 00:59	10:00	43.7	59.8	33.2	45.2	35.1
N14	11/09/2013 01:47	10:00	42.8	63.9	20.8	38.1	25.6
N15	21/08/2013 01:35	10:00	50.2	60.7	39.1	54.0	41.8
N16	11/09/2013 02:10	10:00	35.1	56.1	26.9	37.9	30.3
N17	21/08/2013 01:57	10:00	47.8	57.3	44.7	49.2	46.1

25 **Noise Monitoring Location N1:** This location is situated on the townland boundaries of Moorlagh and Boherlea. The main noise sources at this location were birdsong and foliage noise. Infrequent passing traffic and distant traffic noise was occasionally audible.

26 **Noise Monitoring Location N2:** N2 is in the townland of Aghamore, north-east of Kilmainhamwood. Farm machinery at work in adjacent fields during the daytime, passing local traffic and foliage noise were the main noise sources at this location. Passing local traffic and foliage noise were the main noise sources at night.

27 **Noise Monitoring Location N3:** N3 is located close to the townland boundaries of Altmush and Boynagh. Passing road traffic and cattle in the adjacent field were audible at this location. Distant agricultural machinery at work was also audible in the daytime.

28 **Noise Monitoring Location N4:** N4 is located in the townland of Rahood, at the cross roads. Passing local traffic, agricultural traffic in the daytime and cattle in the field were the main noise sources at this location. At night local traffic and cattle in the field were the main noise sources.

29 **Noise Monitoring Location N5**: This location is in the townland of Clooney, near Raffin Cross on the N52. Road traffic noise on the N52 was dominant at location N5. Foliage noise was audible in traffic lulls.

30 **Noise Monitoring Location N6:** Monitoring location N6 is situated in the townland of Drakerath. A tractor at work at this location in the daytime, in association with road traffic were the main noise sources at N6. Aircraft passing overhead were also audible. Distant road traffic was the main noise source at night.

31 **Noise Monitoring Location N7:** Noise monitoring location N7 is located in the townland of Cluain na Ghaill (Clongill). Distant agricultural machinery was audible at this location in the daytime as were cattle in the adjacent field. At night distant road traffic and cattle in the fields were the dominant noise sources.

32 **Noise Monitoring Location N8**: N8 is located at Gibstown Cross / Crasulthan Cross on the R163 in the townland of Baile Órthaí (Oristown). Passing road traffic, birdsong and foliage noise were the main noise sources at this location. A barking dog was also audible during the night time survey.

33 **Noise Monitoring Location N9:** N9 is located on the Castlemartin Road, in the townland of Castlemartin, approximately 200m from the N3 road. N3 road traffic and local passing road traffic dominated the noise at this location.

34 **Noise Monitoring Location N10**: N10 is located west of Ardbraccan Village on the Bohermeen Road in the townland of Neillstown. Passing traffic, aircraft over head and a lawnmower in use in the distance were the main noise sources at this location. The lawn mower was not present at night.

35 **Noise Monitoring Location N11:** Halltown crossroads on the N51 road is the site of location N11 on the boundary of the townlands of Halltown and Irishtown. Road traffic on the N51 and local passing traffic were the dominant noise sources at this location.

36 **Noise Monitoring Location N12**: N12 is located on Oak Drive outside the village of Dunderry in Philpotstown townland. Passing road traffic and agricultural machinery at work during the daytime in the distance were the main noise sources at this location. Passing road traffic was dominant at night.

37 **Noise Monitoring Location N13:** On the R161 Road near Bective, in the townland of Rathnally is the location of N13. Traffic on the R161, local passing traffic, including agricultural traffic during the daytime, were the dominant noise sources at this location. Traffic on the R161 and local passing traffic were dominant at night. A barking dog was also audible throughout the surveys.

38 **Noise Monitoring Location N14:** N14 is located in Marshallstown off the R154. This is close to the intersection of the townlands of Creroge, Finlaghtown Little and Ardbraccan. Infrequent passing traffic and distant traffic noise were the main noise sources at this location. A shot gun in use in the distance was audible during daytime.

39 **Noise Monitoring Location N15**: N15 is located in the townland of Martinstown on a local road. Passing local traffic and distant road traffic noise were the main noise sources at N15, foliage noise was audible in traffic lulls.

40 **Noise Monitoring Location N16**: N16 is located in the townland of Derrypatrick on a local road. Passing local traffic, foliage noise and birdsong were the main noise sources audible at N16.

41 **Noise Monitoring Location N17**: N17 is located between Woodtown and Curraghtown on the R125 road. Passing local traffic including agricultural traffic were the main noise sources at this location. Distant road traffic noise was audible at night.

42 There is some minor variation in background noise levels compared to 2009 levels (shown in **Appendix 9.1, Volume 3D Appendices** of the EIS) as these were recorded in June 2009 and more recent noise levels were recorded in August and September 2013. The background noise levels recorded most recently in 2013 are considered to be similar to but marginally lower than those measured previously. However, these recent measurements show no significant changes in the dominant noise sources in the existing noise environment. Background noise levels are influenced mainly by constant traffic flows, agricultural activity, and weather conditions.

9.4.2.1 Woodland Substation

43 In addition to the 17 No. noise surveys, a baseline evaluation was carried out in November 2013 at Woodland Substation, County Meath. Baseline noise monitoring was also taken under the existing 400 kV line, at Bogganstown County Meath, close to where it enters the substation site. The results of this survey are presented in **Tables 9.4** and **9.5.**

Table 9.4: Baseline Monitoring at Woodland Substation

Locations	Date	Time	Duration	L_{Aeq}	L_{AMin}	L_{AMax}	L_{A10}	L_{A90}
Woodland Substation	07/11/2013	14:18	15:00	43.1	35.1	104.5	44.6	38.3

Table 9.5: Baseline Monitoring directly under Existing 400 kV Line at Bogganstown near Woodland Substation

Locations	Date	Time	Duration	L_{Aeq}	L_{AMin}	L_{AMax}	L_{A10}	L_{A50}	L_{A90}
Under 400kV Line at Bogganstown	07/11/2013	14:51	5:00	47.6	38.1	99.4	50.6	44.3	39.8
Under 400 kV Line at Bogganstown	07/11/2013	14:56	5:00	45.0	37.9	96.1	47.1	43.6	40.6
Under 400 kV Line at Bogganstown	07/11/2013	15:01	5:00	42.9	36.4	89.5	45.7	41.2	38.5
Average				45.1	37.5	95.0	47.8	43.0	39.6

44 As can be seen from the levels recorded at Woodland Substation in **Table 9.4**, there is no significant noise emission from the existing substation. The substation was not the dominant noise source in the area during the surveys. During the survey, the dominant noise sources were local traffic and foliage noise, while a faint broadband hum from the substation was also audible. There was no precipitation during the readings, and there was a light breeze of less than 5m/s. The noise levels shown in **Table 9.4** include all of these sources in addition to all of the existing power lines entering the substation, including the existing 400 kV line, multiple other power lines, transformers, line bays, bus bars and switch gear contained in the substation site. As such the modifications required to the substation to accommodate the connection of the proposed transmission line is not expected to have any significant noise impact to the local noise climate.

45 The noise levels shown in **Table 9.5** include all ambient noise sources in addition to the existing 400 kV line. These readings were taken directly under the existing 400 kV line. These include foliage noise, distant road traffic noise, birdsong and occasional passing traffic. There was no precipitation during the readings, and there was a light breeze of less than 5m/s.

46 With regard to tonality a 1/3 Octave frequency band analysis was carried out on the survey recorded at Woodland Substation. The results of this analysis are presented in **Figure 9.1**.

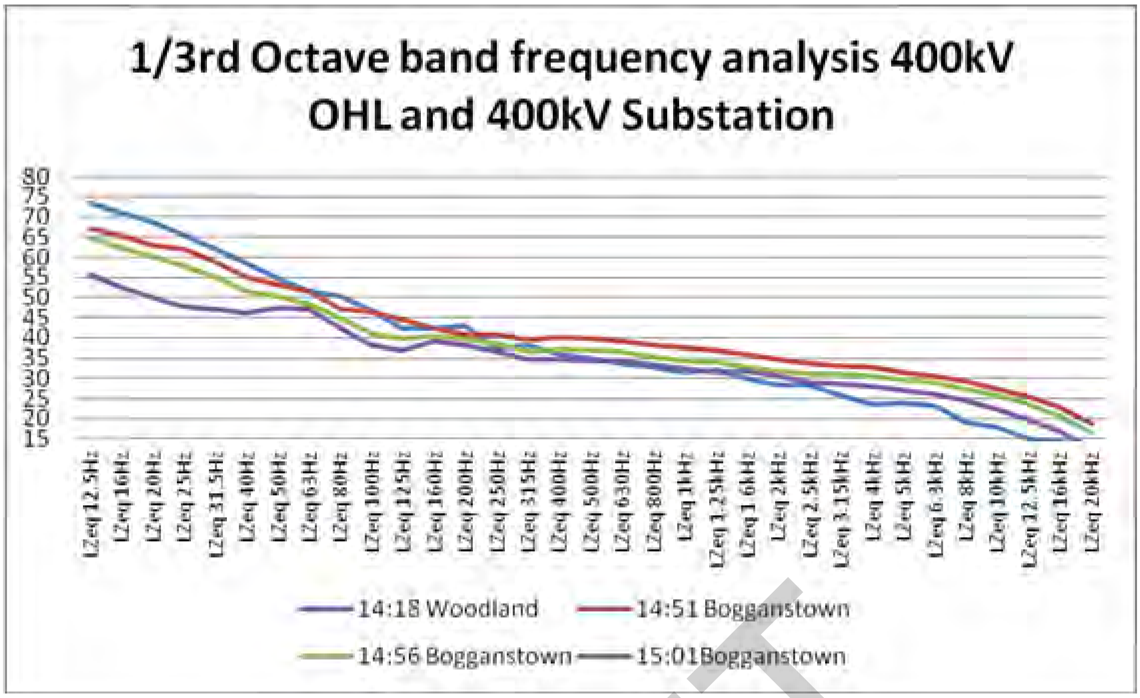


Figure 9.1: Frequency Analysis at Existing 400 kV OHL and at Woodland Substation

47 As can be seen from the frequency analysis, there was no tonal component to any of the noise sources recorded at Bogganstown or at Woodland Substation.

9.5 POTENTIAL IMPACTS

48 During the preparation of this EIS, an extensive evaluation of the likely significant effects of all aspects of the proposed development has been undertaken.

49 The noise and vibration characteristics of the proposed development will be divided between the construction and the operational phases of the development. The majority of impacts will occur during the construction phase of the development.

50 The construction phase will involve excavation, piling (if required) and general construction activities and is discussed further below. The construction details for the proposed development are set out in Chapter 7, **Volume 3B** of the EIS. The operational phase will not have any vibration impacts and will only have the potential for minimal noise impact, as described later in this chapter.

9.5.1 Do Nothing

51 In the ‗Do Nothing‘ Scenario the proposed development will not proceed. In this scenario the baseline noise and vibration climate, save for the potential for general development outside of the scope of this proposed development will remain unchanged.

9.5.2 Construction Phase

52 The construction phase of the proposed development has the potential to temporarily increase noise levels at noise sensitive locations surrounding the proposed alignment i.e. at the construction phase of the towers and during the extension of the existing 400 kV substation at Woodland. The nearest noise sensitive receptors are located at least 50m from proposed tower locations.

53 Noise sensitive locations as referred to in this evaluation are comprised of houses, schools, hospitals, places of worship, heritage buildings, special habitats, amenity areas in common use and designated quiet areas. There are none of these sensitive receptors located within 50m of a proposed tower location.

54 Impact from the construction phase will depend on the number and types of equipment used during the construction of the proposed development. Construction noise sources will result in a temporary impact on the noise climate in the area. The temporary and transient nature of the construction phase on this type of development should not give rise to excessive construction noise levels. The list of machinery as detailed in **Table 9.6** will form the plant which will be in operation during the construction phase.

Table 9.6: Construction Phase Plant Noise Levels

CONSTRUCTION PHASE			
BS5228 Calculations	**Estimated Construction noise levels at varying distances $L_{Aeq\ 1\ hour}$**		
Machinery	**50m**	**75m**	**100m**
Wheeled loader	65	60	57
Winch	56	51	48
Line tensioner	56	51	48
Road lorry pulling up	49	44	41
Tracked excavator	65	60	57
Vibratory hammer	61	56	53
Tracked crane moving	66	61	58
Support crane moving	57	52	49
Lorry unloading	63	58	55
Diesel generator	54	49	46
Continuous flight auger	56	51	48
Combined Level LAeq 1hour	**71dB**	**67dB**	**64dB**

55 Predicted noise levels have been estimated using the methodology described in *BS: 5228: Noise and control on construction and open sites*, (1997). Predictions are based on typical equipment used during various construction phases of the proposed development. Predictions are based on a $L_{Aeq1hour}$ value with all machinery listed in **Table 9.6** operating for a continuous period of 1 hour.

56 This may be considered a worst case scenario as this machinery will not operate simultaneously. Additionally, calculations are based on minimum distances between site activities and the nearest noise sensitive locations, with no allowance for screening of hedgerows, trees or buildings in between.

57 In Ireland, there are no statutory guidelines relating to noise limits for construction activities. These are generally controlled by local authorities and commonly refer to limiting working hours to prevent a noise nuisance. The National Roads Authority (NRA) *Guidelines for the Treatment of Noise and Vibration in National Road Schemes* (2004) outlines recommended noise levels for construction noise during the construction of national road schemes.

58 Although these NRA's guidelines refer to road projects, they have been developed in line with typical construction noise limits on construction projects used previously in Ireland. The limits outlined represent a reasonable compromise between the practical limitations during a construction project and the need to ensure an acceptable ambient noise level for local residents. As a result, these limits have become the most acceptable standard for construction noise limits for EIS assessments in Ireland to date. The NRA does note however, that where pre-existing noise levels are particularly low, more stringent levels may be more appropriate. **Table 9.7** details these recommended limits.

59 The predicted values are a worst case evaluation and as such the impact is likely to be moderate, with regard to the nearest noise sensitive locations. The evaluation is considered worst case as the temporary nature of the construction period and the variety of machinery used should ensure that no construction activity is operational for long periods. Similarly, all the plant listed in **Table 9.6**, will not be in use at the same stage of construction, as it is a phased process. Hence, the noise impact to be expected at the nearest noise sensitive receptor would be significantly less than the worst case scenario described in **Table 9.6**. The construction phase will therefore result in a moderate temporary, transient noise impact.

60 There is a possibility that a small amount of localised rock breaking may be required if rock is encountered close to the surface during tower construction. In the unlikely event, that the need for rock breaking arises the process will be carried out so as to achieve adherence to the guideline noise limits as presented in **Table 9.7**. If required, temporary noise barriers as outlined in **Section 9.6.2** will be used to achieve these guideline noise level values.

Table 9.7: Typical Maximum Permissible Noise Levels at the Façade of Dwellings during Construction Activities

Day & Times	$L_{Aeq\ (1hr)}$ dB	L_{Amax} dB
Monday – Friday (07:00 to 19:00 hrs)	70	80
Monday – Friday (19:00 to 22:00 hrs)	60[1]	65[1]
Saturday (08:00 to 16:30 hrs)	65	75
Sundays and Bank Holidays (08:00 to 16:30 hrs)	60[1]	65[1]

[1] Construction activities at these times, other than that required in respect of emergency works, will normally require the explicit permission of the relevant local authority.

Source: NRA *Guidelines for the Treatment of Noise and Vibration in National Road Schemes* 2004.

9.5.2.1 Construction Phase Traffic Noise Impact

61 The likely Heavy Goods Vehicles (HGV) noise impact due to the expected traffic flows has been calculated using the Haul Road Method detailed in BS5228 *Noise and Control on Construction and Open Sites*, (1997). Considering a standard tower construction site, as detailed in Chapter 7, **Volume 3B** of the EIS, a maximum frequency of 9 vehicle trips per hour (Q) and a minimum distance of at least 5m (v) from the haul road to any nearby property, and a speed of 30km/h (V) the calculated noise impact is as follows:

$$\text{Level} = \text{Average SWL} - 33 + 10 \log Q - 10 \log V - 10 \log d$$

$$+ 98 - 33 + 10 \log 9 - 10 \log 30 - 10 \log 5$$

$$= 52.8\text{dB } L_{Aeq,\ 1h}$$

62 This is not predicted to cause any significant noise impact to the nearest sensitive receptor at a distance of 5m.

63 Considering an angle mast tower construction site, as detailed in Chapter 7, **Volume 3B** of the EIS, a maximum frequency of 12 vehicle trips per hour (Q) and a minimum distance of at least 5m (v) from the haul road to any nearby property, and a speed of 30km/h (V) the calculated noise impact is as follows:

$$\text{Level} = \text{Average SWL} - 33 + 10 \log Q - 10 \log V - 10 \log d$$

$$+ 98 - 33 + 10 \log 12 - 10 \log 30 - 10 \log 5$$

$$= 54.0\text{dB } L_{Aeq,\ 1h}$$

64 This is not predicted to cause any significant noise impact to the nearest sensitive receptor at a distance of 5m. A distance of 5m has been assumed in these calculations and is presented as a practical assumption for distance from receptor to haul road.

9.5.2.2 Supply Vehicle Movements

65 An increase of 3 dB (A) on existing traffic noise is required before it may be noticed by the public (example ref: UK Department for Transport *Guidance on the Methodology for Multi-Modal Studies* (DETR 2000), paragraph 4.3.5). With reference to the UK Department of Transport Welsh Office *Calculation of Road Traffic Noise* (CRTN 1988) and if all other factors remain equal, this would represent an increase in traffic flow of 100%.

66 The UK Highways Agency *Design Manual for Roads and Bridges* document (DMRB 2008) suggests that a 1dB increase in traffic might be perceptible although it acknowledges that other factors in visual perception and magnitude of traffic levels before increases are relevant. Again with reference to CRTN, a 1dB increase in noise level is approximately equivalent to a traffic number increase of 25%. It is unlikely that the introduction of a small number of additional vehicles on the local supply roads will be sufficient to present a 25% increase in traffic flows. As such this element of the proposed development is not expected to cause significant noise impact. In instances of tree felling for example where supply traffic would use local roads, this would be very short term and transient and would not be expected to cause any significant noise impact. Any such activity will be carried out in adherence to the requirements of the *Construction Environment Management Plan* (CEMP) (an outline of which is available in Appendix 7.1**, Volume 3B Appendices** of the EIS).

9.5.2.3 Construction Phase Vibration Impacts

67 There is potential for ground vibration due to the construction phase works, this will mainly be derived from excavation and from piling works (in the unlikely event that this is required). Vibration may be defined as regularly repeated movement of a physical object about a fixed point. The magnitude of vibration is expressed in terms of Peak Particle Velocity (PPV) expressed in millimetres per second (mm/s).

68 Common practice in Ireland has been to use guidance from internationally recognised standards. Vibration standards come in two varieties, those dealing with human comfort and those dealing with cosmetic or structural damage to buildings. In both instances, the magnitude of vibration is expressed in terms of PPV in mm/s.

69 In order to ensure that there is no potential for vibration damage during construction, the NRA recommends that vibration from road construction activities be limited to the values set out in **Table 9.8**. These values have been derived through consideration of the various international standards, compliance with this guidance should ensure that there is little to no risk of even cosmetic damage to buildings.

70 These limits will be adhered to at all times during the construction phase of the proposed development. There is no vibration impact predicted for the operational phase of the proposed development.

Table 9.8: Allowable Vibration during Road Construction in Order to Minimise the Risk of Building Damage

Allowable vibration velocity (Peak Particle Velocity) at the closest part of any sensitive property to the source of vibration, at a frequency of:		
Less than 10Hz	10 to 50Hz	50 to 100Hz and above
8mm/s	12.5mm/s	20mm/s

9.5.3 Operational Phase

71 There will be no significant operational phase vibration impacts associated with the proposed development. There will be occasional requirement in the operational phase for tree cutting / lopping to protect the OHL. This will be carried out during day time hours only. This will be localised, short term and temporary and is unlikely to cause any significant noise impact. Following construction the transmission line will be subject to an annual survey by helicopter patrol. Helicopter inspections will be announced in advance in local newspaper and the Famers Journal. This is not expected to cause any significant noise impact due to the short term and transient nature of the annual survey.

72 Operational phase noise from the proposed transmission line is characterised by the following types of noise:

- Corona Discharge Noise;
- Continuous Operational Noise;
- Aeolian Noise; and
- Gap Sparking.

73 These aspects are each evaluated in detail in the sections below.

9.5.3.1 Corona Discharge Noise

74 Corona noise is the predominant noise audible from OHLs and can occur on transmission lines carrying higher voltages. Most modern transmission lines and substations are designed to reduce the magnitude of the electric field surrounding the line conductors below the air breakdown value. Corona discharge typically occurs where a sharp point or edge is present, either on the conductor or the tower coupling. Occasionally a small sharp point can be found on a line or on nearby hardware that will result in a corona discharge.

75 Such discharges are often more active during the increased humidity conditions provided by fog or light rain. Water drops impinging or collecting on the conductors produce a large number of corona discharges, each of them creating a burst of noise. In dry conditions, the conductors usually operate below the corona inception level, and much less corona sources are present.

76 Corona noise comprises two sound components; one is irregular (random noise) sound and the other is the pure sound (corona hum noise) of buzzing. The random sound has a wide frequency band because the impulsive sounds caused by corona discharge overlap randomly.

77 The corona hum noise results from the excitation of ion groups, which are generated from corona discharge, caused by the electric field surrounding the conductors. The predominant frequency of the corona hum noise is double the commercial frequency (100Hz is the frequency of the corona hum noise in this instance).

78 The level of operational noise from OHLs will vary depending upon the environmental conditions, the locality and a number of other factors including the distance to ground and voltage. The noise derived from this discharge is typically a short burst of random ‗crackling'.

79 However, **Figures 9.2** and **9.3** depict the noise in wet conditions at distances from 0m to 100m from the line. It may be the case, that under certain circumstances, the background level may be exceeded by more than +10 dB. However, due to the unpredictability of corona noise derived from OHLs and very short limited duration of such discharges (typically peak levels of a duration of less than 1 second) the overall impact when considered over an hour (reference BS4142 daytime reference time period) can be deemed minimal.

80 The Electric Power Research Institute's (EPRI) *AC Transmission Line Reference Book – 200 kV and Above* (Third Edition, 2005) provides a method for predicting the noise level at varying distances from the line under varying climatic conditions. The document provides the noise level during rainfall in terms of dB L_{A50} which represents the A-weighted sound pressure level (in decibels, dB) obtained using ‗Fast' time-weighting that is exceeded for 50% of the given time interval.

81 A noise prediction calculation has been carried out with reference to the proposed line for inclusion within this evaluation. The results of this calculation are presented in **Figures 9.2** and **9.3** which illustrate the noise level at varying distances from the line. The noise levels presented have been calculated using the Bonneville Power Administration Method (BPA) and represent the noise level during normal rainfall.

82 **Figures 9.2 and 9.3** and **Table 9.9** shows the predicted L_{A50} dBA level (A-weighted sound level that is exceeded for 50% of the measurement period) and L_{A10} dBA level (A-weighted sound level that is exceeded for 10% of the measurement period). These levels are predicted using the EPRI calculation methodology. The noise indicators represent the predicted corona noise levels as a function of lateral distance from the centre of the proposed line route during wet conditions.

83 Corona is rarely a problem at distances beyond 50m from the transmission line. The level of audible corona at any time is dependent on the prevailing weather conditions. The dielectric strength of air is lower in wet weather than in dry weather. Thus the voltage stress at a conductor surface does not have to reach such high levels in wet weather for corona noise to become audible.

84 Corona noise attains higher levels and may become audible in wet weather, when large numbers of corona sources form as water droplets on the conductors. However, on such occasions the background noise level of rainfall and wind tend to mask the noise from the line. People tend to find noise from a high voltage line to be more noticeable during periods of light rain, snow, or fog, when they are more likely to be outdoors or to have windows open, and when the background noise is generally lower. In fair weather, corona sources are sufficiently few in number that this noise is unlikely to cause complaint due to the very short term nature of the source (less than 1 second).

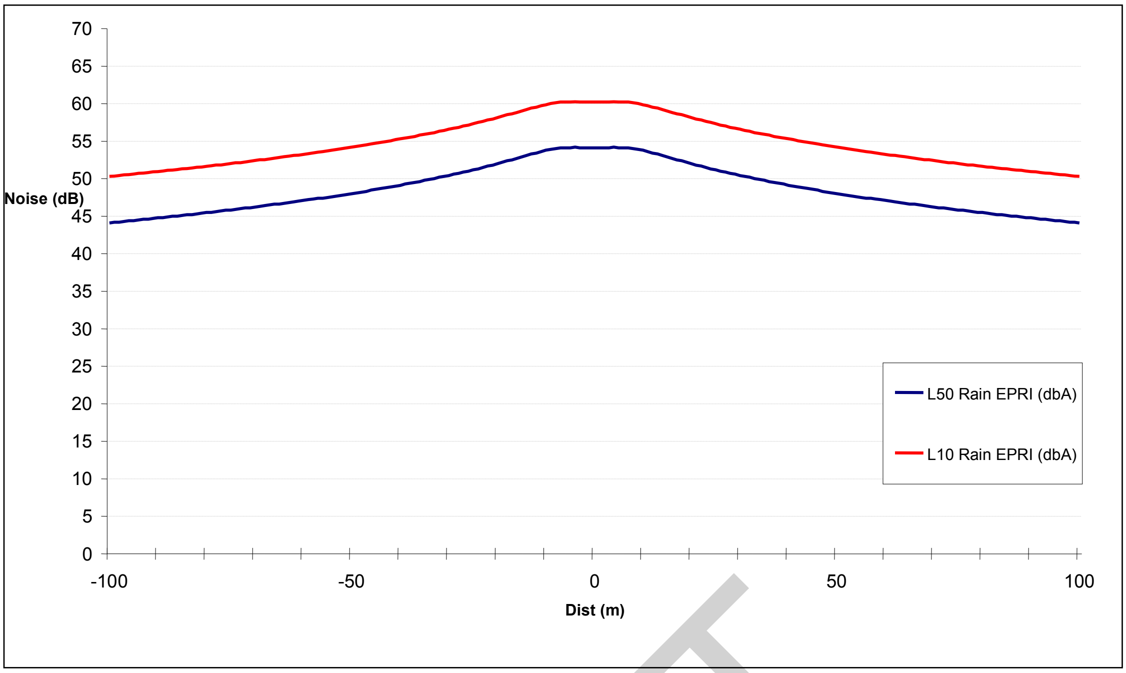


Figure 9.2: 400 kV Double Circuit Line Noise Levels in Wet Conditions

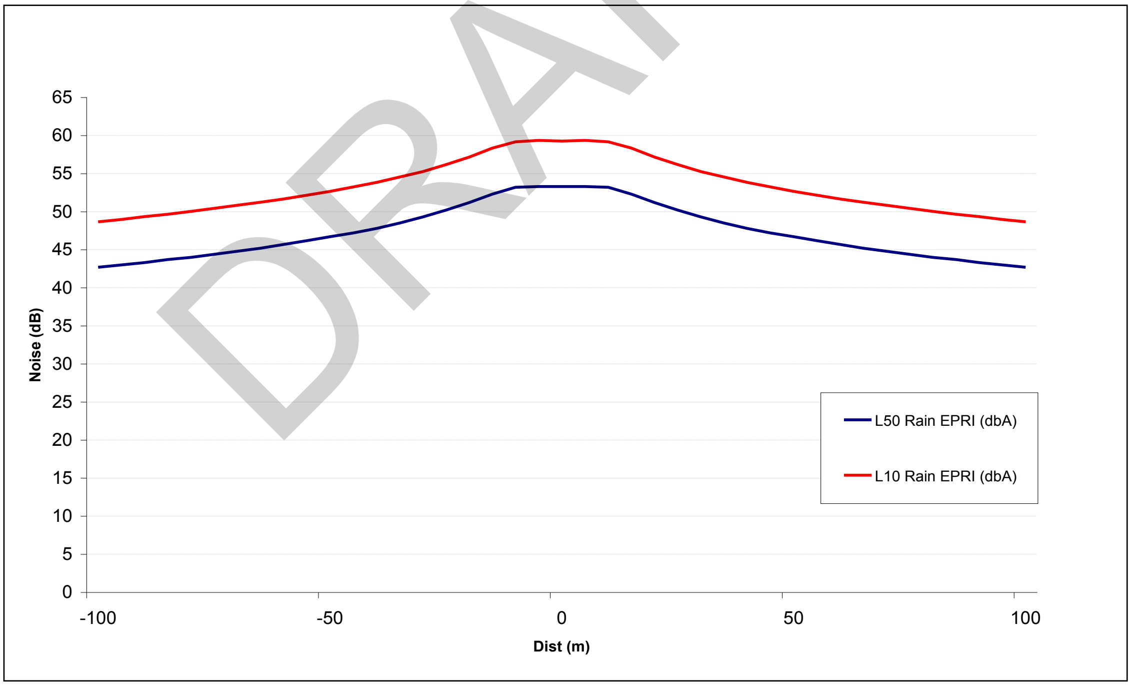


Figure 9.3: 400 kV Single Circuit Line Noise Levels in Wet Conditions

85 A useful guideline referring specifically to power lines is the New York Public Service Commission (NYPSC) following a public enquiry in 1978. This specified an L_{50} rain level limit of 52dB (A) at the edge of a right of way. This L_{50} noise level was based on an indoor maximum permitted noise level of 35dB (A). This was in the bedroom of a house at the edge of a right of

way. It was assumed that the noise attenuation of a partly closed window was 17dB (A). An examination of the background noise measurements and the predicted corona noise levels are unlikely to cause annoyance. The predicted corona noise emitted from the proposed 400 kV transmission line (measured at 50m from the line) is presented in **Table 9.9.**

Table 9.9: Summary of Noise Values

Circuit Type	L_{50} Rain EPRI (dBA)	L_{10} Rain EPRI (dBA)	Fair Weather Range (dBA)	
400 kV Double Circuit	48.0	55.4	21.9	41.4
400 kV Single Circuit	46.7	52.7	20.9	40.2
Transposition Towers	46.7	52.7	20.9	40.2

86 As illustrated in **Table 9.9** the L_{50} value during rain for both the double and single circuit line, reaches a maximum of 48dB (A) L_{50} at 50m from the centre of the proposed line route. This is 4dB (A) below the 52dB (A) L_{50} NYPSC guideline limit for OHL noise in rainy conditions. The maximum fair weather value of 41.4dB (A) is significantly lower than the 52dB guideline limit value. Based on this comparison, the proposed 400 kV transmission line will not cause noise annoyance to nearby residents as there are no residential receptors located within 50m of the proposed tower locations.

87 In the case of the southern end of the OHL where the line will meet the existing Oldstreet to Woodland 400 kV OHL there will be a section of double circuit 400 kV OHL that will continue to Woodland Substation. The proposed OHL will run on existing towers at this stage of the line. The closest sensitive receptors to these existing towers are located at approximately 27m distance. The noise impact from the double circuit line reaches a maximum of 51dB (A) L_{50} at approximately 27m from the centre of the proposed line route. This is 1dB (A) below the 52dB (A) L_{50} NYPSC guideline limit for OHL noise in rainy conditions. Based on this comparison, the proposed 400 kV transmission line will not cause noise annoyance to nearby residents.

9.5.3.1 **Continuous Operational Noise**

88 Due to the voltages associated with 400 kV OHLs, continuous operational noise may be audible but not dominant over the ambient noise levels. A noise survey at an existing 400 kV OHL has been conducted at Bogganstown near the existing Woodland Substation. This line runs to the west of Woodland Substation on a route south of the village of Summerhill, County Meath. A noise survey was also undertaken at the existing 400 kV substation at Woodland, County Meath. In these surveys, the substation / tower noise was audible but not dominant over the ambient noise levels.

89 The measurement results are presented in terms of ‗dB L_{Aeq},' which is representative of an average of the energy associated with the noise at a location over a given time interval. The levels in terms of ‗dB L_{A90}' are also presented and represent the level exceeded for 90% of the given time interval. The results are presented in **Table 9.5**.

90 The dB L_{A90} noise level represents the level exceeded for 90% of the given time interval. This is often considered as representative of the ‗background' noise level at a location. This is inclusive of the noise from the active substation and the existing 400 kV OHL which enters the substation site. This noise level of 39.6dB L_{A90} is not considered significant and would not be expected to cause any significant noise impact to sensitive receptors. It is of note that this noise level is inclusive of all ambient noise sources in the area, such as foliage noise, distant road traffic etc., in addition to the OHL noise.

9.5.3.2 **Aeolian Noise**

91 Aeolian noise also known as turbulent wind noise may be created due to high wind speeds affecting the towers and conductors. It refers to the audible sound of wind interaction with the towers and conductors. The amount of aeolian noise is directly linked to wind speed and direction. This type of noise impact is normally not considered as significant with regard to noise impact to sensitive receptors, as the ambient noise levels are also higher due to wind noise, therefore masking any specific aeolian noise impact from the proposed development.

92 Aeolian noise is present in the environment as a natural noise source and occurs when wind blows through tree branches, fences and other such structures. Aeolian noise from the interconnector is not expected to cause significant noise impact to sensitive receptors.

9.5.3.3 **Gap Sparking**

93 Gap sparking can develop at any time on transmission lines at any voltage. It occurs at tiny electrical separations (gaps) that develop between mechanically connected metal parts. Combinations of factors like corrosion, vibration, wind and weather forces, mis-fabrication, poor design or insufficient maintenance contribute to gap formation. Gap sparking can give rise to electrical noise, i.e. it occurs at frequencies higher than those that are audible to humans and therefore can be omitted as a source of noise nuisance.

9.5.4 Decommissioning

94 The proposed development will become a permanent part of the transmission infrastructure. The expected lifespan of the development is in the region of 50 to 80 years. This will be achieved by routine maintenance and replacement of hardware as required. There are no

plans for the decommissioning of the OHL. In the event that part of, or the entire proposed infrastructure is to be decommissioned, all towers, equipment and material to be decommissioned will be removed off site and the land reinstated. Impacts would be expected to be less than during the construction phase and would be of short term duration.

9.6 MITIGATION MEASURES

9.6.1 Construction Phase Mitigation

95 With regard to construction activities the contractor appointed will have to ensure that all plant items used during the construction phase will comply with standards outlined in *European Communities (Construction Plant and Equipment) (Permissible Noise Levels) Regulations* (1990). The mitigation measures are outlined in BS5228: *Noise Control on Construction and Open Sites* (2009), which offers detailed guidance on the control of noise from construction activities. All such controls will be set out in the Construction Environmental Management Plan (CEMP) (an outline of which is available in Appendix 7.1**, Volume 3B Appendices** of the EIS).

96 It is proposed that various practices be adopted during construction, in conjunction with those presented in Chapter 7, **Volume 3B** of the EIS including:

- Night time working will typically not occur, but there is the unlikely possibility that there may be a necessity to continue to operate generator, pumps or other equivalent machinery at a number of locations, where the digging of foundations and erection of towers may cause activity to remain in one location for a longer period of time.

- On these infrequent occasions screening and enclosures can be utilised. Similar measures will apply should rock breaking be required along the OHL route, (although this will not occur at night). For maximum effectiveness, a screen should be positioned as close as possible to either the noise source or receiver. The screen should be constructed of material with a mass of > 7kg/m^2 and should have no gaps or joints in the barrier material. This can be used to limit noise impact to 45dB (A) L_{eq} (BS 5228 acceptable night time level) at any noise sensitive receptors, if required by agreement with the local authority.

- Appoint a site representative responsible for matters relating to noise and establish channels of communication between the contractor / developer, local authority and resident i.e. for notification of requirement of night works, should this be required.

97 Furthermore, it is envisaged that a variety of practicable noise control measures will be employed, these may include:

- Selection of plant with low inherent potential for generation of noise and / or vibration.

- Erection of temporary barriers around items such as generators or high duty compressors. For maximum effectiveness, a barrier should be positioned as close as possible to either the noise source or receiver. The barrier should be constructed of material with a mass of > 7kg/m^2 and should have no gaps or joints in the barrier material. An example is shown in **Figure 9.4.**

Figure 9.4: Example of a Section of Temporary Noise Barrier

- As a rough guide, the length of a barrier should be 5 times greater than its height. A shorter barrier should be bent around the noise source, to ensure no part of the noise source is visible from the receiving location.

- Positioning of noisy plant as far away from sensitive receptors, as permitted by site constraints.

9.6.1.1 Continuous Operational Noise

98 Any construction works that have the potential to cause vibration at sensitive receptors will be carried out in accordance with the limit values as set out in **Table 9.6**.

9.6.2 Operational Phase Noise Mitigation

99 As outlined in the previous sections it is not expected that noise arising from the proposed development will cause significant noise impact. Corona noise will only be audible under certain weather conditions and in close proximity to the line. Corona noise is caused predominantly by items of transmission line hardware, other than conductors, e.g. clamps and can be effectively mitigated by replacement of individual items of hardware. Aeolian noise very rarely occurs on 400 kV lines and is not expected to arise on the proposed development. Recommended mitigation measures for aeolian noise, include the fitting of air flow spoilers on conductors and the fitting of composite insulators.

100 The OHL will be subject to an annual survey by helicopter patrol. The steady rise in noise level as the helicopter is approaching any given point (while following the line route) should minimise any surprise element to the onset of the helicopter noise. This is not expected to cause any significant noise impact, due to the short term and transient nature of the annual survey and the advance notice given to landowners.

9.7 RESIDUAL IMPACTS

101 Adherence to the mitigation measures will ensure there are no residual impacts associated with the proposed development.

9.8 INTERRELATIONSHIPS BETWEEN ENVIRONMENTAL FACTORS

102 During both the operational and the construction phase the noise and vibration impacts will be predominately associated with the road traffic impacts. This chapter should be read in conjunction with **Chapter 13** of this volume of the EIS, for a full understanding of the main interrelationships between these environmental topics.

103 The main impacts arise from the following interrelationships:

- **Chapter 2** - Human Beings – Population and Economic - There is the potential for noise impact to population in the form of impact to sensitive receptors such as private dwellings etc. in the construction phase and the operational phase. In the operational phase corona noise has the potential to cause noise impact during inclement weather conditions. These impacts are addressed in the EIS and are not deemed to be significant.

- **Chapter 13** - Material Assets – Traffic - In terms of traffic, during both the operational and the construction phase, the noise and vibration impacts will be predominantly associated with the road traffic impacts. No significant noise and vibration impacts are predicted.

9.9 CONCLUSIONS

104 An evaluation of the potential for noise and vibration impact to sensitive receptors from the proposed development has been carried out. It is predicted that the proposed development as designed, inclusive of the mitigation measures described in this evaluation, will not have a significant noise and vibration impact on sensitive receptors.

10 AIR – QUALITY AND CLIMATE

10.1 INTRODUCTION

1 The Inter Governmental Panel on Climate Change (IPCC) report *Climate Change 2013 The Physical Science Basis,* referred to as the *Fifth Assessment Report (AR5)* presents clear and robust conclusions in a global assessment of climate change science[40]. The report clearly indicates with 95 percent certainty that human activity is the dominant cause of observed warming of the climate system since the mid-20th century. The *Working Group 1 Report Approved for Policy Makers* has also been published in 2013 and summarises the main findings of the AR5[42]. The AR5 Report confirms that warming in the climate system is unequivocal with many of the observed changes unprecedented over decades to millennia: warming of the climate system is occurring with increased atmospheric and sea temperatures, reduction in snow and ice cover, sea level rise and increasing greenhouse gas concentration in the atmosphere. Each of the last three decades has been successively warmer at the Earth‘s surface than any preceding decade since 1850.

2 Met Éireann‘s Research Division recently led a major study on the future of Ireland's climate as part of the AR5. The study was a collaborative effort between Met Éireann, University College Dublin (UCD), University College Cork (UCC), National University of Ireland (NUI) Galway, Dublin Institute of Technology (DIT), Trinity College Dublin (TCD), NUI Maynooth, National Biodiversity Centre, ***Irish Centre for High-End Computing*** (ICHEC) and universities in Germany, UK, Holland and the USA and is published in the Met Éireann led study report *Ireland‟s Climate: the road ahead* (2013) [44]..

3 Climate change impacts may have subsequent effects on wildlife, public health, air pollution, waves, coastal flooding and renewable energy through to the middle of the century. Regard has also been made to the European Commission‘s Gui*dance on Integrating Climate Change and Biodiversity into Environmental Impact Assessme*nt (2013) in the preparation of this

[40] Stocker, T.F., D. Qin, G.-K. Plattner, L.V. Alexander, S.K. Allen, N.L. Bindoff, F.-M. Bréon, J.A. Church, U. Cubasch, S. Emori, P. Forster, P. Friedlingstein, N. Gillett, J.M. Gregory, D.L. Hartmann, E. Jansen, B. Kirtman, R. Knutti, K. Krishna Kumar, P. Lemke, J. Marotzke, V. Masson-Delmotte, G.A. Meehl, I.I. Mokhov, S. Piao, V. Ramaswamy, D.Randall, M. Rhein, M. Rojas, C. Sabine, D. Shindell, L.D. Talley, D.G. Vaughan and S.-P. Xie, 2013: Technical Summary. In: *Climate Change 2013: The Physical Science Basis*. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Stocker, T.F., D. Qin, G.-K. Plattner, M. Tignor, S.K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex and P.M. Midgley (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.

[42] IPCC, 2013: Summary for Policymakers. In: *Climate Change 2013: The Physical Science Basis*. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Stocker, T.F., D. Qin, G.-K. Plattner, M. Tignor, S.K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex and P.M. Midgley (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.

[44] www.met.ie/UserMediaUpl/file/Irelands_Climate_25092013_LR.pdf .

section. Air quality is essential for human health and well being and to ensure the maintenance of natural ecosystems. This chapter assesses the potential impacts on air and climate arising from the proposed development.

4 The proposed development will have a net positive impact on reducing greenhouse gas emissions through facilitation of further development of renewable energy sources in a cost effective and efficient manner. This will in turn displace energy production from fossil fuels with a consequent reduction in the emission of greenhouse gases, mainly carbon dioxide (CO_2), sulphur dioxide (SO_2) and nitrous oxides (NOx). It will also help towards reducing Ireland‘s dependence on fossil fuels for energy production and underpin the achievement of Ireland‘s agreed European Union (EU) targets with respect to greenhouse gas emissions and renewable energy. As with the majority of large civil engineering projects potential emissions to air are inevitable during the construction phase, arising from construction activities, transport of materials and the use of plant and equipment. However, given the linear nature of the proposed development, as set out in Chapter 6, **Volume 3B** of the EIS and its construction methodology as set out in Chapter 7, **Volume 3B** of the EIS the construction impacts will be localised and relatively short term and should be considered in the context of the long term impact of the development.

5 This chapter should be read in conjunction with Chapter 7, **Volume 3B** of the EIS and **Chapter 13** of this volume of the EIS.

10.2 METHODOLOGY

6 The proposed development is a linear construction located in the air quality management area Zone D as defined by the Environmental Protection Agency (EPA) in accordance with EU air quality legislation. Background air quality data for Zone D was obtained from the EPA report on *Air Quality in Ireland 2012 – Key Indicators of Ambient Air Quality (2013) a*nd air quality bulletins as published periodically by the EPA and assessed against the *Air Quality Standards Regulations 2011* (S.I. No. 180/2011) which transpose the requirements of the Clean Air for Europe (CAFE) Directive (2008/50/EC).

7 Global Climate information was obtained from the IPCCs AR5. Predicted local climate change information with respect to Ireland was obtained from the Met Éireann led study report *Ireland‟s Climate: The Road Ahead* (2013).

8 Potential localised air pollution impacts arising from construction of the proposed development have been assessed based on the experience of similar construction projects of this nature and with reference to the Environmental Protection UK (EPUK) guidance document *Development Control: Planning For Air Quality* (2010 Update).

9 Reference is also made to the 2013 EU Guidance on *Integrating Climate Change and Biodiversity into Environmental Impact Assessment*. This guidance recognises the need for action on climate change and biodiversity loss across Europe and around the world. It identifies the need to fully integrate the combating of and adaptation to climate change, to halt the loss of biodiversity and the degradation of ecosystems. Potential national impacts of climate change on Ireland's biodiversity have been identified in the Met Éireann led study report and are outlined in **Section 10.4.1**. The overall beneficial impact of the proposed development in providing infrastructure to facilitate displacement of greenhouse gas emissions thereby combating climate change is discussed in **Section 10.5.3**.

10.2.1 Policy and Legislative Context and Air Quality Standards

10.2.1.1 **European Union Climate Change Policy**

10 In acknowledgement of the clear message of the AR5 Report in January 2014 the European Commission presented a framework to drive continued progress towards a low carbon economy in the European Union. Key to the framework is a 40% reduction in greenhouse gas emission by 2030 compared to 1990 levels. To achieve this target it is estimated that:

- The sectors covered by the EU Emission Trading Scheme (ETS), including energy, would have to reduce emissions by 43% compared to 2005.
- Emissions from the non-ETS sectors would have to reduce by 30% compared to 2005 levels. The effort needed to meet these targets will be shared equitably between Member States.

11 In addition, an EU-level 2030 target for renewable energy is proposed with, at least, 27% of EU energy consumption to come from renewable sources. This renewable energy target does not, however, place binding targets on Member States and is to be reached by the EU as a whole.

12 Further improvements in energy efficiency are also foreseen. However, the role of energy efficiency in the 2030 framework is not as yet known until a review of Directive 2012/27/EU on energy efficiency is undertaken in 2014.

10.2.1.2 National Policy Position on Climate Action & Low Carbon Development

13 In April 2014 the Government published its *National Policy Position on Climate Action & Low Carbon Development for Ireland*[46] which:

- 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; and
- Aims, as a fundamental national objective, to achieve transition to a competitive, low-carbon, climate-resilient and environmentally sustainable economy by 2050.

14 The wider context for national climate policy includes –

- Existing and future obligations of the State under international agreements;
- The commitment by Ireland to the United Nations Framework Convention on Climate Change (herein after referred to as the Convention), and its ultimate objective of achieving stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system – to be achieved within a time frame sufficient to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened and to enable economic development to proceed in a sustainable manner;
- The European Union objective which details the necessary reductions, according to the Intergovernmental Panel on Climate Change, by developed countries as a group, to greenhouse gas emissions by 80-95% by 2050 compared to 1990;
- Existing and future obligations of the State under the law of the European Union; and

[46] www.environ.ie/en/Environment/Atmosphere/ClimateChange/NationalClimatePolicy.

- The evolution of climate policy within the European Union and at a wider international level under the Convention.

15 The Government also published the final *Heads of the Climate Action and Low-Carbon Development Bill* in April 2014 The objectives of the Bill are to enable Ireland to meet its legally binding non-ETS emissions reduction 2020 target (and any other new EU and international obligations) and to achieve transition to a low-carbon, climate resilient and environmentally sustainable economy in the period up to and including the year 2050.

10.2.1.3 **Air Quality Standards**

16 To protect human health, vegetation and ecosystems, EU Directives have been adopted which set down air quality standards for a wide variety of pollutants. The current standards are contained in the CAFE Directive (2008/50/EC) (European Parliament (EP) and Council of Europe (CEU), 2008) and the Fourth Daughter Directive (EP & CEU, 2004). These Directives also include rules on how Member States should monitor, assess and manage ambient air quality.

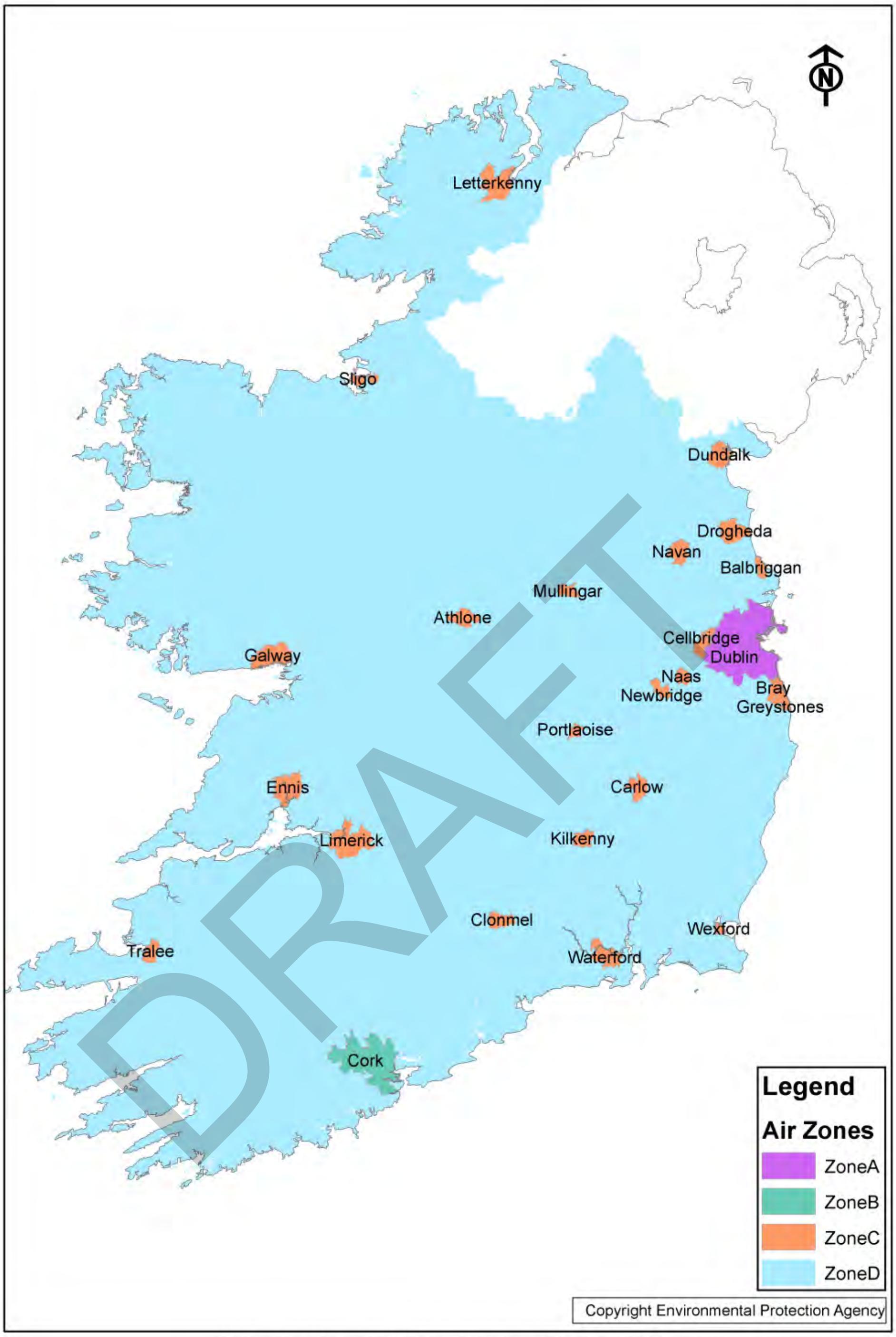
17 The CAFE Directive is an amalgamation of the Air Quality Framework Directive and its subsequent first, second and third daughter Directives.

18 The CAFE Directive was transposed into Irish legislation by the *Air Quality Standards Regulations 2011* (S.I. No. 180/2011). It replaces the *Air Quality Standards Regulations 2002* (S.I. No. 271/2002), the *Ozone in Ambient Air Regulations 2004* (S.I. No. 53/2004) and S.I. No. 33/1999 *Environmental Protection Agency Act, 1992 (Ambient Air Quality Assessment and Management) Regulations*. The Fourth Daughter Directive was transposed by the *Arsenic, Cadmium, Mercury, Nickel and Polycyclic Aromatic Hydrocarbons in Ambient Air Regulations 2009* (S.I. No. 58/2009).

19 EU legislation on air quality (CAFE) requires that Member States divide their territory into zones for assessment and management purposes. Ireland is divided into four such zones in the Air Quality Standards Regulations (2011) (refer to **Figure 10.1**). The zones were amended on 1 January 2013 to take account of population counts from the 2011 CSO Census and to align with the coal restricted areas in the 2012 Regulations (S.I. No. 326 of 2012). Zone A is the Dublin conurbation, Zone B is the Cork conurbation, Zone C other cities and large towns comprising Limerick, Galway, Waterford, Drogheda, Dundalk, Bray, Navan, Ennis, Tralee, Kilkenny, Carlow, Naas, Sligo, Newbridge, Mullingar, Wexford, Letterkenny, Athlone, Celbridge, Clonmel, Balbriggan, Greystones, Leixlip and Portlaoise and Zone D, principally rural, is the remaining area of Ireland. The proposed development which includes counties Meath and Cavan is located within Zone D.

20 In conjunction with individual local authorities, the EPA undertakes ambient air quality monitoring at specific locations throughout the country in the urban and rural environment. It prepares an Air Quality Report based on data from 30 monitoring stations and a number of mobile air quality monitoring units. The EPA as the National Reference Laboratory for Air coordinates and manages the monitoring network. Monitoring stations are located across the country. The EPA published air quality summary bulletins for PM_{10}, Ozone and Nitrogen Dioxide to the end of September 2014 and also provides real time air quality data on its website (www.epa.ie/air/quality/).

21 Air quality standards have been developed and incorporated into Irish statute in order to protect both human health and the ambient environment. These standards are based on International agreements, which identify performance standards and limit the generation of air quality pollutants at a regional, national and global level.



Air Quality in Ireland 2012, Key Indicators of Ambient Air Quality

Figure 10.1 Air Quality Zones in Ireland

(Source: Air Quality in Ireland 2012, EPA)

10.2.1.4 Dust Deposition Standards and Guidelines

22 Currently in Ireland there are no statutory limits for dust deposition. Dust particles in the ambient environment is pervasive; however localised increases in dust particles is usually associated with exposure of soil surfaces, usually through human activities associated with agricultural practices or construction. Whether dust deposition becomes an issue for the general public is a subjective issue and depends on a variety of factors including the sensitivity of nearby locations, the repetitive nature of any dust deposition occurring and the nature of the dust particulate itself. It is because of these variances and the subjectivity of the issue that there are no statutory limits. The focus for dust control and emissions is on minimising the potential for a nuisance occurring in the first instance and implementing good site practices where practicable.

23 In recent years the TA Luft/VDI 2119/Bergerhoff Method of dust emission monitoring has become the most commonly used method. This method is advocated by both the EPA and the Department of Environment, Community and Local Government (DoECLG). This method involves determining a mass dust deposition rate per unit area over a given time period, using a direct collection pot to standardise dimensions of either glass or plastic. The system benefits from being a direct collection method i.e. less transferring of material and consequent reduction in sampling errors. This method is defined as an internationally recognised standard and has been adopted by the EPA as the method of choice for licensed facilities.

24 The TA Luft/VDI 2119 recommended threshold guideline value is 350mg/m²/day. Below this threshold guideline value dust deposition problems are considered less likely. This is the recommended threshold value normally stipulated by local authorities and the EPA in conditions attached to development consent and Waste Licences.

10.3 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

25 The types of issues which overhead line (OHL) developments of this nature typically raise in relation to this topic include the potential for impacts on air quality primarily due to the generation and dispersion of dust but also due to additional emissions from construction vehicles and plant. The positive climatic effects will also be detailed in this chapter. In this regard, this chapter considers the construction, operational and decommissioning aspects of the proposed development.

10.4 EXISTING ENVIRONMENT

10.4.1 Climate Change

26 Global warming, and the management of emissions with the potential to contribute to global warming, is increasingly important on a national and international basis. Global warming has numerous potential implications for Ireland‘s environment, including:

- Greater risk of intense storms and rainfall events leading to greater potential for flooding in rivers and on the coast, where almost all cities and large towns are situated;
- Changes to habitats and eco-systems with changes in the distribution of species; and the possible extinction of vulnerable species;
- Effects on sea levels and river levels;
- Increased stress on water resources with water shortages in summer in the east and potential for over exploitation; and
- Increased summer temperatures can also impact human health among the susceptible sector of the Irish community, particularly the elderly.

27 Increased atmospheric levels of greenhouse gases are now widely recognised as the leading cause of climate change. This is borne out by the most recent findings of the IPCCs AR5. Some of the key points of the approved summary of the report include:

“Warming of the climate system is unequivocal, and since the 1950s, many of the observed changes are unprecedented over decades to millennia. The atmosphere and ocean have warmed, the amounts of snow and ice have diminished, sea level has risen, and the concentrations of greenhouse gases have increased”

In terms of atmosphere –

“Each of the last three decades has been successively warmer at the Earth‟s surface than any preceding decade since 1850 (see Figure SPM.1). In the Northern Hemisphere, 1983–2012 was likely the warmest 30-year period of the last 1400 years (medium confidence)”.

In terms of Ocean -

–Ocean warming dominates the increase in energy stored in the climate system, accounting for more than 90% of the energy accumulated between 1971 and 2010 (high confidence). It is virtually certain that the upper ocean (0−700 m) warmed from 1971 to 2010… and it likely warmed between the 1870s and 1971”.

―……the rate of sea level rise since the mid-19th century has been larger than the mean rate during the previous two millennia (high confidence). Over the period 1901 to 2010, global mean sea level rose by 0.19 [0.17 to 0.21] m."

In terms of croysphere –

"Over the last two decades, the Greenland and Antarctic ice sheets have been losing mass, glaciers have continued to shrink almost worldwide, and Arctic sea ice and Northern Hemisphere spring snow cover have continued to decrease in extent (high confidence)".

In terms of carbon and other biogeochemical cycles –

"The atmospheric concentrations of carbon dioxide (CO2), methane, and nitrous oxide have increased to levels unprecedented in at least the last 800,000 years. CO2 concentrations have increased by 40% since pre-industrial times, primarily from fossil fuel emissions and secondarily from net land use change emissions. The ocean has absorbed about 30% of the emitted anthropogenic carbon dioxide, causing ocean acidification"

"Natural and anthropogenic substances and processes that alter the Earth's energy budget are drivers of climate change".

28 The Met Éireann led study *Ireland‟s Climate: the road ahead* (2013) carried out global climate model simulations as part of Ireland‘s contribution to the science underpinning the IPCCs AR5. The Irish study modelled projections for climate change in Ireland which indicated the following:

- The observed warming over the period 1981-2010 is expected to continue with an increase of ~1.5 degrees in mean temperatures by mid-century; the strongest signals are in winter and summer. Highest daytime temperatures are projected to rise by up to 2 degrees in summer and lowest night-time temperatures to rise by up to 2 - 3 degrees in winter.

- Milder winters will, on average, reduce the cold-related mortality rates among the elderly and frail but this may be offset by increases due to heat stress during summer.

- Winters are expected to become wetter with increases of up to 14% in precipitation by mid-century with summers becoming drier (up to 20% reduction in precipitation). The frequency of heavy rainfall events during winter may increase by up to 20%.

- Changes in precipitation are likely to have significant impacts on river catchment hydrology, such as increased flow and level during higher rainfall events and prolonged periods of low water level in drier summers.

- An overall increase (0-8%) in the energy content of the wind for the future winter months and a decrease (4-14%) during the summer months.
- A small decrease in mean wave heights is expected around Ireland by the end of the century, while in winter and spring, storm wave heights are likely to increase.
- Expected increases in temperature will further affect the ecology such as that of Irish butterflies, in particular.
- Chapter 7 of the Met Éireann led study considers some additional potential impacts of a warmer climate on Irish Wildlife stating that:

  "Spring warming in recent years has had a significant impact on Irish wildlife by advancing the timing of key phenological phases of a wide range of organisms, including trees, birds and insects".

29 The most important long-lived greenhouse gases are CO_2, N_2O, and Methane (CH_4). CO_2 arises from a range of sources including the combustion of fossil fuels. According to the EPA, agriculture remains the single largest contributor to overall greenhouse gas emissions in Ireland, at 32.1% of the total, followed by Energy (power generation and oil refining) at 20.8% and Transport at 19.7%. The remainder is made up by Industry and Commercial at 14.0%, the Residential sector at 11.5%, and Waste at 1.8%.

30 The International Kyoto Protocol was devised in 1997 in response to rising emissions of the principal compounds contributing to global warming. The Kyoto Protocol was subsequently ratified by the EU in 2005.

31 Under the burden sharing agreement within the EU, devised to implement the Kyoto Protocol, Ireland agreed to limit emissions between 2008 and 2012 to 13% above 1990 emission levels.

32 Ireland's target, according to the EU Climate Change and Energy Package[47], is to reduce CO_2 emissions by 20% and to increase renewable energy production by 16%. The main policies to be implemented by Ireland are to source 15% of national electricity requirements from renewable energy by 2010 and by 40% by 2020. Other policies include improving the quality and participation in public transport, use of bio-fuels, higher energy conservation in building standards, schemes to improve recovery / recycling of waste streams and better agricultural and forestry management.

[47] The climate and energy package is a set of binding legislation which aims to ensure the European Union meets its ambitious climate and energy targets for 2020.

33 Key objectives for reductions in greenhouse gases across the agriculture, energy, transport, industrial, forestry and built environment sectors, which will ensure that Ireland can meet its international commitments, are set out in the *National Climate Change Strategy 2007–2012*. This Strategy includes the Government‘s target of achieving 40% of electricity consumption on a national basis from renewable energy sources by 2020. Achieving this target will potentially contribute significantly to limiting the increase of greenhouse gases in Ireland.

34 Under the EU National Emissions Ceiling Directive (2001/81/EC), Member States were required to limit their annual national emissions of SO_2, NOx, volatile organic compounds (VOC) and NH_3 to amounts not greater than the emissions ceilings laid down in Annex 1 of the Directive, by the year 2010 at the latest. Ireland‘s limits are as follows:

- SO_2 42 kilotonnes;
- NOx 65 kilotonnes;
- VOC 55 kilotonnes; and
- NH_3 116 kilotonnes.

35 Ireland is subject to several conventions and protocols that place limits on, and force reductions in, these emissions.

36 Some key emission reductions have occurred in the energy sector reflecting an increase in the share of renewables in gross electricity consumption. The SEAI publication *Renewable Energy in Ireland 2012*[48] reports that the share of electricity generated from renewable energy sources has increased between 1990 and 2012 from 4.9% to 19.6%. The principal contribution to this transition has come from wind generation.

37 Ireland‘s combined emissions in 2008, 2009, 2010 and 2011 were 1.77 million tonnes above its Kyoto limit when the EU Emissions Trading Scheme (ETS) and approved Forest Sinks are taken into account.

38 The EPA is also designated under the *National Climate Change Strategy 2007–2012* to prepare annual national emission projections for greenhouse gases relating to key sectors of the national economy. In the latest EPA projection report *Ireland‟s Greenhouse Gas Emission Projections 2012–2030*, (April 2014) the following was stated with respect to the energy sector:

[48] http://www.seai.ie/Publications/Statistics_Publications/EPSSU_Publications/Renewable-Energy-in-Ireland-2012.pdf.

"Energy sector emissions comprise emissions from power generation, oil refining, peat briquetting and fugitive emissions. Emissions from power generation accounted for 97% of energy sector emissions in 2012 and are responsible for a similar share of emissions over the projection period.

Under the With Measures scenario, total energy sector emissions are projected to decrease by 11% over the period 2013–2020 to 11.5 Mt CO2eq. The decrease in emissions is caused by a projected decrease in the use of peat and increase in the use of natural gas and renewable fuels for electricity generation. Renewables penetration in 2020 is projected to be 26% under this scenario. The emissions savings associated with increased natural gas and renewable fuels in electricity generation is, however, partially offset by the continued combustion of coal which is projected to be 19% higher in 2020 compared with 2012 in this scenario.

Under the With Additional Measures scenario, total energy sector emissions are projected to decrease by 16% over the period 2012 – 2020 to 11 Mt CO2eq. In this scenario, it is assumed that renewable energy reaches 40% penetration by 2020. The largest renewable energy contribution comes from wind which is estimated to be 62% above that in the With Measures scenario in terms of generation input. This scenario also includes additional expansion of renewable electricity generation from co-firing biomass, the construction of an additional waste to energy incineration plant and the continued development of landfill gas electricity generation and biomass CHP."

39 Overall the projections set out in the EPA report show that Ireland is not on a pathway to a low-carbon economy. Total national greenhouse gas emissions are projected to, at best, decrease by an average of 0.4% per annum up to 2020 if all national policies are implemented and delivered. Furthermore, emissions are projected to increase between 2020 and 2030 (12% in total) with transport a key contributor to this trend in the absence of additional policies and measures.

"There is a significant risk that Ireland will not meet its 2020 EU targets even under the most ambitious emission reduction scenario. These projections show a cumulative distance to target of 1 – 17 Mt CO2eq for the period 2013-2020 with Ireland breaching its annual limits in 2016 – 2017."

"Strong projected growth in emissions from transport and agriculture are the key contributors to non-ETS emissions. In 2020 non-ETS emissions will be 5-12% below 2005 levels compared with a 20% reduction target."

40 It is clear that the country still faces considerable challenges in meeting EU 2020 targets and developing a low-carbon emission pathway to 2050. The lower cumulative distance to target assumes that all the targets set out in the Government's *National Energy Efficiency Action Plan* 2009-2020 (NEEAP) and *National Renewable Energy Action Plan* (NREAP) (2010) are achieved.

10.4.2 Ambient Air Quality

41 Clean air is of particular importance to the Irish population's general health and well-being. The benefits of a clean natural environment play an important role in reducing the burden of chronic disease. Ireland is fortunate in having a good quality of air relative to other EU Member States as evidenced by the most recent EPA report A*ir Quality in Ireland 2012 - Key Indicators of Ambient Air Quality* (2013).

42 The EPA Air Quality report provides an overview of air quality in Ireland for 2012, based on the data obtained from 29 monitoring stations that form the National Ambient Air Quality Monitoring Network. It includes an assessment of the following pollutants: NOx, SO_2, CO, ozone, particulate matter (PM_{10}, $PM_{2.5}$ and black smoke), benzene and VOC, heavy metals and polycyclic aromatic hydrocarbons. The EPA Air Quality report concludes that:

> "*Overall, relative to other EU Member States, Ireland continues to enjoy good air quality, with no exceedances for the pollutants measured in 2012. This is due largely to the prevailing clean westerly air-flow from the Atlantic, a small number of large cities and an industrial sector which is relatively clean and well regulated*".

43 To assess air quality the EPA compares the results of air quality monitoring in Ireland to the limit and target values in the latest EU legislation, the CAFE Directive (2008/50/EC) (EP and CEU, 2008) and the Fourth Daughter Directive (EP and CEU, 2004).

44 The air quality in each zone is assessed and classified with respect to upper and lower assessment thresholds based on measurements over the previous five years. As stated above, the proposed development area falls into the area classified as Zone D, a predominately rural area. In this zone ambient air quality is influenced principally by agricultural activity, domestic heating and vehicle emissions.

45 A summary of background air quality for the main pollutants such as NOx, SO_2, CO, PM_{10} and $PM_{2.5}$ as assessed by the EPA for Zone D is provided in **Tables 10.1 -- -10.6**. The appropriate limit values as derived from the EU CAFE Directive (2008/50/EC) and as transposed into Irish legislation [S.I. No. 180/2011] are also provided for comparative purposes.

46 Air quality in Zone D areas is generally very good with low concentrations of pollutants such as NO_2, SO_2, Particulate Matter 10 microns in size (PM_{10}), particulate Matter 2.5 microns in size ($PM_{2.5}$) and Carbon Monoxide (CO). This is due mainly to the prevailing clean westerly air flow from the Atlantic and the relative absence of large cities and heavy industry. Concentrations of ozone are higher in rural areas than in urban areas due to the absence of the nitrogen oxide in rural areas as an ozone scavenger. Ozone is also a transboundary pollutant, with locations on the west coast having the highest concentrations in Ireland.

Table 10.1: EPA Air Quality Monitoring Nitrous Oxides (NOx)

Limit threshold Values for NO_X as set out in the 2008 CAFE Directive & S.I. No. 180 Of 2011				**Summary Statistics For Hourly NO_X Concentrations In Ireland In 2012**	
Objective	***Reference Time Period***	***Limit or Threshold value***	***No. of Allowed Exceedances***		
Human Health	One hour	200 µg/m^3	18 hours per year	**Annual Mean**	4 µg/m^3
Human health Calendar year 40 µg/m3	Calendar year	40 µg/m^3		**Median**	3 µg/m^3
Alert	One hour	400 µg/m^3		**Hourly Max**	77 µg/m^3
Vegetation	Calendar year	30 µg/m^3			
Upper assessment threshold for human health	Calendar year	32 µg/m^3			
Lower assessment threshold for human health	Calendar year	26 µg/m^3			

Table 10.2: EPA Air Quality Monitoring Sulphur Dioxide (SO_2)

Limit threshold Values for SO2 as set out in the 2008 CAFE Directive & S.I. No. 180 Of 2011				**Summary Statistics For Hourly SO2 Concentrations In Ireland In 2012 Zone D**	
Objective	***Reference Time Period***	***Limit or Threshold value***	***No. of Allowed Exceedances***		
Human health	One Hour	350 µg/m^3			
Human health	One day	125 µg/m^3	3 days per year	**Annual Mean**	3 µg/m^3
Alert	One Hour	500 µg/m^3		**Median**	2 µg/m^3
Vegetation	Calendar year	20 µg/m^3		**Hourly Max**	12 µg/m^3
Upper assessment threshold for human health	One day	75 µg/m^3	3 days per year	**Daily Max**	7 µg/m^3
Lower assessment threshold for human health	One day	50 µg/m^3	3 days per year		

Table 10.3: EPA Air Quality Monitoring Carbon Monoxide (CO)

Limit threshold Values for CO as set out in the 2008 CAFE Directive & S.I. No. 180 Of 2011				**Summary Statistics For Rolling 8 hour CO Concentrations In Ireland In 2012 Zone D**	
Objective	***Reference Time Period***	***Limit or Threshold value***	***No. of Allowed Exceedances***		
Human health	8 Hour Average	10 mg/m^3	-	**Annual Mean**	0.2 mg/m^3
Upper assessment threshold for human health	8 Hour Average	7 mg/m^3	-	**Median**	0.2 mg/m^3
Lower assessment threshold for human health	13 Hour Average	5 mg/m^3	-	**Hourly max**	0.9 mg/m^3

Table 10.4: EPA Air Quality Monitoring Ozone

Air Quality Limit Values For Ozone Set Out In The 2008 CAFE Directive And S.I. No. 180 Of 2011				**Summary Statistics For Rolling 8 hour Ozone Concentrations In Ireland In 2012 Zone D**	
Objective	***Reference Time Period***	***Limit or Threshold value***	***No. of Allowed Exceedances***		
Human health	Daily maximum 8-hour mean	120 µg/m^3	25 days per year averaged over 3 years	**Annual Mean**	58 µg/m^3
Vegetation	AOT40 accumulated over May-July	18,000 µg/ m^3 averaged over 5 years		**Median**	57 µg/m^3
LTO health	Daily maximum 8-hour mean	120 µg/ m^3		**Max 8 Hour**	136 µg/m^3
LTO vegetation	AOT40 accumulated over May-July	6,000 (µg/m^3).h		**Number of days greater than 120**	3
				Average AOTO40	2240 µg/m^3

Table 10.5: EPA Air Quality Monitoring Particulate Matter (PM_{10})

Air Quality Limit and Target Values for PM_{10} as set out by the CAFE Directive And S.I. No. 180 Of 2011				**Summary Statistics For Daily PM_{10} Concentrations In Ireland In 2012**	
Objective	***Reference Time Period***	***Limit or Threshold value***	***No. of Allowed Exceedances***		
PM_{10} limit value	One day	50 µg/m^3	Not to be exceeded on more than 35 days per year	**Annual Mean**	9 µg/m^3
PM_{10} limit value	Calendar year	40 µg/m^3		**Median**	9 µg/m^3
Upper assessment threshold	One day	35 µg/m^3	Not to be exceeded on more than 35 days per year	**Daily Max**	54 µg/m^3
Lower assessment threshold	One day	25 µg/m^3	Not to be exceeded on more than 35 days per year	**Number of days greater than 50**	1
Upper assessment	Calendar year	28 µg/m^3			

Air Quality Limit and Target Values for PM_{10} as set out by the CAFE Directive And S.I. No. 180 Of 2011				**Summary Statistics For Daily PM_{10} Concentrations In Ireland In 2012**	
threshold					
Lower assessment threshold	Calendar year	20 µg/m^3			

Table 10.6: EPA Air Quality Monitoring Particulate Matter ($PM_{2.5}$)

Air Quality Limits and Target Values for $PM_{2.5}$ as set out by the CAFE Directive and S.I. No. 180 of 2011				**Summary Statistics For Daily $PM_{2.5}$ Concentrations For Ireland In 2012**	
Objective	***Reference Time Period***	***Limit or Threshold value***	***No. of Allowed Exceedances***		
$PM_{2.5}$, target value	Calendar year	25 µg/m^3	To be met by 1 January 2010	**Annual mean**	9 µg/m^3
$PM_{2.5}$, limit value	Calendar year	25 µg/m^3	To be met by 1 January 2015	**Median**	8 µg/m^3
$PM_{2.5}$, limit value2	Calendar year	20 µg/m^3	To be met by 1 January 2020	**Daily max**	46 µg/m^3
Upper assessment threshold	Calendar year	17 µg/m^3			
Lower assessment threshold	Calendar year	12 µg/m^3			
$PM_{2.5}$ exposure concentration obligation.		20 µg/m^3	To be met by 1 January 2015		
$PM_{2.5}$ exposure reduction target	0 - 20 % reduction in exposure (depending on the average exposure indicator in the target reference year) to be met by 2020				

10.4.3 Other Atmospheric Emissions

47 The pollutants SO_2, NOx, VOC and ammonia (NH_3) are responsible for long-range transboundary air pollution such as acidification, eutrophication and ground-level ozone pollution.

- SO_2 is the major precursor to acid deposition, which is associated with the acidification of soils and surface waters and the accelerated corrosion of buildings and monuments. Emissions of SO_2 are derived from the sulphur in fossil fuels such as coal and oil used in combustion activities.

- NOx emissions contribute to acidification of soils and surface waters, tropospheric ozone formation and nitrogen saturation in terrestrial ecosystems. Power generation plants and motor vehicles are the principal sources of NOx emissions, through high-temperature combustion.

- VOCs are emitted as gases by a wide array of products including paints, paint strippers, glues, adhesives and cleaning agents. They also arise as a product of incomplete combustion of fuels and as such are a component of car exhaust and evaporative emissions.

- NH_3 emissions are associated with acid deposition and the formation of secondary particulate matter. The agriculture sector accounts for virtually all (over 98%) ammonia emissions in Ireland.

48 Under Article 4.1 of the National Emissions Ceiling Directive (2001/81/EC), Member States are required to limit their annual national emissions of SO_2, NOx, VOC and NH3 to amounts not greater than the emissions ceilings laid down in Annex 1 of the Directive, by the year 2010 at the latest.

49 The transport sector is the principal source of NOx emissions, contributing approximately 55% of the total. The industrial and power generation sectors are the other main source of NOx emissions, each accounting for 12% of emissions with the remainder emanating from the residential / commercial and the agriculture sectors.

50 The agricultural sector accounts for virtually all NH_3 emissions.

51 The main sources of VOC emissions in Ireland are solvent use and transport accounting for 85% of the total. Domestic coal burning in the residential sector is another important but declining source. Reductions corresponding to 48% have been achieved from 1990 with improved emission control for VOCs in motor vehicles has been largely been responsible for the decrease in overall emissions.

10.4.4 Heavy Metals and Organic Pollutants

52 Heavy metals, benzene and polycyclic aromatic hydrocarbons (PAH) were all below the annual limit values in Zone D also. The EPA Air Quality in Ireland Report 2012 (published 2013) noted however, that domestic fuel burning emissions in rural areas was the main source of particulate matter and poly-aromatic hydrocarbons (PAH). Levels of particulate matter in some smaller towns for example are similar or higher than those in cities, where bituminous coal is banned.

10.4.5 Dust Deposition

53 Owing to the linear nature of the proposed development with isolated areas of activity which are limited in size and the fact that it lies largely in a rural setting, dust deposition monitoring is not considered necessary to inform the existing baseline conditions. Apart from seasonal agricultural activity, dust deposition is unlikely to impact on the ambient environment. The PM_{10} and $PM_{2.5}$ monitoring undertaken by the EPA indicates that the ambient air quality in Zone D is below the threshold limit values.

10.5 POTENTIAL IMPACTS

10.5.1 Do Nothing

54 Climate change and local changes in air quality will continue to change in line with prevailing trends in future years.

10.5.2 Construction Phase

55 There will be potential for minor temporary short term impacts on air quality arising from construction transport and construction related activity. These potential impacts relate to construction and transport vehicle emissions and localised potential for dust generation.

10.5.2.1 Climate Impacts

56 The impacts on climate change during the construction phase will be non significant.

10.5.2.2 Dust and Particulate Matter

57 Dust generation will give rise to potential impact on localised air quality for brief periods. During the construction of the proposed development, there will be site preparation and construction activities, both of which have the potential to generate dust. There is therefore some potential for local air quality to be impacted by dust during the construction phase. Dust generated by construction activity can give rise to local nuisance. However, the impact of this will depend largely on climatic factors. For example the potential for dust to be emitted depends on the type

of construction activity being carried out in conjunction with environmental factors including levels of rainfall, wind speeds and wind direction. The potential for impact from dust also depends on the distance to potentially sensitive locations and whether the wind can carry the dust to these locations.

58 The primary air quality issue related to construction is dust potentially arising from the following activities:

- General construction activities, including tree lopping and cutting;
- Earth moving and excavation equipment including handling and storage of soils and subsoil material;
- Vehicle movement over hard dry surfaces on the site, particularly freshly laid access tracks; and
- Vehicle movement over surfaces off-site contaminated by muddy materials brought off the site.

59 Dust deposition is usually highly localised to areas of activity, with dust particles falling to the ground within several hundred metres of the source. Dust emissions do not cause long term or widespread changes to local air quality but their deposition on nearby properties and cars has the potential to cause soiling and discolouration.

60 The majority of the releases are likely to occur during the normal construction working hours. However, in the instance of exposed soil produced from significant earthwork activities, there is potential for short term dust generation to occur 24 hours per day depending on weather conditions.

61 Particulate matter can remain suspended in the atmosphere for a longer period and can be transported over a wider area than dust, by wind. It is potentially small enough to be drawn into the lung during breathing, which in sensitive members of the public could cause an adverse reaction. However, given the general good air quality along the construction route and relatively short duration of construction activity at any one location no significant impact from particulate matter is expected.

62 Typical sources of particulate matter during the construction phase are similar in nature to those that give rise to dust. Particulate matter is also released from the engines of site plant, such as compressors, generators etc., whilst they are running.

63 Therefore, occasionally, increased and perceptible localised emissions may occur. There may also be occasions when mechanical breakdown of site plant could cause short term releases of excess particulate matter and shortterm release may also occur during start up. However with good construction and mitigation practices dust will not impact significantly on air quality.

10.5.2.3 **Emissions from Construction Traffic**

64 Construction traffic will use local roads to access the working areas with potentially large percentage increases of traffic flow on some local roads, although this is predominantly due to the very low existing flow volumes (see **Chapter 13** of this volume of the EIS). This traffic will be temporary in nature and of short duration and will be dispersed along the proposed alignment. In terms of its potential to cause significant effects on air quality the EPUK guidance document *Development Control: Planning For Air Quality* (2010), identifies the requirement for air quality assessment only where the following criteria are met as otherwise significant air quality effects will be unlikely to occur:

- Road alignment will change by 5m or more; or
- Daily traffic flows will change by 1000 Annual Average Daily Traffic (AADT) or more; or
- Heavy Duty Vehicles (HGV) flows will change by 200 AADT or more; or
- Daily average speed will change by 10km/hr or more; or
- Peak hour speed will change by 20km/hr or more.

65 Additionally the assessment is only required for large, long term construction sites that would generate Heavy Goods Vehicle (HGV) flows of more than 200 movements per day over a period of a year of more. As the numbers of construction vehicles associated with the construction of the transmission line (see **Chapter 13** of this volume of the EIS) are well below the thresholds identified and are considered to be low and temporary in nature at any one construction location, it is considered that impacts to air are non-significant.

10.5.3 Operational Phase

66 During the operational phase there will be no emissions from the towers or OHL and any associated maintenance traffic will be very low with a line inspection by helicopter every year and vehicle access associated with vegetation clearance on a five year cycle.

67 The principal impacts on air quality will be largely positive with respect to climate change arising from increased energy transmission efficiency and displacement of fossil fuel generation through facilitation of renewable energy access to the national grid.

10.5.3.1 Transmission Energy Efficiency

68 The proposed development will consist of an efficient, coordinated and economical system of electricity transmission, which has the longterm ability to meet reasonable demands for the transmission of electricity. Efficient transmission of electricity will reduce transmission losses reducing the overall power generation requirement with a net positive benefit of reducing carbon emissions. The proposed development will comprise a major improvement in electricity transmission system infrastructure on the island of Ireland allowing renewable sources to be utilised on an all-island basis further providing for displacement of fossil fuel power generation on the island as a whole.

69 The proposed development will comprise a major improvement in electricity transmission system infrastructure on the island of Ireland. The improvement in energy infrastructure will facilitate the expansion and incorporation of renewable energy generation into the national grid, transmitting the energy in an efficient manner and facilitating the displacement of energy generation from fossil fuel combustion. This will have a major positive impact on the reduction in national CO_2 emissions associated with the energy sector where this leads to displacement of fossil fuel electricity generation. For example, in 2011 wind energy avoided 2,144kt of CO_2 (60%), followed by solid biomass 633kt of CO_2 and hydro 346kt of CO_2 based on figures published by the Sustainable Energy Authority of Ireland (SEAI). The proposed development will impact positively on Ireland‘s ability to achieve its EU and National targets with respect to reducing greenhouse gas emissions and expanding energy production from renewable sources.

70 The operation and maintenance of the proposed development will not result in any significant impact on air quality impacts and has been scoped out of this assessment.

10.5.4 Decommissioning Phase

71 The proposed development will become a permanent part of the transmission infrastructure. The expected lifespan of the development is in the region of 50 to 80 years. This will be achieved by routine maintenance and replacement of hardware as required. There are no plans for the decommissioning of the overhead line. In the event that part of, or the entire proposed infrastructure is to be decommissioned, all towers, equipment and material to be decommissioned will be removed off site and the land reinstated. Impacts would be expected to be less than during the construction phase and would be of short term duration.

10.6 MITIGATION MEASURES

72 The main potential for impact relates to dust emissions during the construction phase of the proposed development. The most effective way to manage and prevent particulate releases is through effective site management and control of the potential source. Mitigation measures

designed to ensure that emissions from these sources are minimised will be set out in the *Construction and Environmental Management Plan* (CEMP) an outline of which is included in Appendix 7.1, **Volume 3B Appendices** of the EIS.

73 Mitigation measures will be employed on a site specific basis, based on a review of the construction activities involved and their proximity to nearby receptors in each location. The site specific mitigation measures will be employed to ensure that properties within 50m of construction locations will not be subject to significant dust nuisance. This process will focus on the mitigation of dust from key activities including temporary access route construction and earthworks.

74 The measures described in the outline CEMP are ‗good practice' measures and are designed to ensure that the construction activities do not generate excessive dust or particulate material release. Employment of such measures will ensure that no significant dust effects occur during project construction.

10.7 RESIDUAL IMPACTS

75 The development will have positive long term residual impacts on greenhouse gas emissions as it will facilitate further development and connection of renewable energy sources thereby reducing the dependence on fossil fuels with consequent reduction in greenhouse emissions.

76 In terms of dust no significant impacts are predicted following the implementation of good construction practice and implementing the mitigation measures set out in **Section 10.6**. During adverse weather condition some residual impacts will occur, dependent on wind speed and turbulence during construction, however, it is likely that the impact will be localised in the area immediately surrounding the source and will be of short duration and temporary in nature.

77 Traffic emissions themselves will not give rise to significant air quality effects from vehicular emissions. Construction traffic will contribute to existing traffic levels on the surrounding road network and will have the potential to generate dust. The greatest potential for this to occur will be in the areas immediately adjacent to the principal means of access for construction traffic. In these areas increases in dust generated by vehicle movements and local air pollutant emissions from vehicles may be temporarily elevated during the busiest periods of construction activity, however with the implementation of mitigation measures no significant local air quality effects are predicted.

78 Additional indirect impacts on climate can arise from the production of concrete for tower foundation construction. Emissions associated with the construction traffic for the proposed development have been addressed in this chapter, however there will be additional emissions

of CO_2, SO_2 and NO_x associated with the use of raw materials for the production of cement for concrete manufacture, its transport, kiln drying of limestone and concrete batching with aggregate materials. These emissions will occur at quarry locations for aggregate and limestone production at the lime kiln location and the concrete batching location. These activities are controlled under licences issued by the relevant local authority where they take place and will not give rise to local air quality impairment. The overall contribution to climate change gases will be negative but the impact will be very low and will be offset by the positive impact of the displacement of such gases arising through facilitation of renewable energy developments by the proposed transmission infrastructure.

10.8 INTERRELATIONSHIPS BETWEEN ENVIRONMENTAL FACTORS IMPACTS

79 During the construction phase, air and climate impacts will be associated with the construction activities of project and road traffic impacts. Traffic emissions themselves will not give rise to significant air quality effects from vehicular emissions. With the implementation of mitigation measures no significant local air quality effects are predicted. In addition this chapter should be read in conjunction with Chapter 7, **Volume 3B** of the EIS and **Chapter 13** of this volume of the EIS for a full understanding of the main interrelationships between these environmental topics.

10.9 CONCLUSIONS

80 The proposed development will have positive long term residual impacts on greenhouse gas emissions as it will facilitate further development and connection of renewable energy sources thereby reducing the dependence on fossil fuels with consequent reduction in greenhouse emissions.

81 In terms of dust no significant impacts are predicted following the implementation of good construction practice and implementing appropriate mitigation measures.

82 Traffic emissions themselves will not give rise to significant air quality effects from vehicular emissions.

83 With the implementation of mitigation measures no significant local air quality effects are predicted.

11 LANDSCAPE

11.1 INTRODUCTION

1 This chapter describes and analyses the existing landscape character along the route of the proposed development in the Meath Study Area (MSA) and provides an evaluation of the potential for landscape and visual impacts arising from the proposed development in that study area.

2 Accordingly, this chapter of the Environmental Impact Statement (EIS) identifies and describes the landscape impacts which are predicted to occur in the MSA.

3 A description of the proposed development is set out in Chapter 6**, Volume 3B** of the EIS. That chapter describes the full nature and extent of the proposed development, including elements of the overhead line (OHL) design and the towers. In addition, Chapter 6**, Volume 3B** of the EIS provides a factual description, on a section by section basis, of the entire line route. The proposed alignment is described in that chapter using townlands and tower numbers as a guideline. The principal construction works proposed as part of the development are set out in Chapter 7, **Volume 3B** of the EIS.

4 The alignment of the proposed development has been carefully considered so as to avoid and minimise, but it could not remove all, visual and landscape effects. Those effects that remain are the residual unavoidable effects that will occur if planning approval is granted in respect of the proposed development. Accordingly, this chapter does not purport to establish that there are no adverse effects on the appearance or character of the landscape along the alignment of the proposed electricity transmission development in the MSA.

5 This evaluation does not consider views from individual dwellings, nor does it consider the visual impact of individual towers. Rather, as is appropriate in relation to linear developments, a generalised appraisal has been conducted of the residual unavoidable effects of the proposed development on the landscape in the MSA.

6 In summary, this chapter includes the following information:

- Landscape and Visual Impact Assessment Methodology;
- Description of the Characteristics of the Proposed Development;
- Description of the Existing Environment;
- Description of Potential Landscape and Visual Impact;

- Description of Mitigation Measures;
- Description of Residual Landscape and Visual Impact;
- Description of Interrelationships between Environmental Factors; and
- Conclusions

7 Given its subject matter, this chapter is supported by mapping contained in **Volume 3D Figures** of the EIS as follows:

- Figure 11.1 MSA Landscape Character Areas;
- Figure 11.2 MSA Landscape Character Types;
- Figures 11.3 - 11.7 MSA Landscape Constraints and Photomontage Locations; and
- Figures 11.8 - 11.12 MSA Zone of Theoretical Visibility and Photomontage Locations.

8 A set of full-scale photomontages and wireframes are also contained in **Volume 3D Figures** of the EIS.

9 Site assessments were carried out by two landscape architects as per best practice.

11.2 METHODOLOGY

11.2.1 Scope of the Evaluation

10 This section of the EIS has been prepared in accordance with relevant EU and Irish Legislation and guidance, including the requirements of Annex IV of the EIA Directive and in accordance with Schedule 6 of the *Planning and Development Regulations 2001* (as amended) and conforms to the relevant requirements as specified therein. The scope of the evaluation is based on a review of legislation, guidance documents, other EISs, feedback from public consultation, consultation with prescribed authorities, including An Bord Pleanála (the Board), and a consideration of the likelihood for significant impacts arising, having regard to the nature of the receiving environment and the nature and extent of the proposed development.

11 The scoping opinion received from the Board (see Appendix 1.3**, Volume 3B Appendices** of the EIS) identified the following issues as being relevant to this chapter of the EIS, each of which are dealt with in this chapter or elsewhere in the EIS as noted below:

- Include full-scaled photomontages (these are included in **Volume 3D Figures** of the EIS);
- Provide an overview of landscape character having regard to the Landscape Character Assessments which inform statutory development plans;
- Identify the area of visual influence;
- Assess impacts on landscape character and visual amenities having particular regard to designated landscapes, views of amenity value, including protected views, and the setting of main tourism assets;
- Appraise potential impacts on the character and setting of sites of cultural and historic interest and on historic landscapes, including for example Bective Abbey, Donaghpatrick and Teltown;
- Identify and appraise potential impacts on historic demesne landscapes;
- Appraise potential for alternative routing or partial undergrounding in sensitive landscape areas (this is included in Chapter 4, **Volume 3B** of the EIS); and
- Appraise cumulative visual and landscape impact with the 110 kV and 220 kV OHL network and other existing and permitted development (This is included in Chapter 10, **Volume 3B** of the EIS).

12 Scoping submissions were also received from Meath County Council, Cavan County Council, Fáilte Ireland, An Taisce and the Department of the Environment, (Northern Ireland) and have been taken into account in this appraisal.

13 An outline of an OHL route selection methodology, including mitigation by avoidance, is described in detail in Chapter 5**, Volume 3B** of the EIS. The *Final Re-Evaluation Report* (April 2013) (see Appendix 1.1**, Volume 3B Appendices** of the EIS), also provides full details of how the preferred route corridor and indicative line route was selected, including reference to the potential for landscape and visual impacts.

14 The *Preferred Project Solution Report* (July 2013) (see Appendix 1.2, **Volume 3B Appendices** of the EIS), outlines the process of moving from an indicative line route, as identified in the *Final Re-evaluation Report (April 2013)*, to a more detailed preferred line design.

11.2.2 Guidelines

15 The key guidelines used in this appraisal are the Environmental Protection Agency's (EPA) *Advice Notes on Current Practice in the preparation of EIS*, (September 2003) and the Landscape Institute and Institute of Environmental Management and Assessment's *Guidelines for Landscape and Visual Impact Assessment*, 3rd edition, (2013). A full reference list of guidelines and documents is contained in the **Bibliography** in this volume of the EIS and Table 11.1, **Appendix 11.1, Volume 3D Appendices** of the EIS.

11.2.3 Evaluation Area for the EIS

16 The size of the evaluation area is based on conclusions from the *Final Re-Evaluation Report* (April 2013) and a professional judgement on the nature of visibility over long distances. The approach to identifying the size of the study area for the purposes of this EIS is as follows:

- 5km either side of alignment for general evaluation; and
- Extension to 10km either side of the alignment for designated panoramic scenic views that are at a higher elevation than the alignment.

11.2.4 Desktop Study and Site Survey

17 A desktop study was initially carried out to identify the landscape sensitivities within the MSA as described in the relevant county development plans and county landscape character assessments.

18 Data available from the Irish Trails Office, Discover Ireland, Fáilte Ireland and the historic garden survey as described in the National Inventory of Architectural Heritage (NIAH) was taken into account, providing information about tourist attractions and various driving, walking and cycling routes.

19 Site visits to public locations were carried out to confirm the nature and extent of the key desktop identified landscape constraints and to ascertain the general characteristics of the landscape through which the proposed line route passes. Site visits also determined the most appropriate locations for photographs on which to base photomontages.

20 As part of the consultation process, Meath County Council requested photomontages from specific locations.

11.2.5 Definitions of Terms Used in This Chapter

21 Landscape effects are defined as the result of physical changes to the fabric of the landscape resulting from new development. Such physical changes may include the addition, alteration or removal of structures or vegetation. Landscape effects can be temporary and include those caused by temporary access routes, construction areas and construction traffic. Landscape effects may be positive (beneficial), negative (adverse) or neutral (no overall change or a balance of positive and negative effects). Landscape effects were evaluated on the basis of:

- The capacity of the existing landscape to absorb the proposed development;
- Effects on landscape character and physical features;
- Proximity of sensitive viewpoints (e.g. scenic routes) and visual receptors; and
- The heights and locations of the typical structures in relation to existing landscape scale.

22 Visual effects are closely related to landscape effects, but concern changes in views. Visual assessment concerns people‘s perception and response to visual amenity. Effects may result from new elements located in the landscape that cause visual intrusion (i.e. interference with or interruption of the view). Visual effects may be positive (beneficial), negative (adverse) or neutral (no overall change or a balance of positive and negative effects). Visual effects were evaluated taking account of:

- The sensitivity of the receiving environment;
- The visual contrast between the existing environment and the proposed development; and
- The extent of the areas over which these effects will be discernible.

23 A full set of definitions and criteria for assessment (including landscape value, capacity, sensitivity, magnitude of change and significance of effects) is contained in Tables 11.2-11.10, **Appendix 11.1, Volume 3D Appendices** of the EIS.

24 For the purposes of this evaluation, landscape and visual effects resulting from the introduction of an overhead electricity transmission line will normally be considered to be of an adverse nature. The sensitivity of the landscape, the magnitude of change proposed and resulting significance of effects will be evaluated in this chapter.

11.2.6 Landscape Units

25 For the purposes of this appraisal, and for ease of description, the study area is divided into landscape units as illustrated in **Figure 11.1**.

26 These units are based on landscape character areas described in the *Meath County Landscape Character Assessment* (2007), and the *Cavan County Development Plan* 2014-2020.

27 Landscape character changes gradually over the geography of the study area, and therefore the landscape units are a guide to general landscape character in any particular area.

Figure 11.1: Landscape Units

Table 11.1: Cross-Referencing Between Towers, Landscape Units, Photomontages and Figures

Towers	Landscape Character Area	Landscape Unit	Photomontages	Figure
Tower 212 to 239	Highlands of East Cavan (In Cavan)	E	41, 42	11.3
Tower 240 to 272	North Meath Lakelands	F	43, 44, 45, 46	11.3 11.4
Tower 273 to 302	North Navan Lowlands	G	47, 48, 49, 50	11.4 11.5
Tower 303 to 312	Blackwater Valley	H	51, 52, 53, 54, 55, 56, 57, 58, 59	11.5
Tower 313 to 351	West Navan Lowlands	I	60, 61, 62	11.5 11.6
Tower 352 to 363	Boyne Valley	J	63, 64, 65, 66, 67, 69, 71	11.6
Tower 364 to 395	Central Lowlands	K	70, 72, 73	11.6 11.7
Tower 396 to 402	Tara Skryne Hills	L	68, 74, 75, 76, 77	11.7
none	South East Lowlands	M	none	11.7

11.2.7 ZTV (Zone of Theoretical Visibility) Mapping

28 Mapping the extent of the area from which a development is likely to be visible has many names, which is symptomatic of its limitations. Originally known as a Visual Envelope Map (VEM), then as a Zone of Visual Influence (ZVI) and more recently as a Zone of Theoretical Visibility (ZTV), these changes in terminology reflect attempts to address frequent challenges occasioned by the mapping. Thus, as a theoretical methodology, ZTV prediction does not take into account the effects of seasons, lighting, weather conditions or visibility over distance. Moreover, a ZTV does not take into account the screening effects of vegetation or buildings and can omit topographical variations of up to 10m. Therefore, in reality, ZTV mapping‘s principal use is to identify viewing points for further analysis.

29 ZTV mapping has been prepared for this proposed development (Figures 11.8-11.12, **Volume 3D Figures** of the EIS). This was prepared using the latest version of KeyTERRA-FIRMA and AutoCAD software packages. This mapping indicates areas from where the proposed development is *theoretically* visible. It is important to note that the mapping does not indicate areas from which the proposed development will be *actually* visible. The ZTV mapping should therefore be used in conjunction with photomontages in order to ascertain the difference between *theoretical* and *actual* visibility.

11.2.8 Photomontage Locations

30 The Landscape Institute (UK) in its *Advice Note 01/11 Photography and Photomontage in Landscape and Visual Impact Assessment* published in 2011, on the subject states; ―*The landscape professional should select a set of photographic viewpoints which are considered representative of the range of likely effects, viewing experience and viewpoints ensuring that none are under or over represented.”*

31 It is possible to prepare detailed and highly realistic images that illustrate the likely future appearance of a development from a specific viewing point. These are useful for examining the effects from a limited number of critical viewpoint positions. However, they contribute little to an appraisal of the effects on the overall landscape within which an almost infinite number of potential viewpoints exist. There is no meaningful way to illustrate every view within a landscape. Instead, a representative sample of ‘worst case‗views are provided. These include views from elevated areas, in very open landscape, where the alignment crosses higher ground, or at close distances. Many other locations within the study area will not experience any landscape or visual effects as a result of the proposed development.

32 Other photomontage locations are selected to illustrate the nature of visibility in the wider landscape. As the views are representative of viewing conditions that are encountered, some of them may show vegetation, buildings or topography partially screening the proposed development. Such conditions are normal and representative.

33 A significant limitation of visualisations is that the visual prominence of features in the landscape is significantly affected by lighting conditions and weather. Thus, for example, all views will appear different in various conditions of lighting, haze, weather and seasons. The views provided **Volume 3D Figures** of the EIS, and shown at a smaller scale in this chapter of the EIS, are representative but not comprehensive – because in addition to there being an almost infinite number of viewpoints, there are a very large set of combinations and permutations of lighting conditions that could conceivably occur for every view. The Landscape Institute (UK) Guidelines (2011) *in its Advice Note 01/11: Photography and Photomontage in Landscape and Visual Impact Assessment* published in 2011, on the subject states; *"they (photomontages) are subject to the same inherent limitations as photographs, for example only showing the scene as it would appear under the same conditions that prevailed when the original photograph was captured."*

34 Therefore, at best, visualisations can represent a view from a particular location at a particular time in particular weather conditions. There is no such thing as a fixed or single impact on the appearance or character of the landscape.

35 Photomontages do not show the effects of temporary hedgerow removal at construction stage, as this will be reinstated. The more permanent localised trimming or removal of taller vegetation within falling distance of any part of any OHL support or conductor is also not indicated.

36 The most effective use of photomontages is to view them in the field, The Landscape Institute (UK) *in its Advice Note 01/11 Photography and Photomontage in Landscape and Visual Impact Assessment* published in 2011, states; *"It is essential to recognise that two-dimensional photographic images and photomontages alone cannot capture or reflect the complexity underlying the visual experience, and should therefore be considered an approximation of the three-dimensional visual experiences that an observer would receive in the field."*

37 A full-scale set of photomontages, with technical details, are contained in **Volume 3D Figures** of the EIS. The detailed location and context of photomontage views are indicated on the mapping in Figures 11.3 – 11.7, **Volume 3D Figures** of the EIS**.** All photomontage locations are publically accessible.

Table 11.2: Full Set of Photomontages

Photomontage number	Direction of view
41	View east from picnic area beside local road L7567 near scenic view point (SV8) Lough an Leagh Gap
42	View east from local road L3533 in the townland of Drumbar (ED Enniskeen) east of Moyhill Bridge
43	View south-west from local road L68012 in the townland of Ervey
44	View north-east from R164 in the townland of Corrananagh
45	View west from car park at Whitewood Lough - please note this photomontage includes bird flight diverters attached to both earth wires (section between Towers 257 and 258 (midway) and 265)
45A	View north, north-west from Protected View and Prospect 18 located at the T-Junction of local roads L6806 / L28021 in the townland of Ardmaghbreague
46	View north-east from local road L7404 across the main entrance gate of Brittas Estate
47	View north, north-east in the vicinity of Protected View and Prospect 17 located at local road L7405 in the townland of Cruicetown
47A	View north, north-east from Motte at Cruicetown
48	View north-east from N52 approximately 1km west of Raffin Cross - please note this photomontage includes bird flight diverters attached to both earth wires (section between Towers 279 and 283)
48A	View south, south-east from N52 approximately 1km west of Raffin Cross - please note this photomontage includes bird flight diverters attached to both earth wires (section between Towers 279 and 283) and the wind turbines of the proposed Emlagh Wind Farm
48B	View east, south-east from local road L74116 in the vicinity of the townland of Drakerath / Clooney - please note this photomontage includes bird flight diverters attached to both earth wires (section between Towers 279 and 283) and the wind turbines of the proposed Emlagh Wind Farm
48C	View east in the vicinity of Protected View and Prospect 15 located at local road L2811 approximately 1.5km north of Carlanstown - please note this photomontage includes bird flight diverters attached to both earth wires (section between Towers 279 and 283) and the wind turbines of the proposed Emlagh Wind Farm
49	View southeast from local road L74112 (Cul de Sac) in the townland of St. Johns Rath - please note this photomontage includes wind turbines of the proposed Emlagh Wind Farm
50	View north-west from local road L74115 in the townland of Red Island - please note this photomontage includes bird flight diverters attached to both earth wires (section between Towers 292 and 297) and the wind turbines of the proposed Emlagh Wind Farm
50A	View west, north-west from local road L74113 in the vicinity of the boundary of Mountainstown Demesne - please note this photomontage includes wind turbines of the proposed Emlagh Wind Farm

51	View west across cemetery from local road L7414 at the Crasulthan Cross Roads (R163), when standing near the gates of the former Gibstown Demesne
52	View south-west from R163 west of the Crasulthan Cross Roads.
53	View south-east from local road L34097 (Cul de Sac) across the townland of Teltown
53A	View south-east in the vicinity of Protected View and Prospect 80 located at the R147 looking across the River Blackwater valley - please note this photomontage includes bird flight diverters attached to both earth wires (section between Towers 307 and 313)
54	View east from hill at People's Park Lighthouse / Tower of Lloyd (Protected View and Prospect 13) located approximately 1.8km west of Kells - please note this photomontage includes wind turbines of the proposed Emlagh Wind Farm
55	View north-east from R147 (Boyne Valley Driving Route) opposite Fuel Station across the Blackwater Valley - please note this photomontage includes bird flight diverters attached to both earth wires (section between Towers 307 and 313)
56	View north-west from local road L7413 at Donaghpatrick Bridge - please note this photomontage includes bird flight diverters attached to both earth wires (section between Towers 307 and 313)
57	View west from the south western boundary of Donaghpatrick Church and graveyard - please note this photomontage includes bird flight diverters attached to both earth wires (section between Towers 307 and 313)
58	View south-west from local road L3409 near the T-Junction with local road L34091 in the townland of Donaghpatrick - please note this photomontage includes bird flight diverters attached to both earth wires (section between Towers 307 and 313)
59	View south-east across Blackwater Valley from Teltown Church - please note this photomontage includes bird flight diverters attached to both earth wires (section between Towers 307 and 313)
60	View south-west from bridge on local road L8009 crossing M3 motorway in the townland of Ardbraccan
61	View east from local road L4024 overlooking graveyard at Dunderry
62	View from local road L4008 east of Dunderry in the townland of Philpotstown
63	View north-east from R161 at the gates of the Meath GAA centre
64	View south, south-east from the upper landing of the steps at Bective Abbey across the Boyne Valley
65	View west, south-west from the upper landing of the steps at Bective Abbey across the Boyne Valley - please note this photomontage includes aviation marker spheres attached to one earth wire (section between Towers 355 and 357)
66	View south-west across the River Boyne from local road L4010 (Boyne Valley Driving Route) at Bective Bridge (Protected View and Prospect 86) - please note this photomontage includes aviation marker spheres attached to one earth wire (section between Towers 355 and 357)
67	View south-west from local road L2203 (Boyne Valley Driving Route) approximately 500m south-west of Bective

67A	View north-east from local road L2203 (Boyne Valley Driving Route) across the townland of Trubley in the direction of Bective Abbey - please note this photomontage includes aviation marker spheres attached to one earth wire (section between Towers 355 and 357)
68	View west, south-west from the Hill of Tara (Protected View and Prospect 44) at the Lia Fáil
69	View east, south-east from local road L22051 across the townland of Creroge
70	View east from local road L2205 across the townland of Crumpstown or Marshallstown
71	View east from the top of Trim Castle
72	View north-east from local road L6202 in the townland of Foxtown
73	View south-east from local road L2207 in the townland of Derrypatrick
74	View south-west from R125 at entrance gate of Culmullin Parish Church at T-Junction with local road L6206
75	View east, north-east from the R125 at a farm gate across the townland of Bogganstown
76	View north-east from the R125 in the townland of Leonardstown
77	View north-east from the R156 across the townland of Leonardstown approximately 500m south-east of the Mullagh Cross Roads

11.3 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

38 It is proposed to introduce large structures into the rural landscape along the length of the line route. These structures are similar in design to other existing high voltage electricity infrastructure in Ireland. The towers and associated infrastructure have the potential to impact on landscape character and visual amenity, particularly where the following factors occur:

- A large number of towers are visible from a single viewing point;
- The OHL crosses or is in close proximity to a scenic route;
- The OHL crosses a national or regional road;
- The OHL is visible along a wide expanse of open countryside of a dominantly natural character;
- The OHL crosses a skyline ridge;
- The OHL is in close proximity to a river or lake at a point where there is visibility from public roads; or
- The OHL crosses a visually conspicuous upland area.

11.4 EXISTING ENVIRONMENT

11.4.1 Landscape Context and Character

39 The study area for this appraisal forms part of the fertile agricultural lowlands of County Meath, drained by the rivers Boyne and Blackwater and long inhabited and altered by man. It includes the southernmost part of the extensive drumlin belt which stretches east-west across the island of Ireland and some very flat areas which tend to be more sparsely populated and, have in some areas, been planted with commercial forestry. The long history of human habitation and agriculture is reflected in a range of visible built heritage features and landscapes as well as widespread rural housing development, farm and commercial buildings, sports fields, a dense road and hedgerow network and existing utilities infrastructure. Main roads, including the M3, N2, R162, and R147 tend to travel in a north-west – south-east direction. The N51, N52 and R161 also form part of the transport network linking the main towns of Navan, Trim and Kells. An important feature of this generally low-lying landscape is the intervisibility between the small hills and the significance of this intervisibility over the millennia.

11.4.1.1 **Meath Landscape Character Assessment (MLCA)**

40 The MLCA was completed in 2007. The MLCA includes descriptions of the physical elements and visual characteristics of the landscape and classifies particular sections of the County in terms of *value, sensitivity, importance* and *capacity*. The *Meath County Development Plan* (CDP) (Section 8.4.3), states however, that it is only possible to accurately define Landscape Capacity on a case by case basis because it will vary according to the type and form of development, its location in relation to the Landscape Character Area (LCA) and its visibility from locations within the LCA.

41 The county level assessment carried out by Meath County Council therefore provides guidance to the more project-specific landscape assessment set out in this chapter. A *Draft National Landscape Strategy for Ireland 2014-2024* was issued by the Department of Arts, Heritage and the Gaeltacht for consultation in July 2014. The implementation of the current draft strategy would include a new National Landscape Character Map and new statutory guidelines on local Landscape Character Assessment.

42 Tables summarising the relevant general recommendations of the MLCA are contained in Tables 11.11 and 11.12, **Appendix 11.1, Volume 3D Appendices** of the EIS.

43 The location of the proposed development in relation to Landscape Character Areas and Landscape Character Types as set out in the MLCA is indicated in Figures 11.1 and 11.2, **Volume 3D Figures** of the EIS.

11.4.2 Landscape Value

44 The criteria for the assessment of landscape value in this EIS are set out in Table 11.2, **Appendix 11.1, Volume 3D Appendices** of the EIS. The factors that feed into a determination of landscape value are set out below as well as in **Section 11.4.3**, which describes the landscape value of each landscape unit.

45 The MLCA has recognised particular parts of the landscape as being of significant value – particularly the Boyne and Blackwater River valleys and an area termed the Tara Skryne Hills, as well as drumlin tops and the setting of heritage features. The proposed line route crosses both rivers and part of the extended elevated landform south of Tara and Skryne Hills. The Meath and Cavan CDPs, past and present, have recognised views worthy of protection as well as landmarks, walking routes and potential tourism areas. Other recreation routes are also promoted by the Irish Trails Office and Fáilte Ireland and a series of historic designed landscapes have been recorded by the NIAH.

11.4.2.1 **Meath County Development Plan 2013-2019**

46 There are several policies and objectives contained in the Meath CDP which focus on County's landscape, the most relevant are listed below.

- Strategic Policy LC SP 1, which aims to *"Protect the landscape character, quality and local distinctiveness of County Meath in accordance with relevant government policy and guidelines and the recommendations included in Meath Landscape Character Assessment (2007)."*
- Objective LC OBJ 1 –*To seek to ensure the preservation of the uniqueness of all landscape character types, and to maintain the visual integrity of areas of exceptional value and high sensitivity."*

47 The Meath CDP also proposes a *Draft Landscape Conservation Area* for the Hill of Tara, the extent of which is indicated in Figure 11.6, **Volume 3D Figures** of the EIS.

11.4.2.2 **Designated Landscape Routes and Features**

48 The following section identifies relevant designated viewpoints, routes and features within the study area for this appraisal. Their locations are shown in Figures 11.3-11.7, **Volume 3D Figures** of the EIS.

11.4.2.3 Protected Views and Prospects

49 A set of protected views and prospects have been recognised in the Meath CDP. It is an objective of Meath County Council, in LC OBJ 5 *“To preserve the views and prospects and the amenity of places and features of natural beauty or interest listed from development that would interfere with the character and visual amenity of the landscape.”*

50 These are views within County Meath that are expansive, iconic or panoramic and tend to demonstrate a key feature or valuable element of the landscape. The list of „Protected Views and Prospects‘ includes an allocation of significance - *local, regional* or *national*. The locations of protected views and prospects in relation to the line route are listed in Table 11.13, **Appendix 11.1, Volume 3D Appendices** of the EIS and shown in Figures 11.3-11.7, **Volume 3D Figures of the EIS.**

51 The closest protected views to the line route are VP19, *Whitewood Lough* (0.5km), VP86, *Bective Bridge* (0.9km), VP16 and VP17 in *Cruicetown* (1.1km and 1km respectively) and VP 21 at *Aghaloaghan* (1km). VP19, VP86 and VP21 are considered to be of local significance and VP17 is considered to be of regional significance.

11.4.2.4 Landmarks

52 Landmarks, as defined in the MLCA, are listed in Table 11.14, **Appendix 11.1, Volume 3D Appendices** of the EIS. These tend to be significant structures in the landscape or trees on the skyline and locations are indicated in Figures 11.3-11.7, **Volume 3D Figures** of the EIS.

53 The closest designated landmarks to the line route are a beech copse at a distance of approximately 0.8km and Bective Abbey at a distance of 0.9km.

11.4.2.5 Tourist Driving Routes

54 Relevant Driving Routes, which are defined in the MLCA and more recently as part of the Fáilte Ireland Boyne Valley Driving Route (2013), are listed in Tables 11.15 and 11.16, **Appendix 11.1, Volume 3D Appendices** of the EIS. Their locations are shown in Figures 11.3-11.7, **Volume 3D Figures** of the EIS.

55 The closest designated driving routes to the line route are those along the county roads connecting Jordanstown, Tara, Bective and Trim, the R147 between Kells and Navan, the R161 from Trim to the Hill of Tara and the Fáilte Ireland Boyne Valley Driving Route.

11.4.2.6 **Existing and Proposed Key Waymarked Paths and Cycle Routes**

56 Waymarked Paths and Cycle Routes are indicated on mapping in the MLCA. Signed routes are also indicated on the Irish Trails Office website www.irishtrails.ie. These routes are listed in Tables 11.17 and 11.18, **Appendix 11.1, Volume 3D Appendices** of the EIS and shown on Figures 11.3-11.7, **Volume 3D Figures** of the EIS**.**

57 The alignment crosses an on-road cycle route linking Tara and Trim, the on-road Táin Trial cycle route and a proposed walking route along the river Blackwater.

58 The route of the disused Navan to Kingscourt railway has the potential to be used as a Greenway for both walkers and cyclists. This route passes closest to the proposed development at Kilmessan, a distance of 2km.

11.4.2.7 **Potential Tourism Areas**

59 Refer to Figures 11.3-11.7, **Volume 3D Figures** of the EIS for locations of sites of ‗*Major Tourist Attractions, Secondary Tourist Attractions* and *Areas/Features with potential to be developed as a Tourist Attraction*‟ as listed in the MLCA.

60 The alignment passes through an ‗*Area with potential to be developed as a Tourist Attraction* at Teltown‘ as listed in Map 18 of the MLCA.

11.4.2.8 **Cavan County Development Plan 2014-2020**

61 The *Cavan County Development Plan 2014-2020* (the Cavan CDP) has undertaken a Categorisation of Cavan‘s landscape. It is not intended as a Landscape Character Assessment but the identified categories may form part of a future landscape character assessment. The categories have been chosen due to their physical characteristics and geomorphological features which make them distinctive in the county. The categories subdivide Cavan‘s landscapes into 5 Character Areas. The line route passes through Area 5 - *East Cavan Highlands.*.

62 Significant landscape features recognised by the Cavan CDP are listed in Table 11.19, **Appendix 11.1, Volume 3D Appendices** of the EIS, and their locations are shown on Figure 11.3, **Volume 3D Figures** of the EIS.

63 The closest to the line route are Lough an Leagh Gap at approximately 1.5km and Dun na Rí Forest Park at 2.8km distance.

11.4.2.9 Historic Designed Landscapes

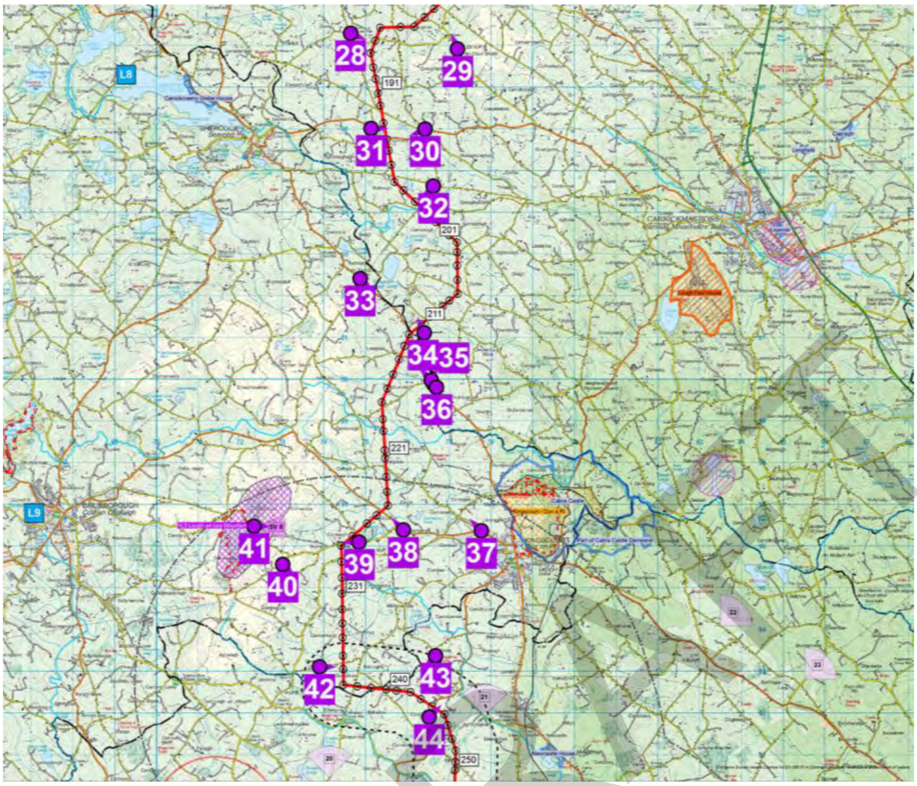
64 A number of Historic Designed Landscapes listed within the NIAH and described as having "*main features substantially present*", fall within 1km of the proposed line route; Brittas, Mountainstown, Philpotstown, Galtrim, Ardbraccan, Churchtown, Whitewood, Dowdstown and Culmullin. The line route crosses through Brittas Estate, Philpotstown and Mountainstown. These historic designed landscapes and others within the study area are set out in Table 11.20, **Appendix 11.1, Volume 3D Appendices** of the EIS along with their description of condition. Their locations are shown on Figures 11.3-11.7, **Volume 3D Figures** of the EIS.

11.4.2.10 Special Areas of Conservation and Natural Heritage Areas

65 While Special Areas of Conservation (SAC) and Natural Heritage Area (NHA) designations relate to ecological importance, their amenity potential is a factor in warranting evaluation in terms of visual and landscape effects (refer also to **Chapter 6** in this volume of the EIS). Table 11.21, **Appendix 11.1, Volume 3D Appendices** of the EIS lists the Ecological Designations within 5km of the proposed line route. Their locations are shown on Figures 11.3-11.6, **Volume 3D Figures** of the EIS**.** The alignment crosses the River Boyne and River Blackwater cSACs.

11.4.3 Detailed Description of the Landscape Units

11.4.3.1 Detailed Description of Landscape Unit E – Highlands of East Cavan



View 41 from Lough an Leagh Gap picnic area

View 42 from the L3533 at Drumbar

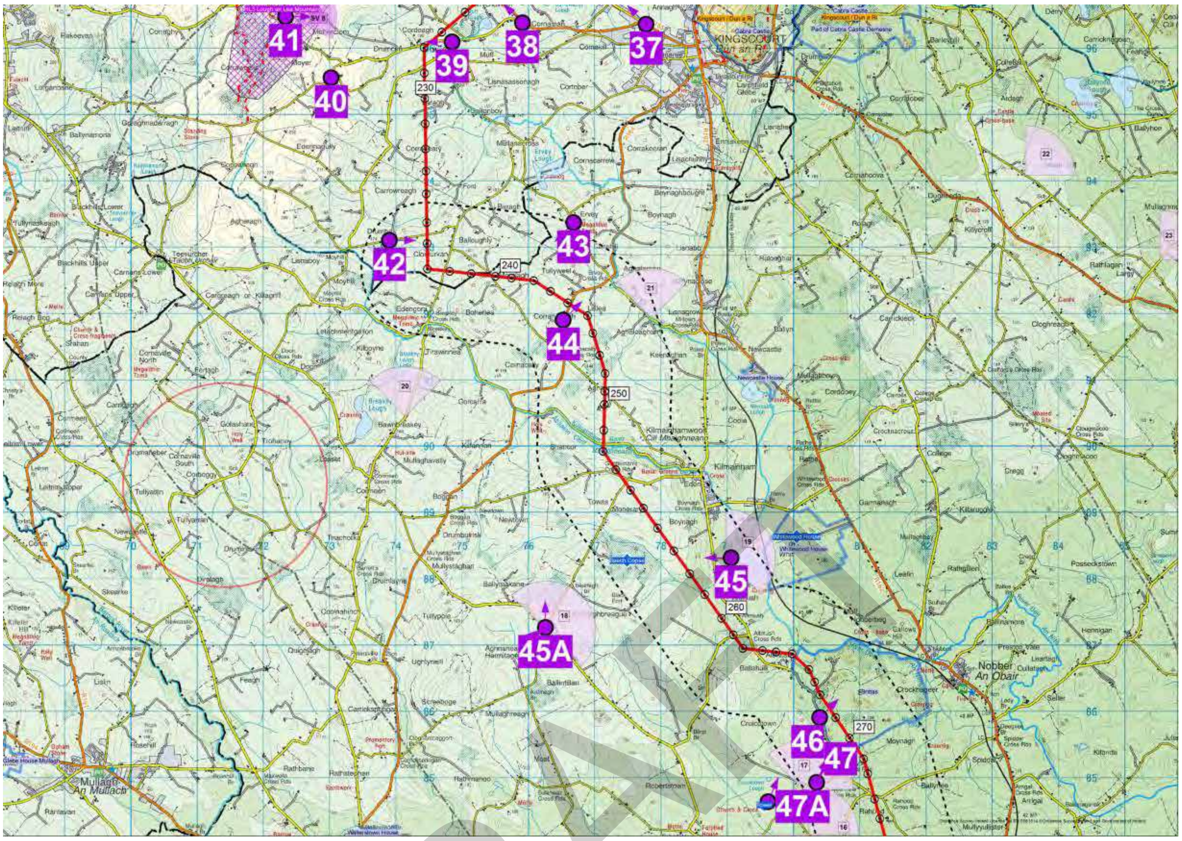
<table>
<tr><td colspan="3">Description
This unit includes two distinct landscape types - the low lying drumlins of the most eastern part of Cavan and the uplands of Lough an Leagh Mountain. Views tend to be enclosed within the drumlin landscape, but elevated positions provide panoramic views. Both the lowlands and the mountain are man-altered and contain agricultural patterns, a network of roads, houses and telecommunications and electricity infrastructure.</td></tr>
<tr><th>Value – Moderate / High</th><th>Capacity – Moderate</th><th>Sensitivity – High / Moderate</th></tr>
<tr><td>A protected viewpoint, SV8, is located at Lough and Leagh Gap which is also designated as a High Landscape Value Area. There is a picnic area beside the local road and a looped walking route leaves from here and passes the existing telecommunications towers on the mountain. The panoramic view from the top of the mountain takes in three windfarms to the west, stands of forestry and the man-altered landscape of the lowlands.

Dun na Rí Forest Park is located to the east of Kingscourt 2.5km from the line route.</td><td>This part of County Cavan has moderate capacity to absorb the landscape and visual effects of a transmission line.

The drumlins are more spaced out than ones further north in Cavan and have less steep slopes. This results in larger areas of visual enclosure. On the other hand there are areas of taller vegetation in this unit which produce a corresponding increase in visual screening by mature vegetation.</td><td>Views from the most elevated parts of the landscape unit at Lough an Leagh Mountain are most sensitive, although current views include a vast sweep of a changing rural landscape incorporating existing power and telecommunications infrastructure.

The lower lying areas are of moderate sensitivity considering the enclosure provided by vegetation and topography. The higher parts of drumlins, are however, more sensitive.</td></tr>
</table>

11.4.3.2 **Detailed Description of Landscape Unit F – North Meath Lakelands**



View 43 from the L68012 at Ervey showing the existing 220 kV transmission line

View 44 from the R164 at Corrananagh

View 47 from the L7405 at Cruicetown

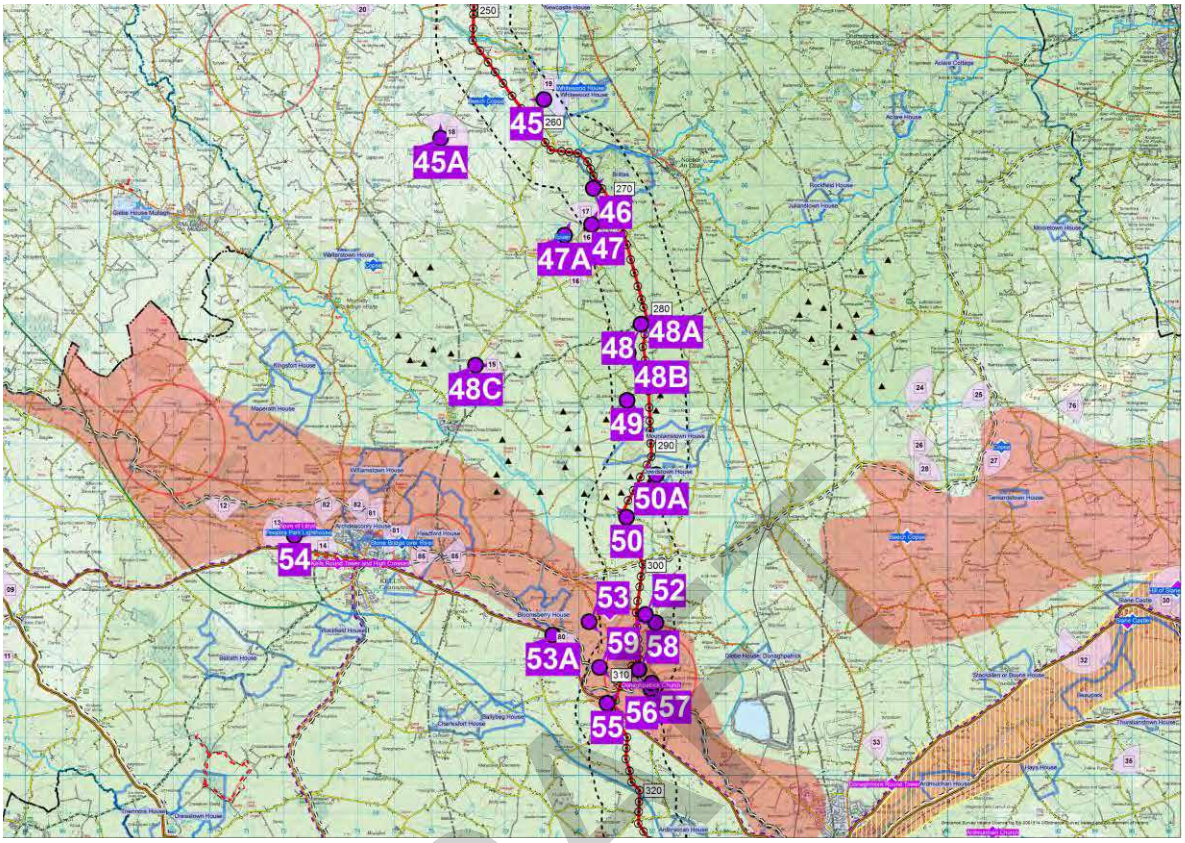
<table>
<tr><td colspan="3">Description
This unit contains a long inhabited, man-altered landscape which includes Nobber and Kilmainhamwood and low undulating agricultural lands, the Kilmainhamwood river valley, Whitewood lake, Brittas Estate, an existing 220 kV overhead line and increasing amounts of drumlins as one moves north.</td></tr>
<tr><th>Value - Moderate</th><th>Capacity – Low / Moderate</th><th>Sensitivity - Moderate</th></tr>
<tr><td>There are a number of protected viewpoints within the study area: VP19 at approximately 0.9km from the line route, VP21 and VP17 at 1km, VP18 at 2.3km and VP20 at 2.3km.

A Beech copse west of Whitewood Lough and an Estate House (Whitewood) immediately east of the Lough are designated as landmarks in the MLCA.</td><td>The MLCA states that this landscape unit has low potential capacity to accommodate a transmission line or towers because drumlin tops are highly visible and panoramic views to the wider landscape are an important characteristic that would be adversely affected by such development. There is higher capacity for absorbing a transmission line if sited at the lower lying areas within the landscape.</td><td>The North Meath Lakelands Landscape Unit is assigned a low sensitivity in the MLCA. However, considering the value of the area in the immediate vicinity of the line route, the landscape is considered to be of moderate sensitivity.

Accessible views from the tops of drumlins can be sensitive as these offer wide panoramas of the surrounding landscape. The lower lying parts of the landscape tend to be more enclosed.

The line route crosses the R164 in a perpendicular manner at Lislea.</td></tr>
</table>

11.4.3.2.1 Detailed Description of Landscape Unit G – North Navan Lowlands



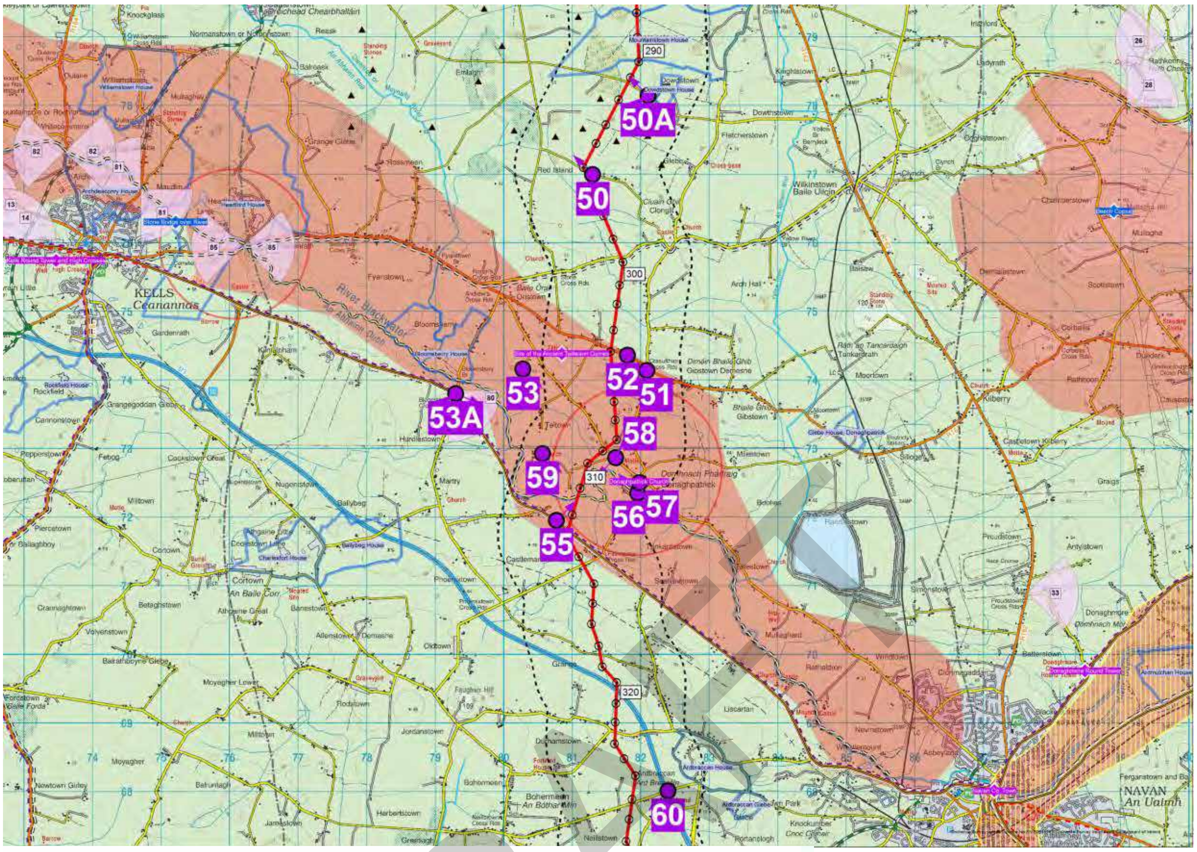
View 48 from the N52, approximately 1km west of Raffin Cross

View 49 from the L74112 at St. Johns Rath

View 50 from the L74115 at Red Island

Description		
This unit includes some of the more flat and remote parts of Meath. Hedgerows tend to be lower than normal. There are some small hills in the northern part of this unit, but the line route mainly passes through a man-altered flat landscape with areas of bog, large fields, forestry, houses and roads.		
Value - Moderate	**Capacity - Moderate**	**Sensitivity – Moderate**
A walking and cycling route runs along the road between Kells and Wilkinstown (Táin Trail), the line route would pass over this road. Protected viewpoint VP15 is at a distance of approximately 4.7km and VP16 is at a distance of approximately 1.1km from the alignment.	The MLCA states that the potential capacity of North Navan Farmland to absorb a transmission line ranges from low to high depending on specific location. The existence of areas of hedgerow and woodland provides screening opportunities along the proposed alignment. The landscape capacity along the alignment is therefore moderate.	North Navan Farmland is assigned a moderate sensitivity in the MLCA. The landscape is open and flat in areas with scope for wide visibility of structures. There is however screening potential provided by the areas of forestry and hedgerows where they are in place. The line route passes over the N52 in a perpendicular manner in an open part of the landscape.

11.4.3.3 Detailed Description of Landscape Unit H – Blackwater Valley



View 55 along the R147 (Boyne Valley Driving Route) opposite the fuel station looking across the Blackwater Valley

View 56 from the L7413 at Donaghpatrick Bridge

<table>
<tr><td colspan="3">Description
The man-altered river valley landscape is generally flat with land falling gradually towards the river and a large number of visible heritage features in the form of churches, stone bridges and earthworks as well as modern rural structures such as roads, houses, schools and utilities. The important archaeological landscape of Teltown is located between Donaghpatrick, Gibstown and Oristown. The roads are usually bordered by hedgerows, but where there are gaps, views out over gently rolling or flat agricultural lands are possible.</td></tr>
<tr><th>Value - High</th><th>Capacity – Low / Moderate</th><th>Sensitivity – Moderate / High</th></tr>
<tr><td>The Blackwater Valley is classified in the MLCA as being of very high value and regional importance. It is also described as being an area of potential Tourist Attraction. This particular section of the Blackwater is of high significance given its relationship with the cultural heritage associated with Donaghpatrick and Teltown / Tailteann.

The R147 is part of the Boyne Valley Driving Route.

There is a scenic viewpoint east of Kells (VP85), which lies just outside the 5km study area at Headford Bridge. VP80 is located 2.5km to the west of the line route at Bloomsbury cross.

The site of the ancient Tailteann Games, listed as an attraction along the Boyne Valley Driving Route is located approximately 600m to the west of the line route.

A walkway and cycle way is proposed along the River Blackwater.</td><td>The MLCA states that the Blackwater Valley has moderate capacity to absorb the landscape and visual effects of a transmission line provided that the potential loss of boundary walls and planting and damage to historic features and their setting is minimised.

This capacity arises from the screening potential provided by hedges and trees and the more robust character of the landscape as one moves away from the river. The immediate setting of heritage features would be more sensitive to new development, particularly in very flat and open parts of the landscape.

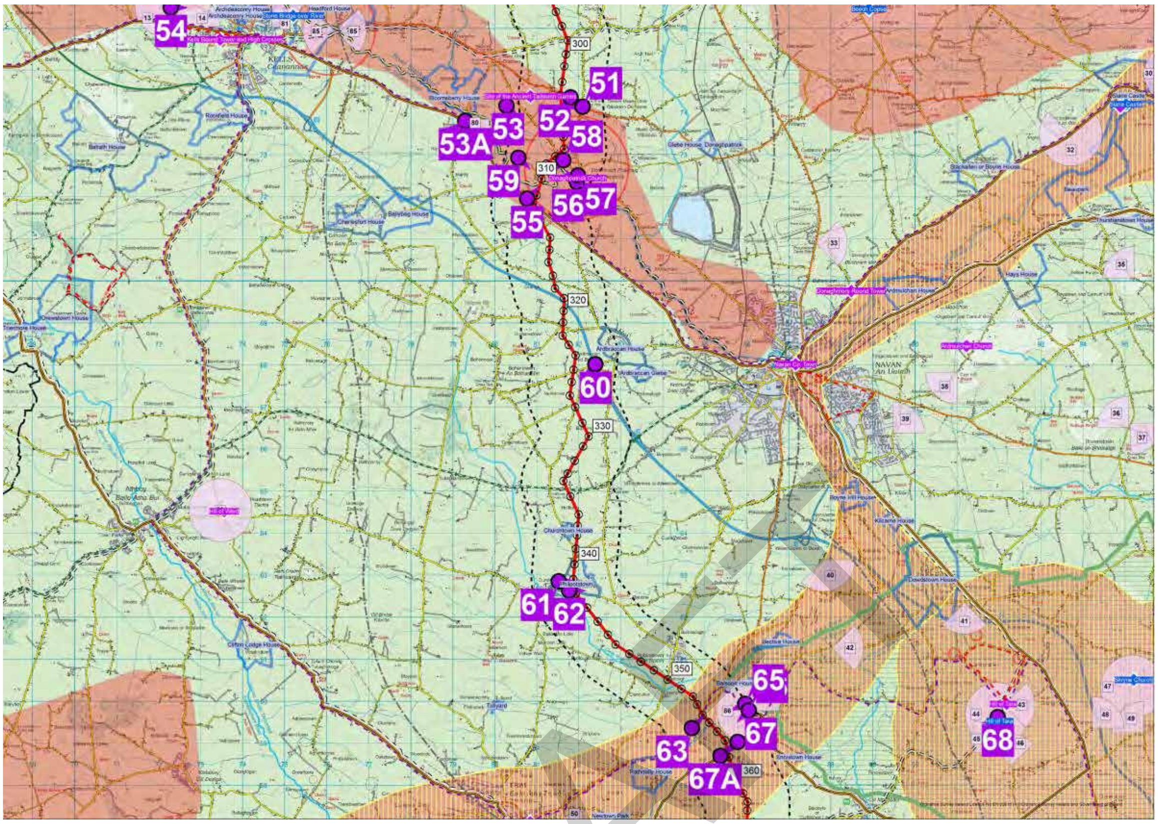
An existing 110 kV transmission line crosses the valley in an east west direction.</td><td>The Blackwater Valley is assigned a high sensitivity in the MLCA. This is appropriate in relation the immediate crossing of the river, but the influence of the river on landscape character diminishes beyond approximately 500m.

The line route crosses the river west of Donaghpatrick and the setting of heritage structures is sensitive.

The line route crosses the R147 approximately 600m north-west of Finnegan‘s cross roads and the R163 approximately 580m west of Crasulthan crossroads.

The farmland is quite open with large fields and these areas are sensitive to new development, but there remains a good hedgerow network in many places with some stands of mature trees.</td></tr>
</table>

11.4.3.4 Detailed Description of Landscape Unit I – West Navan Lowlands



View 60 from the L8009 overpass of the M3

View 62 from the L4008 east of Dunderry

<table>
<tr><td colspan="3">Description
The man-altered landscape consists of flat lowland farmland with a network of hedgerows and roads, including the M3 and the N51 and rural housing along many parts of the local road network. Vegetation tends to be high along roads and in hedgerows. The settlements of Dunderry and Robinstown are located approximately 400m from the line route. This unit also contains the River Claudy.</td></tr>
<tr><th>Value – Moderate</th><th>Capacity - Moderate</th><th>Sensitivity – Moderate</th></tr>
<tr><td>This landscape unit is described in the MLCA as having moderate value and local importance.

This area would be distantly visible from the viewpoint on the Hill of Tara at a distance of more than 6.5km.

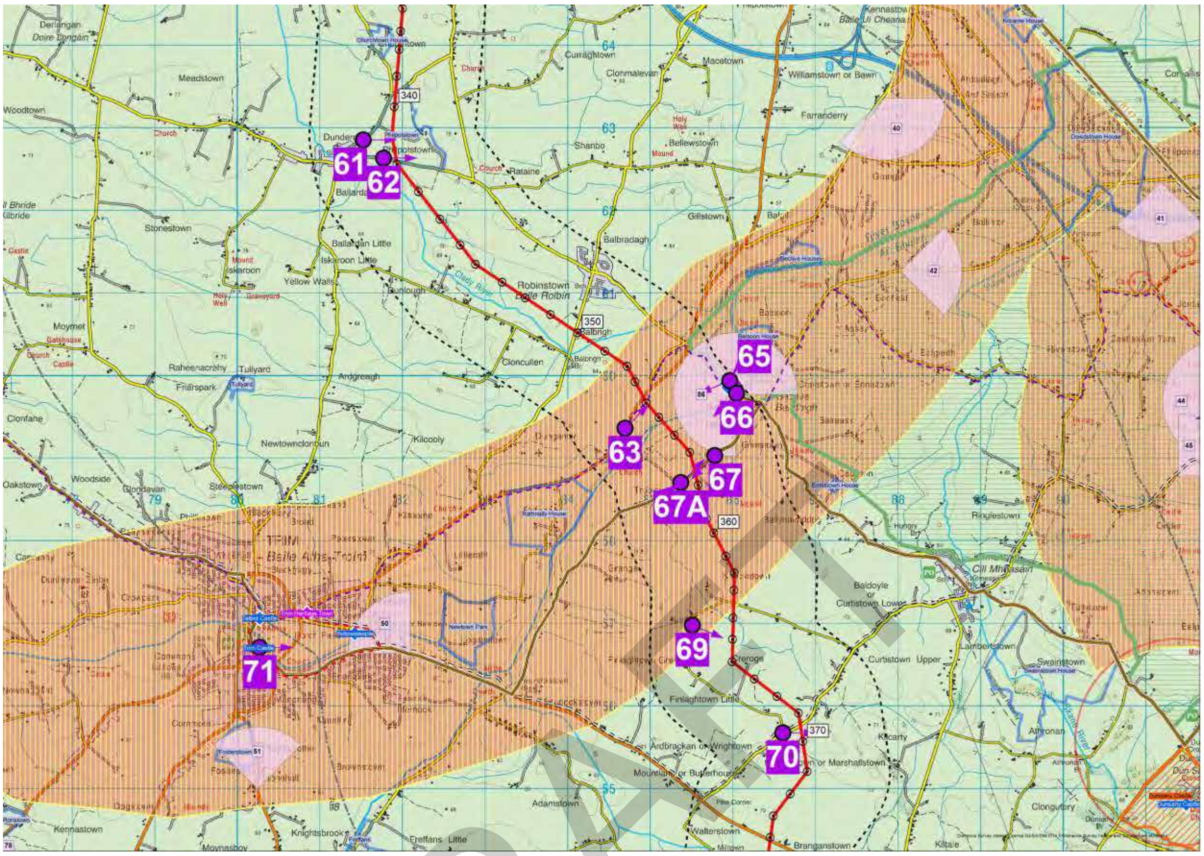
Ardbraccan House and demesne is located approximately 0.7km from the line route.</td><td>The MLCA states that within the parts of this landscape unit that have a strong landscape structure, the potential capacity to accommodate a transmission line would be moderate provided such development was not located in visually prominent areas.</td><td>The MLCA defines the sensitivity of this area as moderate.

Although the topography is flat, the extensive hedgerow network and roadside houses restrict views into the wider landscape in many areas.

In locations where vegetation is low or the viewpoint is even slightly elevated it is possible to experience a relatively wide viewshed.

The environs of settlements are sensitive as well as the setting of the River Claudy.</td></tr>
</table>

11.4.3.5 **Detailed Description of Landscape Unit J – Boyne Valley**



View 63 along the R161 north of the Boyne

View 64 from Bective Abbey steps

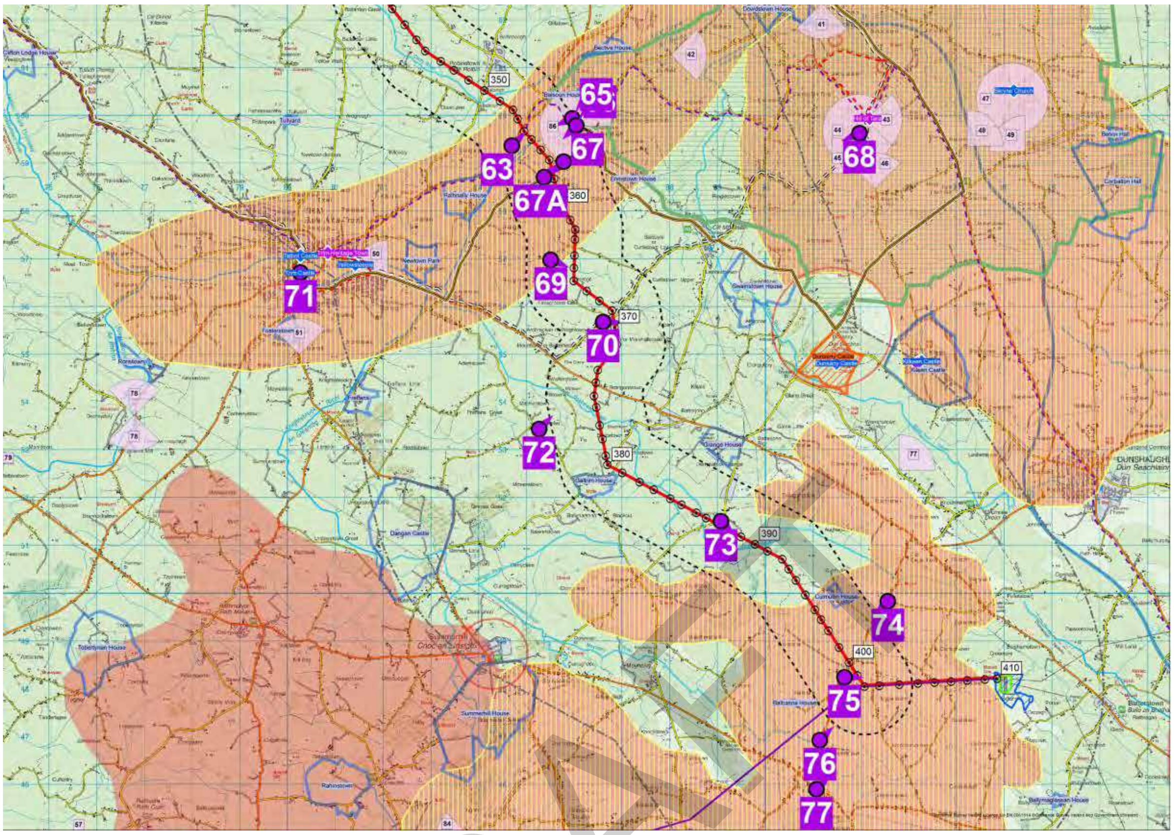
View 66 from Bective Bridge

View 67 from the L2203 (Boyne Valley Driving Route)

Description		
The River Boyne is both an important landscape feature and a part of the landscape with strong cultural associations. Its direct influence on landscape character is limited to the environs of the watercourse, and beyond this the landscape character becomes more influenced by roads, housing and other infrastructure. The relationship between Bective Abbey and the river is important.		
Value – Moderate / High	**Capacity – Low / Moderate**	**Sensitivity – Moderate / High**
The most significant aspect of this part of the Boyne Valley is the immediate vicinity of the river and the setting of Bective Abbey. The influence of the river itself on landscape character extends to a narrow strip of approximately 400m either side of the watercourse. Beyond this other factors have a greater influence on landscape character, such as roads, housing and the hedgerow network. The Boyne Valley is classified in the MLCA as being of Exceptional Value and International Importance. This landscape character area includes the Internationally recognised Brú na Bóinne complex, but the entire river has strong cultural significance. The views out from the bridge at Bective and from Bective Abbey are important and the protected view from the bridge (VP86) is designated as being of local significance by the Meath CDP. The Fáilte Ireland Boyne Driving Route runs along a local road just south of the river Boyne. The R161 is also a designated driving route. Both routes are crossed by the alignment. The river is not openly visible from these routes in this location.	The MLCA states that the Boyne Valley area has a low capacity to absorb a development such as a transmission line due to potential visual prominence within the valley and in relation to the setting of the river corridor. This is the case when the line would be seen in the context of the river valley or in views from Bective Abbey. Further away from the river there is more capacity for absorbing the visual impact of towers but the relatively flat nature of the landscape would result in high visibility of tall structures, particularly to the south of the river.	The Boyne Valley is classified in the MLCA as being of high sensitivity, and this is the case for the areas immediately adjacent to the River Boyne. However, as one moves away from the immediate river valley into more built up landscape, sensitivity reduces. The river itself is publicly most visible from the bridge crossing and from within the grounds of Bective Abbey. The landscape sensitivity is therefore categorised as high in the vicinity of the river valley and Bective Abbey and moderate in other parts of the character area, particularly in the vicinity of the R161. The landscape generally comprises a mix of large pasture / arable fields with a strong network of hedgerows which provide screening. However, immediately to the south of the river is a particularly open flat landscape with few or low hedgerows and a cluster of large farm buildings. Open and flat landscapes are more sensitive to new development. The MLCA describes Bective as *“a substantial ruin in an attractive landscape setting”*. There are panoramic views out from the front

There are three designated landmarks in Trim; Talbot Castle, Trim Castle and the Yellow Steeple. A *Landscape Conservation Area* has been proposed for the area surrounding the Hill of Tara including Bective. A draft outline has been drawn up but has not been adopted.		steps of Bective Abbey across the landscape to the south and west. When in the Abbey complex, the main landscape focus is towards the river to the east. This part of the landscape falls within the panoramic views from the Hill of Tara, but at a distance of over 6km.

11.4.3.6 Detailed Description of Landscape Unit K – Central Lowlands

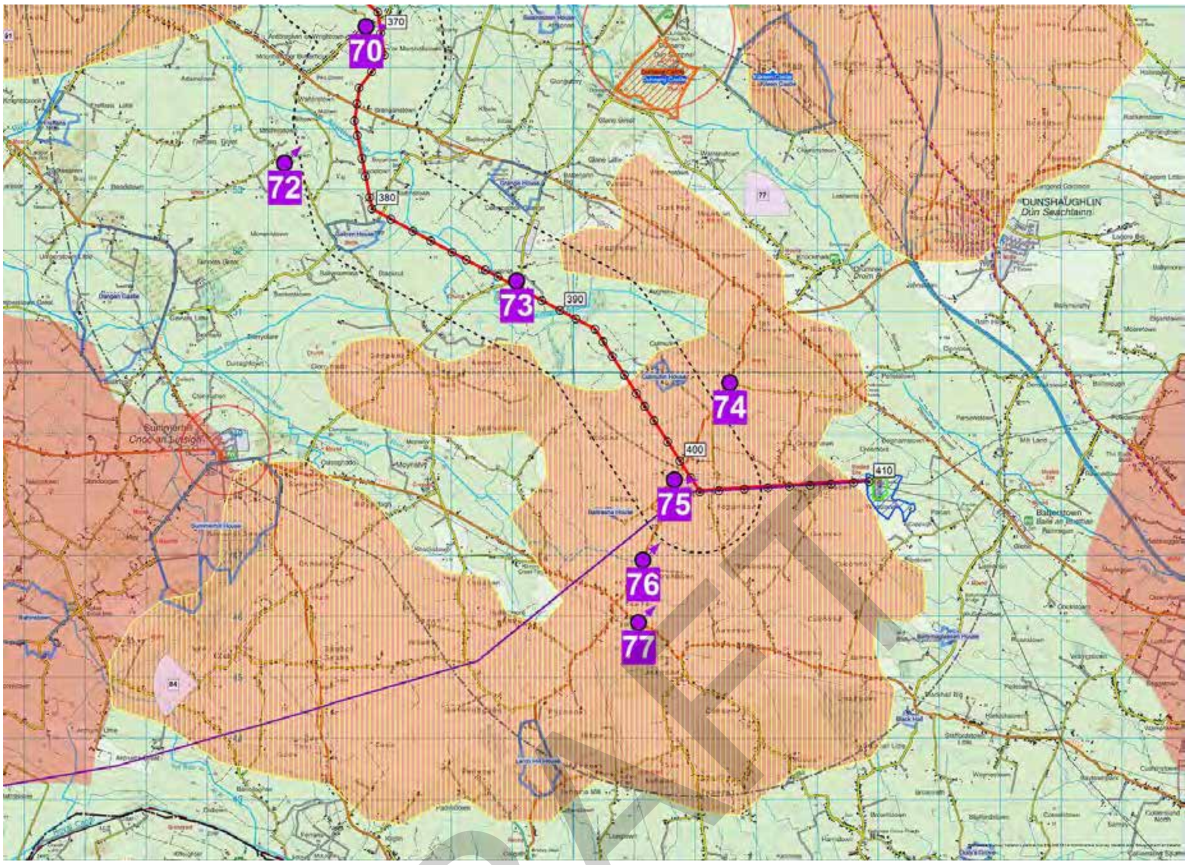


View 69 from the L22051 at Creroge

View 73 from the L2207 at Derrypatrick

Description The man-altered landscape in this unit is flat or gently undulating with medium to large sized fields and a number of small rivers. The land rises to a plateau around Collegeland and Arodstown where open panoramic views over an inhabited and farmed landscape are possible. An existing 220 kV OHL passes through this unit in a north south direction.		
Value - Moderate	**Capacity - Moderate**	**Sensitivity – Moderate**
Scenic Viewpoint VP77, at a distance of over 3km, looks away from the line route from the south-east of Warrenstown college towards Kileen Castle / Skane Valley. The MLCA shows a walking and cycle route travelling on roads from Trim to Kilmessan and on to Tara. The proposed development would cross this on-road walking and cycling route perpendicularly at Crumpstown. Further to the north-east, the viewshed from the Hill of Tara takes in the line route location but at a distance of over 6km.	This area has moderate capacity to absorb the landscape and visual effects of a transmission line due to the variety of land uses and a robust landscape structure. This is effective particularly where hedgerows prevent views into the wider landscape. The MLCA recommends that the visual quality of the landscape be maintained by avoiding development that would adversely affect short-range views between elevated areas and that particular regard should be paid to the retention of high quality landscapes on the tops of hills which are intervisible with the Hills of Tara and Skryne.	The Central Lowlands are classified in the MLCA as being of moderate sensitivity. This is considered appropriate for the areas in the immediate vicinity of the line route. The relatively flat nature of the landscape results in open visibility from some minor roads and means that wide views of the surrounding landscape are possible from even slightly elevated areas. Many of the roads are lined with hedgerows which limit views into the landscape. There are allotments at the townland of Finlaghstown which would experience open visibility of the line route. The line route crosses the R154 at Branganstown.

11.4.3.7 Detailed Description of Landscape Unit L–Tara Skryne Hills



View 75 from the R125 at Bogganstown showing existing 400 kV electricity line

View 76 from the R125 at Leonardstown showing existing 400 kV electricity line

<table>
<tr><td colspan="3">Description
The landscape in this unit forms part of the cluster of low flat hills that includes the Hill of Tara. The flat nature of the surrounding landscape means that panoramic views are possible even from slightly elevated areas. The landscape is man-altered and made up of medium to large scale fields within a network of roads including three regional roads and hedgerows which generally limit views into the landscape. The R156 passes through this unit but is not crossed by the line route. The line route crosses the R125. There is an existing 220 kV and 400 kV electricity line in this landscape unit.</td></tr>
<tr><th>Value – Moderate</th><th>Capacity - Moderate</th><th>Sensitivity – Moderate</th></tr>
<tr><td>The Tara Skryne Area is classified in the MLCA as being of Exceptional value and National importance and is classed as having International importance in the Meath CDP.

Exceptional value is defined in the MLCA as applying to “areas which are of outstanding value by nature of their dramatic scenic quality, unspoilt beauty, and conservation interests, historic, cultural or other associations that influence landscape value.” While this description is applicable to the publicly accessible summit of the Hill of Tara, it is considered that a value classification of Moderate is more applicable to the parts of the landscape unit that contains the line route.</td><td>While the sensitivity of this landscape unit to a transmission line is considered low in the MLCA, it is considered that there is greater capacity to absorb such proposals in the lower lying areas. The landscape capacity for this location is therefore considered moderate, as many potential views of the landscape are enclosed by roadside hedgerows. However, where views are possible, these would take in wide panoramas.</td><td>Although the Tara Skryne Area is classified in the MLCA as being of high sensitivity, the proposed location of the line route is quite different in character and use to the publicly accessible hills to the north-east.

High sensitivity is defined in the MLCA as applying to “a vulnerable landscape likely to be fragile and susceptible to change. Frequency and sensitivity of users is likely to be high. The introduction of change is likely to significantly alter the character to the extent that it would be difficult or impossible to restore”. While this is applicable to the publicly accessible areas associated with the Hills of Tara and Skryne, the areas through which the line route passes are of moderate sensitivity. This sensitivity arises due to the elevated nature of the landscape and the openness of some views. Many views are contained by hedgerows.</td></tr>
</table>

11.4.4 Summary – Landscape Value

66 Criteria for the determination of landscape value are set out in Table 11.2, **Appendix 11.1, Volume 3D Appendices** of the EIS. Landscape Value is determined by landscape quality / condition, scenic quality, rarity, representativeness, conservation interests, recreation value, perceptual aspects and associations. The units of highest landscape value are E (Highlands of East Cavan), H (Blackwater Valley) and J (Boyne Valley). The landscape features of most value within each landscape unit as defined in this EIS have been described in **Section 11.4.3**.

11.4.5 Summary - Landscape Capacity

67 Criteria for the determination of Landscape Capacity are set out in Table 11.3, **Appendix 11.1, Volume 3D Appendices** of the EIS**.**

68 The MLCA defines capacity as *"the ability that the landscape has to absorb specific types of development."*

69 The *Final Re-Evaluation Report* (April 2013) evaluated the general capacity of the landscape in a wider context in order to avoid the areas of least capacity to absorb a transmission line. The preferred line route that emerged from this study and that is the subject of this evaluation, traverses areas which generally have higher landscape capacity to absorb the transmission line within County Meath. The capacity for visual absorption of a transmission line is strongest in Sections E, G, H, I and K where capacity is defined as moderate. This is because of the dense network of hedgerows that screen views of the proposed developmental and a robust landscape character which is capable of accommodating change. Parts of Sections J (Boyne Valley), H (Blackwater Valley) and F (North Meath Lakelands) have lower capacity to accommodate a transmission line. In Sections J and H, this is due to the crossings of the Boyne and Blackwater Valleys and in section F due to the crossing of the upper parts of drumlins.

11.4.6 Summary – Sensitivity of the Landscape

70 The criteria for the determination of landscape and visual sensitivity are contained in Tables 11.4 and 11.5, **Appendix 11.1, Volume 3D Appendices** of the EIS.

71 The MLCA defines sensitivity of a landscape as its *"overall resilience to sustain its character in the face of change and its ability to recuperate from loss or damage to its components".* Sensitivity is evaluated using criteria ranging from Low to High and is based on the interaction of individual components such as landform, amount of evident historical features (time depth) and distribution of views. A highly sensitive landscape is likely to be vulnerable, fragile and

susceptible to change whereas a landscape with low sensitivity is likely to be more robust and tolerant of change.

72 The agricultural landscape of Meath and East Cavan is generally robust and has undergone continuous change including road and house building and introduction of utilities infrastructure while sustaining its underlying character and evident time depth. The scale of the proposed development, however, has the potential to cause significant alteration to the landscape character of areas in the near vicinity of the alignment – most noticeably at distances of up to 600-800m from the alignment. The most sensitive landscape features are located in Sections J (Boyne Valley) and H (Blackwater Valley) and the uplands of Section E (East Cavan Highlands) while F, G, I, K and L are of moderate landscape sensitivity

73 The highest visual sensitivity occurs where the changed landscape is an important element in the view. This generally occurs in views from residential properties, areas of settlement and viewpoints within valued or sensitive landscapes.

74 In general, the higher parts of the landscape (ridgelines and drumlins) are more sensitive to change than the lower lying areas and the parts of the landscape that are very flat with low vegetation are more sensitive to the inclusion of towers than the parts with a well-established hedgerow network and undulating land form.

Table 11.3: Summary of Landscape Value, Landscape Capacity and Sensitivity

Landscape Unit		Towers	Landscape Value	Landscape Capacity to absorb the proposed development	Landscape Sensitivity to the proposed development
E	Highlands of East Cavan	Tower 212 to 239 incl.	Moderate / High	Moderate	Moderate / High
F	North Meath Lakelands	Tower 240 to 272 incl.	Moderate	Low / Moderate	Moderate
G	North Navan Lowlands	Tower 273 to 302 incl.	Moderate	Moderate	Moderate
H	Blackwater Valley	Tower 303 to 312 incl.	High	Low / Moderate	Moderate / High

Landscape Unit		Towers	Landscape Value	Landscape Capacity to absorb the proposed development	Landscape Sensitivity to the proposed development
I	West Navan Lowlands	Tower 313 to 351 incl.	Moderate	Moderate	Moderate
J	Boyne Valley	Tower 352 to 363 incl.	Moderate / High	Low / Moderate	Moderate / High
K	Central Lowlands	Tower 364 to 395 incl.	Moderate	Moderate	Moderate
L	Tara Skryne Hills	Tower 396 to 402 incl.	Moderate	Moderate	Moderate

11.5 POTENTIAL IMPACTS

11.5.1 Do Nothing

75 In this scenario there will be no changes to the landscape, it will continue to change and evolve as a result of other factors.

11.5.2 Construction Phase

76 Chapter 7 of **Volume 3B** of the EIS details the approach to construction and the timescales involved in the various stages.

77 The potential landscape and visual effects arising at construction stage will occur due to removal of vegetation visible construction machinery, construction access routes, guarding positions (where the conductor is to be strung over roads and rivers and existing distribution lines) and increases in vehicular movements along roads. The visual effects of the construction of the towers will be temporary and locally significant. Construction is undertaken on a long linear site with isolated areas of activity which are limited in size. The landscape and visual impact of traffic movements will have a more widespread effect.

78 The nature of temporary access routes is described in detail in Chapter 7, **Volume 3B** of the EIS. This will result in localised and generally temporary landscape changes to the surface of fields and removal of hedgerow and tree vegetation but have little effect on the wider landscape.

79 The highest physical landscape effects will occur at construction stage. The removal of vegetation is described in **Section 11.5.3.9** of this chapter and in detail in **Chapter 6** and the potential effects on soil are described in detail in **Chapter 7 (**all in this volume of the EIS). The removal of vegetation and in particular of mature trees where required will have locally significant physical landscape effects. Trees adjacent to the towers or conductors with the potential to fall on the conductors will be cut back to ensure safety clearances. The nature of long term impact will depend on the success of vegetation reinstatement. Potential landscape impacts of compaction of soil includes failure of vegetation reinstatement and long term ruts.

11.5.3 Operational Phase

11.5.3.1 **Introduction**

80 This section describes the potential landscape and visual effects of the proposed development in the MSA. As set out in the previous section of this chapter, the landscape within the study area is generally robust and has proven to be capable of undergoing change without altering its underlying landscape character. The previous section has also identified the more sensitive locations and features within the study area, which would suggest that the highest landscape and visual effects will occur where:

- Towers are viewed in close proximity with no intervening screening;
- Towers are located on top of drumlins;
- Towers are located close to rivers; and
- Towers are located close to scenic or in panoramic viewpoints.

81 This section uses photomontages as a tool to assist in the description of potential effects. In order to provide an overview of the nature of visibility at various distances, **Section 11.5.2.2** contains a selection of representative photomontages. These illustrate the nature of visibility in typical landscapes crossed by the alignment. The nature of visibility is shown at distances of up to 500m, 500m-1km, 1-1.5km and beyond 1.5km. The effects in scenic viewpoints within 2km of the alignment are also shown.

82 **Section 11.5.3** follows with a detailed description of the landscape and visual effects within each landscape unit supported by a series of reduced scale photomontages for illustrative purposes.

83 A full-scale set of photomontages are contained in **Volume 3D Figures** of the EIS, and the detailed location and context of photomontage views are indicated on the mapping in Figures 11.3 – 11.7, **Volume 3D Figures** of the EIS**.** All photomontages locations are publically accessible.

11.5.3.2 Key Representative Photomontages

84 The area through which the proposed line route passes is widely inhabited, with many houses and farms located along a dense road and hedge network. Hedgerows and landform provide screening of electricity lines in many areas within the 5km study area. Due to the inhabited character of the landscape, visual receptors are spread throughout the study area. However, it is not possible or warranted to assess or represent visually all potential viewpoints and therefore this section sets out the nature of visibility at various distances; up to 500m, 500m-1km, 1-1.5km and beyond 1.5km as well as the effects on scenic viewpoints within 2km of the alignment. These represent the most open and ‘worst case” views of the proposed development at these types of distances.

85 Many of these views are only possible from extremely localised viewing points, but they are provided to offer an indication of the maximum potential effect. There will generally be less effect on the appearance and character of the landscape when seen from other areas within the study area.

86 The photomontages presented in this section are at a reduced scale and for illustrative purposes. Full scale photomontages and wireframes are contained in **Volume 3D Figures** of the EIS and their locations are shown on Figures 11.3-11.7, **Volume 3D Figures** of the EIS. The best way to use the photomontages as a tool is to view them in the field, in the location where the photograph was taken.

11.5.3.3 Viewing Distances of Up to 500m

87 The following reduced scale photomontages represent a range of ‘worst case‗open viewing experiences within 500m of the proposed development. For full-scale versions of these photomontages and accompanying wireframes and technical details, refer to **Volume 3D Figures** of the EIS.

88 Towers are dominant in close views where there is no intervening vegetation or topography, where there are gaps or lower than average roadside vegetation. Even at close distance, vegetation and topography can reduce the visibility or visible extent of towers from specific viewing locations. The nature of visibility changes when the towers are viewed against the sky or the land. In general terms, the visual impact is greatest when the transmission line is seen silhouetted against the sky and least when seen against a dark, visually complex background – such as trees or vegetated hills.

Photomontage 55 from a gap in the hedgerow along the R147, (Boyne Valley Driving Route) at a distance of 246m. This represents the difference in visibility of towers when seen against the land or sky and the effects within a shallow river valley.

Photomontage 58 from an open section of the L3409 west of Donaghpatrick, at a distance of 222m and looking across the Blackwater valley landscape. A tower is located behind the trees in this viewpoint. This represents the screening effects of trees in close proximity to the viewer even in winter and the effects when a number of towers are openly visible from a single viewing point, in this case five towers partly visible.

Photomontage 62 from an open section of the L4008 east of Dunderry, at a distance of 179m. This represents a worst case impact where a tower is located immediately adjacent to a road.

Photomontage 63 from an open section of the R161, at a distance of 407m. This represents an open view where three towers are partially visible against the skyline in a flat river valley landscape in the context of a regional road.

Photomontage 67 from the L2203 (Boyne Valley Driving Route) at a distance of 299m. This represents a view in particularly flat part of the landscape with relatively low roadside hedgerows.

Photomontage 73 from the L2207, at a distance of 136m. This represents an open view at close distance where there is a gap in the roadside vegetation.

11.5.3.4 Viewing Distances of 500m-1km

89 The following reduced photomontages represent a range of 'worst case_ open viewing experiences between 500m and 1km from the proposed development. For full-scale versions of these photomontages and accompanying wireframes and technical details, refer to **Volume 3D Figures** of the EIS**.**

90 Towers are still noticeable in the context of a wider landscape. The screening effects of vegetation, buildings and topography become more apparent. The towers are more conspicuous if sited on higher ground, or of the viewing point is elevated.

Photomontage 45 from the car park at Whitewood Lough, at a distance of 658m. This represents an open view where two towers are partly visible crossing a ridgeline from a public amenity site. A further two towers are screened by vegetation.

Photomontage 47 from the L7405 (vicinity of Scenic Viewpoint 17) in the townland of Cruicetown, at a distance of 782m. This represents an open view from a higher part of a drumlin landscape where four towers are visible against land and partially sky-lined.

Photomontage 49 from the L74112 at St. John's Rath, at a distance of 636m. This represents an open view where four towers are partly visible in the context of vegetation, farm buildings and against the skyline in a very flat landscape. A further two towers are screened by vegetation (please note this photomontage includes wind turbines of the proposed Emlagh Wind Farm).

Photomontage 51 from the L7414 at Crasulthan Cross Roads, Gibstown, at a distance of 514m. This represents an open view where one tower is partly visible and one screened by vegetation from a crossroads in a flat landscape in the context of vegetation, a graveyard, football pitch and against the skyline.

Photomontage 56 from the L7413 at Donaghpatrick Bridge, at a distance of 800m. This represents an open view where two towers on relatively higher ground are partly visible from a sensitive location in the context of vegetation and against the skyline. A number of towers travelling into the distance are screened by vegetation and topography.

Photomontage 60 from the L8009, an overpass of the M3, at a distance of 519m. This represents an open view where two towers are partly visible from an elevated location in the landscape in the context of vegetation and against the skyline.

11.5.3.5 **Viewing Distances of 1-1.5km**

91 The following reduced scale photomontages represent a range of ‘worst case open viewing experiences at 1-1.5km from the proposed development. For full-scale versions of these photomontages and accompanying wireframes and technical details, refer to **Volume 3D Figures** of the EIS**.**

92 It becomes difficult to discern the towers in the landscape and in most cases the towers are not visible at this distance. Towers are still distantly visible if seen traversing higher ground or over very flat ground where there is a gap in intervening vegetation.

Photomontage 72 from the L6202 at Foxtown townland at a distance of 1.28km. This represents an open view where eight towers are partly visible across a flat landscape with large fields in the context of vegetation and against the skyline. A further six towers are screened by vegetation.

Photomontage 74 from the R125 at the gates of Culmullin Parish Church, at a distance of 1.39km. This represents an open view through a gap in the roadside vegetation where two towers are partly visible across a flat landscape.

11.5.3.6 **Viewing Distances Greater than 1.5km**

93 The following reduced scale photomontages represent a range of ‘worst case_open viewing experiences greater than 1.5km from the proposed development.

94 It is not normally possible to distinguish the towers from the surrounding landscape at this distance unless they are seen against the sky in clear weather conditions.

Photomontage 68 from the Hill of Tara (Scenic Viewpoint 44) at a distance of 6.29km. This represents an open view where thirty three towers are theoretically visible from a sensitive elevated viewpoint across a flat landscape in the context of an existing 220 kV transmission line, houses and vegetation against a backdrop of land.

Photomontage 77 from the R156 south-east of Mullagh Cross Roads, at a distance of 2.53km. This represents an open view where two proposed towers are visible on higher ground across a flat landscape in the context of existing 400 kV and 220 kV transmission lines, vegetation and against the sky. A further two proposed towers are screened by vegetation.

11.5.3.7 **Recognised** Scenic Viewpoints within 2km of the Line Route

Photomontage 47 (panoramic) from Protected View and Prospect 17 located on the L7405 in the townland of Cuicetown at a distance of 782m. Four towers are visible, mainly against a background of hills, but the tops of two towers are visible on the skyline. The parts of towers seen against land are difficult to discern at this distance.

Photomontage 66 (panoramic) looking southwest across the River Boyne from Protected View and Prospect 86 at Bective Bridge at a distance of 905m. One tower is visible when looking across the water – a further six are screened by vegetation.

11.5.4 Description of Potential Landscape and Visual Effects on Landscape Units

95 The following section provides a description of the likely effects on the appearance and character of each of the parts of the landscape that have been identified as ‗Landscape Units' - areas of approximately similar character in the previous sections.

96 The potential landscape and visual effects within each landscape unit are described along with potential effects on identified sensitive landscape features or visual receptors. This information is summarised in a table, to assist readers in obtaining a comprehensive overview of all landscape and visual effects arising from this development. These impacts are then illustrated in the following section by referring to reduced scale photomontages. Full scale photomontages and wireframes are contained in **Volume 3D Figures** of the EIS. The best way to use the photomontages as a tool is to view them in the field, in the location where the photograph was taken.

11.5.4.1 Landscape Unit E – Description of Potential Landscape and Visual Effects

Landscape Unit E – Highlands of East Cavan		
		
Potential landscape and visual effects	This unit includes the environs of Lough an Leagh Mountain. The line route passes to the east of an area of designated landscape sensitivity in the Cavan CDP. The rest of the unit is generally low lying or undulating with high vegetation in many areas.	**POTENTIAL LANDSCAPE EFFECTS** • There will be changes to landscape character in the immediate vicinity of the proposed development (up to 600-800m from unscreened structures), but little alteration to the character of the wider landscape. • There will be no significant landscape effects on Lough an Leagh Mountain due to the distance from the alignment. **POTENTIAL VISUAL EFFECTS** • The transmission line will be partially visible from houses and roads up to 1-1.5km from the line where there is no intervening vegetation or topography and from relatively elevated areas such as Cornmagh. Visual effects reduce with distance, with the most significant effects occurring up to 600-800m from unscreened structures. The towers would be difficult to discern at distances beyond 800m.
Settlements	There are individual houses throughout the	Houses up to 1-1.5km from the line route, with no or little intervening screening vegetation will have potential visibility of the proposed

	countryside and along roads.	development. The most significant effects would be experienced in views up to 600-800m from the line route, where there is no or little intervening vegetation. The nature of visibility over distance is shown in **Section 11.5.2.2.** The towers would be difficult to discern at distances beyond 800m.
Scenic Viewpoints	SV8 at Lough an Leagh Mountain	There will be no significant effects on this viewpoint due to the distance from the proposed development.
Key Landscape Features	Dun na Rí Forest Park Lough an Leagh Mountain	There will be no effects on these identified key landscape features due to the distance from the proposed development.
Walking Routes	Lough an Leagh Dun na Rí Forest Park Castle Walk, Bailieborough	There will be no significant effects on these identified walking routes due to the distance from the proposed development.

Photomontage 41 looking east from Lough an Leagh Gap amenity site, 2.15km to the closest tower

Existing view

Proposed view including transmission line

Wireframe – blue shows what is in view, red shows what is screened by intervening vegetation or topography

Reason for selection: This view is recognised as significant in the Cavan CDP. It is a picnic area with an information board and the start of a walk to the highpoint of the mountain. It is a rare elevated panoramic view in this area. The towers visible are located in County Cavan.

Landscape effects - There is no discernible effect on the elevated character of this landscape or on the expansive sense of visibility.

Visual effects - The transmission line would not be discernible at this distance of 2.15km, or from the location higher up the mountain, particularly as the towers are seen against the backdrop of land, further reducing their visibility.

97 The following photomontages show the potential landscape and visual effects of the proposed transmission line within Landscape Unit E – Highlands of East Cavan. Full scale photomontages and wireframes are contained in **Volume 3D Figures** of the EIS.

Photomontage 42 from the L3533 in Drumbar, 575m to the closest tower

Existing view

Proposed view including transmission line

Wireframe – blue shows what is in view, red shows what is screened by intervening vegetation or topography

Reason for selection: This photomontage shows the transmission line at close distance crossing a local road in an area of low drumlins. The towers visible are in County Cavan, but represent similar views in the drumlin landscape of County Meath.

Landscape effects – While a tower is visible breaking the skyline, there is no significant effect on drumlin character or the experience of a rural road bordered by continuous hedgerow.

Visual effects - The transmission line would be visible in the context of a network of hedgerows and a landscape containing an existing power line. The vegetation and topography limits significant visual effects to unscreened areas within the immediate vicinity of towers (up to 400m), with visual effects decreasing rapidly with distance.

11.5.4.2 Landscape Unit F – Description of Potential Landscape and Visual Effects

<table>
<tr><td colspan="3">Landscape Unit F – North Meath Lakelands</td></tr>
<tr><td colspan="3"></td></tr>
<tr>
<td>Potential landscape and visual effects</td>
<td>This unit includes Nobber and Kilmainhamwood and contains a steep river valley, Whitewood Lough, Brittas Estate and increasing amounts of drumlins as one moves north. There is an existing 220 kV line running through this landscape unit.</td>
<td>POTENTIAL LANDSCAPE EFFECTS

There will be changes to landscape character in the immediate vicinity of the line (up to 600-800m from unscreened structures), but little alteration to the character of the wider landscape.
Towers 254 – 257 cross a ridgeline adjacent to a more low lying area with increased landscape effects on the open skyline of the ridgeline.
The line route through Brittas Estate will require the removal of areas of mature woodland and there would be significant localised physical landscape impact (see also Chapters 6 and 14 of this volume of the EIS).
The line route will cross Kilmainhamwood River Valley, but the enclosed nature of the valley limits the extent of effect on landscape character.
There are potential cumulative landscape effects arising from the interaction with the proposed Emlagh Wind farm. These are described in Chapter 10, Volume 3B of the EIS.

POTENTIAL VISUAL EFFECTS

The transmission line will be partially visible from houses and roads up to 1-1.5km from the line where there is no intervening vegetation or topography. Visual effects reduce with distance, with the most significant effects occurring up to 600-800m from unscreened structures. The towers would be difficult to discern at distances beyond 800m
Towers are more visible over wider distances when on higher ground, so there would be intermittent and distant (1km) views of the towers from parts of Kilmainhamwood Village. The visual effects in this location would not be significant. The line route does come closer to the road and

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		houses south of Kilmainhamwood and in unscreened locations, significance of visual effects will increase with proximity. • There are potential cumulative visual effects arising from the interaction with the proposed Emlagh Wind farm. These are described in Chapter 10, **Volume 3B** of the EIS.
Settlements	Nobber, Kilmainhamwood and individual houses throughout the countryside and along roads.	• There would be no significant visual effects on either settlement due to the distance from the development and the screening effects of vegetation and topography. • Houses up to 1-1.5km from the line route, with no or little intervening screening vegetation will have potential visibility of the proposed development. The most significant effects would be experienced in views up to 600-800m from the line route, where there is no or little intervening vegetation. The nature of visibility over distance is shown in **Section 11.5.2.2**, the towers would be difficult to discern at distances beyond 800m.
Protected Views and Prospects	VP16 county road to north of Moydorragh VP17 county road between Mullagheven Cross Roads and Gorrys Cross Roads VP18 county road between Mullystaghan and Robertstown VP19 car park at Whitewood Lough VP20 county road between Cormeen and Breaky Bridge VP21 county road between Miltown Cross Roads and Ervey Cross Roads VP22 county road between Corratober Bridge and Rathlagan VP23 county road between R165 and	• A number of towers will be visible from the vicinity of VP 17 which is described as ~~“~~*expansive views to distant locations to north and to views of Carlingford, Mourne Mountains to the north-east. Highly varied topography. Woodland in lowlands*” and is of regional importance. The nature of visibility of the proposed development is shown in Photomontage 47. This photomontage shows that, while four towers are partially visible and two are visible on the skyline, this is within the context of a complex rural landscape with screening provided by topography and vegetation. The expansive view available from this particular location will not be significantly affected by the proposed development. • The line route will be visible from the location of VP19 at Whitewood Lough, but in the opposite direction to the protected view which looks towards the lake and Whitewood House, see Photomontage 45 **Volume 3D** Figures of the EIS. • There will be no effects on any other of these recognised viewpoints due to the distance from the proposed development and the screening effects of vegetation and topography see Photomontage 45A, **Volume 3D** Figures of the EIS.

	Mullaghmore	
Key Landscape Features	Estate House, Beech Copse	• There would be no significant effects on the physical character or setting either of these recognised landscape features due to the distance between them and the proposed development. The alignment will be visible from the Estate House at Whitewood in the context of an inhabited rural landscape.
Historic Designed Landscapes with main features substantially present	Brittas Estate, Whitewood House	• Towers 266 - 270 pass through Brittas Estate which is a recognised Historic Designed Landscape with *“main features substantially present”.* The line route avoids the central designed features of the demesne and passes through areas of mature and newly planted woodland. Approximately 1.1ha of mature woodland may be required to be removed to allow for a maximum 74m wide corridor. The landscape effects will be significant, as Brittas Estate is a relatively intact example of a designed landscape of the period. The line route runs parallel to the public road in this location, while the road is generally heavily vegetated, intermittent views into the estate are possible. The conductors would be visible crossing the entrance road as shown in Photomontage 46 and towers would be partially visible from the local road adjoining the estate in locations where boundary vegetation is thin. Most of the estate boundary with the public road is well vegetated. An on-site appraisal of the visual effects within the estate was not possible. The visual effects are therefore localised but significant. (see also **Chapters 6** and **14** of this volume of the EIS). 

98 The following photomontages show the potential landscape and visual effects of the proposed transmission line within Landscape Unit F – North Meath Lakelands. Full scale photomontages and wireframes are contained in **Volume 3D Figures** of the EIS.

Photomontage 43 from L68012 at Ervey, 1.06km to the closest tower

Existing view

Proposed view including transmission line

Wireframe – blue shows what is in view, red shows what is screened by intervening vegetation or topography

Reason for selection: This photomontage shows a view from an elevated position as it crosses the higher parts of a drumlin landscape. This is one of the few opportunities for viewing the proposed line in conjunction with the existing 220 kV line. Most potential views such as this are screened by roadside vegetation or topography.

Landscape effects – The addition of a second powerline into this landscape intensifies the existing landscape character of a farmed drumlin landscape which contains high voltage powerlines.

Visual effects - The transmission line would be visible in the context of a network of hedgerows, drumlins and a landscape containing an existing power lines. The vegetation and topography limits significant visual effects to unscreened areas within the immediate vicinity of towers (up to 800m) and from more elevated locations such as this one, where longer distance views are possible.

Photomontage 44 from R164 at Corrananagh, 271m to the closest tower

Existing view

Proposed view including transmission line

Wireframe – blue shows what is in view, red shows what is screened by intervening vegetation or topography

Reason for selection: This photomontage shows the transmission line at close distance crossing a local road in an area of low drumlins.

Landscape effects - The proximity to the tower and the tower's location close to the road results in an alteration to the character of the landscape up to 600-800m of the proposal. This effect is significant in terms of the introduction of a new scale of structure into the landscape in this specific location. There is an existing 220 kV powerline in the wider landscape and so in a wider context the proposal represents an intensification of an established landscape character.

Visual effects - The transmission line would be visible in the context of a network of hedgerows and low hills. The vegetation and topography limits significant visual effects to areas in the immediate vicinity of towers (up to 600-800m), with visual effects decreasing rapidly with distance.

Photomontage 45 from Whitewood Lough car park, 658m to the closest tower

Existing view

Proposed view including transmission line

Wireframe – blue shows what is in view, red shows what is screened by intervening vegetation or topography

Reason for selection: This photomontage shows the transmission line crossing a ridgeline in an area of low drumlins.

Landscape effects – There is a change to the open character of the ridgeline as a tower is seen against the skyline. The existing trees visible on the ridgeline are similar in scale and therefore from this location, the landscape effects are lower than if the ridgeline was completely open.

Visual effects – Part of the transmission line would be conspicuously visible against the skyline of a low ridge from a public car park at Whitewood Lough. There is a protected view in this location looking in the opposite direction over the lake and towards Whitewood House. The protected view is not affected.

11.5.4.3 **Landscape Unit G – Description of Potential Landscape and Visual Effects**

Landscape Unit G – North Navan Lowlands

Potential landscape and visual effects	There are some small hills in the northern part of this unit, but the line route mainly passes through a man-altered flat landscape with areas of bog, large fields, forestry, houses and roads. The bog areas are remote and sparsely occupied, forming a contrast to the wider, more densely populated landscape of Meath. Note that the image above shows the proposed Emlagh Wind Farm.	**POTENTIAL LANDSCAPE EFFECTS** • There will be changes to landscape character in the immediate vicinity of the line (up to 600-800m from unscreened structures), but little alteration to the character of the wider landscape. • The currently remote and empty character of the flat bog areas west of Wilkinstown will change with the introduction of large electricity infrastructure. • There are potential cumulative landscape effects arising from the interaction with the proposed Emlagh Wind farm. These are described in Chapter 10, **Volume 3B** of the EIS. **POTENTIAL VISUAL EFFECTS** • The electricity line will be partially visible from houses and roads up to 1-1.5km from the line where there is no intervening vegetation or topography. Visual effects reduce with distance, with the most significant effects occurring up to 600-800m from unscreened structures. The towers would be difficult to discern at distances beyond 800m. Longer distance views are more likely in the flat parts of the landscape. • The transmission line will be openly visible at the crossing point of the N52, however, the crossing is perpendicular so the driver would briefly experience visibility of towers. • There are potential cumulative visual effects arising

		from the interaction with the proposed Emlagh Wind farm. These are described in Chapter 10, **Volume 3B** of the EIS**.**
Settlements	Carlanstown, Wilkinstown and individual houses throughout the countryside and along roads.	• There would be no significant visual effects on Carlanstown or Wilkinstown due to the distance from the proposed development. Houses up to 1-1.5km from the line route, with no or little intervening screening vegetation will have potential visibility of the proposed development. The most significant effects would be experienced in views up to 600-800m from the line route, where there is no or little intervening vegetation. The nature of visibility over distance is shown in **Section 11.5.2.2**. The towers would be difficult to discern at distances beyond 800m.
Protected Views and Prospects	VP15 County road between Carlanstown and Ardlonan VP16 County road to north of Moydorragh	There will be no effects on these recognised scenic viewpoints due to the distance from the development and screening effect of vegetation.
Key Landscape Features	Bog, areas of woodland	The remote character of the bog areas will change with the introduction of large and openly visible towers into the landscape.
Driving, Cycling & Walking Routes	The Táin Trail – long distance on-road cycle route	While the transmission line would be briefly visible crossing this route east of Oristown, considering the variation of landscape character along the route and the screening vegetation at the crossing point, there would be no significant effects on the character of the cycling route.
Historic Designed Landscapes with main features substantially present	Mountainstown House, Dowdstown	The line route crosses through Mountainstown Estate but through a part that is currently under pasture and commercial forestry. While it was not possible to assess the visual effects within the estate, it is unlikely that there are significant effects on the core designed parts of the historic landscape in the vicinity of the house. Mature trees in the vicinity of the line route, will be lopped, trimmed or removed to allow required clearance (refer to **Chapters 6** and **14** of this volume of the EIS for further details)

99 The following photomontages show the potential landscape and visual effects of the proposed transmission line within Landscape Unit G – North Navan Lowlands. **F**ull scale photomontages and wireframes are contained in **Volume 3D Figures** of the EIS.

Photomontage 48 from the N52, west of Raffin Cross, with little screening along the road, 194m to the closest tower

Existing view

Proposed view including transmission line

Wireframe – blue shows what is in view, red shows what is screened by intervening vegetation or topography

Reason for selection: This photomontage shows the crossing of the N52 at close distance, where there is no roadside screening.

Landscape effects - The crossing is perpendicular so the driver would briefly experience visibility of towers which would not be uncharacteristic when seen in the context of a busy road.

Visual effects - The transmission line would be openly visible as this part of the landscape contains large fields and a flat or gently undulating topography. The vegetation and topography limits significant visual effects to unscreened areas within the immediate vicinity of towers (up to 600-800m), with visual effects decreasing rapidly with distance.

Photomontage 49 from the L74112, a generally flat landscape with large fields at St. John's Rath, 636m to the closest tower(please note this photomontage includes wind turbines of the proposed Emlagh Wind Farm).

Existing view

Proposed view including transmission line

Wireframe – blue shows what is in view, red shows what is screened by intervening vegetation or topography

Reason for selection: This photomontage shows an open view of the transmission line, at a distance of approximately 600m, crossing an open flat landscape with large fields.

Landscape effects – The transmission line forms part of a changing rural landscape. Landscape effects in a flat landscape are greatest up to 600-800m from unscreened towers. At this distance of 636m, the trees and structures start to absorb the proposal into a broader rural landscape character.

Visual effects – Due to the flat nature of the landscape, the gap in the hedge and the large field**,** the upper parts of the transmission line would be visible. Such views would be discernible intermittently in this landscape although the relative remoteness of this area results in low levels of visual receptors.

Photomontage 50 from the L74115, over a flat open landscape at Red Island, 172m to the closest tower(please note this photomontage includes wind turbines of the proposed Emlagh Wind Farm)

Existing view

Proposed view including transmission line

Wireframe – blue shows what is in view, red shows what is screened by intervening vegetation or topography

Reason for selection: This photomontage shows a very open view at close distance where a tower is located immediately adjacent to a road in a flat landscape with low roadside hedgerows.

Landscape effects – This relatively unpopulated landscape west of Wilkinstown would experience a change to the remote and empty landscape character arising from the introduction of a new scale of structure to the landscape. The underlying flat characteristics of the topography or locally distinctive nature of the vegetation will not change.

Visual effects - The transmission line would be openly visible in a flat landscape with relatively few other structures in view. Visibility will therefore be possible over longer than normal distances. However this is balanced by the fact that there are few visual receptors in this relatively uninhabited landscape.

11.5.4.4 Landscape Unit H – Description of Potential Landscape and Visual Effects

Landscape Unit H – Blackwater Valley

<table>
<tr>
<td>Potential landscape and visual effects</td>
<td>This is a man-altered river valley landscape which is generally flat with land falling gradually towards the river and a large number of visible heritage features in the form of churches, stone bridges, earthworks and demesne landscapes. The important archaeological landscape of Teltown is located between Donaghpatrick, Gibstown and Oristown. The farmland is quite open with large fields, but there is a strong hedgerow network in many places. An existing 110 kV transmission line crosses the valley in an east west direction.</td>
<td>POTENTIAL LANDSCAPE EFFECTS

There will be changes to landscape character in the immediate vicinity of the line (up to 600-800m from unscreened structures), but little alteration to the character of the wider landscape.
There will be changes to the character of the Blackwater River Valley up to 600-800m of the crossing point, particularly where the landscape is open. Tree cover provides screening within parts of the valley.
The transmission line will be visible in conjunction with and from some specific views of above ground heritage structures and the transmission line will pass through the Teltown archaeological landscape which has been identified as an area of potential tourism interest (see also Chapters 4 and 14 of this volume of the EIS).
There are potential cumulative landscape effects arising from the interaction with the proposed Emlagh Wind farm. These are described in Chapter 10, Volume 3B of the EIS.

POTENTIAL VISUAL EFFECTS

The transmission line will be partially visible from houses and roads up to 1-1.5km from the line where there is no intervening vegetation or topography. Visual effects reduce with distance, with the most significant effects occurring up to 600-

</td>
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</table>

		800m from unscreened structures. The towers would be difficult to discern at distances beyond 800m. Longer distance views are more likely in the flat open parts of the landscape. • The transmission line will be openly and briefly visible at the crossing points of the R147, which is part of the Boyne Valley Driving Route and R163. • There are potential cumulative visual effects arising from the interaction with the proposed Emlagh Wind farm. These are described in Chapter 10, **Volume 3B** of the EIS.
Settlements	Donaghpatrick and Gibstown and individual houses throughout the countryside and along roads.	• The transmission line will not be visible from the centre of Donaghpatrick due to the concentration of trees and buildings. • Photomontage 57 shows the view from Donaghpatrick church and graveyard where open views are possible. • The transmission line would be visible from parts of Gibstown where there are open views westwards (see Photomontage 51). • Houses up to 1-1.5km from the line route, with no or little intervening screening vegetation will have potential visibility of the proposed development. The most significant effects would be experienced in views up to 600-800m from the line route, where there is no or little intervening vegetation. The nature of visibility over distance is shown in **Section 11.5.2.2**. The towers would be difficult to discern at distances beyond 800m.
Protected Views and Prospects	VP80 Bloomsbury Bridge VP85 Headford Bridge	There would be no significant effect on the open scenic view VP80 (shown below) or VP85 due to the distance from the development, see Photomontage 53A, **Volume 3D Figures** of the EIS. 

Key Landscape Features	People's Park Lighthouse, heritage structures, Blackwater Valley	• The line route will not be visible from the People's Park Lighthouse at Kells. • The transmission line will be visible in conjunction with some specific views of above ground heritage structures and the transmission line will pass through the Teltown archaeological landscape (see also **Chapter 14** of this volume of this EIS). • There will be changes to the character of the Blackwater River Valley up to 600-800m of the crossing point, particularly where the landscape is open. Tree cover provides screening within parts of the valley.
Driving, Cycling & Walking Routes	The R147 between Kells and Navan (driving route) Boyne Valley Driving Route (Fáilte Ireland 2013) Proposed route along the river Blackwater from Navan to Kells (Walking / Cycling route)	• The line route crosses the R147 which forms part of the Boyne Valley Driving Route. The transmission line will be openly visible at the crossing point of the R147 for a short distance in the context of a man-altered landscape (see Photomontage 55). • The line route crosses the proposed walking route along the Blackwater River. Tree cover would provide screening along parts of this walk, although any removal of mature trees in the vicinity of the line route would result in significant physical landscape effects.

100 The following photomontages show the potential landscape and visual effects of the proposed transmission line within Landscape Unit H – Blackwater Valley. Full scale photomontages and wireframes are contained in **Volume 3D Figures** of the EIS.

Photomontage 52 from the R163 west of Crasulthan Cross Roads, 252m to the closest tower

Existing view

Proposed view including transmission line

Wireframe – blue shows what is in view, red shows what is screened by intervening vegetation or topography

Reason for selection: This photomontage shows the crossing of the R163 between Oristown and Gibstown at close distance, where there are low hedgerows.

Landscape effects - The crossing is perpendicular so the driver would briefly experience visibility of towers which while dominant in close proximity, would not be uncharacteristic when seen in the context of a busy road and existing powerlines.

Visual effects - The transmission line would be openly visible as this part of the landscape contains large fields and in some areas, low hedgerows. The tower is located immediately adjacent to the road and is therefore very conspicuous at close distance. Vegetation in the wider landscape limits significant visual effects to unscreened areas within the immediate vicinity of towers (up to 600-800m). Visual effects decrease rapidly with distance.

Photomontage 53 from the L34097 across the townland of Teltown, 1.31km to the closest tower

Existing view

Proposed view including transmission line

Wireframe – blue shows what is in view, red shows what is screened by intervening vegetation or topography

Reason for selection: This photomontage is a typical open view of the transmission line within the Blackwater Valley and Teltown archaeological landscape at a distance of just over 1km, crossing an open flat landscape with large fields.

Landscape effects – The transmission line forms part of a rural landscape. Landscape effects in a flat landscape are greatest up to 600-800m of unscreened structures. At this distance of 1.31km, while the towers are partially visible, the proposal is absorbed into a broader rural landscape character.

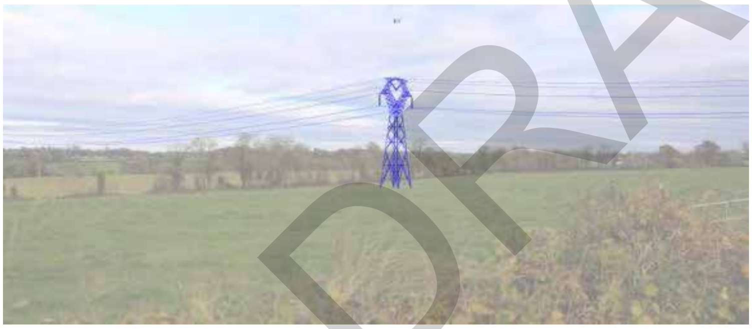
Visual effects – Due to the flat nature of the landscape, the gap in the hedge and the large field**,** the upper parts of the transmission line would be very distantly visible. Such views would be possible intermittently in this landscape although at this distance they would not be discernible.

Photomontage 55 from the R147 across the Blackwater Valley, 246m to the closest tower

Existing view

Proposed view including transmission line

Wireframe – blue shows what is in view, red shows what is screened by intervening vegetation or topography



Reason for selection: This photomontage shows the transmission line at close distance crossing the R147 where there is no roadside screening. This road is part of the Boyne Valley Driving Route.

Landscape effects - The crossing is perpendicular so the driver would briefly experience visibility of towers which would not be uncharacteristic when seen in the context of a busy road. While the land falls away northwards towards the River Blackwater, the immediate environs of this road do not have a discernible river valley character.

Visual effects - The transmission line would be openly visible as this part of the landscape contains large fields and a flat or gently undulating topography. The vegetation and topography limits significant visual effects to unscreened areas within the immediate vicinity of towers (up to 600-800m). Visual effects would decrease rapidly with distance.

Photomontage 56 from the L7413 at Donaghpatrick Bridge, 800m to the closest tower

Existing view

Proposed view including transmission line

Wireframe – blue shows what is in view, red shows what is screened by intervening vegetation or topography

Reason for selection: This photomontage shows the view from a sensitive viewpoint on Donaghpatrick Bridge looking towards Donaghpatrick Church across the Blackwater River Valley.

Landscape effects – The proposed development is a new structure in this landscape which is defined by the sloping Blackwater Valley, the heritage buildings of Donaghpatrick and mature trees. The majority of the line is screened by vegetation, but a small part is visible on the skyline. The proposal would represent a small change to the landscape character in this location due to its visibility on the skyline. Visibility of the tower would be dependent on weather conditions from this particular location.

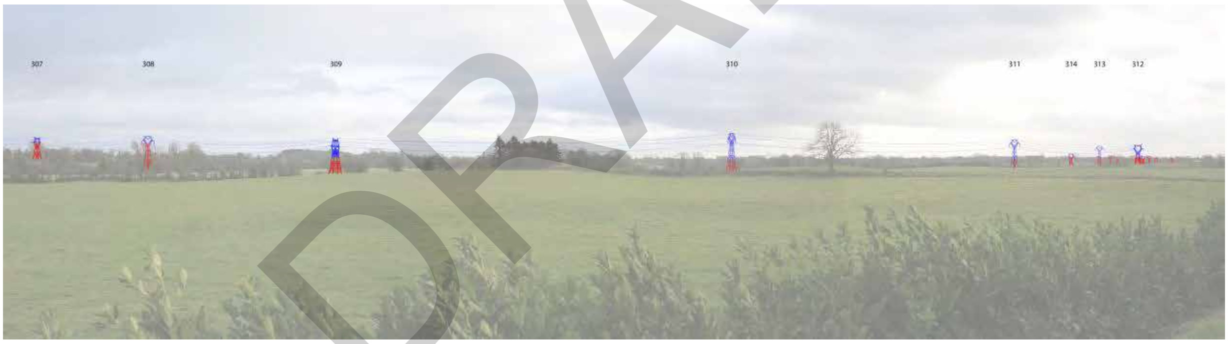
Visual effects – One tower is partially visible above the treeline on the horizon of the river valley. The viewing location is sensitive and takes in a broader view of an agricultural landscape with houses, roads and heritage buildings. While potentially visible, the tower would not necessarily be immediately discernible to a viewer in this location.

Photomontage 59 from Teltown Church, 670m to the closest tower

Existing view

Proposed view including transmission line

Wireframe – blue shows what is in view, red shows what is screened by intervening vegetation or topography



Reason for selection: This photomontage shows the view from Teltown church in the Blackwater Valley.

Landscape effects – The setting of this heritage structure is very open towards the river. The landscape is flat with some taller vegetation in the distance. The proposed powerline will introduce a new tall element into this landscape which is currently absent of visible built features on the horizon. This will adversely affect the open character of the valley landscape in this location, although the distance to the proposed development and the large scale of the landscape means that the scale of the proposed towers does not dominate the landscape character.

Visual effects – Eight towers are partially visible from this location over the tops of vegetation in the distance. They are visible against the skyline in a viewpoint with no other built structures in view. The visibility of towers against the sky would mean that visibility would depend on weather conditions.

11.5.4.5 Landscape Unit I – Description of Potential Landscape and Visual Effects

<table>
<tr><th colspan="3">Landscape Unit I – West Navan Lowlands</th></tr>
<tr><td colspan="3"></td></tr>
<tr><td>Potential landscape and visual effects</td><td>The man-altered landscape consists of flat lowland farmland with a network of hedgerows and contains the M3 and the N51.</td><td>POTENTIAL LANDSCAPE EFFECTS
There will be changes to landscape character in the immediate vicinity of the line (up to 600-800m of unscreened structures), but little alteration to the character of the wider landscape.
The transmission travels through the Claudy River Valley which will have a landscape effect on the scale and character of this landscape feature.
Locations within approximately 800m of the line that include expansive unscreened open views over the landscape will experience change to the open character of the horizon line.
There are potential cumulative landscape effects arising from the interaction with the proposed Emlagh Wind farm. These are described in Chapter 10, Volume 3B of the EIS.
POTENTIAL VISUAL EFFECTS
The transmission line will be partially visible from houses and roads up to 1-1.5km of the line where there</td></tr>
</table>

		is no intervening vegetation or topography. Visual effects reduce with distance, with the most significant effects occurring with 600-800m of unscreened structures. The towers would be difficult to discern at distances beyond 800m. Longer distance views are more likely in the flat open parts of the landscape or where elevated views are possible. • There are potential cumulative visual effects arising from the interaction with the proposed Emlagh Wind farm. These are described in **Chapter 10, Volume 3B** of the EIS**.**
Settlements	Dunderry and Robinstown and individual houses throughout the countryside and along roads.	• There would be partial views of the transmission line at close distance (up to 500m) from parts of Dunderry and Robinstown where there is no intervening screening. There would also be views of the line from the parts of the road connecting these settlements that have open views to the south and where the line crosses the road just east of Dunderry. • In the wider landscape, houses up to 1-1.5km from the line route, with no or little intervening screening vegetation will have potential visibility of the proposed development. The most significant effects would be experienced in views up to 600-800m from the line route, where there is no or little intervening vegetation. The nature of visibility over distance is shown in **Section 11.5.2.2.** The towers would be difficult to discern at distances beyond 800m. Longer distance views are more likely in the flat open parts of the landscape or where elevated views are possible.
Protected Views and Prospects	VP52 Hill of Ward.	• This scenic view will not be significantly affected due to the distance to the proposed development.

101 The following photomontages show the potential landscape and visual effects of the proposed transmission line within Landscape Unit I – West Navan Lowlands. Full scale photomontages and wireframes are contained in **Volume 3D Figures** of the EIS.

Photomontage 60 showing the view from an M3 overpass and the effect of viewing towers from a high point in the landscape, 519m to the closest tower

Existing view

Proposed view including transmission line

Wireframe – blue shows what is in view, red shows what is screened by intervening vegetation or topography

Reason for selection: This is a typical view from an elevated position at a distance of approximately 500m.

Landscape effects – The transmission line forms part of a changing rural landscape which has recently included the construction of the M3. The landscape effects arise from the scale of the towers in relation to the existing landscape character of mature trees and hedgerows. This elevated position is unusual in the general low-lying context of the landscape.

Visual effects – Due to the elevated nature of the viewpoint, the upper parts of the towers are visible against the sky, the lower parts are screened. Due to the speed of the viewer in this location, the towers will be conspicuous on the skyline, but only briefly visible.

Photomontage 62 showing the line route crossing the L4008 east of Dunderry, 179m to the closest tower

Existing view

Proposed view including transmission line

Wireframe – blue shows what is in view, red shows what is screened by intervening vegetation or topography

Reason for selection: This photomontage shows the transmission line at close distance crossing the local road between Dunderry and Robinstown.

Landscape effects - The proximity of the tower means that the tower is dominant and the localised landscape character in the immediate vicinity of this viewpoint will change. The landscape effect primarily arises from the scale of the proposed development and its proximity to a public road.

Visual effects – A tower will be openly visible as it is located immediately adjacent to the road and is therefore very conspicuous at close distance. Vegetation in the wider landscape limits significant visual effects to unscreened areas within the immediate vicinity of towers (up to 600-800m). Visual effects decrease rapidly with distance.

11.5.4.6 Landscape Unit J – Description of Potential Landscape and Visual Effects

Landscape Unit J – Boyne Valley

Potential landscape and visual effects	The river valley landscape generally comprises a mix of large pasture / arable fields with a strong network of hedgerows which provide screening. However, there is a particularly open flat landscape with few or low hedgerows and a cluster of large farm buildings immediately to the south of the river. The landscape of the Boyne Valley is sensitive to change. However, as one moves away from the immediate river valley into more built up landscape, sensitivity reduces.	**POTENTIAL LANDSCAPE EFFECTS** • There will be significant changes to landscape character in the immediate vicinity of the line (up to 600-800m of unscreened structures), but little alteration to the character of the wider landscape. • The most significant landscape effects will occur in the immediate vicinity of the river crossing where influence of the river on landscape character is strongest. The transmission line will increase the amount of modern development in the valley landscape which currently includes roads, houses, smaller powerlines and farm buildings. • Specific heritage and landscape features contribute to landscape character in this area, the most notable being Bective Abbey and Bective Bridge. There will be no significant effects on the ability of these features to continue to contribute to the character of this rural landscape. (see also **Chapter 14** of this volume of this EIS). **POTENTIAL VISUAL EFFECTS** • The transmission line will be partially visible from houses and roads up to 1-1.5km from the line where there is no intervening vegetation or topography. Visual effects reduce with distance, with the most significant effects occurring with 600-800m of unscreened structures. The towers would generally be difficult to discern at distances beyond 800m.

		• However, the sensitive and protected viewpoint on Bective Bridge includes a view of Tower 357 seen at a distance of 905m looking along the river. This view is possible because of the lack of hedgerows in the area immediately south of the river and the fact that the eye is drawn along the route of the river. Other potentially visible towers are partially or fully screened by intervening vegetation (see Protected Views and Prospects below for more detail). • Other longer distance views are more likely where the line crosses relatively higher ground or where the viewpoint is elevated such as from the steps of Bective Abbey. Photomontages 64 and 65 show the most open views possible from this location, an elevated position on the entrance steps looking over an inhabited landscape. When inside Bective Abbey, views are either enclosed or orientated towards the river and away from the line route. (see also **Chapter 14** of this volume of the EIS) • Both Bective Abbey and Bective Bridge fall within the *Draft Hill of Tara Landscape Conservation Area.* • See also **Section 11.5.3.11** which describes the impact of aviation markers in this location.
Settlements	Bective and individual houses throughout the countryside and along roads.	• There will be no significant effects on this settlement due to screening effects of buildings and vegetation. • In the wider landscape, the transmission line will be partially visible from houses and roads up to 1-1.5km of the line where there is no intervening vegetation or topography. Visual effects reduce with distance, with the most significant effects occurring with 600-800m of unscreened structures. The towers would be difficult to discern at distances beyond 800m. Longer distance views are more likely in the flat open parts of the landscape or where elevated views are possible.
Protected Views and Prospects	VP86 Bective Bridge	• The Meath CDP describes this view as *locally significant* and defines it as a *"view looking northward from Bective Bridge towards Bective Abbey and along river Boyne in both directions."* • The protected view northward from the bridge towards Bective Abbey will not be affected by the proposed development. • The protected view south from the bridge includes a view

		of Tower 357 seen at a distance of 905m looking along the river. This view is possible because of the lack of hedgerows in the area immediately south of the river. Other potentially visible towers are partially or fully screened by intervening vegetation as seen in Photomontage 66.
Key Landscape Features	Talbot Castle, Trim Castle, Yellowsteeple	• There will be no effects on either of these sites due to the distance from the proposed development.
Driving, Cycling & Walking Routes	Boyne Valley Driving Route	• The Boyne Valley Driving Route was developed by Fáilte Ireland and links Boyne Valley sites such as the site of the ancient Tailteann Games, Donaghpatrick Church, Bective Abbey, the Hill of Tara and Trim Heritage Town. The landscape where the proposed development crosses the drive is particularly flat and open with low hedgerows. The proposed development will represent a new large scale element in a rural landscape which contains houses and existing utilities infrastructure. • Due to the particularly open nature of the landscape in this location, the crossing of the proposed development will be openly visible and dominant in views for a section of this road. The line crosses in a perpendicular manner and therefore the most significant visual effects are limited to a short section. The line crossing does not interfere with specifically significant views from the Boyne Valley Driving Route see Photomontage 67A, **Volume 3D Figures,** of the EIS.

102 The following photomontages show the potential landscape and visual effects of the proposed transmission line within Landscape Unit J – Boyne Valley. Full scale photomontages and wireframes are contained in **Volume 3D Figures** of the EIS.

Photomontage 63 from the R161, 407m to the closest tower

Existing view

Proposed view including transmission line

Wireframe – blue shows what is in view, red shows what is screened by intervening vegetation or topography

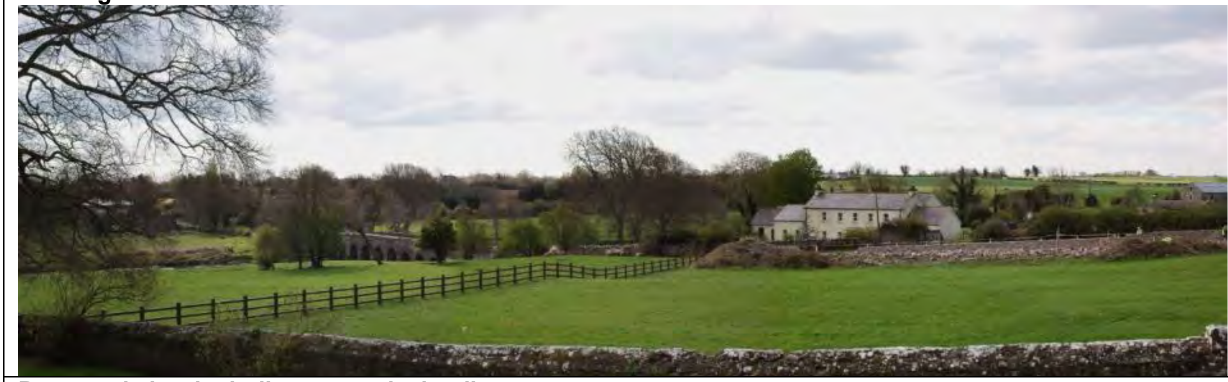
Reason for selection: This photomontage shows the crossing point of the R147 at close distance.

Landscape effects – The transmission line forms part of a rural landscape which contains other infrastructure including roads, lights and a sports facility. Although located within 300m of the River Boyne, there is no river valley landscape character evident along this road.

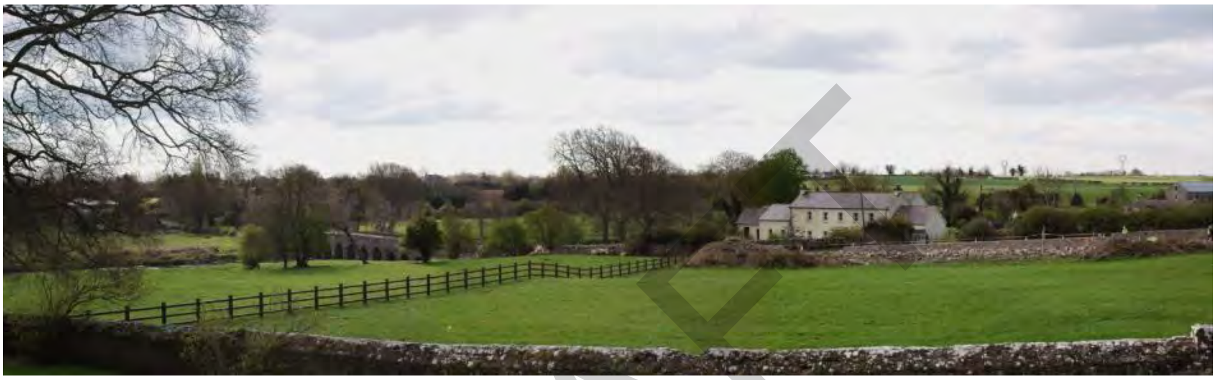
Visual effects – Due to the open nature of the viewpoint, the closest tower to the road is conspicuous. The other towers are partially or fully screened by vegetation in the wider landscape. Due to the speed of the viewer in this location, the towers will be conspicuous on the skyline, but only briefly visible.

Photomontage 64 from steps at Bective Abbey, 948m to the closest tower

Existing view



Proposed view including transmission line



Wireframe – blue shows what is in view, red shows what is screened by intervening vegetation or topography

Reason for selection: This view is available from the top of the steps at Bective Abbey. It is the most open view available within the Abbey site.

Landscape effects – The towers will be visible on the skyline, but the scale of the towers is in keeping with the scale of the landscape in this location. Nonetheless, the particular heritage character in this location will be slightly affected by the inclusion of the proposed development. It should be noted that this elevated experience of the landscape is limited to one specific location within the Abbey complex and that the important landscape relationship between the Abbey and the River Boyne is not affected.

Visual effects – Towers are partially visible on the skyline, which introduces a modern man-made element to distant views in the context of a landscape which from this viewing angle is predominantly of a heritage character. The visibility of the towers would be dependent on weather conditions at this distance.

Photomontage 65 from steps at Bective Abbey, 948m to the closest tower

Existing view

Proposed view including transmission line

Wireframe – blue shows what is in view, red shows what is screened by intervening vegetation or topography

Reason for selection: This view is available from the top of the steps at Bective Abbey.

Landscape effects – The transmission line forms part of a changing rural landscape. While the scale of the towers is in keeping with the landscape character, the adverse landscape effects arise from location of the towers on the skyline. This elevated experience of the landscape is limited to one specific location within the Abbey complex. The important landscape relationship between the Abbey and the river Boyne is not affected.

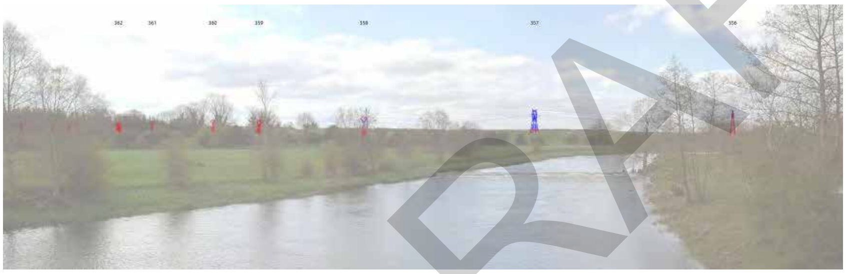
Visual effects – Towers are partially visible on the skyline, which introduces a modern man-made element to distant views in the context of a landscape which contains houses, roads and existing powerlines. The visibility of the towers would be dependent on weather conditions at this distance.

Photomontage 66 from the L4010 (Boyne Valley Driving Route) at Bective Bridge (Scenic Viewpoint 86) looking across the River Boyne, 905m to the closest tower

Existing view

Proposed view including transmission line

Wireframe – blue shows what is in view, red shows what is screened by intervening vegetation or topography



Reason for selection: This photomontage shows the most open view of the proposed development from Bective Bridge which is a protected viewpoint and located within a sensitive river landscape.

Landscape effects –The proposal changes the landscape character of the immediate vicinity of the river crossing and affects the landscape character where the towers are visible in conjunction with the river. The transmission line will increase the amount of development in the valley landscape which currently includes roads, houses, powerlines and farm buildings. The narrow extent of the influence of the river landscape character and mature vegetation means that landscape effects in this location are localised. Landscape effects are higher on the southern bank which is more open than the northern bank.

Visual effects – The visibility of Tower 357 from this location has an effect on the view south from the scenic viewpoint, which is absent of structures. Tower 358 is also potentially visible from other locations on the bridge. At this distance, visibility would be dependent on weather conditions. The view in the other direction towards Bective Abbey is not affected. The photomontage shows how much of the transmission line is screened by existing vegetation and the potential for screening the towers that are visible from this location.

Photomontage 67 from the L2203 (Boyne Valley Driving Route), approximately 500m south-west of Bective, 299m to the closest tower

Existing view

Proposed view including transmission line

Wireframe – blue shows what is in view, red shows what is screened by intervening vegetation or topography

Reason for selection: This photomontage shows a view from a part of the Boyne Valley Driving Route just south of the River Boyne. See also Photomontage 67A **Volume 3D Figures** of the EIS which shows a more open viewpoint looking north east from this road.

Landscape effects – The Boyne Valley Driving Route was developed by Fáilte Ireland and links Boyne Valley sites such as the site of the ancient Tailteann Games, Donaghpatrick Church, Bective Abbey, the Hill of Tara and Trim Heritage Town. It does not include open views of the Boyne River in this location, although glimpsed views are possible. The landscape is particularly flat and open in this location with low hedgerows and the proposed development will represent a new large scale element in a rural landscape which contains houses and existing utilities infrastructure.

Visual effects – Due to the particularly open nature of the landscape in this location, the crossing of the proposed development will be openly visible and dominant in views for a section of this road. The line crosses in a perpendicular manner and therefore the most significant visual effects are limited to a section of approximately 1m with intermittent views possible for a further approximate 1km. The line crossing does not interfere with specifically significant views from the Boyne Valley Driving Route.

11.5.4.7 Landscape Unit K – Description of potential landscape and visual effects

Landscape Unit K – Central Lowlands

Potential landscape and visual effects	This is a flat or gently undulating landscape with medium to large sized fields and a number of small rivers. The land rises to a plateau around Collegeland and Arodstown where open panoramic views over an inhabited and farmed landscape are possible. The relatively flat nature of the landscape results in open visibility from some minor roads and means that wide views of the surrounding landscape are possible from even slightly elevated areas. However, many of the roads are lined with hedgerows which limit views into the landscape.	**POTENTIAL LANDSCAPE EFFECTS** • There will be changes to landscape character in the immediate vicinity of the line (up to 600-800m from unscreened structures), but little alteration to the character of the wider landscape. • Locations within approximately 800m of the line that include expansive unscreened open views over the landscape will experience change to the open character of the horizon line. **POTENTIAL VISUAL EFFECTS** • The transmission line will be partially visible from houses and roads up to 1-1.5km of the line where there is no intervening vegetation or topography. Visual effects reduce with distance, with the most significant effects occurring within 600-800m of unscreened structures. The towers would be difficult to discern at distances beyond 800m. Longer distance views are more likely in the flat open parts of the landscape or where elevated views are possible. • The transmission line will cross the R154 at Branganstown, a tower will be located adjacent to the road and will be briefly but openly visible to drivers. • The towers would be distantly visible from elevated locations at Collageland and Arodstown within the context of an occupied landscape.
Settlements	Kilmessan and individual houses throughout the countryside and along roads	• There will be no significant effects on Kilmessan village due to the distance from the proposed development.

		• In the wider landscape, houses up to 1-1.5km from the line route, with no or little intervening screening vegetation will have potential visibility of the proposed development. The most significant effects would be experienced in views up to 600-800m from the line route, where there is no or little intervening vegetation. The nature of visibility over distance is shown in **Section 11.5.2.2**. The towers would be difficult to discern at distances beyond 800m. Longer distance views are more likely in the flat open parts of the landscape or where elevated views are possible.

103 The following photomontages show the potential landscape and visual effects of the proposed transmission line within Landscape Unit K – Central Lowlands. Full scale photomontages and wireframes are contained in **Volume 3D Figures** of the EIS.

Photomontage 69 from the L22051 in the townland of Creroge, 503m to the closest tower

Existing view

Proposed view including transmission line

Wireframe – blue shows what is in view, red shows what is screened by intervening vegetation or topography

Reason for selection: This is a typical open view of the proposed development at a distance of approximately 500m where there is a gap in the hedge in a flat landscape.

Landscape effects – A transmission line in a flat landscape is likely to break the skyline where there are open views. This affects the open character of this type of agricultural landscape. However even in a flat landscape, the strong hedgerow network means that effects are localised.

Visual effects – Due to the open nature of the viewpoint, the upper parts of the towers are visible against the sky, the lower parts are less visible as they are seen against vegetation. The visual effects will be significant at distances up to 600-800m where open views are possible.

Photomontage 72 from the L6202 in Foxtown, 1.28km to the closest tower

Existing view

Proposed view including transmission line

Wireframe – blue shows what is in view, red shows what is screened by intervening vegetation or topography

Reason for selection: This photomontage shows an open view from an elevated position in a flat landscape with hedgerows at a distance of over 1km.

Landscape effects – The transmission line is absorbed into the wider landscape and has no significant effect on landscape character.

Visual effects – While distantly visible, the proposal would not be normally discernible to a viewer due to the effects of distance and the screening effects of an agricultural landscape.

Photomontage 73 from the L2207 at Derrypatrick, 136m to the closest tower

Existing view

Proposed view including transmission line

Wireframe – blue shows what is in view, red shows what is screened by intervening vegetation or topography

Reason for selection: This shows a very close open view, in a location where there is a gap in the roadside hedgerow with a tower viewed against the sky.

Landscape effects – This is an example of a significant localised landscape effect in an open agricultural landscape setting. The tower is dominant due to its proximity and lack of screening. However, transmission lines are not uncharacteristic when seen in the context of a rural landscape.

Visual effects – Due to the proximity and openness of this view, the tower is visually dominant.

11.5.4.8 Landscape Unit L – Description of potential landscape and visual effects

Landscape Unit L – Tara Skryne Hills

Potential landscape and visual effects	The landscape in this unit forms part of the cluster of low flat hills that includes the Hill of Tara. The flat nature of the surrounding landscape means that panoramic views are possible even from slightly elevated areas. The landscape is man-altered and made up of large fields within a network of roads and hedgerows. There is an existing 220 kV and 400 kV transmission line in this landscape unit.	**POTENTIAL LANDSCAPE EFFECTS** • There will be changes to landscape character in the immediate vicinity of the line (up to 600-800m of unscreened structures), but little alteration to the character of the wider landscape. • There will be cumulative landscape effects in the townland of Bogganstown where the proposed line connects with the existing 400 kV line. These are concentrated within a slightly elevated area between the R125 and the local road at Bogganstown. The established character of a farmed landscape containing electricity infrastructure will intensify. **POTENTIAL VISUAL EFFECTS** • The transmission line will be partially visible from houses and roads up to 1-1.5km of the line where there is no intervening vegetation or topography. Visual effects reduce with distance, with the most significant effects occurring with 600-800m of unscreened structures. The towers would be generally difficult to discern at distances beyond 800m but longer distance views are possible, as some towers are located on relatively elevated land. • The transmission line will be visible at close distance in conjunction with the existing 400 kV line in viewpoints along the R125.

		• Open views of the location where the proposed line meets with the existing 400 kV OHL are possible from the R156, but at a distance of 2km, the line is barely perceptible and seen in the context of existing power lines.
Settlements	Individual houses throughout the countryside and along roads.	Houses up to 1-1.5km from the line route, with no or little intervening screening vegetation will have potential visibility of the proposed development. The most significant effects would be experienced in views up to 600-800m from the line route, where there is no or little intervening vegetation. The nature of visibility over distance is shown in **Section 11.5.2.2**. The towers would generally be difficult to discern at distances beyond 800m but longer distance views are possible, as some towers are located on relatively elevated land. Longer distance views are more likely in the flat unscreened parts of the landscape or where elevated views are possible.

104 The following photomontages show the potential landscape and visual effects of the proposed transmission line within Landscape Unit L – Tara Skryne Hills. Full scale photomontages and wireframes are contained in **Volume 3D Figures** of the EIS.

Photomontage 75 from the R125 in the townland of Bogganstown showing the proposed transmission line in conjunction with existing 400 kV line, 271m to the closest tower

Existing view

Proposed view including transmission line

Wireframe – blue shows what is in view, red shows what is screened by intervening vegetation or topography

Reason for selection: This photomontage shows an open view of the location where the proposed transmission line connects with the existing 400 kV OHL.

Landscape effects – The transmission line intensifies the existing landscape character which is determined by agricultural pattern, rural housing, roads and powerlines.

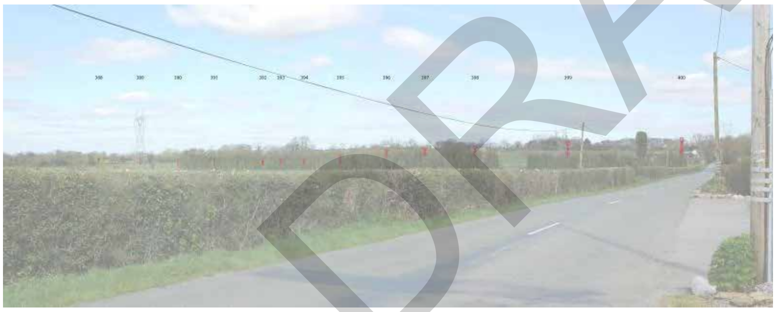
Visual effects – Due to their location on elevated land, the towers will be visible over a slightly wider area than usual in the wider Meath landscape. They will be seen in conjunction with the existing towers resulting in cumulative and locally significant visual effects.

Photomontage 76 from the R125 in the townland of Leonardstown showing the proposed transmission line in conjunction with the existing 400 kV line, 1.57km to the closest tower

Existing view

Proposed view including transmission line

Wireframe – blue shows what is in view, red shows what is screened by intervening vegetation or topography



Reason for selection: This photomontage shows an open view of the proposed development in conjunction with the existing 400 kV OHL.

Landscape effects: The proposed development intensifies the existing landscape character in this location which is determined by agricultural pattern, rural housing, roads and powerlines.

Visual effects: The existing 400 kV OHL is visible in the field adjacent to the road in view. A very small part of the proposed development is potentially visible over vegetation in the distance, but the transmission line would be mostly screened by vegetation and topography.

11.5.4.9 Potential Physical Landscape Effects

105 The main physical landscape effects arise from the need for the removal of vegetation. The degree of tree lopping, trimming and removal will depend on a number of factors including tower height, closeness of hedgerow and towers and the lowest point of the conductor sag and topography. Areas where the line route passes through woodland will require the removal of an up to 74m swathe of trees. This will have the most impact within the Brittas Estate, but also at other less significant and intermittent locations along the route (described in detail in **Chapter 6** of this volume of the EIS).

106 While a maximum working area of 30m x 30m around each tower may require removal of hedgerow vegetation at construction, this will be reinstated, and therefore adverse impacts would be temporary. Other hedgerows along the line route will be permanently lopped or trimmed in order to accommodate required safety clearances. Hedgerows with a height of up to 6m are unlikely to be lopped, although the height will depend on the conductor sag. On reinstatement of vegetation the continuity of any affected hedgerow or tree lines will be restored but the linear open corridors though woodland will remain. It is considered that tree cutting will not be required at riparian areas of the River Boyne and Blackwater crossings.

11.5.4.10 Potential Impact of a new 400 kV circuit on Towers 402-410

107 There would be localised landscape and visual effects at construction stage. This would arise from the temporary and localised visibility of access routes, construction machinery and vehicles. Following construction there would be no significant landscape or visual effects.

11.5.4.11 Potential Impact of Works to Woodland Substation

108 There would be localised landscape and visual effects at construction stage. This would arise from the temporary and localised visibility of access routes, construction machinery and vehicles. Following construction there would be no significant landscape or visual effects, as the localised landscape character is currently determined by the existing substation.

11.5.4.12 Potential Impact of Swan Flight Diverters

109 **Chapter 6** of this volume of the EIS contains information on the location, extent and type of swan flight diverters required along the route. These have been illustrated on photomontages at varying viewing distances (see Photomontages 45, 48, 50, 55, 56, 58 and 61).

110 Swan flight diverters will be located:

- Between Towers 355 and 356 at the River Boyne crossing point;
- Between Towers 307 to 312 at the River Blackwater crossing point;
- West of the Yellow River foraging area between Towers 291 to 295 through a flat bog landscape;
- Between Towers 279 to 283 west of Cloony Lough at the crossing point of the N52; and
- Between Towers 257 to 268 near Cruicetown / Whitewood Lough on higher ground west of the lake and partly within Brittas Estate.

111 The requirement for swan flight diverters often corresponds with areas of landscape sensitivity and these five locations are sensitive due to their proximity to rivers and lakes, location on higher or flat parts of the landscape, location at open road crossings and part location within Brittas Estate. The swan flight diverters will be visible on the earth wires at close proximity to the proposed development. However the type of bird flight diverter selected for use is visually subtle and is not perceptible at distances greater than approximately 500m. Therefore, considering the relevant scale of the proposed development, the addition of swan flight diverters is not considered to result in significant landscape or visual effects. The slightly higher visual impact resulting from the swan flight diverters is balanced with the benefits to landscape character arising from bird protection.

11.5.4.13 Potential Impact of Aviation Markers

112 The fitting of aviation marker spheres is recommended in the vicinity of Trim Airfield between Towers 355 and 357.

113 These spheres are alternatively white and orange, spherical with a diameter of 60cm and located at distances of 30m fitted to the earth wire.

114 This location corresponds with one of the most sensitive locations identified along the alignment of the proposed development where towers are visible from Bective Bridge looking along the River Boyne. The area to the south of the river is unusually flat and open and forms part of the Boyne Valley Driving Route.

115 By their very nature, the marker spheres are intended to be highly visible, although their spacing at 30m is wider than for swan flight diverters. The inclusion of marker spheres in this location will render the proposed development slightly more visible at close distances by increasing the perception of the conductors. It will increase the localised adverse effects on

landscape character in a landscape recognised as being significant in the MLCA by emphasising the visibility of the transmission line.

116 However, while distantly visible, the markers would not be generally perceptible in key viewpoints in this location - from the bridge crossing of the River Boyne at Bective or in views from Bective Abbey.

11.5.5 Decommissioning Phase

117 The proposed development will become a permanent part of the transmission infrastructure. The expected lifespan of the development is in the region of 50 to 80 years. This will be achieved by routine maintenance and replacement of hardware as required. There are no plans for the decommissioning of the OHL. In the event that part of, or the entire proposed infrastructure is to be decommissioned, all towers, equipment and material to be decommissioned will be removed off site and the land reinstated. Impacts would be expected to be less than during the construction phase and would be of short term duration.

11.6 MITIGATION MEASURES

118 In landscape terms, the best mitigation measure is avoidance of potential impact by a route selection process that avoids higher ground, minimises changes in direction, visibility on skylines and proximity to waterbodies and that avoids or minimises excessive proximity or dominance on sensitive visual receptors – such as scenic routes, residences, tourism and leisure amenities and facilities. This has been carried out over the course of constraints evaluation and route selection and is described in *The Final Re-Evaluation Report* (April 2013) (see Appendix 1.1**, Volume 3B** of the EIS) and *The Preferred Project Solution Report* (July 2013) (see Appendix 1.2, **Volume 3B** of the EIS).

119 The Route Selection stage resulted in the avoidance of the parts of the landscape most extensively sensitive to an overhead powerline. The most sensitive locations along the proposed alignment and the most significant landscape and visual impacts of an OHL have been identified and described.

120 Where it has not been possible to avoid adverse effects on identified specific viewpoints, micro-mitigation is possible through the retention, enhancement or replanting of trees and hedgerows in key locations. This is specifically relevant in relation to the Boyne and Blackwater river crossings and Brittas Estate, but is also relevant for all areas along alignment.

121 The mitigation measures described in **Chapter 6** of this volume EIS will serve to minimise physical landscape effects. The key mitigation measures as described in detail in the Flora and

Fauna section in relation to landscape effects are; using existing access tracks and gaps in hedgerows, reinstatement of hedgerows and ground vegetation (with similar or better quality planting), protection of retained vegetation, sensitive vegetation pruning methods and monitoring of vegetation establishment. Hedgerows will be maintained to ensure no vegetation is tall enough to potentially interfere with the conductors. Trees will be pollarded to retain tree lines and minimise physical landscape effects. On-going monitoring will be carried out during construction and inspection and if necessary, replacement, of reinstated planting will be carried out over a 24 month period.

122 The mitigation measures in **Chapter 4** of this volume of the EIS will serve to minimise effects on soil and subsequent vegetation establishment. The key mitigation measures in relation to physical landscape effects are; correct removal, storage and reinstatement of subsoil and topsoil, avoidance of soil compaction, removal and disposal of soil where not required for reinstatement.

11.7 RESIDUAL IMPACTS

123 As the key mitigation measures when planning a transmission line occur at route selection and line design stage, the residual unavoidable effects are those that have been described in detail in **Section 11.5** of this volume of the EIS**.**

124 A summary of the significance of residual effects is given in Table 11.22, **Appendix 11.1, Volume 3D Appendices** of the EIS.

125 As visibility of towers is highly influenced by intervening vegetation and buildings, the localised nature of this residual impact may slightly reduce or increase over time as vegetation grows, hedgerows are enhanced or removed and buildings are built.

11.8 INTERRELATIONSHIPS BETWEEN ENVIRONMENTAL FACTORS

126 Other potential impacts related to landscape are described in **Volume 3C** (CMSA) of the EIS. The following chapters of this volume of the EIS are also relevant to the potential for effects on landscape in the CMSA; **Chapter 4** Human Beings – Tourism and Amenity, **Chapter 6** - Flora and Fauna, **Chapter 7** - Soils, Geology and Hydrogeology, **Chapter 9** - Air – Noise and Vibration and **Chapter 14**- Cultural Heritage

127 Interrelationships between ecological impacts and landscape occur where the removal or trimming of wooded features (including woodlands, hedgerows and treelines) may have adverse effects on both ecology and landscape. The impacts on such wooded features has been minimised by, where possible, locating towers away from hedgerows and other wooded

areas. The use of swan flight diverters will slightly increase the visual impact of the alignment at close distances where these have been installed.

128 Soil compaction caused by construction or maintenance can have an adverse effect on localised landscape character and vegetation establishment.

129 The potential impacts on the setting of recognised individual cultural heritage sites are appraised in **Chapter 14** of this volume of the EIS. This chapter appraises potential impact in the context of the broad cultural heritage contained within the landscape, which includes the patterns of human impact over the millennia. This human impact includes agriculture, drainage, transport, utilities and housing.

130 Aviation markers increase the discernibility of the OHL conductor at close distances.

131 The OHL will be visible from some short sections (approximately 2km in total) of the Boyne Valley Driving Route, from Bective Bridge and within the Blackwater Valley. This may be perceived as reducing the attractiveness of these areas for tourism and amenity purposes, although the adverse effects are localised.

132 There is a negative impact on population which arises from the visual impact, where dwellings are located in close proximity to the proposed development with no intervening vegetation or topography.

133 Noise that may occur in close proximity to the line can have an adverse effect on landscape character.

11.9 CONCLUSIONS

134 The study area for this appraisal forms part of the fertile agricultural lowlands of County Meath, drained by the rivers Boyne and Blackwater and long inhabited and altered by man. The long history of human habitation is reflected in a range of visible built heritage features and landscapes as well as widespread rural housing development, farm and commercial buildings, a dense road and hedgerow network and existing utilities infrastructure.

135 The MLCA has recognised particular parts of the landscape as being of significant value – particularly the Boyne and Blackwater rivers and an area termed the Tara Skryne Hills. The proposed line route crosses both rivers and part of the extended elevated landform south of Tara and Skryne Hills. This chapter has also identified other sensitive areas and features including settlements, scenic views, recreation, heritage and tourist routes and historic designed landscapes and the uplands of East Cavan. The inhabited rural locations in close proximity to

the alignment and road crossings are also sensitive to the changes to landscape character that occur with the construction of a 400 kV transmission line.

136 The agricultural landscape of Meath and East Cavan is generally robust and has undergone continuous change including road and house building and introduction of utilities infrastructure while sustaining its underlying character and evident time depth. The scale of the proposed development will, however, result in significant alteration to the landscape character of areas in the near vicinity of the alignment – most noticeably at distances of up to 600-800m from the alignment.

137 Towers and associated infrastructure are dominant in close views (up to 500m) where there is no intervening vegetation or topography, where there are gaps or lower than average roadside vegetation or if they are located on higher ground.

138 At distances of 500m to 1km, towers are still noticeable in the context of a wider landscape. The screening capabilities of vegetation, buildings and topography however, become more effective. The towers are more conspicuous at these distances if sited on higher ground, if the viewing point is elevated or if the proposed development is seen against the sky.

139 Beyond 1km, it becomes difficult to discern the towers in the landscape and in most cases the towers are not visible at this distance. Towers are still however, distantly visible if seen traversing higher ground or over very flat ground where there is a gap in intervening vegetation.

140 Over the full length of the proposed development, the residual unavoidable impacts will include adverse effects on landscape character and on unscreened views within 600-800m of the alignment. Some areas that are particularly flat or elevated in relation to the line will experience significant effects at distances up to 1km. These effects will be particularly noticeable where the transmission line crosses roads where hedgerows are low.

141 Specific identified sensitive locations along the alignment which will experience residual unavoidable impact include; the Boyne River Valley at Bective, the Blackwater River Valley at Teltown and Brittas Estate.

12 MATERIAL ASSETS – GENERAL

12.1 INTRODUCTION

1 This chapter presents an evaluation of the proposed development as set out in Chapter 6, **Volume 3B** of the Environmental Impact Statement (EIS), in relation to Material Assets - General.

2 Chapter 6, **Volume 3B** of the EIS describes the full nature and extent of the proposed development including elements of the OHL design and the towers. It provides a factual description, on a section by section basis, of the entire line route. The principal construction works proposed as part of the development are set out in Chapter 7, **Volume 3B** of the EIS.

3 The information contained within this chapter is concerned with material assets of the Meath Study Area (MSA) as defined in Chapter 5, **Volume 3B** of the EIS, specifically focusing on:

- Utilities: Gas Pipeline, Electricity Lines and Telecoms;
- Aviation: Airfields and Ballooning; and
- Waste.

4 In this chapter the existing environment is examined with regards to current utilities, aviation and waste infrastructure; potential impacts on the surrounding environment resulting from the proposed development are evaluated and appropriate mitigation measures are proposed.

5 This chapter should be read in conjunction with Chapters 6 and 7, **Volume 3B** of the EIS and **Chapters 6**, **7**, **8** and **11** of this volume of the EIS.

12.2 METHODOLOGY

6 This section of the EIS has been prepared in accordance with relevant EU and Irish Legislation and guidance, including the requirements of Annex IV of the EIA Directive and in accordance with Schedule 6 of the *Planning and Development Regulations 2001* (as amended) and conforms to the relevant requirements as specified therein.

7 The following guidelines were referred to while preparing this appraisal:

- Environmental Protection Agency (EPA) (2002). *Guidelines on the Information to be contained in Environmental Statements;*

- EPA (2003). *Advice Notes on Current Practice (in the preparation of Environmental Impact Statements*; and

- Department of the Environment Community and Local Government (2013) *Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessments*.

8 The scope of the appraisal is based on a review of legislation, guidance documents, other EISs, feedback from public consultation, consultation with prescribed bodies, consultation with An Bord Pleanála (the Board), the Irish Aviation Authority (IAA) and on a consideration of the likelihood for significant impacts arising, having regard to the nature of the receiving environment and the nature and extent of the proposed development.

9 The scoping opinion received from the Board (refer to Appendix 1.3, **Volume 3B Appendices** of the EIS) identified the following issues as being relevant to this chapter of the EIS:

- Identify the enhancements to existing electricity network infrastructure;

- Information on the likely effects on public utilities and services along the route corridor and in particular any proposed re-routing of overhead electricity lines ; and

- Assessment of potential impacts on aviation transport, including impacts on Trim Airfield.

10 This section sets out how the appraisal of material assets, specifically utilities, aviation and waste were evaluated for the proposed development. The objective of this chapter is to identify existing utility, aviation and waste infrastructure and determine whether these features place constraints on the proposed development. Impacts during construction, operation and decommissioning that the proposed development may have on utilities, aviation and waste infrastructure are examined and mitigation measures which may be required to minimise any adverse impacts of the proposed development are identified and considered (refer to Sections **12.5** and **12.6**).

11 The evaluation is based on the fact that existing best practices in design, construction and operation are employed for the proposed development as set out in this EIS.

12.3 CHACTERISTICS OF THE PROPOSED DEVELOPMENT

12 This section describes the characteristics of the proposed development and indicates how the material assets are affected by the proposed development.

13

14 The main potential impacts on waste infrastructure and utilities occur during the construction phase and details of said impacts are included in **Section 12.5**.

15 The main potential impacts on aviation and ballooning occur during the operation phase, details of said impacts are included in **Section 12.5** and mitigation measures must take account of the long term nature of transmission infrastructure.

12.4 EXISTING ENVIRONMENT

12.4.1 Evaluation of Baseline - Utilities

12.4.1.1 **Gas Pipelines**

16 There are a number of gas pipelines in the MSA, particularly around the main settlements of Navan, Trim, Dunshaughlin, Kells and Kingscourt.

17 There are also a network of gas pipelines which connect these settlements including the following:

- From Rathoath to Dunshaughlin;
- Dunshaughlin passing approximately 1km to the north of the village of Summerhill toward the village of Rathmoylan;
- Trim to Navan; and
- Ardee towards Kingscourt, Lisnagrow and Mullagh.

18 This information is contained the *Final Re-evaluation Report* (April 2013) and a map illustrating the constraints within the MSA is presented in Appendix D of that report (refer to Appendix 1.1, **Volume 3B Appendices** of the EIS**)**.

12.4.1.2 **Electricity Lines and Telecoms**

19 There are a number of existing electricity lines located throughout the MSA, which include both transmission and distribution lines. The most significant electricity lines in the MSA are the Oldstreet to Woodland 400 kV line, located to the south of the MSA and the Flagford-Louth 220 kV OHL which runs in an east-west direction to the south of Kingscourt.

20 There are a number of existing OHL 220 kV lines in the MSA namely Louth to Gorman and Gorman to Maynooth. There are three 110 kV OHLs which cross the MSA north of Navan, Gorman to Meath Hill, Gorman to Navan and Arva to Navan. There are also a number of medium voltage 38 kV lines crossing the MSA.

21 Overall in the MSA there are approximately 359km of existing medium and high voltage electricity lines (161km of 38 kV, 101km of 110 kV, 93km of 220 kV and 4km of 400 kV).

22 In addition there are thousands of kilometres of low voltage (20 kV and 10 kV) and telephone OHLs in the MSA.

23 This information is contained the *Final Re-evaluation Report* (April 2013) and a map illustrating the constraints within the MSA is presented in Appendix D of that report (refer to Appendix 1.1, **Volume 3B Appendices** of the EIS**)**.

12.4.2 Evaluation of Baseline – Aviation

12.4.2.1 **Airfields**

24 There are three licensed airfields in the MSA; Trim Airfield, Trevet Airfield and Athboy Airfield. The IAA has indicated that there are a number of unlicensed airfields and landing strips in the MSA.

25 The nearest airfield to the proposed line route is Trim Airfield, which is located in Dunganny, Trim, Co. Meath, approximately 4km north-west of Trim and 1.2km from the OHL. Trim Airfield is 15 minutes flying time from the coast (Irish Sea) and a similar flying time from Dublin Airport. The airfield is open from 10.00a.m. until sunset, the end of Visual Flight Rules (VFR). Aircraft are not permitted to take-off before 10am without the permission of the operator. The single runway (10/28) is a grass strip, 560m long and 12m wide, see **Figure 12.1**, www.trimflyingclub.ie.

Figure 12.1: Trim Airfield Grass Runway

26 Pilots need to consider their aircraft's take-off performance when using the runways at Trim, wet or long grass will reduce take-off and landing performance. Pilots are encouraged to avoid overflying any settlements at low level. Pilots taking off on Runway 10 should avoid flying over the farm house on the far side of the river. Pilots taking off on Runway 28 must avoid flying over the house located behind the trees and to the left of the climb out from 28. **Figure 12.2**, www.trimflyingclub.ie, shows the desired circuit pattern for Runway 28, with the objective of avoiding flying into the area marked in red, which can happen on the climb-out or on the cross-wind leg.

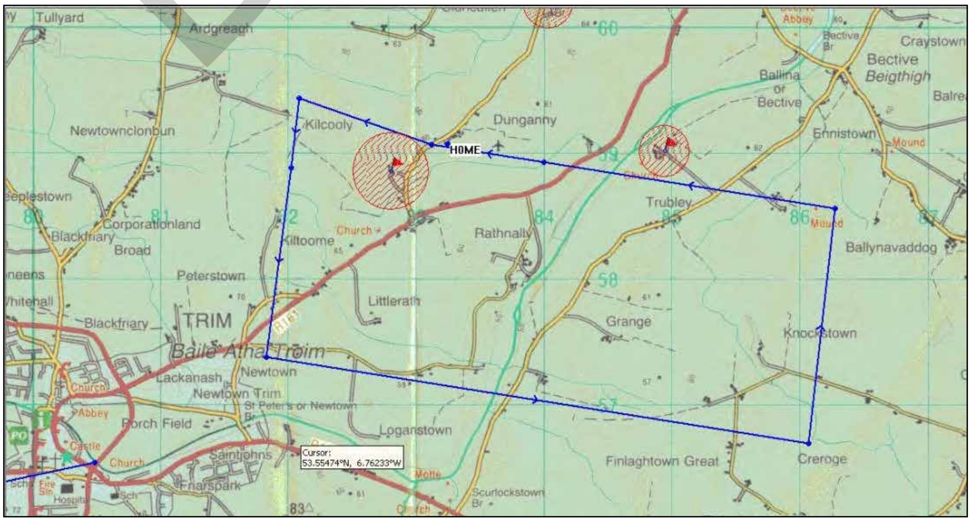


Figure 12.2: Desired Circuit Pattern for Runway 28

12.4.2.2 **Ballooning**

27 A company called Irish Balloon Flights Ltd. operate in the Trim area, flying from a number of launch sites, including Trim Castle, Athboy, Slane, the Hill of Tara and others depending on the wind direction on the day of the flight. They fly from Trim most midweek and Sunday evenings during the summer months (www.balloons.ie).

28 Irish Balloon Flights Ltd. has a significant volume of balloon flight traffic, see **Figure 12.3**, an image displaying recent balloon flight paths in the Trim area.

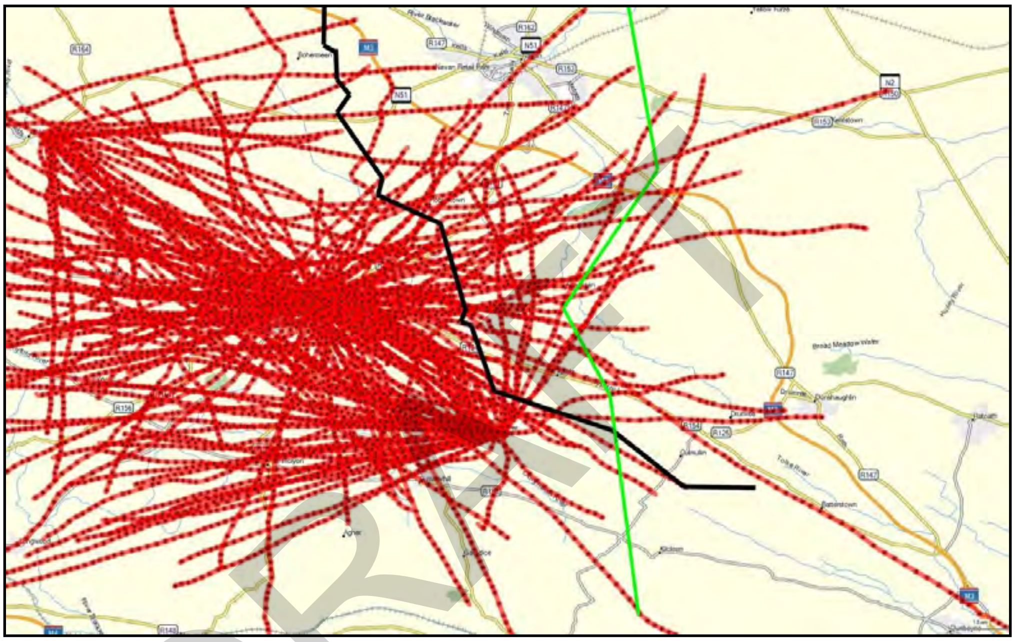


Figure 12.3: Balloon Flight Paths in the Trim area

12.4.3 Evaluation of Baseline – Waste

29 In the MSA there are no EPA licensed waste facilities within 500m of the OHL. A list of the waste management facilities in the MSA can be found in **Appendix 7.2, Volume 3D Appendices** of the EIS.

12.5 POTENTIAL IMPACTS

30 During the preparation of this EIS, an evaluation of the likely significant effects of all aspects of the proposed development has been undertaken.

31 The material asset impacts of the proposed development are divided between the construction and the operational phases of the proposed development.

12.5.1 Do Nothing

32 In the ‗Do Nothing' Scenario, the OHL will not proceed and the baseline material asset environment, save for the potential for general development outside of the scope of this project, will remain unchanged. The existing environment remains the same and no material assets are impacted.

12.5.2 Construction Phase

33 The construction programme is anticipated to last approximately 3 years from commencement of site works (refer to Chapter 7, **Volume 3B** of the EIS for further details on construction). The construction of the OHL will be undertaken in five general stages, according to the following sequence, on a rolling programme of estimated durations:

- Stage 1 – Preparatory Site Work;
- Stage 2 – Tower Foundations;
- Stage 3 – Tower Assembly and Erection;
- Stage 4 – Conductor / Insulator Installation; and
- Stage 5 – Reinstatement of Land.

34 The construction phase will have potential impacts on utilities and waste. It will be a requirement of the contractor appointed to construct the proposed development, to prepare a detailed *Construction Environment Management Plan* (CEMP) prior to the commencement of construction operations. The objective of this plan will be to minimise the impact caused by the construction stage of the proposed development. Refer to Appendix 7.1 of **Volume 3B Appendices** of the EIS for an outline CEMP.

12.5.2.1 Gas Pipelines

35 Gas pipelines traverse the proposed line route at least twice.

12.5.2.2 Electricity Lines and Telecoms

36 There are a number of existing electricity and telecom lines which will be crossed by the proposed development.

37 The proposed development crosses two existing electricity high voltage OHLs:

- Arva to Navan 110 kV OHL; and
- Gorman to Maynooth 220 kV OHL.

12.5.2.3 Construction Waste

38 As with any infrastructure project there will be excavated material during the construction of the proposed development, specifically in relation to the tower foundations. Typically 34m^3 of excess soil will be excavated at each intermediate tower location with approximately 230m^3 of excess soil excavated from angle towers. A worst case scenario would be that all excavated material (14,200m^3 for all the towers in MSA) would be sent off-site to a licensed / permitted waste recovery facility / landfill.

39 Timber waste will be generated from hedge rows, tree lines and forestry to clear open space for OHL development.

40 The proposed extension works at Woodland Substation will involve the production of waste material. The construction of the substation will result in approximately 3,500m^3 of excavated material, which will have to be removed off site to licensed disposal facilities.

12.5.3 Operational Phase

41 The operational phase will have potential impacts on aviation and the potential to generate a negligible amount of waste.

12.5.3.1 Operational Waste

42 It is envisaged that little waste will arise from the operational phase of the proposed development. Waste generated in the operational phase will include light cleaning waste. arising in maintenance and cleaning operations, the replacement of lighting units as required, oils arising from occasional maintenance activities and packaging materials.

12.5.3.2 Aviation

12.5.3.2.1 Airfields

43 Aircraft operating at Trim Airfield will pass in the vicinity of Towers 355, 356 and 357. Prior to the application for planning approval being made, the views of the prescribed authority for aircraft safety, the Irish Aviation Authority (IAA) were sought and the following is an extract from correspondence dated the 18.09.2013:

"As far as aerodromes are concerned, Trim aerodrome is mentioned in the project proposals, and Aircraft operating there will pass in the vicinity of Tower numbers 355, 356 and 357. If the towers are to be the maximum height of 43 metres, the maximum line height will be approximately 104 metres OD. Over these wires, the Approach and Take-off surfaces (the relevant Obstacle Limitation Surfaces for the aerodrome) for the runway at Trim will be at approximately 130 metres OD. Although the lines will be below the obstacle limitation surfaces for the aerodrome, making them more conspicuous through the fitting of marker spheres should be considered between Towers 355 and 357.

On this subject, where power transmission lines cross rivers and watercourses, similar marker spheres are often fitted. This is usually claimed to be for aircraft, but it is usually to help prevent large birds, in particular swans, form colliding with the lines."

44 This shows that the proposed development does not provide an obstacle for aircraft operating at Trim Airfield. With the towers at a maximum height of 43m, the maximum line height will be approximately 104m OD and this is 26m below the relevant Obstacle Limitation Surfaces for the airfield, which is 130m OD. The IAA confirmed that the OHLs will be below the obstacle limitation surface for Trim Airfield.

45 This position was also confirmed by a study carried out by Rod Fewings an independent aviation expert employed by TOBIN at the line routing stage, refer to **Appendix 12.1, Volume 3D Appendices** of the EIS.

12.5.3.2.2 Ballooning

46 Ballooning is an activity regulated by the IAA. Again, prior to the application for planning approval being made, the views of the prescribed authority, the IAA were sought in relation to ballooning activity and the following is an extract from correspondence dated the 24.10.2013:

~~–~~Balloon flights are only permitted / possible in particular weather conditions – light winds and good visibility. Balloon pilots have to take account of numerous hazards in their vicinity, including any power lines. They have to plan their launch point / flight to avoid known hazards. The potential presence of power lines in this area will have to be considered by the balloon pilots as part of their flight planning. They are permitted to fly over the powerlines, but have to avoid launching or landing in their proximity. The tracks show regular overflights of Trim town (see **Figure 12.3**)*, which is also an unsuitable landing site, but does not prevent their operations.*

In my opinion, the balloonists will have to consider the presence of the proposed 400 KV interconnector in the vicinity of their intended operation, but there already are numerous hazards in the area including various other electricity and telecom lines. The ballooning activity should not be a reason to prevent changes to the existing landscape, including the construction of power transmission lines."

47 This clearly shows that the ballooning activity should not prevent construction of the proposed 400 kV OHL. The power line will have to be considered by the balloon pilots for launching and landing, but as stated by the IAA balloon pilots are allowed fly over power lines.

12.5.4 Decommissioning

48 The proposed development will become a permanent part of the transmission infrastructure. The expected lifespan of the development is in the region of 50 to 80 years. This will be achieved by routine maintenance and replacement of hardware as required. There are no plans for the decommissioning of the overhead line (OHL). In the event that part of, or the entire proposed infrastructure is to be decommissioned, all towers, equipment and material to be decommissioned will be removed off site and the land reinstated. Impacts would be expected to be less than during the construction phase and would be of short term duration.

12.6 MITIGATION MEASURES

49 The construction methods carried out by the ESB and its contractors will be in line with international best practice and will fully comply with relevant health and safety.

50 It will be a requirement of the contractor appointed to construct the proposed development to prepare a detailed CEMP prior to the commencement of construction operations. The CEMP will include method statements and work programmes that provide more detailed phasing of work based on the methodologies described in Chapter 7, **Volume 3B** of the EIS and the mitigation measures contained in this EIS. An outline CEMP is included in Appendix 7.1, **Volume 3B Appendices** of the EIS. The objective of this plan will be to minimise the impact caused by the construction stage of the proposed development.

12.6.1 Construction Phase

12.6.1.1 **Electricity and Telecoms**

51 A site specific risk assessment must be completed where the crossing of existing electricity and telecom services is necessary. Consultation will take place with service providers prior to any construction works in the proximity of existing telecoms services likely to be impacted, as required.

52 Refer to **Section 12.5.2.2** for details on where the crossing of existing OHL and telecom services is necessary during construction, maximum efforts will be made to minimise disruption to the service. Extreme caution will be exercised during the construction of towers to ensure no cables will be disturbed. Care will be taken when stringing conductors. Certain obstacles along a straight have to be guarded such as road / railway crossings and other OHLs by way of temporary guard poles (refer to Chapter 7, **Volume 3B** of the EIS for further details on construction).

12.6.1.2 **Gas Pipeline**

53 A pre-construction survey will be undertaken during the construction phase, including ground investigations, to confirm the conditions which are anticipated to be encountered.

54 The survey will confirm the conclusions set out herein as to the presence or absence of gas infrastructure in the construction areas. This is a standard requirement for all construction projects.

12.6.1.3 **Waste**

12.6.1.3.1 Legislation

55 All waste arising during the construction and operational phases will be managed and disposed of in a way that ensures compliance with the provisions of the following legislation:

- *Waste Management Act 1996-2011:*
  - *Waste Management (Amendment) Act 2001* [S.I. No. 36/2001]*;*
  - *Protection of the Environment Act 2003* [S.I. No. 27/2003]; and
  - *Environment (Miscellaneous Provisions) Act 2011* [S.I. No. 20/2011].
- *European Communities (Waste Directive) Regulations 2011* [S.I. No. 126/20011];
- *Waste Management (Facility Permit and Registration Regulations) 2007* [S.I. No. 821/2007];
- *Waste Management (Facility Permit and Registration Regulations) 2008* [S.I. No. 86/2008];
- *Waste Management (Collection Permit) Regulations 2007* [S.I. No. 820/2007];
- *Waste Management (Collection Permit) (Amendment)* Regulations 2008 [S.I. No 87/2008];

- Department of Environment, Community and Local Government (2006) *Best Practice Guidelines on the Preparation of Waste Management Plans for Construction & Demolition Projects*; and

- Meath County Council. *Waste Management Plan for the North East Region 2005-2010.*

56 Waste management will be carried out in accordance with *Best Practice Guidelines on the Preparation of Waste Management Plans for Construction & Demolition Projects* (2006) produced by the Department of Environment, Community and Local Government (DoECLGs).

57 A requirement of the *Waste Management (Facility Permit and Registration) Regulations 2007 and 2008* is to obtain a Certificate of Registration if excavated material is being disposed or recovered. The extract from the regulations is as follows:

> –*Classes of activity subject to registration with a local authority or the agency. Recovery of excavation or dredge spoil, comprising natural materials of clay, silt, sand, gravel or stone and which comes within the meaning of inert waste, through deposition for the purposes of the improvement or development of land and the total quantity of waste recovered at the site shall not exceed 25,000 tonnes*.”

12.6.1.3.2 Construction Waste Management Plan

58 A (CWMP) (which will form part of the CEMP) will be implemented to minimise waste and ensure correct handling and disposal of construction waste streams in accordance with the *Best Practice Guidelines on the Preparation of Waste Management Plans for Construction and Demolition Projects, Department of the Environment*, July 2006. The key principles underlying the plan will be to minimise waste generation and to segregate waste at source.

59 Facilities for segregation of waste will be made available to optimise reuse and recycling of construction waste and correct disposal of domestic waste. On-site segregation of waste will be provided by the contractor using skips for timber, steel, general waste and recyclables.

60 The measures proposed below shall be incorporated into this plan and shall be the minimum level of mitigation to be included inCWMP:

- Disposal of construction waste will be to licensed / permitted disposal facilities;

- Regulations in relation to waste management will be adhered to;

- Excavated material will be re-used on site where appropriate and where it is possible to do so;

- Other waste generated will be removed off site by licensed contractors for appropriate treatment / disposal or recycling at licensed facilities;
- Soil material will be tested regularly by a qualified company prior to removal to ensure material is inert;
- Where applicable, temporary site sanitary facilities will be connected to a holding tank which will be pumped out as required and disposed of in an appropriate manner to a licensed disposal facility;
- Fuels or chemicals stored on site will be stored in an enclosed, bunded unit and located a safe distance from mobile generators or electrical equipment;
- Hazardous waste oils and oil contained material will be stored in designated bins and disposed of by a licensed hazardous waste contractor;
- Spill kit bags / bins will be made available at sites and in relevant vehicles, should a spill occur; and
- Portable bunds will be used when refuelling to avoid fuel spills.

Top Soil

61 All topsoil excavated in the construction of tower foundations will be reinstated where possible. Where practical and appropriate, excavated subsoil will be used for associated construction and landscaping purposes on site. This will allow the material to be beneficially reused and would have no traffic implications or waste disposal to an outside site. Due to the relatively small footprint of each tower, there will not be a large amount of subsoil excavated at each tower. Typically $34m^3$ of excess soil will be excavated at each intermediate tower location with approximately $230m^3$ of excess soil excavated from angle towers. Where the excavated material will not be used onsite, all surplus soils will be transported to a licensed waste recovery facility and / or landfill, refer to **Appendix 7.2, Volume 3D Appendices** of the EIS.

62 In the unlikely event that any soil / subsoil is deemed to be contaminated it will be stored separately from the inert soil / subsoil and it will be sampled and tested. The material will be appropriately classified as non-hazardous or hazardous in accordance with EU Council Decision 2003/33/EC which establishes the criteria for the acceptance of waste at landfills, before being transported to an appropriately licensed facility by permitted contractors. The transport of materials will be carried out by contractors licensed under the *Waste Management (Collection Permit) Regulations 2007 as amended*.

Waste Steel, Copper and Aluminium

63 Waste steel, copper and aluminium will be stored separately in a metal skip and recycled using a licensed waste company and recycling facility. Other construction waste will include excess material, damaged material, waste timber and packaging waste will be stored in designated skips / bins on site for collection by a licensed waste contactor.

Hazardous Waste

64 Waste oils and oil contained material will be stored in designated bins and disposed of by a licensed hazardous waste contractor.

General Waste

65 General domestic type waste consisting of mixed food waste and food packaging, polystyrene, cardboard and plastic etc. will be generated during construction works by construction workers at the tower sites and stringing areas. This waste will be brought back to the construction material storage yard where it will be segregated correctly and placed in designated skips / bins for collection by a licensed waste contractor.

Foul Effluent

66 Temporary facilities will be provided for construction works at tower locations. The Contractor will provide chemical toilets / holding tank and provide for regular collection by a licensed company for discharge to the nearest local authority sewage treatment plant.

Timber

67 Qualified and certified timber contractors will recover / dispose of all timber waste arising from clearing hedgerows, tree lines and forestry (refer to **Chapter 6**, of this volume of the EIS for further details on the flora and fauna impacts).

12.6.2 Operational Phase

12.6.2.1 **Waste**

68 Light waste generated in the operational phase of the proposed development arising in maintenance and cleaning operations, replacement of lighting units as required, oils arising from occasional maintenance activities and packaging materials, will be removed off site by licensed contractors for appropriate recovery / disposal at licensed facilities.

12.6.2.2 **Airfields**

69 The proposed line route has been selected taking into account the presence of Trim Airfield and the relevant obstacle limitation surfaces for the aerodrome.

70 Landing aircraft using Runway 28 would need to be visually aware of where the towers are located and a formal approach procedure of *„visual contact of towers / cables required before starting field approach"* should be introduced, even though there is a clear margin between the top of the towers and the obstacle limitation surface. The OHLs will be below the obstacle limitation surfaces for Trim Airfield, but they will be made more conspicuous through the fitting of marker spheres between Towers 355 and 357.

71 Consultation with the IAA was sought to identify the type of marker spheres to be used and the following is an extract from correspondence dated the 08.01.2014:

> *"International aviation regulations have defined the marker spheres in the following paragraphs;*
>
> *5.4.3.8 A marker displayed on an overhead wire, cable, etc., should be spherical and have a diameter not less than 60 cm.*
>
> *5.4.3.9 The spacing between two consecutive markers or between a marker and a supporting tower should be appropriate to the diameter of the marker, but in no case should the spacing exceed:*
>
> > *a) 30 m where the marker diameter is 60 cm progressively increasing with the diameter of the marker to,*
> >
> > *b) 35 m where the marker diameter is 80 cm and further progressively increasing to a maximum of,*
> >
> > *c) 40 m where the marker diameter is at least 130 cm.*
>
> *Where multiple wires, cables, etc. are involved a marker should be located not lower than the level of the highest wire at the point marked.*
>
> *5.4.3.10 A marker should be of one colour. When installed, white and red or white and orange markers should be displayed alternately. The colour selected should contrast with the background against which it will be seen.*
>
> *Where marker spheres are proposed for aviation purposes, they will have to conform to these standards".*

72 The landscape consultants propose fitting 60cm diameter spheres at 30m intervals alternating orange and white colours, refer to **Chapter 11** of this volume of the EIS.

12.6.2.3 **Ballooning**

73 Consultation with the IAA, clearly indicated that ballooning activity should not be a reason to prevent changes to the existing landscape, including the construction of overhead power lines.

74 The potential presence of all power lines in this area will have to be considered by the balloon pilots as part of their flight planning. The OHL will have to be taken into account by the balloon pilots for launching and landing, but as stated by the IAA balloon pilots are allowed fly over power lines.

12.7 RESIDUAL IMPACTS

12.7.1 Gas Pipelines

75 Adherence to the mitigation measures will ensure there are no residual impacts associated with the proposed development.

12.7.2 Electricity Lines & Telecoms

76 Adherence to the mitigation measures will ensure there are no residual impacts associated with the proposed development.

12.7.3 Airfields

77 Adherence to the mitigation measures will ensure there are no residual impacts associated with the proposed development.

12.7.4 Ballooning

78 Adherence to the mitigation measures will ensure there are no residual impacts associated with the proposed development.

12.7.5 Waste

79 To manage construction waste, the main contractor will be required to develop, implement and maintain a CEMP during the construction works. The main contractors will be required to minimise waste and to segregate waste at source.

80 The main waste arising, inert soil, will be reused for onsite purposes. Where the excavated material will not be used onsite, all surplus soils will be transported to a licensed waste recovery facility and / or landfill, this ensures the provisions of the *Waste Management Act 1996* and

subsequent amendments and regulations and any of the relevant local authorities *Waste Management Plans.*

81 All other waste generated from construction activities will be sent to licensed waste recovery facilities, where possible. It is envisaged that the fraction of waste arising from the proposed development which will be sent to landfill will be minimal consisting only of the residual fraction of the domestic type waste generated by the construction workers which cannot be recovered. All other materials such paper, plastic, glass etc. will be segregated and recycled.

82 Following good waste management practices it is not expected that waste arising from the proposed development will give rise to any significant impacts.

12.8 INTERRELATIONSHIPS BETWEEN ENVIRONMENTAL FACTORS

83 The use of aviation marker spheres on the line between Towers 355 and 357 may increase the visual impact of the alignment; refer to **Chapter 11** of this volume of the EIS. This location corresponds with one of the most sensitive locations identified along the alignment of the proposed development, where towers are visible from Bective Bridge looking along the river Boyne.

84 The use of aviation marker spheres on the line between Towers 355 and 357 will negate the need for swan diverters on this section of the OHL, refer to **Chapter 6** of this volume of the EIS.

85 This chapter should be read in conjunction with Chapters 6 and 7 of **Volume 3B** of the EIS and **Chapters 6**, **7**, **8** and **11** of this volume of the EIS, for a full understanding of the main interactions between these environmental topics.

12.9 CONCLUSIONS

86 The proposed development does not provide an obstacle for aircraft operating at Trim Airfield and the IAA confirmed that the OHLs will be below the obstacle limitation surface for Trim Airfield. The IAA also confirmed that ballooning activity should not be a reason to prevent changes to the existing landscape, including the construction of power transmission lines.

75 The mitigation measures to be outlined in the CEMP (refer to Appendix 7.1, **Volume 3B Appendices** of the EIS for an outline CEMP) will be implemented as part of the construction management. It is considered that the operation of the proposed development will have no significant impacts and adherence to the mitigation measures will ensure there are no residual impacts associated with the proposed development.

13 MATERIAL ASSETS – TRAFFIC

13.1 INTRODUCTION

1 This chapter presents an evaluation of the proposed development as set out in Chapter 6**,** **Volume 3B** of the Environmental Impact Statement (EIS), in relation to traffic.

2 That chapter describes the full nature and extent of the proposed development, including elements of the overhead line (OHL) design and the towers. It provides a factual description, on a section by section basis, of the entire line route. The proposed line route is described in said chapter using townlands and tower numbers as a guideline. The principal construction works proposed as part of the development are set out in Chapter 7, **Volume 3B** of the EIS.

3 This chapter concentrates on the Meath Study Area (MSA). Chapter 13, **Volume 3C** of the EIS contains an evaluation of the Cavan Monaghan Study Area (CMSA).

4 The primary means of transporting materials and labour to / from site will be by means of vehicles using the existing public road network. This will result in a temporary increase in traffic on public roads in the MSA (as described below) and as such necessitates that the impacts of this traffic be considered.

5 The MSA for this evaluation includes a greater area than the footprint of the infrastructure described above. The MSA includes the existing road infrastructure in the vicinity of the proposed development and the haul routes within a much wider area, which will be used to bring materials to the work areas. The extent of the MSA for this evaluation is shown on Figure 13.18, **Volume 3D Figures** of the EIS.

6 This chapter should be read in conjunction with **Chapters 3**, **6**, **8**, **9**, **10**, **11** and **14** of this volume of the EIS, as well as Chapters 6 and 7 of **Volume 3B** of the EIS.

13.2 METHODOLOGY

7 This section of the EIS has been prepared in accordance with relevant EU and Irish Legislation and guidance, including the requirements of Annex IV of the EIA Directive and in accordance with Schedule 6 of the *Planning and Development Regulations 2001* (as amended) and conforms to the relevant requirements as specified therein.

8 The scope of the appraisal is based on a review of legislation, guidance documents, other EISs, feedback from public consultation, consultation with prescribed authorities, pre-application consultation with An Bord Pleanála (the Board) and a consideration of the likelihood for

significant impacts arising, having regard to the nature of the receiving environment and the nature and extent of the proposed development. The following guidance and policy documents were reviewed during the preparation of this chapter:

- National Roads Authority (NRA) (May 2014). *Traffic and Transport Assessment Guidelines* (;
- *Meath County Development Plan 2013 – 2019*;
- *Cavan County Development Plan 2014 – 2020*;
- NRAs Design Manual for Roads and Bridges TD 27 (November 2011) *Cross Sections and Headroom*;
- NRAs Design Manual for Roads and Bridges TD 41-42 (November 2011) *Geometric Design of Major / Minor Priority junctions and Vehicular Access to National Roads*; and
- NRA *Project Appraisal Guidelines* (January 2011).

9 The scoping opinion received from An Bord Pleanála (see Appendix 1.3, **Volume 3B Appendices** of the EIS) identified the following issues as being relevant to this chapter of the EIS:

- A construction traffic management plan will be required, which should address stringing operations, road closures / detours and impacts on railway infrastructure;
- Identify the means of access for construction and on-going maintenance and the treatment of new or widened construction entrances; and
- Identify and assess public road crossings, including the construction methodology. Particular regard should be had to the relationship with the national primary and secondary road network and with the proposed Leinster Orbital Route, to include issues and separation.

10 Following a meeting with the Board in December 2013 to clarify the scope of the construction traffic management plan referred to above, the Board clarified that a that fully detailed construction management and construction traffic management plans would not necessarily be required at the time of submitting the planning application. A detailed construction traffic management plan will be carried out post planning however, details of the methods that will be used for construction are outlined within Chapter 7, **Volume 3B** of the EIS. This chapter describes mitigation measures that will form part of the detailed construction traffic management plan.

11 The operational phase of the transmission line will generate minimal traffic flows as towers and substations are unmanned. Maintenance of the existing substation, proposed transmission line and towers will generate some traffic but this will be rare and the volumes involved negligible. The operational phase of the transmission line, therefore, is not considered in great detail.

12 The construction phase of the development, as outlined in Chapter 7, **Volume 3B** of the EIS will generate significantly larger volumes of traffic compared to the operational phase, including long / heavy vehicles, concentrated over a shorter time span. This allied with the largely rural nature of the surrounding road network, means the impact of the construction traffic needs to be considered. However, as discussed further in this chapter, that is not to say that the construction of the proposed development will generate significant volumes of construction traffic.

13 Sources of information used to undertake the evaluation of the construction traffic impacts for the proposed development are as follows:

- Project construction methodology;
- Ordnance survey mapping;
- Aerial photography;
- Consultation with the NRA;
- Consultation with Cavan County Council; and
- Consultation with Meath County Council.

14 The above sources of information, combined with feedback received during landowner engagement, as well as other expert and experienced input concerning construction of transmission infrastructure, were used to identify the locations where access to tower locations and stringing areas (areas used to install cables onto the towers) can be achieved and the likely haul routes that will be used by construction traffic to travel to these access locations. Based on these haul routes, a qualitative evaluation of the ability of these roads to cater for the vehicles, which will be utilised during construction, was undertaken.

15 The development of a construction methodology was used to estimate the number and type of vehicles (both light and heavy vehicles) that will be generated by the construction of each individual tower and associated temporary access tracks for accessing tower locations. This information was then used to further estimate the volumes of traffic that will be generated at the construction material storage yard and the access between that yard and the construction sites of this linear development.

16 Locations where each tower site and stringing area can be accessed from the public road have been identified. The location identified for these have been chosen to make use of existing entrances and field tracks where possible. The locations of these temporary access tracks are shown in Figures 13.14 – 13.17, **Volume 3D Figures** of the EIS.

17 By considering the proposed construction methodology and phasing, the location of the identified temporary construction access route locations and the haul routes that will be used to access these locations, an estimate of the volumes of construction traffic that will use individual roads within the MSA can be generated. These estimates can be used to evaluate the impact on individual roads within the road network in numerical terms (i.e. numbers of vehicles).

18 Data collection, in the form of ‗Automatic Traffic Counts', were carried out to ascertain the typical existing traffic volumes currently using the roads which will be impacted by the construction of the proposed development (refer to **Appendix 13.2, Volume 3D Appendices of the EIS**). By comparing the projected increase in traffic to the existing background traffic levels, the level of impact has been ascertained.

19 In addition to the impacts on traffic capacity and road condition, other traffic related impacts should be considered. These include:

- Road Safety;
- Air Pollution;
- Noise and Vibration;
- Flora and Fauna;
- Cultural Heritage; and
- Landscape.

20 With the exception of Road Safety, the above impacts are evaluated in other chapters of this volume of the EIS in respect of the MSA and **Volume 3C** of the EIS in respect of the CMSA. Regarding Road Safety, in order to get an understanding of the road accident history of the area, Road Accident data for the roads that will be affected by the development has been obtained from the Road Safety Authority website (www.rsa.ie).

13.3 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

21 A detailed description of the proposed development is provided in Chapter 6, **Volume 3B** of the EIS and the construction methodology is outlined in Chapter 7**, Volume 3B** of the EIS. As described in Chapter 7, **Volume 3B** of the EIS the operational phase of the development will result in negligible volumes of traffic, with the primary traffic impact occurring during the construction phase.

22 The proposed OHL will effectively result in a long linear construction site with multiple isolated areas where construction activities will take place. In order to facilitate construction at the areas where construction activities will be occurring, materials, personnel and equipment will be transported to / from these sites.

23 Transportation of these materials personnel and equipment will primarily be achieved using the existing public road network. Access to the individual sites will generally be achieved via existing field accesses and existing internal tracks where available.

24 Despite the scale of the proposed development, the volumes of vehicles required to attend each individual construction location along the length of the linear development will be relatively low and this traffic will be spread out over several weeks, which is the duration it will take to construct individual towers.

25 Due to the length of the proposed line, traffic will be dispersed over a large area during the construction phase, notwithstanding the fact that construction will occur in any one location for a relatively short duration. It is proposed that a construction material storage yard, located to the south-east of Carrickmacross, County Monaghan will be used to store materials for distribution to the individual sites. Higher volumes of traffic are anticipated at this location prior to their dispersion across the road network leading to individual sites (refer to Chapter 7**, Volume 3B** of the EIS). The roads adjacent to the construction material storage yard that will experience the higher volumes of traffic associated with operations at the yard have been evaluated in Chapter 13, **Volume 3C** of the EIS.

13.4 EXISTING ENVIRONMENT

13.4.1 Existing Road Infrastructure

26 Figures 13.1 – 13.4, **Volume 3D Figures** of the EIS indicate the roads which will potentially be impacted by the proposed development.

27 Traffic surveys were carried out on the surrounding road network in order to determine background traffic flows on the haul routes that will be used by construction traffic. These counts consisted of Automatic Traffic Counters that were in place for a week. The surveys were carried out by Nationwide Data Collection Ltd. in October 2013 at 103 locations. These locations are indicated in Figures 13.5 – 13.8, **Volume 3D Figures** of the EIS. A further three counts were carried out in January 2014 adjacent to the entrance to the construction material storage yard.

28 In addition to the counts referred to above, some traffic counter data was taken from publicly available traffic counter data located on the NRAs website (www.nra.ie).

29 Traffic flows fluctuate seasonally. Based on permanent traffic counter data available from the NRAs website (www.nra.ie) this seasonal fluctuation can be determined. Thus, based on the flows measured at the counter located on the N2 to the south of Ardee (N02 – 15) during 2010, flows in October are higher than those normally experienced throughout the rest of the year. To account for this, baseline flows have been multiplied by a factor of 0.94. While this will result in the measured flows reducing, the lower flows will represent a worse case when presenting the percentage increase of traffic flows due to the proposed development. For the three counts carried out in January 2014, the same NRA counter was referenced. Flows were found to be 20% lower in January. As the flows on these three junctions are being used in junction analysis, presenting the worst case involves the factoring up of these flows by this percentage.

30 It is anticipated that, in the event that planning approval is granted, construction of the overall proposed development will commence in 2015 and last for approximately three years. Again, it should be noted that, given the linear nature of the proposed development, no part of the proposed line will experience construction for any extended time period. To account for the predicted growth of background traffic on the road network during the period between the date the surveys were carried out on and the date construction is expected to commence, growth rates have been applied to the background traffic flows. The rates applied have been taken from the NRAs *Project Appraisal Guidelines* and are as follows:

- Meath and Monaghan Counters - 1.040; and
- Cavan Counters – 1.051.

31 The above growth factors have been derived using the high growth rates appropriate to each county and represent two years growth to bring the measured flows to those expected in 2015. While the construction period will continue into 2016 and 2017, it is not certain which towers will be constructed within each year and using 2015 figures will result in higher percentage increases when comparing the predicted flows to existing flows and thusly 2015 represents the worst case.

32 Details of the roads, including daily traffic flows where available, that may be impacted upon are provided in **Tables 13.1 – 13.3**.

Table 13.1: Potentially Impacted National Roads

Road Number	AADT[73]	HGV%[74]
N2	8106	10.1%
M3	47927	3.3%
N51	5641	10.0%
N52	3045	20.4%

Table 13.2: Potentially Impacted Regional Roads

Road Number	AADT	HGV%
R125	800	10.5%
R154	7566	10.7%
R161	7395	13.0%
R147	10029	11.4%
R163	1691	12.6%
R164	830	15.4%
R162	3724	15.5%
R179	4050	12.1%

Table 13.3: Potentially Impacted Local Roads

Road Number	AADT	HGV%
L-6206-0	181	7.6%
L-6207-0	N/A	N/A
L-62061-0	247	10.7%
L-62051-0	N/A	N/A
L-62061-9	N/A	N/A
L-6205-0	235	7.5%
L-2207-44	1089	10.5%
L-6202-32	515	15.2%
L-22054-0	73	10.7%
L-2205	634	9.1%
L-22051	116	11.8%
L-22030	757	10.7%
L-40071-7	837	58.6%

[73] Average Annual Daily Traffic (AADT)

[74] Heavy Goods Vehicle (HGV) Percentage

Road Number	AADT	HGV%
L-40231-0	164	8.3%
L-4008	697	11.6%
L-4024-2	1440	10.7%
L-4009-27	519	12.6%
L-40063-0	133	18.4%
L-40065-0	N/A	N/A
L-80091-16	108	7.3%
L-8009-6	1186	7.7%
L-8790	220	7.6%
L-40051-0	N/A	N/A
L-4005-0	745	10.8%
L-4005-11	981	11.1%
L-8008-0	996	11.9%
L-80001-0	N/A	N/A
L-8001-0	N/A	N/A
L-7413-0	1648	9.9%
L-3409-18	N/A	N/A
L-34091-0	N/A	N/A
L-3409-0	714	6.4%
L-7414-12	1081	10.2%
L-7414-0	856	10.2%
L-3408-0	502	10.5%
L-74115-0	77	5%
L-3406-44	203	12.0%
L-74113-0	67	10.3%
L-3406-30	182	11.3%
L-34061-0	67	11.8%
L-74116-0	167	16.4%
L-74112-0	N/A	N/A
L-74051-7	77	11.4%
L-3402	830	9.5%
L-34021-0	110	9.8%
L-7404-0	312	11.9%
L-68371-0	175	7.6%
L-74023-0	N/A	N/A
L-6837-0	383	10.7%
L-28021-0	175	4.5%
L-2802	1573	7.3%
L-6801-0	111	5.3%
L-68011-0	102	7.7%

Road Number	AADT	HGV%
L-68011-17	40	2.4%
L-68017-0	194	8.1%
L-2805-0	N/A	N/A

33 While it is likely that each road referred to in **Tables 13.1 – 13.3**, will be utilised at some stage during the construction phase, the use of the local roads will be minimised with the use of national and regional routes being prioritised due to their standard generally being higher.

34 Materials used in the construction of the proposed development, such as steel and concrete, are likely to be sourced from manufacturers that are not situated within the immediate vicinity of the proposed development. It is proposed that a construction material storage yard will be located at a site situated to the south-east of Carrickmacross and that construction traffic will emanate from this site, towards its destination.

35 Vehicles departing from the construction material storage yard will join the N2 from the L4700, turning north towards Carrickmacross or south towards Ardee, depending on the destination of the materials being delivered. Thereafter construction traffic will migrate onto national and regional roads as necessary. The use of local roads will be minimised as much as possible, particularly to avoid or minimise the encountering of narrow road widths, poorly maintained visibility and unsuitable bearing capacities. Haul routes have been identified, as shown in Figures 13.9 – 13.13, **Volume 3D Figures** of the EIS which indicate this hierarchical approach.

36 As the national and regional roads will be most used by the development, a brief description of each is included in the following paragraphs.

37 The N2 is a national primary road linking Dublin to the Border with Northern Ireland in Monaghan. The cross section of this road varies between two lane dual carriageway, type 3 dual carriageway and single carriageway, the details of which can be found in the NRAs *TD27 Cross Section and Headroom*.

38 The N3 / M3 is a national primary road linking Dublin to Donegal. The N3 / M3's cross section varies between two lane dual carriageway and single carriageway, the details of which can be found in the NRAs *TD27 Cross Section and Headroom*. Within the section to be used by the line construction traffic, the road is two lane dual carriageway to motorway standard.

39 The N51 is a national secondary road linking Delvin to Drogheda. This road has a carriageway width of approximately 7m. This road has several tight bends however, along the portion that will be used by construction traffic it is generally straight with sufficient forward visibility available.

40 The N52 is a national secondary road linking Nenagh to Dundalk. This road has a cross section of approximately 7m. This road has several tight bends along the portion that will be used by construction traffic.

41 The R125 is a regional road linking Dunshaughlin to Kilcock. This road has a cross section of approximately 6m. This road has several sharp bends which limits forward visibility in places.

42 The R147 is a regional road linking Clonee to Derver via Navan. The road‘s cross section varies but is typically 7m single carriageway with hard shoulders. The section of the road that will be used by construction traffic has sufficient forward visibility to safely accommodate construction traffic.

43 The R154 is a regional road linking Blackbull to Trim and Athboy. This road has a cross section of approximately 7m carriageway width with 0.5m hardstrips and grass verges. The speed limit along this road is generally 80km/h. This road is generally straight along the stretch that will be affected by construction traffic with sufficient forward visibility available.

44 The R161 is a regional road linking Navan to Kinnegad. This road has a cross section of between 6m and 7m. The speed limit along this road is generally 80km/h. This road is generally straight along the stretch that will be affected by construction traffic with sufficient forward visibility available.

45 The R162 is a regional road linking Navan to Sherlock via Kingscourt. The section which construction related to the proposed line route traffic will use, it has a carriageway width of approximately 6m with grass verges on each side although this varies in places. This road is generally subject to a speed limit of 80km/h, however, this is reduced in places. Forward visibility along the road is adequate to accommodate these speeds.

46 The R163 is a regional road linking Kells to Slane. The carriageway width of the road varies but is generally approximately 6m with grass verges on both sides. This road is generally subject to a speed limit of 80km/h but this reduces to 60km/h in places. Visibility along the sections of road, likely to be used in relation to the transmission line construction traffic is generally in keeping with the standards required for the speed limit.

47 The R164 is a regional road linking Mooneystown to Kingscourt via Kells. This road has a cross section of between 6m and 7m. The speed limit along this road is generally 80km/h. This road has several tight bends along the portion that will be used by construction traffic and the specified forward visibility for this design speed is not available in places.

13.4.2 Road Safety

48 A search of the accident statistics has been carried out using the Road Safety Authority's website. **Table 13.4** identifies the number of serious and fatal accidents that have been recorded on the sections of road (in the period between 2005 and 2012) that are likely to be used during the construction phase of the proposed development. This is the most up to date information currently available.

Table 13.4: Road Accidents Along Proposed Haul Routes 2005 – 2012

Road Number	No. of Serious Accidents	No. of Fatal Accidents
R154	2	1
L-2207-44	1	1
L-6202-32	1	0
R161	2	1
R162	12	4
R147	9	4
L-8001-0	1	0
N52	4	1
L-3402-17	1	0
N2	6	8
M3	0	2
R179	3	1

13.4.3 Site Access

49 The proposed development in the MSA has a total of 165 new towers which will require access for construction. In addition to tower locations, access will be required to associated stringing and general working areas. There are a total of 140 temporary accesses required from the public road network to construct the proposed line. The majority of these will be accessed using existing field gates or laneways. Figures 13.14 – 13.17, **Volume 3D Figures** of the EIS show the proposed access route locations.

50 It is proposed that a site to the south-east of Carrickmacross will be used as a construction material storage yard. This yard is located to the west of the N2 and is accessed by the L4700. The existing access into the storage yard is located adjacent to a junction on the public road

network and has restricted visibility. As such, it is proposed to construct a new entrance onto the L4700 further south of the existing entrance. A speed survey along the L4700 indicated that 85^{th} percentile speeds along the road are 70km/h. A visibility splay of 160m from a 3m set back is achievable to the left and 120m from a 3m setback is achievable to the right. The L4700, N2 and the N2 to L4700 Link Road have been evaluated in Chapter 13, **Volume 3C** of the EIS.

13.4.4 Proposed Network Improvements

51 The Leinster Orbital Route is a proposed new road linking the towns of Navan, Drogheda, Naas / Newbridge / Kilcullen while also serving towns such as Kells, Trim, Maynooth, Celbridge, Leixlip and Kilcock. This project is currently at feasibility stage during which the need for the scheme and broad constraints are identified. The scheme has yet to go through the route selection stage and an exact route is, therefore, not known. Should this proposed scheme go ahead, it is likely to interface with the proposed development with a location in the vicinity of Navan and Trim being the most likely crossing location.

13.5 POTENTIAL IMPACTS

52 Due to the length and relative remoteness of this transmission line, the principal form of transport used in the construction of this line route is by road. This allows flexibility not achievable by other modes of transport, such as rail.

53 The construction of each tower will necessitate the use of several different types of road vehicles. The vehicles directly involved in the works include crane(s), excavators, dump trucks, 4x4s, tractor and trailers and concrete delivery vehicles. For further details of the vehicles being used for the construction of this development, refer to Chapter 7, **Volume 3B** of the EIS. Vehicles not directly involved in construction activities but involved in the construction phase will be vehicles used by site personnel travelling to and from the site.

54 In general the vehicles listed above will be the only road vehicles used during the construction phase. In some locations tree felling / lopping will need to take place in order to construct the transmission line or to provide a corridor with sufficient clearance to avoid conflict between trees and the line route. Tree felling will require the use of specific vehicles for this purpose (refer to **Chapter 6** of this volume of the EIS).

13.5.1 Do Nothing

55 Should this proposed development not be constructed, traffic and road conditions on the public road network would remain similar to the existing situation barring unforeseen circumstances.

13.5.2 Construction Phase

13.5.2.1 Traffic Generation at Tower Sites

56 A detailed breakdown of the volumes of traffic expected to be generated by the construction of the development is presented in **Appendix 13.3, Volume 3D Appendices** of the EIS. This has been prepared based on the construction methodology of towers. The volumes of traffic expected to be generated by each tower is summarised in **Table 13.5** for Light Vehicle (LV) and Heavy Goods Vehicles (HGV). The best case presented below assumes that materials excavated at tower sites will remain on site, being deposited within the same landholding. The worst case assumes that a suitable location was unable to be found on the site and materials excavated are removed from site for disposal at an appropriate facility.

Table 13.5: Tower Traffic Generation

Tower Type	Movements Generated				Peak Daily Movements Generated	
	Best Case		Worst Case		Best Case	Worst Case
	LV	HGV	LV	HGV		
Intermediate Tower	108	46	108	56	17	17
Angle Tower	122	142	122	218	27	46

57 The expected traffic generated by each tower has been prepared based on the estimates described above and these are presented in **Appendix 13.1, Volume 3D Appendices** of the EIS.

13.5.2.2 Traffic Generation at Woodland

58 Traffic will be generated due to the proposed extension works at Woodland Substation. The construction of the foundations will result in the greatest impact. It is estimated that approximately 3,500m^3 (equivalent to approximately 7,350 tonnes) of material will be removed off site as a result of these works and a comparable volume of concrete being delivered for the pouring of foundations. Assuming material is removed by 20 tonne dump trucks and concrete is delivered using 8m^3 concrete trucks, this will result in approximately 1,612 movements. Assuming a 6 month construction period for these civil works results in approximately 13 movements per day. Allowing for site operatives and other miscellaneous trips, the peak period of traffic generation would be approximately 30 vehicle movements per day.

13.5.2.3 Guarding

59 Guarding will be required at locations where the line route passes over roads. The volumes of traffic generated at each guarding location is expected to be one to two vehicles per day over a five day period. The erection of guarding will result in the requirement for temporary road closures such that the netting can be erected safely. The exact duration of each road closure will be determined at the construction phase; however it should generally only be approximately one to two hours for local roads. More extensive closures may be required at larger crossings, however these closures should be a day at worst.

13.5.2.4 Impact on Road Network

60 Based on the estimated traffic generation presented in the above sections the percentage increase in traffic on the roads to be used during the construction phase of the development are presented in **Table 13.6**.

Table 13.6: Impact on Road Network

Road Number	AADT	Peak Daily Increase		Percentage Peak Increase	
		Best Case	Worst Case	Best Case	Worst Case
N2 North of Storage Yard	8106	216	216	2.7%	2.7%
N2 South of Storage Yard	8106	216	216	2.7%	2.7%
M3	47927	27	46	0.1%	0.1%
N51	5641	81	138	1.4%	2.4%
N52	3045	108	184	3.5%	6.0%
R125	800	57	76	7.1%	9.5%
R154	7566	57	76	0.8%	1.0%
R161	7395	27	46	0.4%	0.6%
R147	10029	27	46	0.3%	0.5%
R163	1691	27	46	1.6%	2.7%
R164	830	27	46	3.3%	5.5%
R162	3724	54	92	1.5%	2.5%
R179	4050	54	92	1.3%	2.3%
L-6206-0	181	17	17	9.3%	9.3%
L-6207-0	N/A	30	30	N/A	N/A
L-62061-0	247	17	17	6.9%	6.9%
L-62051-0	N/A	17	17	N/A	N/A
L-62061-9	N/A	17	17	N/A	N/A
L-6205-0	235	17	17	7.2%	7.2%
L-2207-44	1089	17	17	1.6%	1.6%
L-6202-32	515	27	46	5.2%	8.9%

Road Number	AADT	Peak Daily Increase		Percentage Peak Increase	
		Best Case	Worst Case	Best Case	Worst Case
L-22054-0	73	27	46	37%	63%
L-2205	634	17	17	2.7%	2.7%
L-22051	116	27	46	23.3%	39.7%
L-2203-0	757	27	46	3.6%	6.1%
L-40071-7	837	27	46	3.2%	5.5%
L-40231-0	164	27	46	16.5%	28.0%
L-4008	697	27	46	3.9%	6.6%
L-4024-2	1440	17	17	1.2%	1.2%
L-4009-27	519	27	46	5.2%	8.8%
L-40063-0	133	27	46	20.3%	34.6%
L-40065-0	N/A	17	17	N/A	N/A
L-80091-16	108	27	46	25%	42.6%
L-8009-6	1186	27	46	2.3%	3.9%
L-8790	220	27	46	12.3%	20.9%
L-40051-0	N/A	27	46	N/A	N/A
L-4005-0	745	27	46	3.6%	6.2%
L-4005-11	981	27	46	2.8%	4.7%
L-8008-0	996	27	46	2.7%	4.6%
L-80001-0	N/A	27	46	N/A	N/A
L-8001-0	N/A	27	46	N/A	N/A
L-7413-0	1648	27	46	1.6%	2.8%
L-3409-18	N/A	27	46	N/A	N/A
L-34091-0	N/A	27	46	N/A	N/A
L-3409-0	714	17	17	2.4%	2.4%
L-7414-12	1081	17	17	1.6%	1.6%
L-7414-0	856	27	46	3.2%	5.4%
L-3408-0	502	27	46	5.4%	9.2%
L-74115-0	77	27	46	35.1%	59.7%
L-3406-44	203	27	46	13.3%	22.7%
L-74113-0	67	27	46	40.2%	68.7%
L-3406-30	182	27	46	14.8%	25.3%
L-34061-0	67	17	17	25.4%	25.4%
L-74116-0	167	27	46	16.2%	27.5%
L-74112-0	N/A	27	46	N/A	N/A
L-74051-7	77	27	46	35.1%	59.7%
L-3402	830	17	17	2.0%	2.0%
L-34021-0	110	17	17	15.5%	15.5%
L-7404-0	312	27	46	8.7%	14.7%
L-68371-0	175	27	46	15.4%	26.3%

Road Number	AADT	Peak Daily Increase		Percentage Peak Increase	
		Best Case	Worst Case	Best Case	Worst Case
L-74023-0	N/A	17	17	N/A	N/A
L-6837-0	383	17	17	4.4%	4.4%
L-28021-0	175	17	17	9.7%	9.7%
L-2802	1573	27	46	1.7%	2.9%
L-6801-0	111	27	46	24.3%	41.4%
L-68011-0	102	17	17	16.7%	16.7%
L-68011-17	40	27	46	67.5%	115%
L-68017-0	194	27	46	13.9%	23.7%
L-2805-0	N/A	27	46	N/A	N/A

61 As can be seen from **Table 13.6**, traffic on the road network will increase for the duration of the construction phase. While some of the percentage increases are quite high, this is generally reflective of the low number of vehicles generally using these roads. Furthermore, the figures above present the peak additional flow along each road. These peak flows would only be occurring for short durations, typically during the laying of foundations which will take approximately five days. From a capacity perspective, the road network will be able to cater for the flows predicted.

62 Heavy vehicles will be used to construct the transmission line. Local and minor roads are particularly sensitive to the increase in heavy vehicles as these roads are typically not designed to accommodate large numbers of these types of vehicles. The potential for impacts to the pavement structure, verges, boundary treatments etc. are all increased as is disturbance caused to the local community in relation to noise, vibration, dust and air quality impacts (refer to **Chapters 9** and **10** of this volume of the EIS).

13.5.3 Operational Phase

63 Minimal traffic volumes will be generated by the proposed development during the operational phase of the development, as electricity lines are not manned. An annual inspection is carried out of the line, however this is typically done by air, thus generating no traffic. A more detailed inspection is carried out every five years whereupon each tower on the line is visited. This will result in one to two vehicles travelling to each landholding along the line route to facilitate this inspection. Thereafter, no further traffic would be generated except in exceptional circumstances, such as a fault occurring.

13.5.4 Decommissioning

64 The proposed development will become a permanent part of the transmission infrastructure. The expected lifespan of the development is in the region of 50 to 80 years. This will be achieved by routine maintenance and replacement of hardware as required. There are no plans for the decommissioning of the OHL. In the event that part of, or the entire proposed infrastructure is to be decommissioned, all towers, equipment and material to be decommissioned will be removed off site and the land reinstated. Impacts would be expected to be less than during the construction phase and would be of short term duration.

13.6 MITIGATION MEASURES

13.6.1 Construction Phase

65 It shall be a requirement of the contractor appointed to construct the proposed development to prepare a detailed Construction Traffic Management Plan prior to the commencement of construction operations.

13.6.1.1 Construction Programme

66 Prior to the commencement of the construction phase, a construction programme shall be developed that shall seek to maintain traffic levels at an average level throughout the construction phase, avoiding high peaks that would be caused by scheduling multiple teams to be constructing angle towers simultaneously for example.

67 The construction programme shall be developed in consultation with the appropriate local authorities, specifically taking into account potential road repair works that are included in the local authority's road works schedule. One of the key aims of this programme would be to enable any road works being carried out by the local authority to be undertaken following the presence of construction traffic on the road.

13.6.1.2 Road Condition Monitoring

68 The extent of the heavy vehicle traffic movements and the nature of the payload may create problems of:

- Fugitive losses from wheels, trailers or tailgates; and
- Localised areas of subgrade and wearing surface failure.

69 Loads of materials leaving each site will be evaluated and covered if considered necessary to minimise potential dust impact during transportation. The transportation contractor shall take all reasonable measures while transporting waste or any other materials likely to cause fugitive loses from a vehicle during transportation to and from site. The roads forming part of the haul routes will be monitored visually throughout the construction period and a truck mounted vacuum mechanical sweeper will be assigned to roads along the haul route as required.

70 In conjunction with the appropriate local authority, additional inspection and review of the roads forming the haul routes will be undertaken one month prior to the construction phase to record the condition of these roads at that particular time. As a minimum this survey shall comprise review of video footage taken at that time, which shall confirm the condition of the road corridor immediately prior to commencement of construction. This shall include video footage of the road wearing course, the appearance and condition of boundary treatments and the condition of any overhead services that will be crossed. Visual inspections and photographic surveys will be undertaken of bridges and culverts that are along the haul roads.

71 Where requested by the local authority, pavement condition surveys will also be carried along roads forming part of the haul route. These will record the baseline structural condition of the road being surveyed immediately prior to construction.

72 Ongoing visual inspections and monitoring of the haul roads will be undertaken throughout the construction period to ensure any damage caused by construction traffic is recorded and that the relevant local authority is notified. Arrangements will be made to repair any such damage to an appropriate standard in a timely manner such that any disruption is minimised.

73 Upon completion of the construction phase, the surveys carried out at pre-construction phase will be repeated. The pre construction phase surveys will be used as a baseline to use as a comparison with these post construction surveys. Damage identified as being attributable to construction traffic associated with the proposed development will be repaired to an appropriate standard.

13.6.1.3 **Road Closures**

74 It is not envisaged that road closures will be required for tower construction or the upgrade works at Woodland Substation. It is acknowledged that some of the roads that will be used for the construction of towers are narrow, however, there are generally opportunities for vehicles to pass. Where required, traffic management measures, such as temporary traffic lights or flagmen, will be deployed on roads. This is consistent with normal good practice traffic management during construction of any project where public road access is required.

75 Temporary road closures will be required during the erection and removal of guarding at road crossings the most notable of which is the M3 Motorway. These road closures will generally be short in duration and the appropriate measures and time for closing each road shall be agreed with the local authorities and any other appropriate stakeholders (refer to Chapter 7, **Volume 3B** of the EIS).

13.6.1.4 Communication

76 Close communication between the relevant local authorities and An Garda Síochána will be maintained throughout the construction phase. This will include the submission of proposed traffic management measures for comment and approval, updates on the condition of the road network and updates on the construction programme. Information on local events that could conflict with traffic management measures and construction traffic will be sought such that alternative measures can be implemented to avoid such conflicts.

77 The local community will be informed of proposed traffic management measures in advance of their implementation. This will be done by posting advertisements in the local newspapers and by delivering leaflets to houses in the affected areas. Contact details will be provided such that residents can seek further information and provide any additional knowledge, such as dates of local events, which could impact on traffic management measures that have been put in place.

13.6.1.5 Site Entrances

78 In accordance with Chapter 8 of the Department of the Environment's *Traffic Signs Manual*, road signs will be erected to provide warning of the temporary access locations to construction site's entrance as well as for any operations requiring the provision of warning signs. Signage shall be erected one week prior to the commencement of operations on site.

13.6.1.6 Emergency Response Management

79 It is important that, notwithstanding materials haulage traffic, emergency services can gain ready access to any household along the haul route and gain emergency access to each tower construction site and Woodland Substation. Priority usage of the haul route and priority access to and from the site will be given to emergency services. Emergency Services in County Meath and Cavan will be provided with contact details of the contractors personnel responsible for the management of construction traffic. On being notified of an incident, communication will be made to drivers that an incident has occurred and instructions will be provided to them on how to proceed.

13.6.2 Operational Phase

80 Due to the minimal levels of traffic that will be generated by the development during the operational phase, no mitigation measures are proposed for this phase of the development.

13.7 RESIDUAL IMPACTS

81 The temporary nature of the construction phase coupled with the mitigation measures proposed will result in minimal residual impact due to the construction phase of the development in terms of traffic and transport.

82 The residual impact due to the operational phase of the development will be minimal as a result of the minimal volumes of traffic that will be generated during this phase of the development.

13.8 INTERRELATIONSHIPS BETWEEN ENVIRONMENTAL FACTORS

83 In addition to the impact on the road network, road vehicles also have an associated impact on other environmental factors such as air pollution, dust generation, noise and vibration. During the operational phase this will be minimal due to the low volumes of traffic that will be generated, however, during the construction phase these impacts, although temporary in nature, will prove more significant. These impacts are evaluated in other chapters of this EIS and this chapter should, therefore, be read in conjunction with **Chapters 9** and **10** of this volume of the EIS.

84 Traffic also has the potential to impact on several other environmental factors depending on circumstances. This likelihood for such impacts would increase when vehicles leave the public road network. These potential impacts traffic may indirectly cause are as follows:

- **Chapter 3** - Human Beings – Land Use and Soils, Geology and Hyrdogeology – Due to the compaction of soil caused by vehicles driving across farmland;
- **Chapter 6** - Flora and Fauna due to the removal of vegetation at access locations to accommodate vehicular access to construction sites;
- **Chapter 8** - Water quality due to potential fuel or fluid leaks reaching groundwater;
- **Chapter 11** - Landscape due to the placing of temporary access tracks; and
- **Chapter 14** - Cultural heritage due to potential damage due to vibrations caused by heavy vehicles operating near cultural heritage sites.

85 This chapter should, therefore, also be read in conjunction with **Chapters 3**, **6**, **7**, **8**, **11** and **14** of this volume of the EIS**.**

13.9 CONCLUSIONS

86 The operational phase of the proposed development will generate minimal volumes of traffic. The construction phase of the proposed development will generate significant, albeit temporary, volumes of traffic because the primary means of transporting materials and labour to / from site will be via the existing public road network.

87 Due to the nature of the proposed development, during the construction phase the proposed development will consist of multiple discrete construction sites. Access to the individual sites will generally be achieved via existing field accesses and existing internal tracks where available. A total of 140 temporary construction accesses are required from the public road network to construct the proposed line.

88 Despite the scale of the proposed development, the volumes of vehicles required to attend each individual construction location along the length of the linear development will be relatively low and this traffic will be spread out over several weeks, which is the duration it will take to construct individual towers. Due to the length of the proposed line, traffic will be dispersed over a large area during the construction phase, notwithstanding the fact that construction will occur in any one location for a relatively short duration. While construction works at the Woodland substation may take up to six months, the daily volumes of vehicles required to attend this location will be similarly relatively low when compared to the construction of a tower.

89 It is proposed that a construction material storage yard, located to the south-east of Carrickmacross, County Monaghan will be used to store materials for distribution to the individual construction sites.

90 Heavy vehicles will be used to construct the transmission line. Local and minor roads are particularly sensitive to the increase in heavy vehicles as these roads are typically not designed to accommodate large numbers of these types of vehicles. The potential for impacts to the pavement structure, verges, boundary treatments etc. are all increased as is disturbance caused to the local community in relation to noise, vibration, dust and air quality impacts.

91 A *Construction Traffic Management Plan* shall be prepared prior to the commencement of construction operations. The objective of this plan will be to minimise the impact caused by the construction phase of the proposed development.

14 CULTURAL HERITAGE

14.1 INTRODUCTION

1 This chapter evaluates impacts on the cultural heritage arising from the proposed development and associated development works within the Meath Study Area (MSA) as defined in Chapter 5, **Volume 3B** of the EIS. This chapter evaluates both the direct and indirect impacts of the proposed development on the cultural heritage of the MSA, as well as recommending mitigation measures and summarising the residual impacts that will persist once the mitigation has been completed. Impacts are evaluated for the construction, operation and decommissioning phases of the proposed development.

2 The term ‗cultural heritage‘ is a wide ranging concept, covering a vast breadth of knowledge and it is beyond the scope of this document to discuss it in detail. However, in summary, for the purposes of this appraisal, it includes archaeological heritage, architectural heritage, underwater cultural heritage, cultural landscapes and intangible cultural heritage such as folklore. In subsequent sections of this chapter and in line with the recommendations of the National Monuments Service and the Built Heritage and Architectural Policy Section of the Department of the Arts, Heritage and the Gaeltacht (DAHG), these have been broadly divided under the headings of ‗archaeological heritage‘, ‗architectural heritage‘ and ‗other cultural heritage‘.

3 Efforts have been made from the earliest stages of the project, during both constraints mapping and route selection, to minimise any direct physical impacts and impacts on the setting of cultural heritage sites in the study area.

14.1.1 Legal Framework

14.1.1.1 **Conventions and Legislation**

4 This appraisal is cognisant that Ireland has ratified several European and international conventions in relation to the protection of its cultural heritage, including:

- The UNESCO World Heritage Convention, 1972;
- ICOMOS Xi‘an Declaration on the *Conservation of the Setting of Heritage Structures, Sites and Areas, 2005;*
- Codified EIA Directive 2011/92/EU;
- The European Landscape Convention 2000;

- The European Convention on the Protection of the Archaeological Heritage (Valletta Convention), ratified by Ireland in 1997; and
- The European Convention on the Protection of the Architectural Heritage (Granada Convention), ratified by Ireland in 1997.

Relevant legislation includes:

- The *Planning and Development Act 2000*, as amended;
- The *National Monuments Act 1930*, as amended; and
- The *Architectural Heritage and Historic Properties Act, 1999*.

14.1.1.2 **County Development Plans**

5 The provisions of the *Cavan County Development Plan 2014-2020* (the Cavan CDP) and the *Meath County Development Plan 2013-2019* (the Meath CDP) are a material consideration for An Bord Pleanála (the Board) in its determination of the application for planning approval of the proposed development. The CDPs contain lists of archaeological, architectural and cultural heritage sites including national monuments, recorded monuments, Architectural Conservation Areas (ACAs), protected structures and protected views, as well as baseline assessments of the landscape character of the county. The plans also outline the county's heritage policies and objectives that aim to protect and promote the archaeological, architectural and cultural heritage of the region. This evaluation was carried out with due regard to these policies and other relevant information contained within the plans.

6 The following is a synopsis of how the cultural heritage consultants have addressed the archaeological and architectural policies and objectives outlined in each of the relevant CDPs.

14.1.1.2.1 Cavan County Development Plan 2014-2020 – Archaeological Heritage Policies

7 In order to protect the archaeology of County Cavan, all archaeological monuments in Cavan contained in the Archaeological Survey Database, available from the www.archaeology.ie website, were mapped in a Geographic Information System (GIS) to ensure that they could be avoided, thereby preserving them in-situ, as far as is practicably possible given all the constraints within the study area. Furthermore, National Monuments in State care, in the ownership of the local authority or subject to preservation orders were highlighted. During desk based evaluation, orthophotography, historic mapping and Light Detection and Ranging (LiDAR) data were referred to, to assist in identifying previously unrecorded sites of archaeological potential and to assist subsequent field studies. Mitigation measures have been recommended to ensure that should any archaeology be impacted upon by the construction,

operation or decommissioning of the proposed development, that it is preserved by record, by suitably qualified archaeologists, in full consultation with the Archaeological Section of the DAHG and the National Museum of Ireland. Should previously unrecorded archaeology be encountered during works associated with the proposed development, works in the area will immediately be suspended and that the appropriate Government agency will be informed.

14.1.1.2.2 Cavan County Development Plan 2014-2020 – Architectural Heritage Policies

8 In order to protect and preserve the architectural heritage of County Cavan, the Record of Protected Structures (RPS) and the National Inventory of Architectural Heritage (NIAH) proposed have been mapped in GIS from the earliest stages of the development, to ensure that they could be avoided, as far as is practicably possible, given all the constraints within the study area, thereby reducing both potential physical impacts and impacts on their setting. Upon the release of the Cavan NIAH survey in 2012, this data was added to the GIS and reviewed to see what effect the development may have on any new sites contained in the data set. The RPS and NIAH are not a complete record of the important architectural heritage of the county, therefore during both desk based work and fieldwork a search for new, previously unrecorded sites and / or features that deserve protection, including bridges, vernacular architecture, railways, street furniture, industrial heritage etc. was carried out. A review of the ACAs contained in the Cavan CDP was carried out as part of the evaluation; however none were located in the vicinity of the proposed development.

14.1.1.2.3 Meath County Development Plan 2013-2019 – Archaeological Heritage Policies

9 All archaeological monuments in the archaeological Survey Database and National Monuments, in State care, in the ownership of a local authority or monuments under preservation orders were downloaded from the www.archaeology.ie website and other relevant inventories and were mapped in GIS from the earliest phases of the proposed development (CH Pol 6 and 7). Meath County Council also made available their Graveyard Survey in GIS format. Cognisant of the increased level of legislative protection for National Monuments, all sites with this classification were highlighted to assist the project team in the preparation of the *Preliminary Re-Evaluation Report* (May, 2011). In addition the project team were provided with a full inventory of recorded archaeological monuments in order to inform the design process. Meath County Council note that *"through policies contained in this Development Plan, [Meath County Council] seek to ensure the effective protection, conservation and enhancement of archaeological sites, monuments and their settings."* This chapter evaluates the impact on the setting of all archaeological monuments located within 2km of the proposed route and National Monuments in State care within 5km.

10 Where previously unrecorded sites of archaeological potential have come to light through the evaluation process, potential impacts are evaluated in this chapter and mitigation measures recommended. No mitigation measures will however be implemented without the guidance of the National Museum of Ireland and the National Monuments Service of the DAHG in accordance with National Monuments legislation (CH Pol 9).

14.1.1.2.4 Meath County Development Plan 2013-2019 – Architectural Heritage Policies

11 The Meath CDP – Architectural Heritage Policies. All recorded architectural sites, including Protected Structures, sites from the NIAH (both building and garden surveys) and ACAs were mapped in GIS for the constraints mapping phase. Also included were structures and features identified from historic mapping (first edition 6" inch colour maps dated 1829-41). As most RPSs and NIAH sites are upstanding structures and the character of ACAs is afforded special protection in the *Planning and Development Act 2000* (as amended), the sensitivity of these sites to impacts on setting were highlighted during initial constraints mapping. Through early identification of architectural heritage sites, it has been possible to avoid physically impacting upon any ACAs or Protected Structures and their immediate curtilages (CH POL 10). In relation to designed landscapes, historic parks, gardens and demesnes every effort was made to minimise any impacts on the principal components of these features (CH OBJ 22). However, given the scale of the proposed development and conscious of other environmental constraints avoidance of all impacts was not possible. Although not backed up by a specific objective or objective, Meath County Council also state:

> "*Meath County Council acknowledges that the continued well-being of a Protected Structure may involve its adaptation for a new use. However, Meath County Council will require the maintenance of its architectural character, and its setting. Developments in proximity to Protected Structures, which would seriously detract from their character, will not normally be permitted. Further guidance is provided in this regard in Section 2.9.5."*

14.1.1.3 **Other Guidelines**

12 The following guidelines were used in the evaluation of the Cultural Heritage in the MSA:

- Cork County Council (2006). *Guidance Notes for the Appraisal of Historic Gardens, Demesnes, Estates and their Settings;*
- Department of the Environment Community and Local Government (DoECLG) (March 2013). *Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment*;
- Department of Arts, Heritage, Gaeltacht and the Islands (1999). *Framework and Principles for the Protection of the Archaeological Heritage;*

- Department of Arts, Heritage and the Gaeltacht (DAHG) (2011). *Architectural Heritage Protection Guidelines for Planning Authorities;*
- DoECLG (April 2009). *Code of Practice between the Department of the Environment, Heritage and Local Government and ESB Networks;*
- DoECLG (April 2009). *Code of Practice between the Department of the Environment, Heritage and Local Government and EirGrid; and*
- DAHG (July 2014). *A Draft National Landscape Strategy for Ireland 2014-2024; and*
- Institute of Field Archaeologists (2008). *Setting Standards: A Review*.

14.2 METHODOLOGY

13 The following methodology was prepared to evaluate the impact of the proposed development upon the cultural heritage of the MSA. A more detailed methodology is outlined in **Appendix 14.1, Volume 3D Appendices** of the EIS which includes details regarding the methodology for evaluation of impacts on setting.

14.2.1 Summary of Methodology

14 An overhead line (OHL) has a relatively small footprint and careful placement of towers can keep physical impacts on cultural heritage sites to a minimum. However, due to the upstanding linear form of an OHL, preventing impacts on the setting of cultural heritage sites is more difficult. Mitigating such impacts is best achieved by ensuring that known designated and undesignated archaeological and architectural sites are highlighted during the constraints mapping and route selection stages of the proposed development and that sites of particular importance are brought to the attention of the project team to reduce, where possible, any impacts. Prior to undertaking this evaluation the following stages of work had been completed:

- Mapping of designated and undesignated archaeological sites, including:
  - World Heritage Sites;
  - National Monuments, be they in the ownership or guardianship of the State, in the ownership of a local authority or monuments under preservation orders; and
  - Archaeological Survey Database, including the Sites and Monuments Record and the Record of Monuments and Places.
- Mapping of designated and undesignated architectural sites, including:
  - ACAs;

  - Protected Structures;
  - NIAH; and
  - Demesne Landscapes and Historic Gardens as indicated on the Ordnance Survey Ireland (OSI) 6 inch historic mapping, surveyed circa 1830.

- EirGrid (May 2011). *North-South 400 kV Interconnection Development Preliminary Re-Evaluation Report*;
- EirGrid (April 2013). *North-South 400 kV Interconnection Development Final Re-Evaluation Report*;
- EirGrid (July 2013). *North-South 400 kV Interconnection Development Preferred Project Solution Report*.

15 In addition to the previous work listed above, this chapter has been prepared in two main phases, desk based evaluation and fieldwork. Desk based evaluation involved:

- Review of mapping in GIS compiled over the course of the proposed development;
- Review of literature, including historical sources, guidelines and policy documents, relevant legislation, development plans and heritage plans and subsequent updating of GIS mapping where appropriate; and
- Review of other sources including historic mapping, orthophotography and LiDAR. During this phase, previously unrecorded sites of archaeological and / or architectural potential were highlighted for review during the fieldwork phase of the proposed development.

16 The desk based evaluation gave rise to a greater understanding of the archaeological, architectural and cultural heritage environment through which the proposed development passes, along with detailed mapping in GIS highlighting known features, sites, areas and landscapes in the vicinity which may experience impacts from the proposed development. This chapter has considered in detail an area within approximately 2km either side of the alignment, including tower locations, guarding areas, temporary access routes and stringing areas, as well as having regard to all National Monuments in State care within 5km either side of the alignment and some notable sites further afield.

17 Upon completion of the desk based evaluation, fieldwork was undertaken to ‗ground truth' the results of the desk study. Detailed GIS mapping was used in the field to identify known archaeological and architectural sites; these included designated and undesignated archaeological and architectural sites as well as sites of archaeological and architectural

potential noted from historic mapping and aerial photography. GIS mapping included base mapping of OSI Discovery Series maps as well as first edition OSI historic maps and detailed aerial photography. Where possible, with the permission of land owners, land was accessed and where this was not possible, evaluation was undertaken from the nearest publicly accessible land, roads or adjacent land where access was granted. Consultants in the field were cognisant that the mapping supplied did not contain all sites of archaeological, architectural or cultural heritage importance and any new archaeological, architectural or cultural heritage sites identified during fieldwork were recorded and added to the GIS. The significance of impacts that may be experienced by archaeological sites, architectural sites and other cultural heritage located in the vicinity of the proposed development was then evaluated, for the construction, operation and decommissioning phases of the proposed development.

18 Mitigation measures have been recommended and residual impacts that may be expected following mitigation have been noted.

19 The scoping opinion received from the Board (refer to Appendix 1.3, **Volume 3B Appendices** of the EIS) identified the following issues as being relevant to this chapter of the EIS:

- Identification and assessment of potential impacts on archaeological heritage, including an appraisal of all recorded monuments potentially impacted on during construction activities and an assessment of the visual impact on listed sites. This should include impacts on the character and setting of features of interest as well as the relationship between sites;

- Particular areas of social, cultural and historic interest to be considered include Bective Abbey, Domhnagh Phádraig (Donaghpatrick), Teltown Zone of Archaeological Amenity (ZAA);

- Identify any pre-application archaeological excavations or site investigations undertaken. Describe the rationale for the approach adopted with regard to such pre-application investigations, particularly for areas of known archaeological potential;

- Identification and assessment of the effects on architectural heritage. This should include Brittas House, where the line crosses the driveway and views to and from Whitewood House;

- The indirect effects of construction activity, including construction access / routes, on structures and building should be considered; and

- The impact on longer views from sites of national importance and significance should be considered and assessed.

14.2.2 Consultation

20 The overall consultation strategy by or on behalf of EirGrid in relation to all stages and elements of the proposed development is described in a separate *Public and Landowner Consultation Report* (refer to **Volume 2B**of the application documentation). That report sets out the objectives of the overall consultation strategy, its structure, details of all consultation activities, feedback received and how such feedback was responded to.

21 Consultations with the DAHG, Cavan and Meath County Councils and public consultations were undertaken, during the preparation of this chapter of the EIS. All consultation responses received have been logged and considered by the project team.

14.3 CHARACTERISITICS OF PROPOSED DEVELOPEMT

22 The upstanding linear form of the proposed OHL supporting structures has a small physical footprint, meaning that in most cases direct, physical impacts on archaeological, architectural or cultural heritage sites, structures, monuments or features can be avoided. Such impacts are most likely during the construction phase and can be as a result of:

- Excavations associated with tower construction including site levelling, foundation excavation and any diversion of services or existing drainage that may be required;
- Excavations associated with the erection of temporary guarding areas;
- Facilitating access for equipment and materials for the construction of the towers and guarding; and
- Facilitating access for and the process of stringing the OHLs.

23 Given that its upstanding linear form has an influence over a wide area, the greatest potential for impacts from this type of development are impacts on the setting of archaeological, architectural and cultural heritage sites, structures, monuments or features located in the surrounding region throughout the operational phase of the development.

14.4 EXISTING ENVIRONMENT

14.4.1 Landscape (Cavan to Meath)

24 The following section is based on extracts from the *Meath Landscape Character Assessment* 2007 (MLCA) and the ‗Character Area‘ section from the Cavan CDP (Chapter 8, Section 8.19.1).

14.4.1.1 Highlands of East Cavan (Area 5)

25 **Towers 237 to 239 - Clonturkan to Balloughly.** This region consists of drumlins and highlands, with Bailieborough and Kingscourt as the main towns. Much of the area is made up of shale and sandstone, an indication of a landscape forged by the movement of glaciers in the last Ice Age. This area is dotted with lakes; there are both dry and wet grasslands, some limited forest and scrub. The area around Kingscourt and Bailieborough town is described as ‗areas under urban influence‘ as they have seen a greater demand for development in recent years.

14.4.1.2 North Meath Lakelands (Landscape Character Area (LCA) 2)

26 **Towers 239 to 274 - Cavan Border, Balloughly to Rahood.** The complex drumlin landscape is wetter and more wooded than the rest of Meath and has significantly less built development. There are small lakes and stream corridors (Kilmainham River) between the drumlins and road corridors which are often raised above adjacent fields with drainage ditches at either side. The landscape character tends to be a patchwork of small pastoral fields, dense hedgerows and areas of broadleaved woodland. The central area between Nobber and Kilmainhamwood is particularly attractive because it has more visible historic references, such as stone walls and vernacular buildings. West of Nobber along the proposed alignment, there are a number of fine country estates with period houses and associated parkland, including Brittas and Whitewood demesnes.

14.4.1.3 North Navan Lowlands (LCA 3)

27 **Towers 274 to 304 - Rahood to Diméin Bhaile Ghib (Gibstown Demesne).** This section consists of a large area of agricultural land to the north of Navan described as being in a degraded condition. It comprises a mixture of pasture and arable fields that have been enlarged by loss or removal of old boundaries. The topography is undulating with a moderate amount of trees particularly around Gibstown where the tertiary roads are quite enclosed. Near Mountainstown Demesne there is some coniferous plantation with peaty heathland, wet birch and ash woodland on its fringes. Nearer Rahood the road corridors have a more open character with well-maintained hedgerows.

14.4.1.4 Blackwater River Valley (LCA 20)

28 **Towers 304 to 312 - Diméin Bhaile Ghib (Gibstown Demesne) to Castlemartin.** The topography of the Blackwater River Valley changes from being low undulating drumlins north of Kells to being relatively flat around Navan. This is an attractive landscape rich in visible historic features including churches, earthworks and vernacular features such as stone bridges. The open farmland is characterised by a loss of internal field boundaries. Domhnagh Phádraig

(Donaghpatrick) is a small and particularly attractive, well preserved village overlooking the banks of the river between Navan and Kells. It has a wealth of 18th and 19th Century buildings, a Norman motte and a stone bridge over the river. Views from within the village are enclosed by mature trees along road corridors however from the back of the village there are good views towards the river.

14.4.1.5 West Navan Lowlands (LCA 16)

29 **Towers 312 to 351 approximately - Castlemartin to Balbrigh.** This is flat lowland / farmland landscape interspersed with many large estate landscapes with associated parkland. The landscape has a scrappy degraded character to the south-west of Navan with poorly managed but well wooded field boundaries around Robinstown, progressing to manicured estate landscape and parkland near Dunderry. Although the topography of the area is relatively flat, the wooded nature of the landscape restricts views, which are limited to those along enclosed rural road corridors.

14.4.1.6 Boyne Valley (LCA 5)

30 **Towers 351 to 363 - Balbrigh to Knockstown (ED Kilcooly).** The landscape in the Boyne Valley is characterised by a steep river valley with areas of rolling lowland adjacent to the River Boyne. It is arguably one of the most significant and highly valued landscapes in the country containing the Brú Na Bóinne World Heritage Site, though this is not affected by the proposed development. Bective Abbey founded in 1147 as a daughter house to Mellifont, is located approximately 920m to the east of the proposed development. The hills alongside the valley provide good vantage points and views. Pasture farmland is predominant in the rolling lowlands.

14.4.1.7 Central Lowlands (LCA 6)

31 **Towers 363 to 393 - Knockstown to Culmullin.** Large lowland landscape composed of rolling drumlins interspersed with numerous large estates and associated parkland. Thick wooded hedgerows and shelterbelts separate medium to large fields. Deep roadside drainage ditches and banked hedgerows are a common feature along the rural road corridors. Views within this area are generally limited by the complex topography and mature vegetation except at the tops of drumlins. Short range views are channelled along narrow valleys between drumlins and often along road corridors.

14.4.1.8 **South East Lowlands (LCA 12)**

32 **Towers 393 to 407 - Culmullin to Hayestown.** This landscape comprises broad rolling hills separated by a mixture of well managed small and large fields which are enclosed by thick thorn hedgerows and mature trees. Land use is predominantly pasture with concentrations of arable land. There are some small copses within the area but commercial forestry is not present.

14.4.1.9 **South East Lowlands (LCA 11)**

33 **Tower 407 to 410 - Hayestown to Woodland and the Woodland Substation site.** The landscape is predominantly rolling lowland with large areas dominated by attractive estate landscapes with associated parkland, particularly surrounding Dunsany, Dunboyne and the north of Dunshaughlin. The land is extensively used for pasture in the north, with arable land more prominent further south particularly in the Rathoath environs. The landscape is relatively enclosed due to the topography and wooded hedgerows although longer views are afforded at the top of many drumlins. Many of the views in the lowlands are restricted to those along the road corridors and the immediate hinterland.

14.4.2 Archaeological and Historical Background

34 The cultural landscapes of counties Meath and Cavan are rich and varied and many of the sites scattered across the landscape indicate widespread settlement in the area since the Mesolithic period and continuing throughout the prehistoric and historic periods into the present day. Various published sources, including local and national journals, were consulted to establish a historical background for the alignment of the proposed development. In addition archaeological and architectural information gathered as part of this report was incorporated into the background thus providing a broader understanding of the nature of settlement in the area.

14.4.2.1 **Mesolithic Period (8000–4000 BC)**

35 In the absence of any evidence of Palaeolithic communities in Ireland our archaeological record begins in the Mesolithic period when hunter-gatherers navigated the coast and waterways of the country foraging for food and living in temporary camps. Mesolithic sites were usually set on elevated ground overlooking rivers. However, cultural remains from this period have left no lasting legible trace and have no visible dominance in the modern day landscape. Flint tools known as microliths (from Latin ‗small stone') are often the best evidence for these early encampments. These tools are extraordinary in their sophistication and range of use and include scalene triangles, rods, needlepoints, scrapers and micro-awls. Excavations at Newgrange unearthed flint including a Bann Flake, characteristic of the later Mesolithic (O'Kelly

et al. (1978). *PRIA Three passage graves at Newgrange, County Meath*). Supervised field walking in a pilot study to assess the potential of plough zone archaeology in the Boyne Valley area (Cooney and Brady (1998). *The Red Mountain Transect: a pilot field walking study*) recovered a number of butt-trimmed flakes from fields in Tullyallen townland, to the north of the Brú Na Bóinne World Heritage Site (WHS). A later field walking programme within the WHS produced a possible broad flake again dating to the Late Mesolithic (Brady (2007). *Unpublished Ph.D. Thesis A landscape survey of the Newgrange environs: earlier prehistoric settlement at Brú Na Bóinne, County Meath*).

36 Upriver, excavations for the M3 Motorway, recovered microliths at Blundelstown and Castletown. As part of the same scheme a series of well-preserved wooden baskets were discovered at Clowanstown, County Meath, 4km north of Dunshaughlin. The site was interpreted as a late Mesolithic mooring / fishing platform and the baskets were interpreted as conical shaped woven fish traps. A butt trimmed Bann flake was also retrieved from the site (Fitzgerald (2007). *Revolutionising Our Understanding of Prehistoric Basketry*).

14.4.2.2 **Neolithic Period (4000BC-2500BC)**

37 The practice of farming spread from the Middle East, through eastern and southern Europe to reach Ireland via Britain around 4000BC. Ireland's Mesolithic hunters were over a period of time displaced or assimilated by the new Neolithic settlers. This transition fundamentally changed the local economy from one based on hunting and foraging to one of cereal cultivation and livestock rearing. The arrival of the first farmers resulted in land clearance by burning or chopping down trees with stone axes. There were no indigenous cereal crops but the settlers brought with them wheat and barley as well as domesticated sheep, goats and cattle. Tending of crops and animals required a more sedentary lifestyle and larger permanent settlements. Farming as a practice required new skills and more importantly new tools. This demand resulted in the development of specific crafts. Polished stone axes, ards (ploughs) flint tools for harvesting crops and stone saddle querns for grinding the grain required the exploitation of specific stone sources. Porcellanite, found throughout Ireland and Europe, was quarried at Tievebulliagh Mountain near Cushendall and at Brockley on Rathlin Island, County Antrim. Flint remained an important stone for the production of tools and weapons, objects such as javelin heads, mace heads, polished axes and fine leaf and lozenge shaped arrowheads were used for both hunting and warfare. During this period the first long distance trade networks were established. Stone axes from Britain, a flint axe from Scandinavia, pitchstone from Scotland and jadeite axes from the Alpine area of northern Europe have all been found throughout the country. Pottery also makes its first appearance in the archaeological record. The pots were handmade, coil built and fired in bonfires or pits. The earliest pots were mainly undecorated round bottomed bowls, although decoration became more common in the later part of the period. Towards the end of the Neolithic a great diversity in pottery styles existed and flat based pottery was introduced.

38 Other significant changes included the development of a ritual landscape dotted by large megalithic (from the Greek mega – large and lith – stone) monuments built as communal tombs or for ceremonial purposes. These monuments indicate status, knowledge of engineering and the ability to organise resources, including labour. These tombs are divided into four classes; court tombs, portal tombs, passage tombs and wedge tombs. Wedge tombs are so named by the distinctive manner in which the roof slopes down towards the back of the tomb and are taller and wider at the entrance. Court tombs generally consist of a long cairn with a court at one end providing access into a gallery beneath the cairn (Waddell (2000). *Prehistoric Archaeology of Ireland*). Portal tombs are single chambered monuments where the entrance is flanked by two large portal stones.

39 The megalithic tradition in Meath is dominated by the Brú na Bóinne World Heritage site containing the three large passage tombs of Knowth, Newgrange and Dowth. The construction of this passage tomb cemetery commenced sometime around 3300BC and by this time, the area had developed into an open farmed landscape with evidence for domestic houses and occupation scattered throughout. The construction of at least 40 passage tombs displays a sophisticated knowledge of architecture, engineering, astronomy and artistic endeavour indicative of a highly organised and settled society. Indeed the Brú na Bóinne tombs, particularly Knowth, contain the largest assemblage of megalithic art in Western Europe. Other significant Megalith sites include Fourknocks, Loughcrew and the passage tomb at Tara.

40 Various civil engineering projects for the M1 and M3 roadways have also shed light on life in the fourth millennium in Meath. Five Neolithic buildings were found in the townlands of Kilmainham and Cookstown Great near Kells. Similar structures comprising rectangular arrangements of postholes were also discovered at Townparks and Gardenrath (McLaughtlin and Walshe, (2008). *Unpublished Report Interim Report on Archaeological Excavation of Cookstown Great 3, A029/021, E3139, County Meath*). Finds included flint scrapers and débitage, pottery and a chert Javelin head. At Phoenixtown on the M3 between Navan and Kells a circular house with a diameter of 10m was excavated along with an associated linear pit. This house was a domestic building evidenced by the amount of grooved ware pottery shards and a stone artefact interpreted as either a bowl or lamp (Lyne (2008). *Built according to plan: Two enigmatic Neolithic structures on the M3*).

14.4.2.3 **The Bronze Age (2500BC-500BC)**

41 As stone tools were replaced by the use of copper and then later combined with tin to make bronze, the structure of society also changed. The copper for these tools was probably derived from Ross‘s Island in Killarney, County Kerry, where excavations have uncovered the earliest copper mines in the Ireland and Britain. These somewhat crude copper objects were soon replaced by more durable bronze tools including axes, swords, spears, knives, halberds and

cauldrons. Gold jewellery from this period in the form of lunulae, torch and bracelets are amongst the finest in Europe and hint at the presence of new social elites.

42 In a domestic context, dwellings changed from a general rectangular plan, typical of the Neolithic, to circular arrangements, evidenced on excavation by postholes and slot trenches. Middle Bronze Age and Late Bronze Age settlements are usually located on well-drained soils suitable for agriculture and near rivers or fording points for ease of transport and communication. Lacustrian areas were also favoured, as evidenced by excavations at Moynagh Lough near Nobber (Bradley (1999). *Excavations at Monagh Lough, County Meath*). Bronze Age houses in County Meath have been uncovered in advance of road construction, with notable examples excavated along the Kells Navan section of the M3 in the Kilmainham / Cookstown great area (McLoughlin (2008). *Unpublished Report Interim Report on Archaeological Excavation of Cookstown Great 3, A029/021, E3139, County Meath*).

43 Bronze Age ritual and ceremonial activity is represented by a range of monuments, including stone circles, standing stone, stone alignments, henges, tumuli, cairns, barrows and flat cemeteries. Sites belonging to these classifications are found within the wider study area. Standing stones which can mark burial sites or may indicate territorial boundaries or route-ways are recorded in the graveyard at Domhnagh Phádraig (Donaghpatrick) (SMR No. - ME017-034002) and in Boherlea (SMR No. - ME002-040) in the drumlin country north-west of Kilmainhamwood. Burial sites from this period are represented by mound barrows in Ballynavaddog (SMR No. - ME037-030) near Bective and examples from Bellewstown (SMR No. - ME031-005) and Ardbraccan (SMR No. - ME024-013). Barrows are circular enclosures that contain single or multiple burials. Excavated examples date from the late Neolithic through the Iron Age but are more numerous in the Bronze Age. In general they measure between 10m and 25m in diameter. Burials can also be found in cairns or cists but none are recorded along the Meath section of the MSA.

44 Other monuments associated with the Bronze Age include burnt mounds and Fulachtaí Fia, sites used to heat water and which consist of a low horseshoe shaped mound centred on a sunken trough. Many of these sites have been discovered on road schemes in recent years. There is an example to be found in Brittas (SMR No. - ME005-088024) near Moynagh Lough.

14.4.2.4 **Iron Age (c. 500BC-500AD)**

45 The end of the Irish Bronze Age merges into the Early Iron Age almost imperceptibly. Not much is known about this period in time and it has been dubbed ‗The Irish Dark Age‘. It would seem, from the evidence so far uncovered, that iron use was gradually introduced into Ireland, however bronze implements were still very much in use for everyday objects and for ornamentation. Many of the finds dating to the Iron Age include objects decorated in the ‗La Téne‘ style, such as the torc found at Broighter, County Derry. Life in Iron Age Ireland seems to

have been much as it was in earlier times, with mixed farmers living in or around small defended settlements, with late Bronze Age hillforts and hilltop enclosures in use throughout this period. In Meath the primary focus of Iron Age activity is associated with the Royal site of Tara. This complex was both the seat of the kings of Meath and the High King. The site is strongly linked to myth and legend and is associated with the transformation of Ireland from paganism to Christianity. In the literary tradition, recorded by medieval monks, this period corresponds with the epic tales of the Táin as told in the Ulster Cycle.

14.4.2.5 **Early Medieval Period (c. 500AD-1200AD)**

46 With an expansion in population the Early Medieval Period witnessed the introduction of a new settlement type generally known as the ringfort. Other names for this site type include rath, lios, cashel and dun. These enclosures numbering between 30,000 and 40,000 across the country represent the homesteads of the upper echelons of Irish Early Medieval society. Ringforts are generally circular areas surrounded by a bank(s), walls and an external ditch. In some cases there can be up to three sets of defences. The larger more impressive multivallate, raised and platform raths are generally regarded as higher status settlements and are the foci around which the smaller univallate enclosures would be arranged. This relationship is the physical evidence for the Tuath system characterised by petty kingdoms, sovereign in their own right that paid fealty to a larger regional / provincial state. There are numerous ringforts that are found in the MSA with a notable increase going north towards drumlin country. Classic examples include Tankardstown (SMR No. - ME017-032), Raffin (SMR No. - ME011-041), Rahood (SMR No. - ME011-007), Brittas (SMR Nos. - ME005-089, ME005-091 and ME005-092) and Lislea (SMR No. - ME002-044). These sites have in some cases huts or souterrains found in association as well as unrecorded subsurface features. Other habitations contemporary with this period include crannógs or artificial islands found in lakes and rivers. Two examples are found near the northern shores of Whitewood Lough (SMR No. - ME005-045 and 046).

47 Sites classified as enclosures and earthworks also occur throughout the MSA. These monuments were originally identified from 19^{th} Century OS maps and as cropmarks with no visible above ground presence. In the absence of excavation, many of these sites are thought to be early medieval ringforts and the sheer number of them suggests that this area was settled extensively during this period. Examples of these sites are found at Balbrigh (SMR No. - ME031-017), Brittas (SMR No. - ME005-086), Cruicetown (SMR No. - ME005-063) and Towas (SMR No. - ME005-026).

48 Early Christian Ireland dates from the 400s when missionaries such as Palladius and Patrick launched their missions. In Meath this period coincides with legendary Kings such as Niall of the Nine Hostages and the Three Collas. Patrick and his disciples are closely associated with the old royal sites of the Hill of Slane, Tara and Domhnagh Phádraig (Donaghpatrick). By the early 7^{th} Century AD, Christianity had subsumed the indigenous pagan religion resulting in the

development of ecclesiastical centres, a new political landscape and the creation of a literate society. Churches of potential early date are found in Tailtin (SMR No. - ME017-031) and Nobber (SMR No. - ME005-071001).

49 By the time the Vikings arrived in Ireland in the late 8th Century, the country consisted of a patchwork of petty kingdoms vying with each other to establish local powerbases all under the nominally rule of a High King. Meath was ruled by the Southern Uí-Neill, while Ulster was ruled by Niall-Caille of the northern Uí-Neill. The Vikings early success was in large part due to their ability to exploit these internal conflicts.

50 As with monasteries throughout the country the annals record Viking attacks at Ardbraccan (889, 951,993), Brugh Na Boinne (863, 935), Domhnagh Phádraig (Donaghpatrick) (889,951,995) Galtrim (842) and Navan (896, 970) to mention a few.

51 By the early 10th Century, the Vikings had established permanent trading ports at Dublin, Cork, Wexford, Waterford and Limerick and had become integrated, albeit begrudgingly, into Irish life. Many also converted to Christianity. Norse settlement in Ireland was as much about trade as it was aggression; indeed the graves of wealthy Vikings often contained a trader‘s scales as well as the more martial accoutrements of a warrior class. The end of the Viking Age in Ireland came with the reign of Brian Ború as leader of the Dalcassians and Malachy, the Uí Neill King of Tara. Following a number of battles including Tara in 980 and Clontarf in 1014 the Norsemen‘s military power was broken. They, however, continued as traders and intermarried amongst the native Irish. Ború‘s descendants squandered his victory and regional squabbling over territory led indirectly to an invasion by the Anglo-Normans under Strongbow in 1169.

14.4.2.6 **Medieval Period Onwards (c. 1200AD-1600AD)**

52 The start of the medieval period is generally defined by the arrival of the Anglo-Normans in 1169. Originally invited by Diarmuid Mac Murchada as mercenaries to assist in the recovery of his Leinster Kingdom, the Anglo-Normans quickly set about making territorial claims for themselves. By 1171 King Henry II mounted a second invasion resulting in his Lordship of Ireland. Hugh de Lacy one of the Kings staunchest supporters was rewarded with a grant of Meath. De Lacy in return divided his new territory amongst his barons, who immediately began organising its colonisation and settlement.

53 These baronies were divided up into smaller units known as manors, many of which evolved into modern towns - for example, Navan, Rathoath, Athboy, Trim, Dunboyne and Dunshaughlin (Bradley (1988). *The Medieval Towns of County Meath*). Manors generally comprised a fortification (usually a motte or later a tower house), a church and a number of dwellings. An example of one of the most important Norman military castles in the general area is Trim, built on the site of a Motte. Examples of Mottes, the earliest examples of Norman fortifications within

the MSA include Culmullin (SMR No. - ME043-018), Galtrim (SMR No. - ME043-002), Robertstown (SMR No. - ME011-004) and Cruicetown (SMR No. - ME005-093).

54 In later years constant attacks on Anglo Norman lands led by the local population provoked the English government to offer grants to build tower houses. These fortifications include the castle at Trubley (SMR No. - ME031-024), Bective (SMR No. - ME031-026002) and Cluain an Ghaill (Clongill) (SMR No. - ME017-019).

55 Ecclesiastical centres representing the various orders were also prolific during medieval times. Religious houses are represented by a monastery at Ardbraccan (SMR No. - ME025-022) and a well preserved Cistercian abbey founded by Marchad O'Máeil-Sechlainn c.1150 at Bective (SMR No. - ME031-026). Churches from the Norman period within the MSA include Cruicetown (SMR No. - ME005-094).

56 On receipt of his land grant Hugh De Lacy divided the Kingdom of Meath amongst his principal followers who were dubbed barons. These baronies subsequently became the general name for the great divisions of the counties. The new governing class were not left unchallenged and Roderic O‘Conor, King of Ireland, entered Meath at the head of a large army and laid siege to Trim. The county also suffered from the incursions of the Irish of Ulster and from an invasion of Melaghlin, King of Meath, who took and demolished Slane Castle, after its governor, Richard Fleming, had been killed in its defence. On the death of Hugh de Lacy, who was assassinated at Dermagh or Durrow, in the Kings County (Offaly), by one of his own dependants, Meath descended to his son Walter.

57 King John spent some time in this county during his travels in Ireland and tradition says that he held a parliament at Trim, which is very doubtful, as there are no traces of its proceedings. A tomb in which one of this King‘s daughters is said to have been interred was shown in the abbey of Newtown, near Trim. About the year 1220, Meath was almost ruined by the private quarrels of Hugh, Earl of Ulster and William Marshall.

58 In the reign of Henry VIII, the extensive church property in the county fell into the hands of the King on the dissolution of the monasteries. Typical of this was the confiscation of the lands held by Mellifont which passed into the hands of Edward Moore, an ‗English soldier of Fortune‘.

59 During the reign of Elizabeth the county was in a state of great wretchedness as appears from the report made by Sir Henry Sidney, in 1576, in which he says *–of that, of the 224 parish churches then in the diocese, the walls of many had fallen; very few chancels were covered and the windows and doors were spoiled”* (Lewis 1837).

60 Following the Nine Years' War the re-conquest of the country was completed by James I. After this point, the English authorities in Dublin established real control over Ireland for the first time, bringing a centralised government to the entire island and successfully disarmed the native lordships. From the mid 16th Century and into the early 17th Century, crown governments carried out a policy of colonisation known as Plantations. Scottish and English Protestants were sent as colonists to the provinces of Munster, Ulster and the counties of Laois and Offaly. These settlers, who had a British and Protestant identity, would form the ruling class of future British administrations in Ireland. However, the English were not successful in converting the Catholic Irish to the Protestant religion and the brutal methods used by crown authority to pacify the country heightened resentment of English rule.

61 This resentment was unleashed with a rebellion of the Irish of Ulster in October 1641, during which thousands of Scots and English Protestant settlers were killed. The rebellion spread throughout the country and at Kilkenny in 1642 the association of 'The Confederate Catholics of Ireland' was formed to organise the Irish Catholic war effort. The Irish Confederates professed to side with the English Royalists during the ensuing civil wars, but mostly fought their own war in defence of their own landed interests.

62 From 1641 to 1649, the Confederates fought against Scottish Covenanter and English Parliamentarian armies in Ireland. Following the death of Charles I at the hands of the victorious parliamentarians the Confederate revolt was brutally suppressed during the Cromwellian conquest of Ireland. The New Model Army was paid for its campaign in Irish land that effectively ended the old Catholic landed class.

63 Despite the devastation wreaked on the country by the Cromwellian conquest there was still another bloody chapter to be written. The War of the Two Kings also known as the Williamite War followed the deposition of catholic King James II in 1688 when he was replaced by his daughter Mary II with her protestant husband William of Orange. In order to regain his throne James landed in Ireland in March 1689, with 6,000 French soldiers. After initial successes such as Dromore the Jacobites were able to advance northwards and occupy Belfast. At Crom Castle on 28 July 1689, near Enniskillen, the Jacobites received their first major setback. This was compounded later when William decided to take personal charge of the campaign culminating in his victory on the banks of the Boyne near the village of Oldbridge on 11 July 1690 (Simms (1986). *War and Politics In Ireland 1649-1730*).

64 The Williamite victory in Ireland ensured British and Protestant dominance over Ireland. Until the 19th Century, Ireland would be ruled by what became known as the 'Protestant Ascendancy', the mostly English Protestant ruling class. The majority Irish Catholic community and the Ulster-Scots Presbyterian community were systematically excluded from power, which was based on land ownership.

65 This legacy is evident in the many large country homes of the Anglo-Irish landed gentry in County Meath and to a lesser extent in County Cavan. These big houses and demesnes are usually encompassed by large estates with small plots rented out to the native Irish tenants. Of the many big houses built in County Meath many, like Randallstown House, are no longer standing. Others, like Slane Castle, Headfort house, Brittas and Mountainstown are still in use for various different purposes.

14.4.3 Desk Based Evaluation Archaeological

66 Unless stated otherwise, in the tables herein distance refers to the distance from the data point indicated in the Archaeological Survey Database, downloaded from the www.archaeology.ie website, to the nearest point on the centreline of the proposed line route. The Archaeological, Architectural and Cultural Heritage sites in the MSA are displayed in Figures 14.1 - 14.17, **Volume 3D Figures** of the EIS.

14.4.3.1 World Heritage Sites

67 The closest United Nations Educational Scientific and Cultural Organisation (UNESCO) World Heritage site is the archaeological ensemble of the Bend in the Boyne or Brú na Bóinne (Ref: 659) which is located approximately 15km to the east north-east of the MSA.

68 In closer proximity to the development are two Candidate World Heritage Sites, which were submitted in 2010 by the then Minister for Environment, Heritage & Local Government as part of a tentative list of sites that Ireland would be considering for World Heritage listing. The sites include the early medieval monastic site of Kells, located approximately 7km to the west of Towers 295 to 305 and the Tara Complex located approximately 6.3km to the east of Towers 350 to 360.

14.4.3.2 Landscape Conservation Areas

69 Meath County Council has commenced the process of designating a Landscape Conservation Area (LCA) associated with the Tara, Skryne region and in May 2010 published the *Draft Tara Skryne Landscape Conservation Area Explanatory Document*. The Meath CDP states that it is the ―*policy of Meath County Council to progress this project in a timely fashion*". The draft report includes a Map of the *Draft Tara Skryne Landscape Conservation Area* which encloses an area that at its western extent is approximately 800m to the east of the proposed development, in the vicinity of Towers 352 to 356 (Figure 14.19, **Volume 3D Figures** of the EIS).

70 The Meath CDP also discusses designating a LCA related to Lough Crew, which is located approximately 20km to the west of the proposed development.

14.4.3.3 National Monuments in the Ownership or Guardianship of the State

71 Within County Cavan there are no National Monuments in the Ownership or Guardianship of the State located within 5km of the proposed development. Within County Meath eight National Monuments in State ownership and one in the guardianship of the State are located within 5km of the proposed development

72 The closest of these, Bective Abbey, is located approximately 920m to the east of the proposed development in the vicinity of Towers 352 to 355. In the vicinity of Towers 270 to 275 there are three National Monuments located to the west of the proposed development, the closest are Cruicetown Church and Cross which are approximately 1.5km away, with Robertstown Castle and the ringfort at Robertstown located approximately 2.8km and the 3.6km away respectively. The Cathedral at Newtown, St. John‘s Priory and the Town Defences at Sheepgate are all located in the town of Trim, approximately 4.5km to 5km to the west of the proposed development. Dunsany Church is located approximately 4.8km to the east of the proposed development in the vicinity of Tower 372.

Table 14.1: National Monuments in the Ownership or Guardianship of the State Located within 5km of the Proposed Development

Name / Classification	Townland	National Monument Number	SMR No.	Grid Ref.
Town Defences, Trim	Blackfriary	679	ME036-048053-	280769/256782
St. John's Priory	Saintjohns	553	ME036-049011-	281704/256816
Ringfort	Robertstown	542	ME011-009----	277807/283363
Church	Dunsany	489	ME037-019----	291720/254910
Church & Cross	Cruicetown	264	ME005-094004-	279533/284523
Robertstown Castle	Robertstown	256	ME011-004----	278377/284321
Bective Cistercian Abbey	Bective	187	ME031-026001-	285950/259957
Cathedral	Newtown	110	ME036-049002-	281392/256868

14.4.3.4 National Monuments in the Ownership of a Local Authority

73 Within the *National Monuments Act 1930* (as amended) archaeological monuments in the ownership of a local authority can be afforded the same level of protection as those in the ownership or guardianship of the State. The most common monuments in the ownership of local authorities consist of historic graveyards that were vested to the Burial Boards by the

Church Temporalities Commission. Vesting of these sites took place during the disestablishment of the Church of Ireland towards the end of the 19th Century. The modern day successor to the Burial Boards are the local authorities.

74 There are no religious sites within 2km of the proposed development in County Cavan.

75 There are 38 religious sites in the Archaeological Survey Database located within 2km of the proposed development within County Meath. Three of these sites, Cruicetown Church and Graveyard and Bective Abbey, have already been noted above (refer to **Table 14.1**) as National Monuments in the ownership or guardianship of the state, the remaining 35 sites are listed in alphabetical order by townland in **Table 14.2**. Meath County Council made available the results of their Graveyard Survey which contains details regarding the ownership of the graveyards surveyed, where the ownership is known it is noted in the table.

Table 14.2: National Monuments in the Ownership of a Local Authority Located within 2km of the Proposed Development

Classification	Owner	Townland	SMR No.	Grid Ref.
Church	Unknown	Ardbraccan	ME025-022----	282882/268316
Graveyard	Unknown	Ardbraccan	ME025-022001-	282894/268301
Church	Meath County Council	Arodstown	ME043-015----	288063/249901
Burial ground	Unknown - unlisted	Augherskea	ME043-049----	291729/251679
Church	Meath County Council	Baile Órthaí	ME017-014----	280654/275788
Graveyard	Meath County Council	Baile Órthaí	ME017-014001-	280654/275788
Church	Unknown	Balsoon	ME031-020----	286220/260565
Church	Unknown	Bective	ME031-019----	285988/260987
Church	Meath County Council	Churchtown	ME030-006----	282617/263745
Church	Meath County Council	Cluain An Ghaill	ME017-018----	282561/276233
Graveyard	Meath County Council	Cluain An Ghaill, Arch Hall	ME017-018001-	282561/276233
Church	Unknown - unlisted	Cruicetown	ME005-095----	280384/284905
Church	Meath County Council	Culmullin	ME043-017----	291444/250066
Church	Meath County Council	Derrypatrick	ME043-010----	288350/251261
Graveyard	Meath County Council	Derrypatrick	ME043-010001-	288343/251257
Graveyard	Null - Representative Church Body	Diméin Bhaile Ghib	ME017-034001-	281969/272540
Church	Representative Church Body	Drakestown	ME012-024----	283112/281402
Graveyard	Representative Church Body	Drakestown	ME012-024001-	283112/281402
Church	Unknown - unlisted	Durhamstown	ME024-012----	281250/268344
Graveyard	Unknown - unlisted	Durhamstown	ME024-012001-	281234/268346
Church	Unknown	Galtrim	ME043-001----	286108/252224

Church	Unknown - unlisted	Grange	ME024-008----	280540/269651
Graveyard	Unknown - unlisted	Grange	ME024-008001-	280540/269651
Church	Unknown	Kilmainhamwood	ME005-028----	278316/289731
Graveyard	Unknown	Kilmainhamwood	ME005-028004-	278316/289731
Church	Representative Church Body	Knightstown	ME012-038----	283580/278600
Graveyard	Representative Church Body	Knightstown	ME012-038001-	283571/278601
Church	Meath County Council	Martry	ME017-037----	279156/272337
Graveyard	Meath County Council	Martry	ME017-037001-	279146/272337
Church	Meath County Council	Nobber	ME005-071001-	282397/286468
Graveyard	Meath County Council	Nobber	ME005-071006-	282426/286454
Church	Meath County Council	Rataine	ME030-011----	282894/262473
Church	Meath County Council	Tailtin	ME017-031----	280550/272926
Graveyard	Meath County Council	Tailtin	ME017-031001-	280536/272927
Church	Unknown - unlisted	Trubley	ME037-001----	284778/258900

14.4.3.5 Monuments Subject to Preservation Orders

76 There are three sites contained in the list of Monuments Covered by Preservation Orders (2010) located within 2km of the proposed development.

77 A Castle Motte and Bailey located just to the north of Nobber Village became the subject of a preservation order in 1978 (Preservation Order No. 1/78, SMR No. - ME005-070). The site is located approximately 1.7km to the north-east of Tower 270.

78 Approximately 250m to the east of the proposed development between Towers 278 and 279, is the site of Raffin Fort (SMR No. ME011—040) which became the subject of a preservation order in 1988 (Preservation Order Number 4/88). The site was subsequently excavated by Connor Newman during the early 1990s.

79 Approximately 850m to the north-east of Tower 260 on the southern shore of Whitewood Lough is a crannog (SMR No. – ME005-058) that became the subject of a preservation order in 1955 (Preservation Order 223/1955).

14.4.3.6 Sites and Monuments Record (SMR)

80 There are 325 recorded monuments within a 2km distance of the centreline of the proposed development.

81 The earliest site dating to the Mesolithic Period is a habitation site in Moynagh townland near Nobber (SMR No. ME005-088). There are relatively few Neolithic sites - the paucity of which is probably indicative of a prehistoric landscape that was heavily forested, interspersed with impenetrable bog and relatively unsuitable for settlement.

82 The pre-historic funerary tradition is represented by a number of sites including a portal tomb, a wedge tomb, five barrows and two pit burials. Portal tombs, sometimes called Dolmens, are constructed with two large upright stones forming the entrance or a portal to a chamber. They are covered with a massive capstone and may have originally been mounded with loose stones. Wedge tombs are characterised as having a gallery constructed with side-stones which decrease in height from the western to the eastern end, giving it a wedge-shaped appearance. They are roofed with large stones which sit directly on the walls of the gallery and are usually oriented north-east to south-west, and the entrance, placed at east, is often closed by a single stone. In its simplest form a barrow is a circular ditch with a small mound at its centre, with the mound being formed by material thrown up during the excavation of the enclosing ditch. They may cover or contain Linkardstown type cists of the Neolithic.

83 Relatively speaking the Bronze Age period is also under represented with only five Fulachtaí Fia recorded, a number of ring ditches and pit burials and a Late Bronze Age platform and habitation within 2km of the proposed development.

84 The majority of the sites found along the length of the alignment are classified variously as enclosures (45), ringforts (81) or earthworks (8) some of which have associated souterrains (6). These sites typically represent early medieval farmsteads (500-1100 AD) and over 45,000 have been found throughout the country. Ringforts are usually circular with a diameter of between 20 and 60m. They are defined by an earthen bank formed by material thrown up from a fosse or ditch immediately outside the bank. In many instances throughout Meath these sites are now covered in scrub and trees.

85 There are several sites for which the precise date cannot be determined, in the absence of archaeological excavation; many of these sites could date to either the prehistoric or early medieval period. These sites include Crannógs (7), holy wells (4), a hut site, linear earthwork and structures (2).

86 The introduction of Christianity to Ireland from the 5th Century onwards brought with it the development of ecclesiastical related structures and features. These Christian sites are represented by churches (22), graveyards (14), graveslabs (5) and high crosses (two at Nobber). There is one religious house along the proposed line route at Bective.

87 The High Medieval period ushered in with the arrival of the Normans brought substantial changes to the Irish countryside. Sites dating to this period include Motte and Baileys (three at Culmullin, Domhnagh Phádraig (Donaghpatrick) and Nobber), tower houses (five at Cluain an Ghaill (Clongill), Arodstown, Bective and Trubley) and four unclassified castles (Drakerath, Balsoon, Balreask and Derrypatrick). There is also deserted medieval settlements at Cruicetown and Rataine.

Table 14.3: Summary of Archaeological Monuments Located within 2km of the Proposed Development

	Count		Classification	Count
Architectural fragment	2		Habitation site	2
Barrow - mound barrow	4		Hearth	2
Barrow - unclassified	1		House - 16th/17th century	2
Bawn	1		House - Bronze Age	1
Bridge	2		House - early medieval	3
Building	2		House - fortified house	1
Bullaun stone	3		House - Neolithic	1
Burial	1		House - prehistoric	1
Burial ground	1		Hut site	2
Burnt spread	1		Kiln - corn-drying	1
Castle - motte	4		Linear earthwork	1
Castle - motte and bailey	3		Megalithic tomb - portal tomb	1
Castle - tower house	5		Megalithic tomb - wedge tomb	1
Castle - unclassified	4		Metalworking site	2
Church	22		Mound	2
Churchyard cross	1		Pit-burial	2
Crannog	7		Platform - peatland	1
Cross	13		Religious house - Cistercian monks	1
Cross - High cross	2		Ring-ditch	8
Cross - Wayside cross	1		Ringfort - rath	81
Cross-slab	2		Ritual site - holy well	4
Earthwork	8		Rock art	1
Embanked enclosure	1		Settlement cluster	1
Enclosure	45		Settlement deserted - medieval	2
Excavation - miscellaneous	4		Sheela-na-gig	1
Field system	6		Souterrain	6
Font	8		Standing stone	2
Font (present location)	1		Stone head	1
Fulacht fia	5		Structure	2
Furnace	3		Sundial	1

	Count		Classification	Count
Graveslab	5		Tomb - chest tomb	2
Graveyard	14		Tomb - effigial	4
Total	182		Total	143
Overall Total 325				

14.4.3.7 **Topographical Files**

88 The finds listed in the topographical files of the National Museum pertaining to the townlands within the vicinity of the development comprise a typical cross section of artefacts and tools spanning from the Mesolithic to the early modern period. The earliest recorded find is a relatively large Bann flake from Altmush (NMI Find No. - 1960:612). Later, Neolithic material has been found in Drakerath, a flint arrowhead (NMI Find No. - 1960:570), polished stone axeheads from Gaulstown and Hayestown (NMI Find No. - 1981.1.1600) and a hollow scraper and arrowhead from Philpotstown.

89 The Bronze Age is well represented with various assemblages, food vessels and decorative items. These troves include an Oval Bronze Disc and Annular Brooch retrieved from Altmush (NMI Find No. - 1960:612), two Bronze Axeheads (socketed), three Bronze Axeheads (flanged), Bronze Object (circular), Bronze Spoon and a, Bronze ring-headed Pin from Philpotstown, (NMI Find No. - 1931:353-360).

90 Material from the Iron Age, always underrepresented in these inventories, due to its ephemeral nature, include a bronze bridal bit and a La Tene bridle-pendant from Cluain an Ghaill (Clongill) (NMI Find No. - 1963:101-2). Various other objects probably from this period but without secure dates include quern stones from Altmush, a drinking horn from Nobber and a tine of deer antler with ogham inscription from Moynagh (NMI Find No. - 1893:13).

91 The early medieval period is well represented due to Crannóg excavations carried out at Moynagh and Corraneary. Typical of these are querns, stone troughs, stone discs, bone combs and spindle whorls (see NMI Find No. - 1887:43-51 and NMI Find No. - 1938:9311-9392). Other significant finds include a medieval seal matrix from Dunshaughlin (NMI Find No. - 1976:609) and a stone finial from Grange (NMI Find No. - 1968:206).

92 In terms of human remains burials have been found at Irishtown in a stone protected grave with 3 glazed potsherds (NMI Find No. - 1964:59-62), at Martinstown from a sandpit and from a ringfort at Baile Órthaí (Oristown). All these burials were isolated finds and do not indicate extensive cemeteries.

93 Note: the finds from the topographical index in many instances do not record artefacts recovered from recent excavation work, which may be with conservators or individual archaeological consultancies.

14.4.3.8 Previous Archaeological Fieldwork

94 The Excavation Bulletin is both a published annual directory and an online database that provides summary accounts of all the excavations carried out in Ireland and Northern Ireland from 1970 to 2010. The Excavations Bulletin is compiled by Isabel Bennett and published by Wordwell, with support from the OPW and the OAHG. For the years from 1977 to 1984 the Excavation Bulletin was incorporated in the Irish Journal of Archaeology. The database gives access to almost 15,000 reports and can be browsed or searched using multiple fields, including Year, County, Site Name, Site Type, Grid Reference, Licence No., Sites and Monuments Record No. and Author.

95 Similarly the National Roads Authority (NRA) archaeological database (http://archaelogy.nra.ie) contains a description of the results of excavations carried out in advance of various road schemes. In general, the database contains information on sites for which final excavation reports have been received. In a small number of cases, owing to the significance of particular sites, information from preliminary excavation reports has been included in lieu of the final report. The database can be searched using menus in one or more categories including county, townland, site type and dating period.

96 A search through the Excavation Bulletin database produced results for a number of townlands with significant archaeological potential. Ardbraccan was investigated along Testing Area 11 of the Navan bypass section (Contract 3) of the M3 Clonee North of Kells road scheme and exposed burnt mounds, a circular enclosure, a hut site and pits were found. Excavation was carried out in May 2002, on a site at Arodstown, County Meath, as part of the Bord Gáis Éireann Pipeline to the West project and the site revealed a large spread of burnt stone and charcoal and a Fulacht Fiadh. Bective Abbey has also been the subject of a number of excavations carried out as part of the R161 realignment and widening of the Trim–Navan Road, these investigations did not expose material of archaeological significance. There has also been a series of research excavations funded by the Royal Irish Academy within the grounds of Bective Abbey carried out between 2009 and 2012. Excavations in 2009 exposed the south western corner of a building with an external drain enclosed by a medieval ditch. The drain produced an array of medieval pottery, oyster shells and animal bones, which provide an important clue as to the probable function of this building as the monastic infirmary. Results for later seasons are pending.

97 More recently a test excavation was carried out on a proposed dwelling house, garage and stable block on a site overlooking the River Boyne, 500m west of Bective Abbey and c.150m to the south-east of a ringfort (SMR No. - ME031–025). Six trenches sited on the footprint of the development revealed nothing of archaeological significance (Licence no. 09E0043).

98 In Baltrasna townland as part of the scheme of archaeological mitigation, in advance of the N2 Finglas-Ashbourne road realignment (Site 17-18) carried out between January and March 2004, a number of sites were exposed and fully excavated. These included a Medieval Ditch, two Fulachtaí Fia and assorted pits and features dating from Prehistoric to the Early Modern period. At Betaghstown pre-development excavations and chance finds have exposed a cist, a ring ditch, a habitation site and an Iron Age Cemetery. A series of excavations in Brittas particularly around a Crannóg at Moynagh Lough has produced a wealth of material from successive phases dating from the Mesolithic to the Late Medieval. At Dowdstown in 2004 a number of evaluations carried out in advance of the planned M3, on the Dunshaughlin to Navan section, exposed a number of sites indicating Early Medieval to Post Medieval settlement, including an enclosure complex. North of this, investigations at Fletcherstown, exposed human remains near the base of a cross. In Martry, testing in advance of a road scheme uncovered burnt-mound material, pits and a spread of stones.

99 Following unlicensed bulldozing work at the Knockauns in Baile Órthaí (Oristown) an excavation was carried out and samples taken to date the earthwork. Finds consisting of post-medieval pottery, flint and a fragment of bronze were recovered in the lower layers of the bank construction material, while fragments of leather, wood, a small amount of bone and one shard of glass came from contexts within the organic core. Test-trenching for a one-off house as part of further information took place near a linear earthwork, in the Teltown area, in 2008 (SMR No. - ME017–049). Mr. D. Sweetman, Archaeologist, recorded nothing of archaeological interest.

100 At Raffin, rescue work following the site being levelled by a bulldozer uncovered a multi-phased complex with a settlement and ritual enclosure.

101 The NRA database produced a single result in relation to pre-construction works associated with the development of the M3 motorway between Navan and Kells. The M3 and this proposed development intersect between Grange and Durhamstown townlands to the west, 4km west of Navan. Excavations in the area in 2006 uncovered a field ditch and lazy beds / furrows in Ardbraccan townland.

14.4.3.9 **Teltown Zone of Archaeological Amenity**

102 During discussions with the National Monuments Service of the then DoEHLG the consultants were provided with a map outlining a region referred to as the Teltown ZAA (Figure 14.18, **Volume 3D Figures** of the EIS. Located to the north of the Blackwater River, approximately halfway between Navan and Kells, the boundary encompasses the townland of Tailtin (Teltown) and parts of the neighbouring townlands of Baile Órthaí (Oristown) and Diméin Bhaile Ghib (Gibstown Demesne). This area has been identified as the core of the historic region of Tailtiú a ritual landscape with a unique wealth of folklore, literary references and associated archaeological monuments.

103 An extensive and detailed evaluation was undertaken to investigate the potential impacts that the proposed development would have on the Teltown ZAA. Primary literary sources were consulted and historic and contemporary mapping reviewed, as well as several sources of detailed orthophotography and satellite photography. In the absence of permission to access land along the proposed route, surveys were undertaken from publicly accessible land and roads within the Teltown ZAA and throughout the surrounding area.

104 Cognisant of the importance of the area, a LiDAR survey was undertaken of the entire Teltown ZAA to assist in identifying previously unrecorded archaeological sites in the vicinity of the proposed development that could be impacted upon. The survey was undertaken in October 2013 and both Digital Terrain Models (DTM) and Digital Surface Model (DSM) data produced at 25cm and 12.5cm resolutions. A possible ditched enclosure and the possible location of the artificial lakes referred to by O'Donovan were identified during analysis of the DTM (for further details refer to the Teltown Appraisal Report in **Appendix 14.5, Volume 3D Appendices** of the EIS). The possible enclosure (MSA_CHS070) is located 120m to the west of the proposed development (Tower 304) while the possible location of the artificial lakes (MSA_CHS073) is located 280m to the west of the proposed development (Tower 310).

105 The landscape of the Teltown ZAA consists, in the south, of low lying land on the banks of the Blackwater River. There is a significant bend in the Blackwater to the east and on the southern bank at this point there is a rath (SMR No. ME017-032). Further to the west, upstream, the river changes direction to the north where Teltown House (RPS No. MH017-120) is situated on the eastern bank. This is a historic demesne house with views to the west over the Blackwood River. On open ground to the rear (east) of Teltown House are the Ruins of Teltown Church and Graveyard (SMR Nos. ME017-031 & ME017-031001) which were vested to the Burial Board by the Church Temporalities Commission and are in the ownership of Meath County Council. The proposed development is located approximately 800m to the east of Teltown House and 600m to the east of Teltown Church and Graveyard.

106 Just to the north of the Blackwater River and at the south western extent of the Teltown ZAA is the picturesque historic town of Domhnagh Phádraig (Donaghpatrick), situated around Saint Patrick‘s Church (RPS No. - MH017-131). Saint Patrick‘s Church was vested by the Church Temporalities Commission to the Representative Church Body and, although Meath County Council‘s Graveyard Survey does not list an owner, it is likely the ownership resides with the Church of Ireland. Within the graveyard of the church (SMR No. – ME017-034001) there is a standing stone (SMR No. ME017-034002) and over the road, to the north of the church, the impressive trivallate ringfort Rath Airthir, with its motte and bailey (SMR No. ME017-033). Also within Domhnagh Phádraig (Donaghpatrick) are a parochial hall (RPS No. MH017-132), sextons house (RPS No. MH017-134) and a 19th Century house (RPS No. MH017-133) and to the south of the town, spanning the Blackwater River is Donaghpatrick Bridge (RPS No. MH017-130). Rath Aithir and Saint Patrick‘s Church are the two closest sites to the proposed development and are located 460m and 650m respectively from the proposed development. Rath Aithir is partially covered in dense vegetation which extends along its western margin, screening views towards the proposed development. Likewise Saint Patrick‘s Church has a copse of woodland to the west screening views towards the proposed development.

107 In the west of Teltown ZAA the land rises quickly out of the Blackwater Valley and it is here that Rath Dhú (SMR No. ME017-027) is situated on a small plateau approximately 20m above the level of the river. John O‘Donovan, during the time of the first edition OSI survey, highlights this as the centre of the Teltown festivities. It was once located at the centre of a large field with commanding views over all the lands to the south. But by the time of the second edition OSI survey there was a lane down the field and it had been divided into over a dozen smaller fields with several houses along the lane. Rath Dhu is located approximately 1.4km to the west of the proposed development.

108 To the east of Rath Dhu is the Knockauns (SMR No. ME017-049) a linear earthwork that was partially destroyed in 1997. John O‘Donovan refers to the Knockauns as the remains of ‗a mound now a rabbit warren‘. Many name this as the place where the Teltown Marriages took place but O‘Donovan ascribes this to a hollow located to the south-east of the Kockauns. In the more recent past two houses have been built along Cromwell‘s Road just to the east of the Knockauns and between it and the proposed development. The Knockauns is located approximately 570m to the west of the proposed development.

109 The detailed evaluation report of the Teltown ZAA is published in full in **Appendix 14.5, Volume 3D Appendices** of the EIS.

14.4.3.10 Cartographic and Aerial Features

110 Detailed analysis of first edition and second edition OSI mapping was undertaken as well as a review of several sources of aerial and satellite photography including LiDAR. Any sites of archaeological, architectural or cultural heritage potential were noted and mapped in GIS. In all, 140 sites were recorded in the vicinity of the proposed development; these are summarised in **Table 14.4**.

Table 14.4: Potential Archaeological, Architectural and Cultural Heritage Sites noted from Cartographic and Aerial Sources

Feature Type	Count		Feature Type	Count
Aerial Anomalies	1		Named Wood Copse	2
Aerial Anomaly	10		Old Mill Race	1
Anomalous field boundary	1		Police Station	1
Bridge	5		Pond	1
Culvert	1		Possible Clachan	1
Demesne structure	1		Possible Enclosure	1
Farmstead	19		Possible Man-made Lough	1
Ford	1		Possible Quarry	3
Gate Lodge	2		Possible standing stone	1
Gravel Pit	5		Potential archaeological site	1
House	31		Quarry	8
Mausoleum	1		R C chapel	1
Memorial Cross	1		Railway Line	2
Mill	2		Rectangular feature	1
Named Cross Roads	3		Sallow Well	1
Named demesne feature	1		Tree Copse	2
Named feature	2		Weir	3
Named house	13		Windmill stump	1
Named Wood	2		Wood copse	6
Total	**102**		**Total**	**38**
Overall Total	**140**			

14.4.3.11 Toponym Analysis

111 Townland names are useful in terms of understanding the geology, archaeology, land use, ownership and folklore of an area. The names can provide information on families, topographical features and historical incidents. In terms of the built environment many names reference churches, fords, castles, raths, graveyards, roads and passes etc. Townlands are the smallest administrative land divisions used in Ireland and are in fact the only surviving administrative structure with a continuous history of development going back to medieval times

if not earlier. Irish townlands generally relate not to settlements, but land units and as such they acquired legal title at an early date. They are the basic divisions of the countryside and were carefully recorded in the maps and books that accompanied the great land transfers of the 17th Century. The names feature on the Ordnance Survey maps, the first edition of which was completed for the whole country circa 1842. In the compilation of the Ordnance Survey scholars, such as Eugene O'Curry and John O'Donovan, were commissioned to provide the Survey with the anglicised forms of the Irish place-names and it is these anglicised forms that have been in general use ever since. In compiling the following data a number of resources were consulted including the Placenames Database of Ireland www.logainm.ie and *Irish Names of Places* by P.W. Joyce (1913).

112 Within the MSA many of the townland names relate to topographical features like Altmush meaning beautiful hill or Corrananagh meaning round hill of the marsh. Flora and fauna feature in townlands such as Ballynavaddog meaning town of the plovers, Creemore, the big bush, and Moynagh, the plain of the birds. Settlements and infrastructure are noted in Lislea, the grey fort, Moorlagh, the lake fort, Ballina the mouth of the ford and Boherlea the road of the fort.

113 The personal name element in many of the townlands e.g. Ballie na Betaghs (the town of the Betaghs), date back to the days of tribal Ireland distinguishing various septs, their divisions and context within the larger Clans. The original Gaelic landowners feature in townlands like Aghaloaghan or Rahood meaning Lohan's field or Hode's fort. Others date to a later more troubled period when the native Irish were divested of their holdings and new settlers were installed. Names like Walterstown, Baile Órthaí (Oristown), Fletcherstown and Martinstown are all of Anglo origin and date to the Plantation and Cromwellian periods. The segregation of these communities is further underlined by townland names such as Irishtown and Gaulstown or the town of the foreigners. Significant early Christian foundations are referenced in Kilboyne and Kilmainhamwood both indicative of church's founded by St. Baithin and St. Maighneam respectively. Saint Patrick also features in Derrypatrick and Donaghpatrick meaning Patricks grove and fort respectively. In a pre-Christian context Teltown is associated with Lewy of the long hand, one of the Tuatha De Danann kings. He established a fair or gathering of the people, to be held here yearly on the first of August, in which games, pastimes and marriages were celebrated. In honour of his foster mother, Tailte, Lewy called the place Tailltenn which is now anglicised to Teltown. Martry, meaning a place where people were massacred, is also informative as it does not relate to a known battlefield or historical event. The name however survived long enough in folk memory until it was recorded and references a grim episode long since lost in time.

114 Refer to **Appendix 14.2, Volume 3D Appendices** of the EIS for a list of townland names and analysis.

14.4.3.12 Townland Boundaries

115 Ranging from less than a hectare up to several thousand hectares, townland boundaries are the smallest officially recognised land division in Ireland. During the early to mid-19thCentury, Ordnance Survey Ireland (OSI) produce the first edition of the Ordnance Survey maps, which documented in detail, for the first time, all the townlands of Ireland; numbering in excess of 60,000. Undertaken for taxation purposes, the process involved defining new townland boundaries where previously there had been none, such as in bog and mountain areas and in some instances amalgamating existing townlands. The earliest references to townland boundaries are found in pre-Norman legal documents, referring to grants of land to monasteries. More recently they may relate to demesne boundaries. Taking a variety of forms from rivers and streams to fences, banks, field walls and demesne walls they can provide an interesting insight into the past.

116 In a number of instances towers are located adjacent to townland boundaries but there are no towers located on townland boundaries.

14.4.4 Desk Based Evaluation Architectural

14.4.4.1 Architectural Conservation Areas

117 There are no ACAs located within 5km of the proposed development within County Cavan. There are a number in County Meath, including:

- Ardbraccan - this is the closest ACA to the proposed development, located approximately 600m to the east of Tower 324. During medieval times it was the home of the Catholic Bishops of Meath subsequently the Church of Ireland Bishops of Meath. It is enclosed by an imposing, high stone wall and mature trees along its western boundary. The house itself was constructed between 1734 and 1770 along with formal and walled gardens. Within the site are also domestic and agricultural outbuildings, a detached house, St. Ultan‘s Church and numerous other demesne features.

- Dunsany - is located to the north and east of the proposed development as it changes course from south to south-east between Towers 371 and 387. At its nearest point the ACA is approximately 3.7km to the north and 2.8km to the east of the proposed development. The castle was built by Hugh de Lacy for the Plunkett family in the late 12th Century. The site now encompasses gates, gate lodges, demesne cottages, a bridge, walled gardens and extensive parkland. Along with several features listed in the RPS including the house, gate lodges, stables, outbuildings and an estate manager‘s house there is also a church which is an archaeological monument.

- Headford Demesne - located just to the west of Kells, is now home to the Headfort Golf Club. The golf course itself has been in existence since 1928. The boundary of the ACA is that of the demesne landscape indicated on the Ordnance Survey Ireland first edition mapping surveyed in the 1830's. There are a number of structures located within the ACA boundary which are listed in the Meath County Council Record of Protected Structures (refer to **Table 14.5**). At its nearest point the Headfort ACA boundary is located approximately 4.1km to the west of the proposed development.

Table 14.5: Protected Structures located within Headfort ACA

RPS No.	Name	Grid Ref.
MH017-116	Headfort House	276116/276664
MH017-117	Headfort Bridge / Sedenrath Bridge	276197/275980
MH017-110	Headfort Mausoleum	274998/276400
MH017-112	Newbridge	275209/276304
MH017-120	Stables	276405/276331
MH017-119	Gates	276250/276000
MH017-115	Estate workers House	276049/276730
MH017-114	Outbuildings	276022/276723
MH017-118	Stables	276221/276647
MH017-113	Gates	275282/275902

118 Kilmessan – the core of Kilmessan ACA is a small oasis of parkland and its associated Church, Rectory and Glebe House. The ACA is bounded down its western side by housing developments, which are situated between the ACA and the proposed development, located approximately 2.8km to the west of the proposed line route.

119 Summerhill – the ACA centres on the designed layout of the town centre, which surrounds a village green at the entrance to the Summerhill Demesne, which is located to the south. The proposed development is located approximately 4.8km to the north-east of the ACA.

14.4.4.2 Records of Protected Structures and the National Inventory of Architectural Heritage

120 Both Cavan and Meath County Councils made available their RPSs in GIS format from the earliest stage of the development. The NIAH survey of County Meath was one of the first to be published in 2002 and was referenced as part of this evaluation. The Cavan NIAH survey was published in 2012 and incorporated into the project GIS at that stage.

121 There are no structures that appear in the Cavan RPS or the NIAH survey for County Cavan located within 2km of the proposed development.

122 Within 2km of the proposed development there are 89 structures listed in the RPS for County Meath (refer to **Table 14.6**). As is to be expected there is a significant overlap between the RPS and the NIAH, however the evaluation was cognisant of three sites within 2km of the proposed development that appear in the NIAH which and are not contained in the RPS. The closest RPS site to the proposed development is a Balbrigh Bridge (MH031-101) located approximately 260m to the south of Tower 350.

123 Structures located within 2km of the proposed development that are contained in the RPS or NIAH for counties Cavan and Meath are summarised in **Table 14.6.** Details of all RPS and NIAH structures located within 2km of the proposed development are contained in **Appendix 14.3, Volume 3D** of the EIS**..**

124 The study was also cognisant of sites that were rated as being of National importance in the wider area. These included Gartlan's Public House (RPS No. - 293) and Church of the Immaculate Conception (RPS No. - 294) both of which are located in Kingscourt, County Cavan, Navan Motte (RPS No. - NT025-166) and Town Wall (RPS No. - NT025-077) and Ballinter House in County Meath (RPS No. - MH031-113).

Table 14.6: RPS and NIAH Structures Located within 2km of the Proposed Development

Description	Count		Description	Count
Bridge (railway)	1		Lime kiln	1
Bridge (road)	5		Mill	2
Castle	2		Monument	1
Church (C of I)	5		Monuments / church	1
Church (C of I) former	2		National School	2
Church (R C)	4		outbuilding	1
Church (RC)	1		Outbuildings	1
Church / chapel	1		Parochial Hall	1
Cloister / tower	1		Parochial House	2
Cottage (semi-detached)	4		Postbox	1
Country House	7		Public House	3
Cross	1		Railway Line	1
Demesne features	1		Railway Platform	1
Farm buildings	1		Railway Shed	1
Farm House	2		Railway warehouse	1
Farmhouse	1		Road Bridge	1
Farmyard	1		School	1
Garda Station	1		Sextons House	1
Gate Lodge	1		Stables	1

Gatelodge	1		Terraced House	1
Hall	1		Thatched house	1
House	5		Tomb	1
House (detached)	9		Vent pipe	1
house (former school)	1		Water pump	4
Kiln	1			
Total	60		Total	32
Overall Total - 92				

14.4.4.3 Demesne Landscapes and Historic Gardens

125 Demesne landscapes and historic gardens appear as shaded areas on the OSI first edition mapping. In the Garden Survey on the www.buildingsofireland.ie website there are 159 gardens listed in County Cavan and 308 in County Meath. A number of these landscapes have been given protection through designation as ACAs; including Ardbraccan, Dunsany, Headfort and Summerhill, all of which are located within 5km of the proposed development within County Meath (refer to **Section 14.4.4.1**).

126 OSI first edition mapping was used in conjunction with the NIAH Garden Survey to map all demesne landscapes and historic gardens within 2km of the proposed development. During the course of this evaluation it was found that there are a number of gardens that appear in the OSI first edition mapping that do not appear in the NIAH Garden Survey and, similarly, there are a number that do not appear on the mapping but are noted in the survey. It appears that the NIAH Garden Survey was undertaken using either a more contemporary map source than the OSI first edition survey or multiple map sources. All demesne landscapes and historic gardens from both the Garden Survey and the OSI first edition mapping have been included in this survey.

127 There were no demesne landscapes or historic gardens noted within 2km of the proposed development in County Cavan. Within County Meath there are 51 demesne landscapes and / or historic gardens found within 2km of the proposed development, ranging in size from less than a hectare to several hundred hectares. To give an idea of the differences in scale between the gardens, almost half of the sites are 10 hectares or less, with the largest, Diméin Bhaile Ghib (Gibstown Demesne), accounting for more than 20% of the total area covered by these sites. The four largest demesnes cover an area greater than all the others combined.

128 Of particular note, in close proximity to or traversed by the proposed development, are Ardbraccan, Brittas, Mountainstown, Philpotstown and Whitewood.

Table 14.7: Demesne Landscapes and Historic Gardens within 2km of the Proposed Development

Name	NIAH Garden Survey rating if available	Townland	Area (Ha)
Unnamed	Does not appear in the Garden Survey	Ballynavaddog	5
Unnamed	Does not appear in the Garden Survey	Milltown	1
Unnamed	Does not appear in the Garden Survey	Knockstown	2
Unnamed	Does not appear in the Garden Survey	Ongenstown	1
Unnamed	Does not appear in the Garden Survey	Staholmog	15
Arch Hall	Virtually no recognisable features	Arch Hall	98
Ardbraccan Glebe	Main features substantially present - peripheral features unrecognisable	Glebe	13
Ardbraccan House	Main features substantially present - some loss of integrity	Ardbraccan	57
Arodstown House	Does not appear in the Garden Survey	Arodstown	3
Bachelors Lodge	Main features unrecognisable - peripheral features visible	Scallanstown	32
Balsoon House	Main features substantially present - peripheral features unrecognisable	Balsoon	10
Baltrasna House	Main features substantially present - peripheral features unrecognisable	Baltrasna	2
Bective House	Main features substantially present - peripheral features unrecognisable	Grange	13
Bloomsberry House	Main features substantially present - some loss of integrity	Bloomsberry	89
Brittas	Main features substantially present - some loss of integrity	Brittas	224
Churchtown House	Main features substantially present - peripheral features unrecognisable	Churchtown	7
Cruicetown House	Main features unrecognisable - peripheral features visible	Cruicetown	53
Culmullin House	Main features substantially present - peripheral features unrecognisable	Culmullin	10
Curraghmore Cottage	Does not appear in the Garden Survey	Arodstown	2
Curtistown House	Main features unrecognisable - peripheral features visible	Curtistown	0
Dowdstown House	Main features substantially present - peripheral features unrecognisable	Dowdstown	10
Drakerath House	Main features substantially present - peripheral features unrecognisable	Staholmog	5
Durhamstown Castle	Main features unrecognisable - peripheral features visible	Durhamstown	13
Ennistown House	Main features substantially present - peripheral features unrecognisable	Cooljohn	2
Galtrim House	Main features substantially present - peripheral features unrecognisable	Galtrim	31

Name	NIAH Garden Survey rating if available	Townland	Area (Ha)
Diméin Bhaile Ghib (Gibstown Demesne)	Main features unrecognisable - peripheral features visible	Diméin Bhaile Ghib (Gibstown Demesne)	520
Glebe	Does not appear in the Garden Survey	Galtrim	5
Glebe House	Does not appear in the Garden Survey	Glebe	3
Grange House	Main features substantially present - peripheral features unrecognisable	Derrypatrick Grange	42
Kilcarty	Main features unrecognisable - peripheral features visible	Kilcarty	72
Kilmainham House	Does not appear in the Garden Survey	Kilmainhamwood	3
Knightstown House	Virtually no recognisable features	Knightstown	7
Liscartan House	Virtually no recognisable features	Liscarton	310
Lisnabo House	Does not appear in the Garden Survey	Lisnabo	6
Martinstown	Does not appear in the Garden Survey	Martinstown	4
Marvelstown House	Does not appear in the Garden Survey	Marvelstown	2
Milestown House	Main features unrecognisable - peripheral features visible	Milestown	69
Mountainstown House	Main features substantially present - peripheral features unrecognisable	Mountainstown	198
Moydorragh House	Virtually no recognisable features	Moydorragh	17
Newtown House	Main features unrecognisable - peripheral features visible	Newtown	14
Oatlands	Virtually no recognisable features	Durhamstown	38
Philpotstown	Main features substantially present - peripheral features unrecognisable	Philpotstown	54
Portion of Allenstown Demesne	Main features unrecognisable - peripheral features visible	Faughanhill	64
Rahood	Virtually no recognisable features	Rahood	18
Rataine Cottage	Does not appear in the Garden Survey	Rataine	5
Rathnally House	Main features substantially present - some loss of integrity	Rathnally	62
Robertstown	Does not appear in the Garden Survey	Durhamstown	1
Teltown House	Main features unrecognisable - peripheral features visible	Tailtin (Teltown)	138
Tullaghmedan House	Does not appear in the Garden Survey	Tullaghmedan	6
Whitewood House	Main features substantially present - peripheral features unrecognisable	Whitewood	102
Woodfort	Main features unrecognisable - peripheral features visible	Ervey	13

14.4.4.4 Cartographic and Aerial Features

129 For details refer to **Section 14.4.3.10**.

14.4.5 Other Cultural Heritage

14.4.5.1 Gaeltacht Areas

130 County Meath contains two Gaeltacht areas that have been officially designated by the Department of Community, Rural and Gaeltacht Affairs namely, Rathcairn, three miles south-east of Athboy and Bhaile Ghib, six miles east of Kells. The Gaeltacht area had a combined population of 1,591 persons in 2002, representing an increase of 13% since the 1996 Census. Of the total population of the county, the Gaeltacht areas represented 1.19% in 2002. Historically the Gaeltacht of Royal Meath has a slightly different history than that of the country‘s other Irish speaking regions. The two Gaeltachtaí of Bhaile Ghib and Rathcairn are resettled communities, where the Irish Government of the 1930s redistributed the vast estates of absentee landlords as small farm holdings to poor farmers from the Gaeltacht areas of Connemara, Mayo and Kerry. The aim was to redress a centuries old imbalance, where Irish farmers were forcibly removed from this land by the English under Oliver Cromwell, with the infamous edict to ‗Hell or Connacht‘. When the Irish farmers returned to the land in Meath, they brought with them their native language and culture, which today is greatly celebrated in the small Gaeltacht regions of Bhaile Ghib and Rath.

131 The alignment passes through the Gaeltacht region of Bhaile Ghib. The Meath CDP acknowledges the importance of the Irish language and its associated cultural heritage to the Gaeltacht areas. It is a goal of Meath County Council to ensure the continued survival and development of the Gaeltachtaí as an area distinct in the linguistic and cultural life of the county, whilst seeking to realise their economic and development potential in a balanced and sustainable manner over the lifetime of the Meath CDP (refer to **Chapter 2** of this volume of the EIS).

14.4.6 Route Survey

132 The following route survey is a distillation of the desktop evaluation including use of detailed aerial photography, LiDAR, coupled with the vantage point surveys and field survey work undertaken.

14.4.6.1 **Towers: 237-254**

Townlands: Clonturkan, Ballyloughly, Boherlea, Moorlagh, Tullyweel, Lislea, Aghamore, Shancor, Towas

133 The MSA section for the North-South 400 kV Interconnection Project proceeds north to south from the Cavan border in drumlin country approximately 3km to the north-east of Kilmainhamwood. From Clonturkan townland the line route proceeds east across the border to Moorlagh townland crossing a river and hills with elevations averaging 150m. Between Towers 237 and 242 the line passes 170m to the north of a rath (SMR No. – ME002-040001) and possible standing stone (SMR No. - ME002-040) on the western slope of a hill in Boherlea. The standing stone is described as triangular in plan and orientated north-west to south-east. The rath is a raised sub circular area (dims. 31.5m) surrounded by earthen bank and fosse with an entrance to the south.

134 Also noted along this section of the line route are two structures and a bridge that feature on the 1st edition OS map dated 1835. Proposed access for construction is on existing farm tracks and through existing gates and does not impact on any known sites in the area.

135 From Tower 242 the line angles to the south-east crossing the regional road R164 between Ervey and Carnacally Cross Roads. Tower 245 is located 170m to the south of a rath (SMR No. - ME002-044). This rath is tree lined and has been damaged by modern farm buildings along its southern arc. Temporary access tracks for Towers 242 and 243 and a stringing area to the east of Tower 242 pass in close proximity to a rath (SMR No. - ME002-026), as does the proposed access for Tower 245 and associated stringing areas which skirts around the edge of rath SMR No. - ME002-044.

136 Further south the line passes between a number of extant raths in Aghamore townland including SMR Nos. - ME002-042, ME002-43, ME005-011, and ME005-013, and an enclosure SMR No. - ME005-012. All these structures are visible on the aerial photographs as tree-lined enclosures. In terms of proximity to the proposed line the ringforts are located approximately as follows; SMR No. - ME002-043 140m, SMR No. - ME002-042 254m, SMR No. - ME005-012 35m and SMR No. - ME005-013 240m. Ringfort (SMR No. - ME005-012) closest to the proposed line route is described as a circular area defined by an earthen bank (diam. 38m) and a west to north stone wall. The fort is immediately adjacent to a farmyard. The access for Tower 247 passes directly over a rath (SMR No. - ME002-043).

137 There is a notable concentration of raths in this area all sited on the upper slopes of drumlins overlooking the heavily wooded, Kilmainham River.

138 The line passes over the river between Towers 251 and 252 approximately 1.1km west of Kilmainhamwood. Within the village there is a concentration of protected structures; including a church (RPS No. – MH005-201), a bridge (RPS No. – MH005-203), a public house (RPS No. – MH005-202), a cross (RPS No. – MH005-206), water pump (RPS No. – MH005-204), two houses (RPS Nos. – MH005-205 & MH005-209) and parochial house (RPS No. – MH005-200). Other sites in the vicinity of the village include a rath (SMR No. - ME005-027) and church and graveyard (SMR Nos. - ME005-028 & ME005-028004) containing a graveslab, and cross-slab and Sheela na gig. The ownership of the graveyard is unknown and could therefore be a National Monument in the ownership of Meath County Council.

139 Two sites are recorded south of the river near Gentleman's Cross Roads - an earthwork (SMR No. - ME005-025) at Shancor of which no visible trace survives and a roadside enclosure at Towas, marked ‗fort' on the 1837 OS map (SMR No. - ME005-026). These sites are 290m and 190m from the proposed line route respectively.

140 There are a number of finds recorded in the topographical files of the National Museum from the townlands evaluated including a stone ball, clay ball, saddle quern (NMI Find No. - 1942:1894), worked flint (NMI Find No. - 1942:68), stone trough (NMI Find No. - 1972:175) and a pivot stone (NMI Find No. - 1956:13:00) from Corraneary townland.

14.4.6.2 **Towers: 254-265**

Townlands: Towas, Eden, Boynagh (E.D. Kilmainham), Altmush, Cruicetown

141 Proceeding south-east from Gentleman's Crossroads the proposed line route traverses elevated ground and passes within 400m of two raths in Boynagh (SMR No. - ME005-043) and Ardmaghbreauge (SMR No. - ME005-042) townlands. From an evaluation of aerial photographs it is clear that both these sites are situated in woodland. South-west of Tower 257 the proposed line route descends along the western slope of a valley that runs parallel to a local road, west of Whitewood Lough. Situated along this road is a protected farmhouse (RPS No. - MH005-101) in Boynagh townland. The house is a detached three bay, two storey farmhouse, built c.1870 with rendered walls and pitched slate roof and projecting porch. The house is in excess of 500m from the proposed line route. On the opposite side of the road are the remains of Boynagh Hill House which first appears on the first edition OS map. The temporary access tracks pass through the grounds of this old house, approximately 270m to the east of Tower 257.

142 Overlooking the lake on the eastern slope is Whitewood House, Lodge and farm buildings (RPS No. - MH005-104). The house is a three bay, two storey over basement house built in 1735 by Richard Castle. It was originally designed as a hunting lodge for the Preston Family. The house is approximately 1.6km to the east of the proposed line route.

143 Continuing south-west the line passes between a corn drying kiln discovered in 1945 during the digging of a pipe trench in Altmush and a rath in Cruicetown (SMR Nos. - ME005-057 and ME005-056). Also notable is a mill race (MSA_CHS026) located to the west of the proposed line between Towers 259 and 260. This unrecorded site features on the first edition OS map.

144 At Tower 262 the line turns eastwards crossing a tributary of the River Dee to the west of the Brittas Estate.

145 There are a number of finds recorded in the topographical files of the National Museum from the townlands including a bone comb, drinking horn, quern stones, bones and timbers from Brittas and Moynagh Lough and a Bann flake of stone (NMI Find No. - 1960:612) from Altmush.

14.4.6.3 **Towers: 265-280**

Townlands: Altmush, Brittas, Moynagh, Rahood, Raffin, Clooney

146 From Tower 265 the line continues south-east over a tributary of the River Dee, through the Brittas Demesne with its associated country house (RPS No. - MH005-105) and along a valley with a local access road and higher ground to the west. Brittas Demesne was the former home of General Thomas Bligh and was built in 1732 incorporating an earlier residence from 1672. The house was later extended in the 18th Century and its ballroom wing, designed by Francis Johnston, was added in the early 19th Century. The house itself is located approximately 430m to the east of the proposed development at Tower 266. The proposed development crosses the avenue between the entrance gates and Brittas House approximately 170m from the entrance into the demesne and a wire scape will be visible from the gate. Passing along the avenue, without screening, the development will be visible to the north and south where it crosses.

147 General Bligh was a brother of Lt. William Bligh (of Mutiny on the Bounty fame) and he took part in a number of continental wars including the War of the Austrian Succession and the Seven Years War. To commemorate his achievements he planted a battlefield wood replicating the battle lines of his engagements with opposing armies. The `Battlefield‘, a 33 acre field located centrally and extending to the south-east within the estate has lime trees laid out in the formations in which he deployed his troops at the Battle of Cherbourg (1758). The ‗Battlefield‘ is located to the east of wooded high ground approximately 430m from the proposed development. Many of the lime trees from the north western extent of the Battlefield have vanished but most of the trees to the south-east have survived.

148 On this his last and most successful military engagement the General was sent by Pitt to organise a descent into France. Bligh with the support of the navy bombarded Cherbourg to cover a landing and with his army drove off the French force detailed to oppose them, captured

the town and destroyed its fortifications, docks and shipping. At the brow of a hill overlooking the Battlefield stands a wooded enclosure containing a brick and stone mausoleum to General Bligh which is located approximately 750m to the east of the proposed development. This mausoleum is marked on both the historic maps, the inscription reads:

> *"Mausoleum. Thomas Bligh, Lieutenant – General of his Majesty‟s Forces, and General of Horse who France‟s Arms withstood at Dettingen, at Valve, at Melle, at Fontenoy and Cherbourge. Not for his own but for his country‟s good he made this improvement, built all these Houses and Temples since the year 1732. Born A.D. 1695. Died Aug. 17, 1775, aged 80 years."*

149 There are a number of archaeological monuments within Brittas Demesne including six ringforts, an enclosure and a cross (SMR Nos. - ME005-085, ME005-086, ME005-087 ME005-089001, ME005-0089002, ME005-090, ME005-091 and ME005-092). Three of the ringforts are within 400m of the proposed line; occupy low hills, with the closest, conjoined enclosures SMR Nos. - ME005-091 and ME005092 located approximately 210m to the east of the proposed development. All three of these monuments will have their setting impacted on by the proposed development. The stone cross (SMR No. – ME005-089001) is described in the archaeological inventory as being located within the interior of a ringfort (SMR No. - ME005-089) and is crudely made with a cross in a circle inscribed on one side.

150 In the south-east corner of Brittas Demesne, approximately 1.2km to the east of the proposed development, is a complex of archaeological sites including a crannog on the shores of Moynagh Lough. This site was originally identified as a crannóg (SMR No. – ME005-088001) in 1977 and was excavated for a short season each year by J. Bradley from 1980 to 1989. Excavation revealed that while the monument has had a long history of occupation the main phase of the crannóg dates to early Christian times. At that time it consisted of a mound of stones and clay c. 40m across defined by wooden piles. A circular house 11.2m in diameter is associated with this phase.

151 There is also an enclosure in Cruicetown on a hilltop to the west (SMR No. - ME005-084). This site is in excess of 400m to the west of the proposed line and is described as a sub-rectangular area (56m south-east to north-west) defined by fosse. This site is well screened by a mature tree boundary to the east.

152 Looking further afield, at this juncture, the proposed development passes between the National Monument at Cruicetown a deserted medieval settlement with a church, graveyard, font, tomb and cross (SMR Nos. - ME005-094001 to ME005-094006) 1.6km to the west and the historic village of Nobber 1.7km to the east. Cruicetown has public access and commanding views to the north and west away from the proposed development. Although there are views towards

the development from Nobber there is good screening in the forms of hills and woodland along the western side of Brittas Demesne.

153 From Gorry's Cross roads the proposed line route continues south south-east through Rahood townland bypassing three raths all located in excess of 400m to the east (SMR Nos. - ME005-097, ME005-098 and ME011-007). Between Towers 273 and 274 the line passes through Rahood House and Demesne. The house is 92m to the east of the proposed line and the NIAH Garden Survey states that virtually no recognisable features remain.

154 North of the N52 the line passes 240m west of the archaeological complex at Raffin (SMR No. – ME011-040). This fort is featured on the historic mapping as a substantial enclosure occupying a summit of a drumlin with views in all directions. In 1988 following unsanctioned levelling work by a bulldozer the site was archaeologically excavated over five seasons (1989-93) by the National Monuments Service (then the OPW). Six different phases of activity were apparent, including Neolithic, Early Bronze Age, Middle Bronze Age, Late Bronze Age, later Iron Age and Early Medieval. Today little survives of the original monument. South-east of the fort on the slope of a hill approximately 400m to the east of the proposed development there is a field system recorded (SMR No. - ME011-042), consisting of the foundations of two house sites with stone walls and a rectangular field system defined by banks, scarps and ditches covering c. 20 acres.

14.4.6.4 **Towers: 280-298**

Townlands: Clooney, Drakerath, Mountainstown, Dowdstown, Fletcherstown, Cluain an Ghaill (Clongill), Baile Órthaí (Oristown)

155 From a point north of the N52 near Raffin Cross Roads, the proposed line route continues southwards through Clooney and Drakerath into more open and less undulating countryside. Approximately 450m to the west of Tower 282 is Drakerath House and its associated historic garden. Temporary access tracks for Towers 282 and 283 is through the grounds of Clooney House which first appears on the first edition OS map and has extensive associated cut stone outbuildings. West of Tower 284 (770m) is a castle site (SMR No. - ME0111-026). This site appears on the historic mapping as a Drakerath Castle; today it survives as a slight rise in a pasture field.

156 Between Towers 288 and 290 it passes through the 800 acre Mountainstown Estate. Mountainstown House (RPS No. – MH012-100) is situated approximately 1km to the east of the proposed line route. It consists of a recently restored Queen Anne style residence, six bay, two storey over basement house, with two bay breakfront and pediment, c.1720 designed by Richard Gibbons, sold to John Pollock in 1796. The demesne is described in the NIAH Garden Survey as having its main features substantially present with peripheral features

unrecognisable. From an inspection of historic maps and aerial photographs the western portion of the demesne was divided into plots of forestry and pasture. A pond marked ‗decoy‘ appears on the first edition map but is now no longer extant. The existing woodland is much as it was in the mid-19th Century. Construction access for Tower 289 is through the grounds of Mountainstown Demesne. Construction access for Tower 290 is along the western perimeter of Dowdstown House (RPS No. - MH011-124) and historic garden. Dowdstown House is approximately 460m east of Tower 291. It is described in the NIAH Garden Survey as having its main features unrecognisable - peripheral features visible.

157 Within Fletcherstown townland, located approximately 280m to the west of Tower 292, is a piece of rock art (SMR No. - ME017-042) described as displaying four concentric penannular rings on a boulder (Clinton (1983). *An example of rock-art from County Meath*).

158 To the north-west of Tower 293 there is an irregularity along an otherwise straight field boundary; a semi-oval feature. This feature corresponds to a since cleared away tree copse indicated on the historic mapping. This site is bounded by a number of large stones in an area otherwise devoid of them and would appear to be archaeological (MSA-CHS061).

159 From Tower 293 to 298 the proposed line route passes over broad fields of arable land with few recorded monuments. Construction access for Tower 294 is adjacent to Glebe House and its associate historic garden. Although the temporary access track passes beside historic outbuildings associated with the house, bordering it to the south, there are modern agricultural buildings to the north and existing wide access used regularly by modern farm machinery.

160 There are a number of finds recorded in the topographical files of the National Museum from the townlands evaluated including some human remains found in a ringfort at Baile Órthaí (Oristown), a La Tene bronze bridal bit and pendant (NMI Find No. - 1963: 101, 2) and stone spindle whorl (NMI Find No. - 1963:67, 68) from Cluain an Ghaill (Clongill), a hone stone (NMI Find No. - 1963:68), a polished stone axe head (NMI Find No. - 1981:16:00) from Fletcherstown and a lozenge shaped flint arrowhead found in Drakerath (NMI Find No. - 1960:570).

14.4.6.5 **Towers: 298-312**

Townlands: Baile Órthaí (Oristown), Cluain an Ghaill (Clongill), Diméin Bhaile Ghib (Gibstown Demesne), Tailtin (Teltown), Castlemartin

161 In Cluain an Ghaill (Clongill) townland there are a number of roadside monuments including a mound, church and graveyard and souterrain (SMR Nos. - ME017-017, ME017- 018, ME017-018001 and ME018-005) all in excess of 700m east of the proposed line route. There is also a Protected Structure (RPS No. – MH017-135), Lerrigh House described as a detached two

storey farmhouse. The house is surrounded by woodland and located approximately 430m to the east of the proposed development.

162 Heading south the proposed line route passes to the west of four demesne cottages associated with the old Gibstown Estate (RPS Nos. - MH017-136, MH017-137, MH017-140 and MH017-141). All the cottages are three bay, single storey, semi-detached roadside buildings on the north western edge of Diméin Bhaile Ghib (Gibstown Demesne). This was the estate of the Gerrard family from the mid-17th Century. At the end of the 19th Century the family replaced their house with a very impressive ‗Italianate‘ house designed by W.H. Lynn. It was dismantled in the 1960's leaving a few peripheral features, including a designed entrance and some outbuildings.

163 Between Towers 303 and 311 the proposed line route passes through a ZAA, delineated by the National Monuments Service, currently part of the DAHG, as an area of high archaeological potential relating to the Teltown assembly site. A map of this Teltown ZAA is held by the National Monuments Service of the DAHG and comprises a region defined by the River Blackwater to the south, a third class road between Oristown and Bloomsbury Crossroads to the west, the R163 Kells to Slane Road to the north and a third class road linking Crassulthan Crossroads to a point south of Donaghpatrick Bridge to the east. This area has been identified as the core of the historic region of Tailtiú a ritual landscape with a number of field monuments and a unique wealth of folklore and literary references. Much of the early literature concerning the area is historical but mainly mythological. Teltown appears to have its earliest significance as a cemetery. Tailtiu was the last Queen of the Fir Bolg and under her direction this landscape was cleared and a grassy plain replaced the original forest. On her death Lugh established a festival, Áenach Tailteann in her honour which continued to be celebrated as late as the 18th Century. Teltown figures prominently in the Táin and Dunaire Finn and also in the Life of Patrick and in the Vitae of Ciaran. Many battles are also supposed to have been fought here including the final battle between the Milesians over the Tuath De Dannan. The Táin records that the defending charioteers confronted invading forces at Roi Ard in Tailtiu. Later the Uí Neill had frequent dynastic battles in the area as claimants fought for the high kingship. In the early Christian period a synod was held at Tailtiu in AD 563 in an effort to Christianise the site. Its ritual significance continued until 1168 when the last of the High Kings Ruaidhri O'Conchobair held a royal assembly here after his inauguration in Dublin.

164 O'Donovan examined this historic site in 1836 for the Ordnance Survey and found among the people vivid traditions of the old customs. Though the younger generation, when speaking English, called it Teltown, the older Irish-speaking people never used any name but Taillten. They told him that games were carried on there down to 30 years ago - i.e. to 1806, but that, on account of the increasing manufacture of ‗pottheen whiskey‘ instead of the old native drinks, ale

and mead, there were quarrels and scenes of violence, so that the magistrates at last put a stop to the meetings.

165 It is worth noting that O'Donovan in his 1836 Map of the significant sites associated with Teltown identified a discreet area including the northern portion of Tailtin (Teltown) and the southern portion of Baile Órthaí (Oristown) between Cromwell's road (local access road between the R163 and L3409) sweeping north-west to the R163 road between Baile Órthaí (Oristown) and Diméin Bhaile Ghib (Gibstown Demesne). The proposed line route is located approximately 400m to the east of this area.

166 The Teltown ZAA, which is approximately 520 hectares in size, encompasses a number of monuments including a possible embanked enclosure (SMR No. - ME017-050), a linear earthwork, known as the Knockauns (SMR No. - ME017-049), the Rath Dhu enclosure (SMR No. - ME017-027) and the impressive Motte and Bailey site of Rath Airthir (SMR No. - ME017-033). Also contained within the Teltown ZAA is Donaghpatrick Graveyard and standing stone (SMR No. - ME017-034001-002). The distances from the proposed line route to the monuments are 410m to the possible embanked enclosure, 560m to the Knockauns, 1.4km to Rath Dhú and 510m to Rath Airthir.

167 From Tower 304 to 308 the line passes through the old Diméin Bhaile Ghib (Gibstown Demesne). The NIAH Garden Survey describes the estate as having some peripheral features but the original house has been cleared away. What does survive is a circular entrance feature at Crasulthan Cross Roads (RPS No. - MH017-138). Construction access for Tower 306 passes to the north of a circular copse of trees (MSA_CHS071), a demesne feature that appeared between the first and second edition OS surveys. At Tower 307 the proposed line route deviates to the south-west, away from Domhnagh Phádraig (Donaghpatrick) and passes through Tailtin (Teltown) townland. Between Towers 309 and 310 the proposed line passes between Teltown Church and graveyard (SMR Nos. - ME017-031 & ME017-031001) and house (RPS No. - MH017-129) to the west and a ringfort in Tankardstown (SMR No. - ME017-032) to the east.

168 Within Domhnagh Phádraig (Donaghpatrick) there are five protected structures (RPS No. - MH017130-134) including the bridge, church, parochial house, Sexton's house and 19th Century house. The existing church built c.1896 was designed by J.F. Fuller and incorporates a former tower house to the west. It has a medieval base batter, with face corbel built in wall and blocked windows. There is a medieval font, sundial and standing stone in the graveyard (Roe (1968). *Medieval fonts of Meath*). The church is approximately 700m from Tower 308.

169 West of Tower 310 just before the the proposed line route crosses the River Blackwater, lies a depression (MSA_CHS073) which was highlighted from the LiDAR survey and may be associated with the man made loughs mentioned in the accounts of the Teltown Games. As the proposed development crosses the River Blackwater there are a number of cartographic features including a weir, corn mill and ford to the west. These sites are not visible on the aerial photographs and are located approximately 100m from the proposed line route. Other notable sites on the southern bank are Martry Mill and house (RPS Nos. - MH017-127 and MH017-128). The mill consists of a group of three adjoining two storey buildings, on an ‗L‘ shape plan built circa 1800. The adjacent house is a three bay, two storey house with steeply pitched roof with a central projecting porch. Both these sites are in excess of 700m to the west of the proposed line route.

14.4.6.6 **Towers: 312 -325**

Townlands: Castlemartin, Tankardstown, Grange, Durhamstown, Neillstown

170 From Tower 312 just past the N3 roadway the proposed line route passes a number of houses that appear on the first edition OS maps and a dismantled railway line and proceeds south across pastureland towards the M3. To the west of the proposed line between Towers 317 and 318 are three recorded monuments - an enclosure and a church and graveyard (SMR Nos. - ME024-007, ME024-008 and ME024008001) in Grange townland, approximately 1040m and 900m respectively from the proposed development. The church site is a square area defined by earthen bank with no visible entrance or fosse. Between Towers 321 and 323 the line passes to the east of a fortified house (RPS No. MH024-104 and SMR No. - ME024-011) and a church and graveyard (SMR Nos. - ME024-012, ME024-12001) in Durhamstown townland. The house is described as a two storey building with an attic and four vaults at ground floor. There is tower at the south-east corner. The building was adapted in the 19th Century. The church site appears to have been destroyed and is discernible now as a slightly raised rectangular stony area. The church and castle are located 500m and 900m from the line.

171 Further south and to the east of Tower 324 near the M3 is Ardbraccan, a historically important site which was the seat of the Bishops of Meath since the 14th Century. The House and demesne are designated as an ACA and are defined by enclosed mature pasture land with formal and walled gardens. The construction of the house commenced c.1734 to the designs of Richard Castle and was completed in the 1770‘s to the designs of James Wyatt, Thomas Cooley and the Rev. Daniel Beaufort. The boundary of the ACA is approximately 680m from Tower 324. The site contains a number of protected structures including a County House (RPS No. – MH024-109), two houses (RPS Nos. – MH024-101 and MH024-112), outbuildings (RPS No. – MH024-110) and a water pump (RPS No. – MH024-111), as well as a church and graveyard (SMR Nos. – ME025-022 and ME025-022001).

172 There are three topographical finds recorded in the townlands in the vicinity of the above section including a spudstone found in Walterstown (NMI Find No. - 1976:149), a bronze zoomorphic pennanular brooch found in Ardbraccan (NMI Find No. - 1984:111) and a decorated stone finial found in Grange (NMI Find No. - 1968:206).

14.4.6.7 **Towers: 325-342**

Townlands: Neillstown, Betaghstown, Ongenstown, Irishtown, Halltown, Churchtown, Philpotstown

173 From Tower 325 the line route proceeds south towards the N51 through the townlands of Neillstown, Betaghstown and Ongestown. At Halltown it passes 135m to the east of an earthwork (SMR No. - ME030-004). This monument has been disturbed by quarrying and only the western scarp remains. Further south it passes a rath (SMR No. - ME030-005) defined by a bank with an external fosse 260m to the east. At Towers 337 and 338 the route passes approximately 90m to the east of Churchtown house and its associated historic garden with construction access for these towers passing along the northern boundary of the demesne on an existing access to extensive agricultural buildings to the north of the house. Between Towers 339 and 342 the line crosses the demesne landscape associated with Philpotstown House (RPS No. - MH030-107), described in the NIAH Garden Survey as having its main features substantially present with peripheral features unrecognisable. Construction access for Towers 340 and 341 and its associated stringing areas, which are located within the demesne, is through an old demesne entrance to the west. The proposed development is located approximately 370m from the main house, now referred to as Dunderry House, and Towers 340, 341 and 342 have been positioned to take advantage of screening in the form of intevening woodland located between the house and the proposed development.

174 There are a number of finds recorded in the topographical files of the National Museum for this section. In Irishtown a human skeleton and three glazed potsherds (NMI Find No. - 1964: 59-62) were retrieved from a stone lined grave and at Betaghstown a food vessel, human bones, two flint flakes and mollusc shells were recorded (NMI Find No.s - 1977: 2329-2334).

14.4.6.8 **Towers: 342-363**

Townlands: Philpotstown, Rataine, Dunlough, Balbrigh, Dunganny, Rathnally, Trubley, Knockstown

175 To the west of Tower 343 the line passes approximately 700m from a deserted medieval settlement and church (SMR Nos. - ME030-011001 and ME030-011) in Rataine townland. The settlement was noted in 1814 as consisting of a considerable number of houses around the church (SMR No. - ME030-011) which have since been destroyed (Mason 1814, 91). There is now no visible trace. The church occupies a stone walled rectangular plot and is described as

an undivided nave and chancel (L 23m, W 7.15m) with a double-light ogee-headed window with square hood and double belfry in the west wall.

176 Turning to the south-east the line route passes to the east of the Clady River passing between Robinstown to the north and Balbrigh Bridge to the south. The bridge is a single-arch road bridge over river, built c.1904. It has rock-faced walls, voussoirs and parapet and plaques to road side elevations (RPS No. - MH031-101). Between Towers 351 and 352 the line passes 120m to the north of a hillside enclosure SMR No. - ME031-017 described in the archaeological inventory as a circular area, probably a landscape feature. Construction access for Towers 351 and 352 and its associated stringing areas passes just to the north of SMR No. - ME031-017.

177 Between Towers 355 and 356 the line route crosses the River Boyne approximately 920m to the south-west of Bective Bridge (RPS No. - MH031-1-8 and SMR No. - ME 031-042) and 730m from a mill (RPS No. – MH031-105). The bridge is a 10 arch limestone, rubble bridge, c.1820, with triangular cutwaters and pedestrian refuges. Bective Abbey (RPS No. - MH031-107) is the most notable site in the vicinity. The abbey was a daughter house of Mellifont and is one of the earliest Cistercian foundations in the country dated to 1150. A National Monument in the guardianship of the State (Ref. No. 187) Bective is classified as a Religious House, with cloister and tower and adjacent castle (SMR No.s - ME031-026, ME031-026-001 and ME031-026-002). The chief features of the ruins are the combination of both church and defence. The cloister is the best preserved of the buildings and there is a pillar of a figure carrying a crozier. There are also some beautiful arches which are still intact. At its closest Bective Abbey is located 920m from the proposed line route. More recently the access to the site has been improved with the addition of a car park and widening of the L4010 to the west.

178 On the south side of the Boyne the proposed line passes through Trubley townland the one time site of a tower house and church (SMR No‘s - ME031-024 and ME037-001). The castle was blown down in a storm in the 1970s and has since been removed and the church site is survived by foundations of a divided nave and chancel with a fragment of an octagonal font. The sites are appoximately 460m and 640m from the proposed alignment. The Topographic files record a copper alloy axehead found in a garden in the townland of Trubley (NMI Find No 1999:127).

179 Between Towers 358 and 363 there is only one monument listed in the general vicinity, a barrow (SMR No. - ME037-030) approximately 17m in diameter in Ballynavaddog townland. This site is nearly 500m from the line route.

14.4.6.9 **Towers: 363-382**

Townlands: Knockstown, Creroge, Crumpstown, Branganstown, Boycetown, Galtrim, Martinstown

180 From Tower 363 to 374 the line route passes through gently undulating pasture and arable land crossing the R154 road at Branganstown. To the north of the Boycetown River, in the vicinity of Towers 375 and 376, the route passes three recorded monuments including two raths (SMR Nos. - ME037-022 and ME037-24) and an earthwork (SMR No. - ME037-023) all of which are within 150m of the line. Of the two forts, SMR No. - ME037-022, marked on the first edition map as ‗Walsh‘s Raheen‘ survives as a portion of a bank and external fosse between the south-east and west circuit. The other rath (SMR No. - ME037-024) survives as a sub-circular area defined by scarp (dims. 36m N-S, 32m E-W) with surrounding fosse. The earthwork (SMR No. - ME037-023) is visible as a raised rectangular area on the aerial photographs. A mound towards its centre may be up-cast from a small quarry.

181 At Tower 380 the line diverts to the south-east avoiding Galtrim House (RPS No. - MH043-104), stables (RPS No. - MH043-105), gate lodge (RPS No. - MH043-1040) and demesne located to the south-west. The house is a detached three bay, two storey over basement house, built c.1802. It was designed by Francis Johnston as a glebe house for the very reverend Vesey Dawson and has a range of outbuildings around three sides of a courtyard. The Garden Survey describes the demesne as having its main features substantially present with peripheral features unrecognisable. Within the demesne there is also a Board of First Fruits Church (RPS No. – ME043-102 and SMR No. - ME043-001) built in 1800. St. Mary‘s Church of Ireland is described as a two-bay elevation to south nave, blank elevation with projecting porch to north nave, three-stage castellated and pinnacled tower attached. In the boundary wall of the church is also located a postbox which is a protected structure (RPS No. - MH034-101). South of this is a 7m high motte and bailey (SMR No. - ME043-002). The house and monuments are in excess of 500m from the line.

14.4.6.10 **Towers: 382- 402**

Townlands: Martinstown, Derrypatrick, Culmullin, Woodtown, Curraghtown, Bogganstown

182 East of Galtrim the line route passes through Martinstown into Derrypatrick, the site of a number of monuments including a church and graveyard, bawn and field system (SMR Nos. - ME043-010, ME043-010001, ME043-011 and ME043-012) respectively. All of these are found over 500m to the south-west of the proposed line route. The graveyard occupies a tree-lined polygonal plot accessed via a roadside gate. The SMR describes the grounds as containing two possible bullaun stones (SMR Nos. - ME043-010002, ME043-010003) although these are not listed in the archaeological survey database. Also fragments from a two-light ogee-headed

window have been set in the graveyard wall on either side of the entrance. The church survives as grass-covered foundations divided into a nave and chancel. The castle to the immediate south of the graveyard is marked on the historic maps but now has no upstanding remains. The Meath inventory describes it in 1984 as "*a raised rectangular area (dims. 8.5m E-W, 6.5m N-S) situated at north-west corner of large bawn, defined on all sides except north by large earthen banks and external fosse. Entrance and causeway to bawn towards east end of south side*". There is an associated field system nearby.

183 Crossing the Derrypatrick River the line passes approximately 485m to the west of Culmullin House and Demesne, described in the NIAH as having its main features substantially present. Within the demesne are three recorded monuments including a motte, house and a font (SMR Nos. - ME043-018, ME043-018001 and ME043-018002). There is also a church to the north (SMR No. - ME043-017) described as containing foundations of an east-west building with opposing doors towards western end. There is a sacristy attached to north side of the chancel. The Galtrim font would have been originally located here and has a separate SMR entry for this location, ME043-017001. In the fields along the proposed line route to the west of the house large cultivation ridges were noted. Construction access for Towers 395 to 398 passes though Culmullin demesne.

184 To the east of Tower 399 is a holy well site (SMR No. - ME043-45). The well is housed in a roadside block built shed with a pump.

185 Between Towers 399 and 400 the line passes in excess of 450m from a treelined ringfort (SMR No. - ME043-030) in Woodtown. South-west of this the line diverts eastwards at Tower 402 terminating at Woodland Substation.

186 The following topographical finds have been recovered from this section of the subject area:- a stone axe (NMI Find No. - 1930:25:00) found in Woodtown townland (NMI Find No. - 1953:12-19) three food vessels, five skeletons, (NMI Find No. - 1949:22, 23,24) fragments of a Neolithic vessel, skeletal remains, (NMI Find No. - 1942:737) stone hone, (NMI Find No. - 1952:2) human remains, (NMI Find No. - 1952:2A), pottery, (NMI Find No. - 1952:2b) and a Pebble (NMI Find No. - 1950:29-30) from Martinstown townland.

14.4.6.11 **Towers: 402 to 410**

Townlands: Bogganstown, Curraghtown, Hayestown, Creemore, Woodland

187 At Tower 402 the proposed development is strung on existing double circuit towers until it reaches Woodland Substation after Tower 410.

188 Topographically Tower 402 is located at a local high point, on a ridge at around 130m altitude. As the line route proceeds to the east it falls gradually in altitude as it approaches the substation which is located at less than 100m.

189 To the south, between Towers 403 and 404 are two enclosures (SMR ME043-035 and ME043-036). The closest (SMR No. ME043-035, approximately 420m to the south of the proposed development is small, only approximately 20m in diameter and covered in dense vegetation. The second (SMR No. - ME043-036) is far more substantial, approximately 60m in diameter and 920 from the proposed development. Just to the north of existing Tower 409 is a moated site (SMR No. – ME044-016) which is evident as a raised rectangular platform approximately 140m to the north of the tower.

14.5 POTENTIAL IMPACTS

14.5.1 Introduction

190 Potential impacts have been considered for both known and previously unrecorded archaeological, architectural and cultural heritage sites, for the construction, operation and decommissioning phases of the development.

14.5.2 Evaluation of impacts

191 In line with the EPA's *Guidelines on the Information to be Contained in Environmental Impact Statements* (March 2002) and the DoECLGs *Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment* (March 2013); the impact upon designated and undesignated archaeological, architectural and cultural heritage sites, structures, monuments or features (as detailed in **Appendices 14.2, 14.3** and **14.4, Volume 3D Appendices** of the EIS) have been evaluated using the following criteria:

14.5.2.1 **Quality of impacts**

- Positive Impact: A change that improves or enhances an archaeological, architectural or cultural heritage site, structure, monument or feature or its setting;

- Neutral Impact: A change that does not affect an archaeological, architectural or cultural heritage site, structure, monument or feature or its setting; and

- Negative Impact: A change that will remove or negatively alter, whether in its entirety or not, an archaeological, architectural or cultural heritage site, structure, monument or feature, or detract from an observer's enjoyment or appreciation of its setting.

14.5.2.2 **Significance of Impacts**

- Imperceptible Impact: An impact capable of measurement but without noticeable consequences;
- Slight Impact: An impact, which causes noticeable changes in the character of the environment without affecting its sensitivities;
- Moderate Impact: An impact that alters the character of the environment in a manner that is consistent with existing and emerging trends;
- Significant Impact: An impact, which, by its character, magnitude, duration or intensity alters a sensitive aspect of the environment; and
- Profound Impact: An impact, which obliterates sensitive characteristics.

14.5.2.3 **Duration of Impacts**

- Temporary Impact: Impact lasting for one year or less;
- Short term Impact: Impact lasting one to seven years;
- Medium term Impact: Impact lasting seven to fifteen years; and
- Long term Impact: Impact lasting fifteen to sixty years.

14.5.2.4 **Permanent Impact: Impact lasting over sixty years. Types of Impacts**

- Cumulative Impact: The addition of many small impacts to create one larger, more significant impact;
- ‗Do-Nothing Impact': The environment as it would be in the future should no development of any kind be carried out;
- Indeterminable Impact: When the full consequences of a change in the environment cannot be described;
- Irreversible Impact: When the character, distinctiveness, diversity or reproductive capacity of an environment is permanently lost;
- Residual Impact: The degree of environmental change that will occur after the proposed mitigation measures have taken effect; and

- ‗Worst Case' Impact: The impacts arising from a development in the case where mitigation measures substantially fail.

14.5.3 Construction Phase

192 Potential construction impacts may be direct, physical impacts on known and previously unrecorded archaeological, architectural or cultural heritage sites, structures, monuments or features. Care has been taken during the design stage to avoid such impacts, however, where there remains a potential for such impacts mitigation measures are recommended. In relation to the proposed development, direct, physical impacts on the archaeological, architectural and cultural heritage can manifest themselves in the following ways:

- Where an archaeological, architectural or cultural heritage site, structure, monument or feature is located within an area where works takes place and the works either intentionally or unintentionally entail the alteration or removal of all or part of the site, structure, monument or feature a direct, physical impact will occur.
- Direct, physical impacts can also occur in gaining access to the site. Where archaeological, architectural or cultural heritage sites, structures, monuments or features are intentionally or unintentionally removed or altered when transporting and / or facilitating access for machinery, equipment and / or materials to or from site for tower construction and / or stringing of OHLs and /or construction of guarding areas, a direct physical impact will occur.
- There is the potential for direct, physical impacts on previously unrecorded archaeological and architectural sites, structures, monuments or features.

193 If these impacts cannot be remediated, for example if archaeological deposits are destroyed during excavations, then the impacts will be permanent.

14.5.3.1 Archaeological Impacts

14.5.3.2 Teltown Zone of Archaeological Amenity Impacts

194 At the request of the National Monuments Service, a specific evaluation was undertaken of the potential impacts that the proposed development may have on this area. This evaluation is contained in **Appendix 14.5, Volume 3D Appendices** of the EIS. In summary, the evaluation reviewed known archaeological monuments within Teltown ZAA and their folkloric and historical associations. Primary sources provided context to these sites and detailed evaluation work was undertaken to attempt to locate previously unrecorded archaeological monuments within Teltown ZAA. This included a review of OSI historic mapping, several sources of aerial and

satellite photography, field survey work from publicly accessible land within the region and finally a LiDAR survey of the entire Teltown ZAA.

195 A possible enclosure (MSA_CHS070) and the possible location of the artificial lakes (MSA_CHS073) referred to by O‘Donovan were identified during analysis of LiDAR data. Neither of these possible sites will be directly, physically impacted upon by the proposed development. The nearest previously known archaeological monuments consist of a rath (SMR ME017-32) located on the southern bank of the Blackwater River approximately 330m to the south-east of Tower 309 and an embanked enclosure (SMR ME017-50) located approximately 390m to the west of Tower 303. This site was originally identified by aerial photography as a crop mark and has no above ground expression. No known archaeological monuments will be directly, physically impacted upon by the proposed development.

196 Despite the lack of evidence of archaeology in the immediate vicinity of the proposed development, the Teltown ZAA is still of high archaeological potential and previously unrecorded archaeological deposits could be encountered during excavations associated with the construction of the tower foundations and mitigation measures have been recommended.

14.5.3.3 **Archaeological Monuments**

197 The following tables contain details of the potential direct, physical impacts that archaeological sites located within the vicinity of the proposed development may experience. To increase the clarity of this evaluation these tables also contain details of site-specific mitigation measures. Further details regarding mitigation measures are contained in **Section 14.6**. It should be noted that not all sites of archaeological importance are represented below, only those that have a potential to be directly physically impacted upon by the proposed development. For details of all archaeological sites that are located within the vicinity of the proposed development please refer to **Appendix 14.2, Volume 3D Appendices** of the EIS.

198 Note that:

- The tables are listed in alphanumeric order by Sites and Monuments Record (SMR) number;
- ‗Distance to route‘ for archaeological monuments is the distance from the centre point of the data provided on the www.archaeology.ie website to the centreline of the proposed line route at its nearest point, rounded to the nearest 10m; and
- Similarly the ‗Distance to Nearest Tower‘ is the distance from the centre point of the data provided on the www.archaeology.ie website to the centre point of the tower.

.Table 14.8: Potential Construction Phase Impacts on Archaeological Monument SMR No. ME002-026----, Ringfort - rath

ME002-026---- Ringfort - rath **Designations – Archaeological Monument**					
County	**Townland**	**NGR**	**Distance to Route (m)**	**Nearest Tower (No.)**	**Distance to Tower (m)**
Meath	Tullyweel	276291,292798	370	242	370
Potential Direct Physical Impacts: Construction Access for Towers 242 and 243 passes in close proximity to this ringfort. There is the potential that construction traffic could have a negative impact on associated archaeological deposits.					
Mitigation Measures: During the construction stage a suitably qualified archaeologist will inspect the access route to see if there is any potential for impact on archaeological deposits associated with the monument. If necessary the archaeologist will either demarcate a buffer to protect the monument and / or require that bog mats are used to reduce the level of ground disturbance in the area and protect archaeological deposits associated with the monument.					
Residual Impacts: Demarcation of the site using an appropriate buffer and/or the use of bog mats will ensure the protection of the monument.					

Table 14.9: Potential Construction Phase Impacts on Archaeological Monument SMR No. ME002-044----, Ringfort - rath

ME002-044---- Ringfort - rath **Designations – Archaeological Monument**					
County	**Townland**	**NGR**	**Distance to Route (m)**	**Nearest Tower (No.)**	**Distance to Tower (m)**
Meath	Lislea	276986,292138	200	245	200
Potential Direct Physical Impacts: Access for the construction of Tower 245 passes in very close proximity to the ringfort, there is the potential that construction traffic could have a negative impact on subsurface deposits associated with the rath.					
Mitigation Measures: During the construction stage a suitably qualified archaeologist will inspect the temporary access track in the vicinity of the ringfort and demarcate the site with an appropriate buffer, in addition bog mats may be required to ensure the protection of the monument from any potential impacts.					
Residual Impacts: The use of bog mats will prevent any impacts from construction traffic on any archaeological deposits that may remain *in situ*.					

Table 14.10: Potential Construction Phase Impacts on Archaeological Monument SMR No. ME005-012----, Enclosure

ME005-012---- Enclosure **Designations – Archaeological Monument**					
County	**Townland**	**NGR**	**Distance to Route (m)**	**Nearest Tower (No.)**	**Distance to Tower (m)**
Meath	Aghamore	277099,290570	50	250	80
Potential Direct Physical Impacts: This outer bank of the monument is located approximately 60m to the south-west of Tower 250, construction traffic for the tower will not encroach on the monument, however there is a guarding area to the south of the tower that is located in very close proximity to the monument, see **Section 14.6.1.3**. There is the potential that vegetation clearance or stringing works may impact on the site. Furthermore there is the potential that groundworks for the tower foundation could impact on archaeological deposits associated with the ringfort.					

Mitigation Measures: It is recommended that archaeological testing be carried out at the proposed location of Tower 250 and the nearby guarding area under licence to the National Monuments Service of the DAHG. During the construction phase a suitable qualified archaeologist will demarcate a buffer no less that 20m from the monument to ensure that there is no inadvertent damage to the monument or associated features in its immediate vicinity.
Residual Impacts: In the event that there are archaeological deposits discovered during archaeological testing they will be excavated in full consultation with the National Monuments Service of the DAHG. There will be no direct impacts on the earthwork itself.

Table 14.11: Potential Construction Phase Impacts on Archaeological Monument SMR No. ME031-017----, Enclosure

<table>
<tr><th colspan="6">ME031-017---- Enclosure
Designations – Archaeological Monument</th></tr>
<tr><th>County</th><th>Townland</th><th>NGR</th><th>Distance to Route (m)</th><th>Nearest Tower (No.)</th><th>Distance to Tower (m)</th></tr>
<tr><td>Meath</td><td>Balbrigh</td><td>284450,260130</td><td>140</td><td>351</td><td>170</td></tr>
<tr><td colspan="6">Potential Direct Physical Impacts: The proposed access for Towers 351 and 352 passes along a field boundary directly to the north of this enclosure. There is a potential that construction traffic could have a negative impact on sub surface deposits associated with the site. Furthermore ground works for Tower 351, located approximately 115m to the north of the monument could impact on previously unrecorded archaeological deposits.</td></tr>
<tr><td colspan="6">Mitigation Measures: It is recommended that archaeological testing of Tower 351 be undertaken in advance of development, under licence to the National Monuments Service of the DAHG. A suitably qualified archaeologist will confirm the temporary access tracks for Towers 351 and 352 and if necessary demarcate a buffer or require the use of bog mats to ensure that associated archaeological deposits in the immediate vicinity of the monument are not impacted by construction traffic.</td></tr>
<tr><td colspan="6">Residual Impacts: In the event that there are archaeological deposits discovered during archaeological testing they will be excavated in full consultation with the National Monuments Service of the DAHG. The use of bog mats will prevent any impacts from construction traffic on any archaeological deposits that may remain in situ.</td></tr>
</table>

Table 14.12: Potential Construction Phase Impacts on Archaeological Monument SMR No. ME037-022----, Ringfort - rath

<table>
<tr><th colspan="6">ME037-022---- Ringfort - rath
Designations – Archaeological Monument</th></tr>
<tr><th>County</th><th>Townland</th><th>NGR</th><th>Distance to Route (m)</th><th>Nearest Tower (No.)</th><th>Distance to Tower (m)</th></tr>
<tr><td>Meath</td><td>Branganstown</td><td>286260,254140</td><td>150</td><td>375</td><td>160</td></tr>
<tr><td colspan="6">Potential Direct Physical Impacts: Tower 375 is located on the field boundary just to the east of this archaeological monument and there is the potential that during excavations associated with the construction of the tower's foundations that associated archaeological deposits could be negatively impacted on. There is also the potential that the monument itself could be inadvertently impacted on, given its proximity to the tower (approximately 100m) and the presence of a stringing area in the same field.</td></tr>
<tr><td colspan="6">Mitigation Measures: It is recommended that an archaeologist undertake archaeological testing of the proposed location of Tower 375 under licence to the National Monuments Service of the DAHG in advance of construction, in addition, during the construction phase an archaeologist will demarcate a buffer no less that 20m from the monument to ensure its protection from any inadvertent damage from traffic.</td></tr>
<tr><td colspan="6">Residual Impacts: In the event that there are archaeological deposits discovered during archaeological testing they will be excavated in full consultation with the National Monuments Service of the DAHG. There will be no direct impacts on the ringfort itself.</td></tr>
</table>

Table 14.13: Potential Construction Phase Impacts on Archaeological Monument SMR No. ME037-023----, Earthwork

ME037-023---- Earthwork **Designations – Archaeological Monument**					
County	**Townland**	**NGR**	**Distance to Route (m)**	**Nearest Tower (No.)**	**Distance to Tower (m)**
Meath	Branganstown	286340,253910	120	376	120
Potential Direct Physical Impacts: Tower 376 is located to the east of a field boundary and at its nearest point foundations will be constructed less than 100m from the earthwork, there is the potential that ground works for the tower's foundations could negatively impact on previously unrecorded sub surface archaeological deposits. There are no construction access issues.					
Mitigation Measures: It is recommended that archaeological testing be carried out at the proposed location of Tower 376 under licence to the National Monuments Service of the DAHG.					
Residual Impacts: In the event that there are archaeological deposits discovered during archaeological testing they will be excavated in full consultation with the National Monuments Service of the DAHG. There will be no direct impacts on the earthwork itself.					

Table 14.14: Potential Construction Phase Impacts on Archaeological Monument SMR No. ME037-024----, Ringfort - rath

ME037-024---- Ringfort – rath **Designations – Archaeological Monument**					
County	**Townland**	**NGR**	**Distance to Route (m)**	**Nearest Tower (No.)**	**Distance to Tower (m)**
Meath	Branganstown	286336,253847	130	376	130
Potential Direct Physical Impacts: Tower 376 is located just to the east of a field boundary less than 100m from the archaeological monument, there is the potential that during excavations associated with the construction of the tower's foundations that associated archaeological deposits could be negatively impacted on. It is proposed to access the tower location from the east meaning the monument itself will not be impacted on by construction traffic.					
Mitigation Measures: It is recommended that an archaeologist undertake testing of the proposed location of Tower 376 under licence to the National Monuments Service of the DAHG.					
Residual Impacts: In the event that there are archaeological deposits discovered during archaeological testing they will be excavated in full consultation with the National Monuments Service of the DAHG. There will be no direct impacts on the ringfort itself.					

199 There are also a number of tower locations where there are no impacts on specific archaeological monuments but where there is the potential of encountering archaeological deposits due to the sensitivity of the surrounding area, **Table 14.15** details these tower locations.

Table 14.15: Other Tower Locations where there are Potential Archaeological Impacts

Tower number	Potential Impacts
237	There is the potential to impact on the subsurface remains of a house (MSA_CHS002)
239	There is the potential to impact on previously unrecorded archaeological deposits associated with a nearby archaeological monument, a rath (SMR No. ME002-040001-) with associated standing stone (SMR No. ME002-040----) and possible standing stone (MSA_CHS005)
245	There is the potential to impact on previously unrecorded archaeological deposits associated with a nearby archaeological monument, a rath (SMR No. ME002-044----)
247	There is the potential to impact on the subsurface remains of a farmstead (MSA_CHS010)
261	There is the potential to impact on previously unrecorded archaeological deposits associated with a nearby archaeological monument, an enclosure (SMR No. ME005-063-)
269	This region has a high archaeological potential due to the presence of several archaeological monuments in the vicinity of the proposed scheme, including 5 raths within 200m to 500m (SMR Nos. ME005-089----, ME005-091----,ME005-092----, ME005-097----, and ME005-098----)
270	This region has a high archaeological potential due to the presence of several archaeological monuments in the vicinity of the proposed scheme, including 5 raths within 200m to 500m (SMR Nos. ME005-089----, ME005-091----, ME005-092----, ME005-097----, and ME005-098----)
271	This region has a high archaeological potential due to the presence of several archaeological monuments in the vicinity of the proposed scheme, including 5 raths within 200m to 500m (SMR Nos. ME005-089----, ME005-091----, ME005-092----, ME005-097----, and ME005-098----)
272	This region has a high archaeological potential due to the presence of several archaeological monuments in the vicinity of the proposed scheme, including 5 raths within 200m to 500m (SMR Nos. ME005-089----, ME005-091----, ME005-092----, ME005-097----, and ME005-098----)
273	This region has a high archaeological potential due to the presence of several archaeological monuments in the vicinity of the proposed scheme, including 5 raths within 200m to 500m (SMR No.s ME005-089----, ME005-091----, ME005-092----, ME005-097----, and ME005-098----)
293	There is the potential to impact on the subsurface archaeological deposits associated with a nearby potential archaeological site (MSA_CHS061)
330	There is the potential to impact on the subsurface remains of a house (MSA_CHS101)
335	There is the potential to impact on previously unrecorded archaeological deposits associated with a nearby archaeological monument, an earthwork site (SMR No. ME030-004----)
352	There is the potential to impact on previously unrecorded archaeological deposits associated with a nearby archaeological monument, an earthwork site (SMR No. ME031-017----)
377	There is the potential to impact on archaeological remains associate with a nearby aerial anomaly (MSA_CHS126)

14.5.3.3.1 Temporary Access Routes

200 There are several tower locations noted in Chapter 7, **Volume 3B** of the EIS where, depending on ground conditions, placing of temporary access tracks may be required to facilitate access to working areas, stringing areas and guarding areas. Excavation of topsoil associated with the placement of Type 3 temporary access tracks could have a permanent, negative impact on previously unrecorded archaeological deposits. However, the requirement for Type 3 access tracks has not been identified.

14.5.3.3.2 Guarding Areas

201 Obstacles such as roads and distribution lines may have to be guarded by way of temporary guard poles and structures. There is the potential that excavation works associated with the construction of guarding areas could have a permanent, negative impact on previously unrecorded archaeological deposits. **Tables 14.16 - 14.46** detail locations where there may be an impact.

202 Guarding areas are referenced according to the nearest tower, for example, ‗at Tower 249‘, or ‗north of Tower 250‘. Where there are multiple guarding areas between two towers a further number is added to discriminate, the first and second guarding areas encountered respectively when heading east along the alignment from Tower 262 would, for example, be referred to as ‗east of Tower 262 (1)‘ and ‗east of Tower 262 (2)‘.

Table 14.16: Potential Construction Phase Impacts Relating to Guarding at Tower 249

Location of guarding - At Tower 249 (NGR - 277150/290790)
Potential Impacts - The guarding on the south side of the road is located in an area where a house was situated during the first edition OS survey (MSA_CHS013). There is the potential that groundworks associated with the construction of the guarding could negatively impact on associated remains.
Mitigation Measures - A suitably qualified archaeologist will monitor groundworks associated with the construction of the guarding.
Residual Impacts - In the event that there are archaeological deposits discovered during archaeological monitoring they may need to be excavated in full consultation with the National Monuments Service of the DAHG and the National Museum of Ireland.

Table 14.17: Potential Construction Phase Impacts Relating to Guarding North of Tower 250

Location of guarding - North of Tower 250 (NGR - 277145/290750)
Potential Impacts - The guarding area is located approximately 120m to the north of an enclosure (SMR No. ME005-012) that appears as a fort on the first edition OS map. Given the proximity of the archaeological monument there is the potential that groundworks associated with the construction of the guarding could negatively impact on associated archaeological deposits.
Mitigation Measures - A suitably qualified archaeologist will monitor groundworks associated with the construction of the guarding.
Residual Impacts - In the event that there are archaeological deposits discovered during archaeological monitoring they will be excavated in full consultation with the National Monuments Service of the DAHG and the National Museum of Ireland. There will be no direct impacts on the enclosure.

Table 14.18: Potential Construction Phase Impacts Relating to Guarding South of Tower 250

Location of guarding - South of Tower 250 (NGR - 277145/290600)
Potential Impacts - The guarding on the south side of the road is located within approximately 10m of an enclosure (SMR No. - ME005-012) and there is the potential that excavations associated with the construction of the guarding could negatively impact on associated archaeological remains. There is also the potential that the monument could be inadvertently impacted upon during construction of the guarding or that facilitating access could negatively impact on subsurface archaeological remains.
Mitigation Measures - A regime of archaeological testing under licence to the National Monuments Service of the DAHG has already been recommended for the adjacent tower location (250) and this testing regime will be expanded to include the proposed guarding area. Also a suitably qualified archaeologist will demarcate of buffer of not less than 10m from the enclosure during the construction phase and monitor works associated with both the construction and dismantling of the guarding.
Residual Impacts - In the event that there are archaeological deposits discovered during archaeological testing they may need to be excavated in full consultation with the National Monuments Service of the DAHG and the National Museum of Ireland.

Table 14.19: Potential Construction Phase Impacts Relating to Guarding South and Adjacent to Tower 261

Location of guarding - South and adjacent to Tower 261 (NGR - 279105/287135)
Potential Impacts - The guarding area is located approximately 140m to the east of an enclosure (SMR No. ME005-063) that appears as a fort on the first edition OS map. Given the proximity of the archaeological monument there is the potential that groundworks associated with the construction of the guarding could negatively impact on associated archaeological deposits.
Mitigation Measures - A suitably qualified archaeologist will monitor groundworks associated with the construction of the guarding.
Residual Impacts - In the event that there are archaeological deposits discovered during archaeological monitoring they will be excavated in full consultation with the National Monuments Service of the DAHG and the National Museum of Ireland. There will be no direct impacts on the enclosure.

Table 14.20: Potential Construction Phase Impacts Relating to Guarding East of Tower 262 (1)

Location of guarding - East of Tower 262 (1) (NGR - 279275/286945)
Potential Impacts - Access to this guarding area is through a possible quarry site first surveyed during the first edition OS survey (MSA_CHS032). The antiquity of this site is not known and there is the potential that facilitating access through this area could negatively impact on associated archaeological remains.
Mitigation Measures - A suitably qualified archaeologist will monitor access through the possible quarry (MSA_CHS032) for both construction and dismantling of the guarding.
Residual Impacts - In the event that there are archaeological deposits discovered during archaeological monitoring they will be excavated in full consultation with the National Monuments Service of the DAHG and the National Museum of Ireland.

Table 14.21: Potential Construction Phase Impacts Relating to Guarding East of Tower 262 (2)

Location of guarding - East of Tower 262 (2) (NGR - 279400/286930)
Potential Impacts - The guarding on the western side of the road is located in an area where a possible quarry was surveyed during the first edition OS survey (MSA_CHS032). The antiquity of this site is not known and there is the potential that groundworks associated with the construction of the guarding could negatively impact on archaeological remains.
Mitigation Measures - A suitably qualified archaeologist will monitor groundworks associated with the construction of the guarding.
Residual Impacts - In the event that there are archaeological deposits discovered during archaeological monitoring they will be excavated in full consultation with the National Monuments Service of the DAHG and the National Museum of Ireland. There will be no direct impacts on the enclosure.

Table 14.22: Potential Construction Phase Impacts Relating to Guarding South of Tower 267

Location of guarding - South of Tower 267 (NGR - 280360/286350)
Potential Impacts - The guarding is located within Brittas Demesne, straddling a road in close proximity to the location of a no longer extant gate lodge that is indicated on the first and second edition OS maps. There is the potential that the proposed guarding could negatively impact on features associated with the gate lodge or the demesne entrance. This is not the main entrance currently in use for accessing Brittas House.
Mitigation Measures - A suitably qualified archaeologist will monitor groundworks associated with the construction of the guarding, subsequent to demarcation of vernacular or demesne features.
Residual Impacts - In the event that there are archaeological deposits discovered during archaeological monitoring they will be excavated in full consultation with the National Monuments Service of the DAHG and the National Museum of Ireland.

Table 14.23: Potential Construction Phase Impacts Relating to Guarding South of Tower 268

Location of guarding - South of Tower 268 (NGR - 280530/286060)
Potential Impacts - The guarding straddles the main entrance avenue into Brittas and will be accessed through the main entrance gates into Brittas Estate. There is the potential that in gaining access and constructing the guarding that demesne features could inadvertently be negatively impacted upon.
Mitigation Measures - A suitably qualified archaeologist will monitor access for the construction and dismantling of the guarding, subsequent to demarcation of vernacular or demesne features.
Residual Impacts - No predicted residual impacts.

Table 14.24: Potential Construction Phase Impacts Relating to Guarding South of Tower 270

Location of guarding - South of Tower 270 (NGR - 280900/285510)
Potential Impacts - There are several archaeological monuments in the vicinity of the guarding area and there is, therefore, a high potential that groundworks in the area could encounter associated archaeological deposits.
Mitigation Measures - A suitably qualified archaeologist will monitor groundworks associated with the construction of the guarding.
Residual Impacts - In the event that there are archaeological deposits discovered during archaeological monitoring they will be excavated in full consultation with the National Monuments Service of the DAHG and the National Museum of Ireland.

Table 14.25: Potential Construction Phase Impacts Relating to Guarding North of Tower 171

Location of guarding - North of Tower 271 (NGR - 280940/285460)
Potential Impacts - There are several archaeological monuments in the vicinity of the guarding area and there is, therefore, a high potential that groundworks in the area could encounter associated archaeological deposits.
Mitigation Measures - A suitably qualified archaeologist will monitor groundworks associated with the construction of the guarding.
Residual Impacts - In the event that there are archaeological deposits discovered during archaeological monitoring they will be excavated in full consultation with the National Monuments Service of the DAHG and the National Museum of Ireland.

Table 14.26: Potential Construction Phase Impacts Relating to Guarding North of Tower 273

Location of guarding - North of Tower 273 (NGR - 281205/284735)
Potential Impacts - There are several archaeological monuments in the vicinity of the guarding area and there is, therefore, a high potential that groundworks in the area could negatively impact associated archaeological deposits.
Mitigation Measures - A suitably qualified archaeologist will monitor groundworks associated with the construction of the guarding.
Residual Impacts - In the event that there are archaeological deposits discovered during archaeological monitoring they will be excavated in full consultation with the National Monuments Service of the DAHG and the National Museum of Ireland.

Table 14.27: Potential Construction Phase Impacts Relating to Guarding South of Tower 273

Location of guarding - South of Tower 273 (NGR - 281250/284585)
Potential Impacts - Access to this guarding area is through the historic landscape associated with Rahood House. There is the potential that in gaining access historic structures could inadvertently be negatively impacted upon.
Mitigation Measures - A suitably qualified archaeologist will confirm access and demarcate any vernacular or demesne features.
Residual Impacts - Following mitigation there would be no predicted residual impacts.

Table 14.28: Potential Construction Phase Impacts Relating to Guarding North of Tower 282

Location of guarding - North of Tower 282 (NGR - 281745/281655)
Potential Impacts - Access to this guarding area is through the grounds of Clooney House which predates the first edition OS maps. There is the potential that in gaining access historic structures could inadvertently be negatively impacted upon.
Mitigation Measures - A suitably qualified archaeologist will confirm access and demarcate any vernacular or demesne features.
Residual Impacts - Following mitigation there would be no predicted residual impacts.

Table 14.28: Potential Construction Phase Impacts Relating to Guarding South of Tower 288

Location of guarding - South of Tower 288 (NGR - 281950/279195)
Potential Impacts - The guarding is to be constructed in very close proximity to structures that are indicated on both the first and second edition OS maps. A ruin relating to one of the structures is discernable in the LiDAR orthophotography. There is the potential that construction of the guarding area could negatively impact on ruins or sub-surface remains associated with these structures.
Mitigation Measures - A suitably qualified archaeologist will monitor groundworks associated with the construction of the guarding and demarcate any vernacular or demesne features.
Residual Impacts - In the event that there are archaeological deposits discovered during archaeological monitoring they will be excavated in full consultation with the National Monuments Service of the DAHG and the National Museum of Ireland.

Table 14.30: Potential Construction Phase Impacts Relating to Guarding South and adjacent to Tower 293

Location of guarding - South and adjacent to Tower 293 (NGR - 281480/277700)
Potential Impacts - The guarding is located less than 100m from a potential archaeological site (MSA_CHS061). There is the potential that groundworks associated with the construction of the guarding could negatively impact on associated archaeological remains.
Mitigation Measures - A suitably qualified archaeologist will monitor groundworks associated with the construction of the guarding.
Residual Impacts - In the event that there are archaeological deposits discovered during archaeological monitoring they will be excavated in full consultation with the National Monuments Service of the DAHG and the National Museum of Ireland.

Table 14.31: Potential Construction Phase Impacts Relating to Guarding North of Tower 303

Location of guarding - North of Tower 303 (NGR - 281565/274450)
Potential Impacts - The guarding on the south side of the road is to be located within the Teltown ZAA, highlighted by the National Monuments Service of the DAHG as an area of high archaeological potential. There is the potential that groundworks associated with the construction of the guarding could negatively impact on archaeological deposits.
Mitigation Measures - A regime of archaeological testing will be undertaken at the location of the nearby Tower 303, this regime will be amended to include the guarding area.
Residual Impacts - In the event that there are archaeological deposits discovered during archaeological monitoring they will be excavated in full consultation with the National Monuments Service of the DAHG and the National Museum of Ireland.

Table 14.32: Potential Construction Phase Impacts Relating to Guarding South of Tower 304

Location of guarding - South of Tower 304 (NGR - 281595/273885)
Potential Impacts - The guarding is to be located within the Teltown ZAA, highlighted by the National Monuments Service of the DAHG as an area of high archaeological potential. There is the potential that groundworks associated with the construction of the guarding could negatively impact on archaeological deposits.
Mitigation Measures - A regime of archaeological testing under licence to the National Monuments Service of the DAHG will be undertaken.
Residual Impacts - In the event that there are archaeological deposits discovered during archaeological monitoring they will be excavated in full consultation with the National Monuments Service of the DAHG and the National Museum of Ireland.

Table 14.33: Potential Construction Phase Impacts Relating to Guarding at Tower 306

Location of guarding - At Tower 306 (NGR - 281630/273430)
Potential Impacts - The guarding is to be located within the Teltown ZAA, highlighted by the National Monuments Service of the DAHG as an area of high archaeological potential. There is the potential that groundworks associated with the construction of the guarding could negatively impact on archaeological deposits.
Mitigation Measures - A regime of archaeological testing under licence to the National Monuments Service of the DAHG will be undertaken.

Residual Impacts - In the event that there are archaeological deposits discovered during archaeological monitoring they will be excavated in full consultation with the National Monuments Service of the DAHG and the National Museum of Ireland.

Table 14.34: Potential Construction Phase Impacts Relating to Guarding north-east of Tower 308 (2)

Location of guarding - North-east of Tower 308 (2) (NGR - 281515/273020)
Potential Impacts - The guarding is to be located within the Teltown ZAA, highlighted by the National Monuments Service of the DAHG as an area of high archaeological potential. There is the potential that groundworks associated with the construction of the guarding could negatively impact on archaeological deposits.
Mitigation Measures - A regime of archaeological testing under licence to the National Monuments Service of the DAHG will be undertaken.
Residual Impacts - In the event that there are archaeological deposits discovered during archaeological monitoring they will be excavated in full consultation with the National Monuments Service of the DAHG and the National Museum of Ireland.

Table 14.35: Potential Construction Phase Impacts Relating to Guarding north-east of Tower 308 (1)

Location of guarding - North-east of Tower 308 (1) (NGR - 281490/273000)
Potential Impacts - The guarding is to be located within the Teltown ZAA, highlighted by the National Monuments Service of the DAHG as an area of high archaeological potential. There is the potential that groundworks associated with the construction of the guarding could negatively impact on archaeological deposits.
Mitigation Measures - A regime of archaeological testing under licence to the National Monuments Service of the DAHG will be undertaken.
Residual Impacts - In the event that there are archaeological deposits discovered during archaeological monitoring they will be excavated in full consultation with the National Monuments Service of the DAHG and the National Museum of Ireland.

Table 14.36: Potential Construction Phase Impacts Relating to Guarding at Tower 309

Location of guarding - At Tower 309 (NGR - 281215/272755)
Potential Impacts - The guarding is to be located within the Teltown ZAA, highlighted by the National Monuments Service of the DAHG as an area of high archaeological potential. There is the potential that groundworks associated with the construction of the guarding could negatively impact on archaeological deposits.
Mitigation Measures - A regime of archaeological testing under licence to the National Monuments Service of the DAHG will be undertaken.
Residual Impacts - In the event that there are archaeological deposits discovered during archaeological monitoring they will be excavated in full consultation with the National Monuments Service of the DAHG and the National Museum of Ireland.

Table 14.37: Potential Construction Phase Impacts Relating to Guarding North-west of Tower 314

Location of guarding - North-west of Tower 314 (NGR - 281160/271305)
Potential Impacts - The guarding on the South side of the road is located in an area where a house was situated during the first edition OS survey (MSA_CHS085). There is the potential that groundworks associated with the construction of the guarding could negatively impact on associated remains.
Mitigation Measures - A suitably qualified archaeologist will monitor groundworks associated with the construction of the guarding on the south side of the road.
Residual Impacts - In the event that there are archaeological deposits discovered during archaeological monitoring they will be excavated in full consultation with the National Monuments Service of the DAHG and the National Museum of Ireland.

Table 14.38: Potential Construction Phase Impacts Relating to Guarding South of Tower 317

Location of guarding - South of Tower 317 (NGR - 281405/269995)
Potential Impacts - The guarding on the North side of the road is located in an area where a house was situated during the first edition OS survey (MSA_CHS089). There is the potential that groundworks associated with the construction of the guarding could negatively impact on associated remains.
Mitigation Measures - A suitably qualified archaeologist will monitor groundworks associated with the construction of the guarding on the north side of the road.
Residual Impacts - In the event that there are archaeological deposits discovered during archaeological monitoring they will be excavated in full consultation with the National Monuments Service of the DAHG and the National Museum of Ireland.

Table 14.39: Potential Construction Phase Impacts Relating to Guarding South of Tower 321

Location of guarding - South of Tower 321 (NGR - 281625/268865)
Potential Impacts - The guarding is located in an area where a farmstead and house were situated on either side of the road during the first edition OS survey (MSA_CHS091 & MSA_CHS092). There is the potential that groundworks associated with the construction of the guarding could negatively impact on associated remains.
Mitigation Measures - A suitably qualified archaeologist will monitor groundworks associated with the construction of the guarding.
Residual Impacts - In the event that there are archaeological deposits discovered during archaeological monitoring they will be excavated in full consultation with the National Monuments Service of the DAHG and the National Museum of Ireland.

Table 14.40 Potential Construction Phase Impacts Relating to Guarding North of Tower 328

Location of guarding - North of Tower 328 (NGR - 281880/267070)
Potential Impacts - Access to the guarding is through the yard of a house that predates the first edition OS survey. There is the potential that in gaining access structures or features of historic potential could be negatively impacted upon.
Mitigation Measures - A suitably qualified archaeologist will confirm access and demarcate any vernacular features.
Residual Impacts - Following mitigation there would be no residual impact.

Table 14.41: Potential Construction Phase Impacts Relating to Guarding at Tower 328

Location of guarding - At Tower 328 (NGR - 281905/267020)
Potential Impacts - Access to the guarding is through the yard of a house that predates the first edition OS survey. There is the potential that in gaining access, structures or features of historic potential could be negatively impacted upon.
Mitigation Measures - A suitably qualified archaeologist will confirm access and demarcate any vernacular features.
Residual Impacts - Following mitigation there would be no residual impact.

Table 14.42: Potential Construction Phase Impacts Relating to Guarding North of Tower 342

Location of guarding - North of Tower 341 (NGR - 281875/262945)
Potential Impacts - The guarding straddles one of the entrance avenues which passes through the historic demesne landscape associated with Philpotstown / Dunderry House (RPS No. - MH030-107). There is the potential that in gaining access and constructing the guarding that associated historic structures or features could be negatively impacted on.
Mitigation Measures - A suitably qualified archaeologist will confirm the access, monitor groundworks associated with the erection of the guarding and demarcate any vernacular or demesne features.
Residual Impacts - Following mitigation there would be no residual impact.

Table 14.43: Potential Construction Phase Impacts Relating to Guarding south-east of Tower 349

Location of guarding - South-east of Tower 349 (NGR - 284005/260595)
Potential Impacts - Access to the guarding is through the yard of a farmstead (MSA_CHS112) that predates the first edition OS survey. There is the potential that in gaining access, structures or features of historic potential could be negatively impacted upon.
Mitigation Measures - A suitably qualified archaeologist will confirm access and demarcate any vernacular features.
Residual Impacts - Following mitigation there would be no residual impact.

Table 14.44: Potential Construction Phase Impacts Relating to Guarding North-west and adjacent to Tower 350

Location of guarding - North-west and adjacent to Tower 350 (NGR - 284095/260535)
Potential Impacts - Access to the guarding on the west side of the road is through the yard of a farmstead (MSA_CHS112) that predates the first edition OS survey. There is the potential that in gaining access structures or features of historic potential could be negatively impacted upon.
Mitigation Measures - A suitably qualified archaeologist will confirm access and demarcate any vernacular features.
Residual Impacts - Following mitigation there would be no residual impact.

Table 14.45: Potential Construction Phase Impacts Relating to Guarding south-east of Tower 366

Location of guarding - South-east of Tower 366 (NGR - 286155/256410)
Potential Impacts - The guarding is located in an area where a farmstead consisting of a number of structures was situated during the first and second edition OS surveys (MSA_CHS123). There is the potential that groundworks associated with the construction of the guarding could impact on associated remains.
Mitigation Measures - A suitably qualified archaeologist will monitor groundworks associated with the construction of the guarding on the north side of the road.
Residual Impacts - In the event that there are archaeological deposits discovered during archaeological monitoring they will be excavated in full consultation with the National Monuments Service of the DAHG and the National Museum of Ireland.

Table 14.46: Potential Construction Phase Impacts Relating to Guarding East of Tower 402

Location of guarding - East of Tower 402 (NGR - 292280/248055)
Potential Impacts - The guarding is located in an area where a number of structures were situated during the first edition OS surveys (MSA_CHS138, MSA_CHS139 & MSA_CHS140). There is the potential that groundworks associated with the construction of the guarding could impact on associated remains.
Mitigation Measures - A suitably qualified archaeologist will monitor groundworks associated with the construction of the guarding.
Residual Impacts - In the event that there are archaeological deposits discovered during archaeological monitoring they will be excavated in full consultation with the National Monuments Service of the DAHG and the National Museum of Ireland.

14.5.3.4 Architectural Impacts

203 The following tables contain details of the potential direct, physical impacts that architectural sites located within the vicinity of the proposed development may experience. To increase the clarity of this evaluation these tables also contain details of site-specific mitigation measures. Further details regarding mitigation measures are contained in **Section 14.6**. It should be noted that not all sites of architectural importance are represented below, only those that have a potential to be directly physically impacted upon by the proposed development. For details of

all architectural sites that are located within the vicinity of the proposed development please refer to **Appendix 14.3, Volume 3D Appendices** of the EIS**.**

204 Note that:

- The tables are listed in alphabetical order by townland;
- ‗Distance to route‘ for architectural sites is the distance from the centre point of the data provided by the County Council or the NIAH surveys on the www.buildingsofireland.ie website to the centreline of the proposed line route at its nearest point, rounded to the nearest 10m; and
- Similarily the ‗Distance to Nearest Tower‘ is the distance from the centre point of the data provided to the centre point of the tower.

14.5.3.4.1 RPS and NIAH Structures

205 The following tables are listed in the order in which they are encountered when following the route from north to south.

Table 14.47: Potential Construction Phase Impacts Relating to Brittas, RPS Ref: MH005-105

Brittas, **NIAH Rating - Regional** **RPS Ref: MH005-105 / NIAH Ref: <Null>**					
County	**Townland**	**NGR**	**Distance to Route (m)**	**Nearest Tower (No.)**	**Distance to Tower (m)**
Meath	Brittas	280533,286777	480	266	430
Potential Direct Physical Impacts: The temporary access track for Tower 267 passes through the historic demesne landscape associated with Brittas. The temporary access track for Tower 268 passes through the main entrance gates for Brittas and along the entrance avenue. There is the potential that in gaining access for the construction of these towers that structures or features associated with Brittas could inadvertently be impacted upon.					
Mitigation: During the construction stage a suitably qualified archaeologist will confirm the proposed access route in consultation with the construction team and if necessary highlight features or demarcate buffers to ensure the protection of sensitive structures and / or features.					
Residual Impacts: Following mitigation there will be no impacts on any features or structures associated with Brittas.					

Table 14.48: Potential Construction Phase Impacts Relating to Mountainstown House, RPS Ref: MH012-100

Mountainstown House, NIAH Rating - Regional RPS Ref: MH012-100 / NIAH Ref: <Null>					
County	**Townland**	**NGR**	**Distance to Route (m)**	**Nearest Tower (No.)**	**Distance to Tower (m)**
Meath	Mountainstown	282999,278938	1040	289	1040
Potential Direct Physical Impacts: The temporary access track for Tower 289 passes through the main gates, down the entrance avenue and past Mountainstown House. There is the potential that in gaining access for the construction of this tower that structures or features associated with Mountainstown House could inadvertently be impacted upon.					
Mitigation: During the construction stage a suitably qualified archaeologist will confirm the temporary access track in consultation with the construction team and if necessary highlight features or demarcate buffers to ensure the protection of sensitive structures and / or features.					
Residual Impacts: Following mitigation there will be no impacts on any features or structures associated with Mountainstown House.					

Table 14.49: Potential Construction Phase Impacts Relating to Dowdstown House, RPS Ref: MH011-124

Dowdstown House, NIAH Rating - Regional RPS Ref: MH011-124 / NIAH Ref: <Null>					
County	**Townland**	**NGR**	**Distance to Route (m)**	**Nearest Tower (No.)**	**Distance to Tower (m)**
Meath	Dowdstown	282365,278306	500	291	520
Potential Direct Physical Impacts: The temporary access track for Tower 290 and one of its associated stringing areas passes through the curtilage of Dowdstown House. There is the potential that in gaining access for the construction of this tower and stringing associated OHLs that structures or features associated with Dowdstown House could inadvertently be impacted upon.					
Mitigation: During the construction stage a suitably qualified archaeologist will confirm the proposed access route in consultation with the construction team and if necessary highlight features or demarcate buffers to ensure the protection of sensitive structures and / or features.					
Residual Impacts: Following mitigation there will be no impacts on any features or structures associated with Dowdstown House.					

Table 14.50: Potential Construction Phase Impacts Relating to Philpotstown / Dunderry House, RPS Ref: MH030-107

Dunderry House, **NIAH Rating - Regional** **RPS Ref: MH030-107 / NIAH Ref: <Null>**					
County	**Townland**	**NGR**	**Distance to Route (m)**	**Nearest Tower (No.)**	**Distance to Tower (m)**
Meath	Philpotstown	282271,262906	400	341	340
Potential Direct Physical Impacts: The temporary access track for Tower 340 and Tower 341 and its associated stringing areas pass through the historic demesne landscape associated with Dunderry House. There is the potential that in gaining access for the construction of these towers and associated stringing areas that structures or features associated with Dunderry House could inadvertently be impacted upon.					
Mitigation: During the construction stage a suitably qualified archaeologist will confirm the temporary access track in consultation with the construction team and if necessary highlight features or demarcate buffers to ensure the protection of sensitive structures and / or features.					
Residual Impacts: Following mitigation there will be no impacts on any features or structures associated with Dunderry House.					

14.5.3.4.2 Demesnes and Historic Gardens

206 The following tables are listed in alphabetical order by townland.

Table 14.51: Potential Construction Phase Impacts Relating to Brittas, NIAH Garden Survey Ref: ME-35-N-806867

Brittas **Garden Survey Ref: ME-35-N-806867**					
County	**Townland**	**NGR**	**Distance to Route (m)**	**Nearest Tower (No.)**	**Distance to Tower (m)**
Meath	Brittas	281024,286295	0	268	0
Potential Direct Physical Impacts: The line route will directly impact on this demesne, described in the NIAH garden survey as having its main features substantially present-with some loss of integrity. The demesne contains five towers running north-west to south-east to the west of the property, crossing over the entrance to the principal buildings. To facilitate the proposed development there will be some clearance of existing woodland along the route, some of which is old deciduous woodland and some more recent plantation woodland (refer to, **Chapter 6** of this volume of the EIS). The proposed route will have a significant negative impact on Brittas Demesne.					
Mitigation: Several attempts were made to find alternative routes that would not impact on the demesne. In attempting to move the route further to the west, it was found that there was the potential for significant impacts on the setting of the nearby National Monument of Cruicetown, which has expansive views to the north, west and north-east. The proposed route is screened from Cruicetown by elevated ground to the west. In attempting to move the route to the east, it was found that the development would have significant impacts on the setting of the Historic Town of Nobber with its numerous designated archaeological and architectural sites. Routes further to the east were also investigated but when all constraints were taken into account these were also found to have a greater potential for impact.					
Residual Impacts: The proposed development will have a significant, negative, direct, physical, impact on the demesne.					

Table 14.52: Potential Construction Phase Impacts Relating to Gibstown, NIAH Garden Survey Ref: ME-42-N-831736

Diméin Bhaile Ghib (Gibstown Demesne) Garden Survey Ref: ME-42-N-831736					
County	**Townland**	**NGR**	**Distance to Route (m)**	**Nearest Tower (No.)**	**Distance to Tower (m)**
Meath	Diméin Bhaile Ghib (Gibstown Demesne)	282614,273704	0	305	0
Potential Direct Physical Impacts: The proposed route traverses the demesne near its far western extent. The portion of demesne that the development passes through is separated from main body of the demesne by a road that links Domhnagh Phádraig (Donaghpatrick) to Crasulthan Cross Road and the only demesne feature present in the area is a circular copse of trees. There is little of the former splendor of this extensive demesne that remains, the entrance gate at the Crasulthan Cross roads give some idea but the house itself vanished following a fire and only the outbuildings survive. The direct, physical impact of the proposed development on the demesne was deemed to be slight.					
Mitigation: None					
Residual Impacts: The proposed development will have a slight, negative, direct, physical impact on the demesne.					

Table 14.53: Potential Construction Phase Impacts Relating to Mountainstown, NIAH Garden Survey Ref: ME-42-N-829790

Mountainstown House Garden Survey Ref: ME-42-N-829790					
County	**Townland**	**NGR**	**Distance to Route (m)**	**Nearest Tower (No.)**	**Distance to Tower (m)**
Meath	Mountainstown	282263,278963	0	289	0
Potential Direct Physical Impacts: The region of the demesne that the proposed development traverses is removed from the house, almost 1km to the west, with demesne entrance avenues and gateways located to the east of the house away from the proposed development. The demesne boundary consists of an impressive mix of large deciduous and evergreen trees that will have to be trimmed to facilitate the proposed development. The demesne survives largely intact. The significance of the direct, physical impact of the proposed development on the demesne was deemed to be moderate.					
Mitigation: None					
Residual Impacts: The proposed development will have a moderate, negative, direct, physical impact on the demesne.					

Table 14.54: Potential Construction Phase Impacts Relating to Philpotstown, NIAH Garden Survey Ref: ME-42-N-823629

Philpotstown **Garden Survey Ref: ME-42-N-823629**					
County	**Townland**	**NGR**	**Distance to Route (m)**	**Nearest Tower (No.)**	**Distance to Tower (m)**
Meath	Philpotstown	281981,262886	0	341	0
Potential Direct Physical Impacts: The line route will directly impact on the demesne, described in the NIAH garden survey as having its main features substantially present - with peripheral features unrecognisable. The demesne will contain two towers running north south through the middle of the property, the main house is to the east and is well screened by woodland. The direct impacts will consist of excavations for tower foundations and trimming of vegetation to facilitate required clearances. The significance of the direct physical impacts on the historic landscape was deemed to be moderate.					
Mitigation: None					
Residual Impacts: The proposed development will have a moderate, negative, direct, physical impact on the demesne.					

Table 14.55: Potential Construction Phase Impacts Relating to Rahood, NIAH Garden Survey Ref: ME-35-N-814844

Rahood **Garden Survey Ref: ME-35-N-814844**					
County	**Townland**	**NGR**	**Distance to Route (m)**	**Nearest Tower (No.)**	**Distance to Structure (m)**
Meath	Rahood	281409,284219	0	274	0
Potential Direct Physical Impacts: The proposed development will traverse the demesne to the rear of the main house, the demesne described in the NIAH garden survey as having virtually no recognisable features, will contain two towers running north south along its western extent.					
Mitigation: None					
Residual Impacts: The proposed development will have a moderate, negative, direct, physical impact on the demesne.					

Table 14.56: Potential Construction Phase Impacts Relating to Teltown, NIAH Garden Survey Ref: ME-42-N-804728

Teltown House **Garden Survey Ref: ME-42-N-804728**					
County	**Townland**	**NGR**	**Distance to Route (m)**	**Nearest Tower (No.)**	**Distance to Tower (m)**
Meath	Tailtin (Teltown)	280691,272893	0	309	0
Potential Direct Physical Impacts: The proposed development crosses a small section of the eastern extent of this historical demesne. There are no demesne features of note in the vicinity of the proposed development. Teltown House itself is located at a remove, approximately 800m to the west of the proposed development. The land in the area is low lying with the Blackwater River forming over half of the demesnes boundary winding around its southern perimeter. The over significance of the direct physical impact of the proposed development was deemed to be slight.					
Mitigation: None					

Residual Impacts: The proposed development will have a slight, negative, direct, physical impact on the demesne.

14.5.4 Operational Phase

207 The majority of potential operational effects will be impacts on the setting of archaeological, architectural or cultural heritage sites, structures, monuments or features. As has been noted previously, the greatest threat to the archaeological, architectural and cultural heritage of the region from this type of development consists of potential impacts on setting throughout the operational phase. Given the upstanding linear form of the proposed development, it has the potential to alter a person's appreciation or enjoyment of a site, structure, monument, feature or cultural heritage landscape even when these are located at a remove from the development. Impacts on setting are best mitigated through sensitive routing of the proposed development during the earliest stages of constraints mapping, preliminary corridor selection and route selection. During the earlier stages of this project, sites where there was a high potential for impacts on their setting were highlighted so that they could be avoided as far as was practicably possible taking into account all the other constraints within the study area.

208 In line with the recommendations of the EPA's *Guidelines on the information to be contained in Environmental Impact Statements* (2002), only sites where it was considered that the significance of the impact on their setting would be moderate or greater are included in this section. An exception is the Tara Complex, which is discussed, given its level of importance and elevated topography, even though the significance of the impact of the proposed development on the setting of the area was found to be less than moderate.

209 In most instances it is not feasible to mitigate impacts on setting; however in some instances, such as Brittas Demesne, County Meath, mitigation measures have been recommended. These mitigation measures are outlined in **Section 14.6.2.1** and details of residual impacts are included in the tables below.

210 The methodology applied for the assessment of impacts on setting is provided in **Appendix 14.1.5, Volume 3D Appendices** of the EIS.

14.5.4.1 **Archaeological Impacts**

14.5.4.1.1 Tara Complex

211 The Tara Complex, also commonly referred to as the Hill of Tara is located approximately 6.3km to the east of the proposed development at an elevation of approximately 160m. This site is one of the Royal sites of Ireland and appears on the UNESCO tentative List for World Heritage status. From the Tara Complex there are views over lowlands to the west where the

proposed development is to be located. Given the expansiveness of this vista the lattice framework of the proposed development will blend into the patchwork of fields that make up the landscape. This is one of Ireland's premier archaeological sites and tourist attraction and given its elevated position and expansive views it sensitivity to impacts on setting is very high.

212 Within approximately 1.25km to the west of the Tara Complex is an existing 220 kV OHL which passes south south-west to north north-east at the foot of the hill. The presence of this OHL development provided a useful reference to evaluate how the proposed development would impact on the setting of the Tara Complex. It was found that the magnitude of the impact of the proposed development on the setting of the Tara Complex would be minor. The overall significance of the impact of the proposed development on the setting of the Tara Complex was considered to be slight.

14.5.4.1.2 Teltown Zone of Archaeological Amenity

213 The proposed development passes from north to south through the area highlighted by the National Monuments Service of the DAHG as the Teltown Zone of Archaeological Amenity (ZAA). A detailed evaluation of the impact of the proposed development was undertaken separately and the report is contained in **Appendix 14.5, Volume 3D Appendices** of the EIS.

214 The evaluation highlighted three areas of particular importance within the Teltown ZAA, Rath Dhu (SMR No. ME017-027), Domhnagh Phádraig (Donaghpatrick) and the Knockauns (SMR No. ME017-049). Also of note is the site of Teltown Church and Graveyard (SMR Nos. ME017-031 and ME017-031001), the ruins of a small church and its associated graveyards located to the east of Teltown House (RPS MH017-129).

215 John O'Donovan, in his notes that accompanied the first edition survey by the OSI, highlighted Rath Dhu (SMR No. ME017-027) as being located at the centre of the Teltown Festival. The impressively banked enclosure discussed by both O'Donovan and William Wilde in his book *The Boyne and the Blackwater* (1849), was located in an elevated position in the centre of a huge field with extensive views to the south all the way to Tara and the Hill of Ward. Now the field has been divided into a dozen fields, with a laneway located to the east of Rath Dhu, between the monument and the proposed development. Also adjacent to the monument, between it and the proposed development are several houses and agricultural buildings. Given the historical associations of the site, its sensitivity to impacts on setting was found to be high, despite the changes that have taken place in its vicinity. The proposed development is located approximately 1.4km to the east of the monument, where it runs from north to south through the Teltown ZAA. The lane beside Rath Dhu and the nearby houses and agricultural buildings screen many of the views towards the proposed development. The magnitude of the impact of the proposed development on the setting of Rath Dhu was considered to be minor with the overall significance of the impact on the setting of the monument deemed to be slight.

216 Domhnagh Phádraig (Donaghpatrick) is a picturesque village located at the eastern extent of the Teltown ZAA. There are a number of protected structures and archaeological monuments associated with the town including Rath Aithir Motte and Bailey (SMR No. ME017-033), Donaghpatrick Church (RPS No. MH017-131) and Graveyard (SMR No. ME017-034001), Parochial Hall (RPS No. MH017-132) Stewards House (RPS No. MH017-133) and Sextons House (RPS No. MH017-134). Nearby, just to the south, is Donaghpatrick Bridge (RPS No. MH017-130). The village itself is encapsulated with dense stands of vegetation to the west of Donaghpatrick Church and Rath Aithir that screen the town from the proposed development which would be located approximately 500m to the west of Rath Aithir. From within the town itself the only view of the proposed development will be that of a wirescape that crosses the road to the west, but dense woodland on either side of the road will constrain this to a very limited view. There is the potential that a small portion of the proposed development may be visible from the south-east corner of the graveyard. On approaches to the village from the west, where the development is to be located, the vegetation screens views towards these designated sites as well. The sensitivity of Domhnagh Phádraig (Donaghpatrick) to impacts on setting was found to be high to but the magnitude of the impacts of the proposed development upon that setting was found to be minor and the overall significance of the impact slight.

217 The site known as the Knockauns is classified as a linear earthwork (SMR No. ME017-049) and consists of two parallel earthen mounds approximately 3m apart. These mounds extended roughly EW for upwards of 65m. The monument was partly destroyed by machinery in 1997, when the northern bank was completely demolished, the ditch was filled with re deposited material and part of the southern bank was removed. Subsequently the site was the subject of two excavations by the National Monuments Service. The Knockauns was thought to have been the site of the Teltown Marriages; details of this custom are contained in the Teltown Assessment Report. However John O‘Donovan in his Ordnance Survey Letters attributes this marriage ritual to an alternate site known as Luganeany, a hollow approximately 200m the south-east of the Knockauns.

218 In recent times two new dwelling houses have been constructed approximately 120m to the east of the Knockauns, between it and the proposed development. The sensitivity of the site to impacts on setting was found to be moderate to high and the magnitude of the impact of the proposed development modest. The overall significance of the proposed development on the setting of the site was deemed to be slight.

219 Teltown Church consists of the ruins of a small church surrounded by a number of gravestones and a low, rectangular enclosing bank. Located as it is, in a large field, there are unobstructed views from the church across the surrounding landscape. Although indicated on one of O‘Donovan‘s maps he has little to say on the site, only acknowledging its existence. Wilde expands little upon this, but only telling us that it was plundered twice in the 12th Century. To

the west, Teltown House (RPS No. - MH017-129) with its extensive cut stone outbuildings compliments the historic setting of the church and views to the house and the lands to the south and south-east are unobstructed. To the north there are a number of more modern houses located along the Domhnach Phádraig (Donaghpatrick) Baile Órthaí (Oristown) Road and a cul-de-sac that extends off it to the south. The only reason that locations of Rath Airthir and St. Patricks Church are evident is due to the amount of vegetation surrounding them, screening them from any intervisibility. There was no intervisibility noted between the church and any of the other archaeological sites in the area. Approximately 75m to the north of the monument, extending from east to west is an existing 110 kV OHL. The sensitivity of the site to impacts on setting was found to be high. Although located at almost 700m from Teltown Church a number of the towers associated with the proposed development will be visible as it passes to the east. This is all the more evident as there is little in the way of screening or other development between the proposed development and the church. The magnitude of the impact of the proposed development was found to be substantial and cumulative to the existing 110 kV OHL to the north. The overall significance of the impact on the setting of Teltown Church was found to be moderate negative.

220 Although, within the Teltown ZAA, there was only a single archaeological monument where there was found to be a moderate impact on its setting, there is no doubt that the proposed development will have an impact on the setting of the region as a whole. Given the historical associations that the region has with the Teltown Games and the Teltown Festival it holds a special place in the folklore of the country and as such must be considered sensitive to impacts on the general setting of the region. Evaluation deemed the significance of this impact on the setting to be moderate.

14.5.4.1.3 Archaeological Monuments

221 The following tables contain details of archaeological sites, structures, monuments or features that will experience impacts on their setting throughout the operational phase of the proposed development. As it is impractical to mitigate these impacts they will persist throughout the operational phase of the development and this is reflected in the residual impacts listed in the tables.

Table 14.57: Potential Operational Phase Impacts on Archaeological Monument SMR No. ME002-027----, Enclosure

ME002-027---- Enclosure **Designations – Archaeological Monument**					
County	**Townland**	**NGR**	**Distance to Route (m)**	**Nearest Tower (No.)**	**Distance to Tower (m)**
Meath	Tullyweel	276670,292720	510	243	510
Potential Impacts on setting: This ringfort is well defined with a stone face along its scarp; the fort is situated in good pastureland to the rear of a farmhouse with good views of the monument from the road 275m to the east. Despite the presence of an existing 220 kV OHL approximately 120m to the north of the monument, the sensitivity of the monument to impacts on setting was found to be high. The development will be seen on the skyline passing to the rear of the monument. The impact will be cumulative to an existing 220 kV line which passes east west approximately 120 to the north of the site. The magnitude of the impact of the proposed development on the setting of the monument was found to be substantial. The overall significance of the impact of the proposed development on the setting of the monument was found to be moderate.					
Mitigation Measures: None					
Residual Impacts: There will be a permanent, negative impact of moderate significance on the setting of the archaeological monument during the operational phase of the development. The impact will be cumulative to that of the existing 220 kV line.					

Table 14.58: Potential Operational Phase Impacts on Archaeological Monument SMR No. ME002-039----, Ringfort - rath

ME002-039---- Ringfort - rath **Designations – Archaeological Monument**					
County	**Townland**	**NGR**	**Distance to Route (m)**	**Nearest Tower (No.)**	**Distance to Tower (m)**
Meath	Boherlea	274924,292049	570	239	590
Potential Impacts on setting: This well preserved rath, with a tree and gorse covered enclosing bank, is located on the western slope of a hill and is visible from a number of locations. Due to its prominence, the sites sensitivity to impacts on setting was found to be high. The proposed development is located approximately 600m to the north of the monument and there will be views to the interconnection scheme from neighbouring roads to the north and south. The magnitude of the impact was found to be substantial. The overall significance of the impact of the proposed development on the setting of the monument was found to be moderate to significant.					
Mitigation Measures: None					
Residual Impacts: There will be a permanent, moderate to significant impact on the setting of the archaeological monument during the operational phase of the development.					

Table 14.59: Potential Operational Phase Impacts on Archaeological Monument SMR No. ME002-040----, Standing stone

ME002-040---- Standing stone Designations – Archaeological Monument					
County	**Townland**	**NGR**	**Distance to Route (m)**	**Nearest Tower (No.)**	**Distance to Tower (m)**
Meath	Boherlea	275167,292428	170	239	170
Potential Impacts on setting: The significance of the impact on the setting of this site was found to be moderate to significant for details see SMR No. ME002-040001.					
Mitigation Measures: None					
Residual Impacts: There will be a permanent, negative impact of moderate to significant significance on the setting of the archaeological monument during the operational phase of the development.					

Table 14.60: Potential Operational Phase Impacts on Archaeological Monument SMR No. ME002-040001-, Ringfort - rath

ME002-040001- Ringfort - rath Designations – Archaeological Monument					
County	**Townland**	**NGR**	**Distance to Route (m)**	**Nearest Tower (No.)**	**Distance to Tower (m)**
Meath	Boherlea	275167,292428	170	239	180
Potential Impacts on setting: The site consists of a well-defined rath and standing stone located on the north-west slope of an elevated platform (140m). There are a significant number of forts in the locality, all on drumlins overlooking small streams. The fort lies in the east corner of a field surrounded by hedgerows with mature trees and has good screening but there will be intervisibility towards the development and Tower 239 in particular. In the field to the north is a stone associated with the ringfort that is noted in the SMR description. This upright stone is located 125m from the centre of tower 239 and can be seen from the road to the north. The sensitivity of this area is considered high and the magnitude of the impact substantial. The line route passes 150m to the north and based on its proximity, the impact on the setting will be moderate / significant.					
Mitigation Measures: None					
Residual Impacts: There will be a permanent, negative impact of moderate to significant significance on the setting of the archaeological monument during the operational phase of the development.					

Table 14.61: Potential Operational Phase Impacts on Archaeological Monument SMR No. ME002-044----, Ringfort - rath

ME002-044---- Ringfort - rath **Designations – Archaeological Monument**					
County	**Townland**	**NGR**	**Distance to Route (m)**	**Nearest Tower (No.)**	**Distance to Tower (m)**
Meath	Lislea	276986,292138	200	245	200
Potential Impacts on setting: This ringfort consists of a tree-lined, raised circular area with an agricultural track running to its immediate west and south. Both the first and second edition maps indicate a farm yard to the sites south-east which impacted on its enclosing bank. This farmstead has since been cleared away. The site lies 173m north of Tower 245 in good pasture. There is some screening between the monument and the OHL provided by trees ringing the monument and intervening hedgerows. The sensitivity of the site was found to be moderate and given the proximity of the proposed development the magnitude of the impact was found to be substantial. The overall significance of the impact on the setting of the monument was found to be moderate.					
Mitigation Measures: None					
Residual Impacts: There will be a permanent, negative impact of moderate significance on the setting of the archaeological monument during the operational phase of the development.					

Table 14.62: Potential Operational Phase Impacts on Archaeological Monument SMR No. ME005-012----, Enclosure

ME005-012---- Enclosure **Designations – Archaeological Monument**					
County	**Townland**	**NGR**	**Distance to Route (m)**	**Nearest Tower (No.)**	**Distance to Tower (m)**
Meath	Aghamore	277099,290570	50	250	80
Potential Impacts on setting: This ringfort is featured on both first and second edition OS mapping. The site is situated to the immediate east of a farm house and yard which significantly impacts on the original setting of the monument. Access to this property is via a lane to the east that runs along the northern and western edge of the enclosure. The ringfort has reasonable screening and its bank is ringed with mature bushes and trees to the south. Views from the monument will be impacted particularly by the OHL to the east; southwards there will be restricted views to Tower 251. Views to the north will be limited as the line route passes over the crest of the hill and mature hedgerows restrict the view to Tower 250. The sensitivity of the site to impacts on setting was found to be low and the magnitude of the impact was found to be substantial to major. The overall significance of the impact on the setting of the site was found to be moderate.					
Mitigation Measures: None					
Residual Impacts: There will be a permanent, negative impact of moderate significance on the setting of the archaeological monument during the operational phase of the development.					

Table 14.63 Potential Operational Phase Impacts on Archaeological Monument SMR No. ME005-013----, Ringfort - rath

<table>
<tr><th colspan="6">ME005-013---- Ringfort - rath
Designations – Archaeological Monument</th></tr>
<tr><th>County</th><th>Townland</th><th>NGR</th><th>Distance to Route (m)</th><th>Nearest Tower (No.)</th><th>Distance to Tower (m)</th></tr>
<tr><td>Meath</td><td>Aghamore</td><td>277388,290498</td><td>240</td><td>250</td><td>280</td></tr>
<tr><td colspan="6">Potential Impacts on setting: This heavily overgrown ringfort is situated on the downward slope of a ridge with good views westwards towards the line route. The fort which can be seen from a nearby access road has relatively good intervening screening with mature hedgerows bounding roads and fields. Approaching the monument from the road from the north-west there is a field boundary and the site is not readily evident. Approaching the monument from the south-east the vegetation that encloses the monument restricts views of the sites defining features. From within the monument views will be entirely screened by surrounding vegetation. From the southern edge of the fort there will be views to the south towards the proposed development as it crosses the Kilmainham River Valley. The sensitivity of the site to impacts on setting was found to be moderate and the magnitude of the impact was found to be substantial to major. The overall significance of the impact of the proposed development on the setting of the site was found to be moderate.</td></tr>
<tr><td colspan="6">Mitigation Measures: None</td></tr>
<tr><td colspan="6">Residual Impacts: There will be a permanent, negative impact of moderate significance on the setting of the archaeological monument during the operational phase of the development.</td></tr>
</table>

Table 14.64: Potential Operational Phase Impacts on Archaeological Monument SMR No. ME005-041----, Enclosure

<table>
<tr><th colspan="6">ME005-041---- Enclosure
Designations – Archaeological Monument</th></tr>
<tr><th>County</th><th>Townland</th><th>NGR</th><th>Distance to Route (m)</th><th>Nearest Tower (No.)</th><th>Distance to Tower (m)</th></tr>
<tr><td>Meath</td><td>Ardmaghbreague</td><td>277134,288477</td><td>830</td><td>255</td><td>840</td></tr>
<tr><td colspan="6">Potential Impacts on setting: The site is on an elevation with expansive views of the surrounding area. The SMR classifies the site as an enclosure however it appears on the first edition OSI maps as 'Lisbane'. The site is easily viewed from the road to the west. The sensitivity of the site to impacts on setting was found to be high. The proposed development passes from north-west to south-east approximately 780m to the north-east of the monument and will form a prominent feature on the horizon where a number of towers will be visible. The magnitude of the impact was found to be substantial. The overall significance of the impact was found to be moderate to significant.</td></tr>
<tr><td colspan="6">Mitigation Measures: None</td></tr>
<tr><td colspan="6">Residual Impacts: There will be a permanent, negative impact of moderate to significant significance on the setting of the archaeological monument during the operational phase of the development.</td></tr>
</table>

Table 14.65: Potential Operational Phase Impacts on Archaeological Monument SMR No. ME005-089----, Ringfort - rath

ME005-089---- Ringfort - rath Designations – Archaeological Monument					
County	**Townland**	**NGR**	**Distance to Route (m)**	**Nearest Tower (No.)**	**Distance to Tower (m)**
Meath	Brittas	281055,285894	340	270	360
Potential Impacts on setting: This fort occupies a summit on the edge of mature hedgerow within Brittas Demesne. Within the centre of the monument is a crudely made stone cross with cross in circle inscribed on one side. The fort enjoys good views to the east, south and west. The fort has a group value because of a number of raths to the north, south and east, and the archaeological complex at Moynagh Lough approximately 1km to the east. To the north SMR ME005-085 is located within woodland and will not be impacted on by the proposed development. However approximately 165m to the south are SMR Nos. ME005-091 and ME005-092 - two well preserved raths. Approximately 270m to the south-east, behind a hedgerow is another rath SMR No. ME005-090. There are intermittent views of these monuments from the road to the west which become more restricted during the summer months due to dense vegetation. The sensitivity of this complex of raths to impacts on setting was considered to be high. The proposed development is located approximately 300m to the west of the monument where it passes from north north-west to south south-east. The line does not pass between these monuments but to the west of the group. The magnitude of the impact was deemed to be substantial. The overall significance of the impact on the setting of the area was found to be moderate to significant. This region was highlighted as being particularly sensitive and attempts were made to find alternative routes that would not impact on the demesne, however local topography, Cruicetown National Monument on high ground to the west and Nobber to the east along with other constraints restricted alternative options.					
Mitigation Measures: None					
Residual Impacts: There will be a permanent, negative impact of moderate to significant significance on the setting of the archaeological monument during the operational phase of the development.					

Table 14.66: Potential Operational Phase Impacts on Archaeological Monument SMR No. ME005-089001-, Cross

ME005-089001- Cross Designations – Archaeological Monument					
County	**Townland**	**NGR**	**Distance to Route (m)**	**Nearest Tower (No.)**	**Distance to Tower (m)**
Meath	Brittas	281055,285894	340	270	360
Potential Impacts on setting: The significance of the impact on the setting of this site was found to be moderate to significant for details see SMR No. ME005-089.					
Mitigation Measures: None					
Residual Impacts: There will be a permanent, negative impact of moderate to significant significance on the setting of the archaeological monument during the operational phase of the development.					

Table 14.67: Potential Operational Phase Impacts on Archaeological Monument SMR No. ME005-090----, Ringfort - rath

ME005-090---- Ringfort - rath Designations – Archaeological Monument					
County	**Townland**	**NGR**	**Distance to Route (m)**	**Nearest Tower (No.)**	**Distance to Tower (m)**
Meath	Brittas	281366,285867	580	270	590
Potential Impacts on setting: The significance of the impact on the setting of this site was found to be moderate to significant for details see ME005-089.					
Mitigation Measures: None					
Residual Impacts: There will be a permanent, negative impact of moderate to significant significance on the setting of the archaeological monument during the operational phase of the development.					

Table 14.68: Potential Operational Phase Impacts on Archaeological Monument SMR No. ME005-091----, Ringfort - rath

ME005-091---- Ringfort - rath Designations – Archaeological Monument					
County	**Townland**	**NGR**	**Distance to Route (m)**	**Nearest Tower (No.)**	**Distance to Tower (m)**
Meath	Brittas	281070,285679	230	270	240
Potential Impacts on setting: The significance of the impact on the setting of this site was found to be moderate to significant for details see ME005-089.					
Mitigation Measures: None					
Residual Impacts: There will be a permanent, negative impact of moderate to significant significance on the setting of the archaeological monument during the operational phase of the development.					

Table 14.69: Potential Operational Phase Impacts on Archaeological Monument SMR No. ME005-092----, Ringfort - rath

ME005-092---- Ringfort - rath Designations – Archaeological Monument					
County	**Townland**	**NGR**	**Distance to Route (m)**	**Nearest Tower (No.)**	**Distance to Tower (m)**
Meath	Brittas	281137,285680	290	270	300
Potential Impacts on setting: The significance of the impact on the setting of this site was found to be moderate to significant for details see ME005-089.					
Mitigation Measures: None					
Residual Impacts: There will be a permanent, negative impact of moderate to significant significance on the setting of the archaeological monument during the operational phase of the development.					

Table 14.70: Potential Operational Phase Impacts on Archaeological Monument SMR No. ME005-096----, Enclosure

ME005-096---- Enclosure Designations – Archaeological Monument					
County	**Townland**	**NGR**	**Distance to Route (m)**	**Nearest Tower (No.)**	**Distance to Tower (m)**
Meath	Cruicetown	280299,284532	930	273	940
Potential Impacts on setting: This site is described in the archaeological survey database as 'probably a tree ring' but appears on the first edition OSI maps as a 'Fort'. Given its elevation and good state of preservation with views of a wide area, the sites sensitivity to impacts on setting was found to be high. The development passes from north to south at a lower elevation, approximately 900m to the east of the monument. Even though there is no public access, there will be views of the development over a wide area with several towers visible. There is a view of the monument from the road approaching from the east and the development will be in the foreground. The magnitude of the impact on the site was found to be moderate to substantial. The overall significance of the impact of the proposed development on the setting of the monument was found to be moderate.					
Mitigation Measures: None					
Residual Impacts: There will be a permanent, negative impact of moderate significance on the setting of the archaeological monument during the operational phase of the development.					

Table 14.71: Potential Operational Phase Impacts on Archaeological Monument SMR No. ME005-098----, Ringfort - rath

ME005-098---- Ringfort - rath Designations – Archaeological Monument					
County	**Townland**	**NGR**	**Distance to Route (m)**	**Nearest Tower (No.)**	**Distance to Tower (m)**
Meath	Rahood	281610,284820	410	272	410
Potential Impacts on setting: This monument is in good condition and the bank, which is ringed with trees, is partially visible on a rise beside the road. Elsewhere from neighbouring roads there are no distant views towards the site. Given its elevated position its sensitivity to impacts on setting was found to be moderate to high. The development passes from north to south approximately 360m to the west of the monument. The line route is at a slightly lower elevation than the monument and several towers will be visible. The magnitude of the impact was found to be substantial. The overall significance of the impact of the proposed development on the setting of the monument was considered to be moderate.					
Mitigation Measures: None					
Residual Impacts: There will be a permanent, negative impact of moderate significance on the setting of the archaeological monument during the operational phase of the development.					

Table 14.72: Potential Operational Phase Impacts on Archaeological Monument SMR No. ME017-031-, Church

ME017-031---- Church Designations – Archaeological Monument					
County	**Townland**	**NGR**	**Distance to Route (m)**	**Nearest Tower (No.)**	**Distance to Tower(m)**
Meath	Tailtin (Teltown)	280550,272930	690	309	690
Potential Impacts on setting: Teltown Church consists of the ruins of a small church surrounded by a number of gravestones and a low, rectangular enclosing bank. Located as it is, in in a large field, there are unobstructed views from the church across the surrounding landscape. Although indicated on one of O'Donovan's maps he has little to say on the site, only acknowledging its existence. Wilde expands little upon this, only telling us that it was plundered twice in the 12th Century. To the west, Teltown House (RPS No. - MH017-129) with its extensive cut stone outbuildings compliments the historic setting of the church and views to the house and the lands to the south and south east are unobstructed. To the north there are a number of more modern houses located along the Domhnach Phádraig (Donaghpatrick) Baile Oraí (Oristown) Road and a cul-de-sac that extends off it to the south. The only reason that locations of Rath Airthir and St. Patricks Church are evident is due to the amount of vegetation surrounding them, screening them from any intervisibility. There was no intervisibility noted between the church and any of the other archaeological sites in the area. Approximately 75m to the north of the monument, extending from east to west is an existing 110 kV OHL. The sensitivity of the site to impacts on setting was found to be high. Although located at almost 700m from Teltown Church a number of the Towers associated with the proposed development will be visible as it passes to the east. This is all the more evident as there is little in the way of screening or other development between the proposed development and the church. The magnitude of the impact of the proposed development was found to be substantial and cumulative to the existing 110kV OHL to the north. The overall significance of the impact on the setting of Teltown Church was found to be moderate negative.					
Mitigation Measures: None					
Residual Impacts: There will be a permanent, negative impact of moderate significance on the setting of the archaeological monument during the operational phase of the development.					

Table 14.73: Potential Operational Phase Impacts on Archaeological Monument SMR No. ME031-017----, Enclosure

ME031-017---- Enclosure Designations – Archaeological Monument					
County	**Townland**	**NGR**	**Distance to Route (m)**	**Nearest Tower (No.)**	**Distance to Tower (m)**
Meath	Balbrigh	284450,260130	140	351	170
Potential Impacts on setting: This tree lined, circular enclosure is described in the inventory as possibly a landscape feature, on the first edition mapping however it is referred to as a 'fort'. The site is located to the north-west of a field with mature trees bordering it to the immediate north and east. The line route dog legs within 180m to the north and east of this site. The enclosure has no public access but the development will impact on an appreciation of the site from the surrounding fields. The sensitivity of the site to impacts on setting was found to be moderate. Due to the proximity of the site to the line route the magnitude of the impact on the monument was found to be substantial. The overall significance of the impact of the development on the site was found to be moderate.					
Mitigation Measures: None					
Residual Impacts: There will be a permanent, negative impact of moderate significance on the setting of the archaeological monument during the operational phase of the development.					

Table 14.74: Potential Operational Phase Impacts on Archaeological Monument SMR No. ME031-026----, Religious house - Cistercian monks

ME031-026---- Religious house - Cistercian monks Designations – National Monument in the ownership or guardianship of the State					
County	**Townland**	**NGR**	**Distance to Route (m)**	**Nearest Tower (No.)**	**Distance to Tower (m)**
Meath	Bective	285966,259951	950	356	950
Potential Impacts on setting: Bective Cistercian Abbey and tower house is a National Monument in state care with recently improved access. The site is a well-known amenity with good signage directing visitors and has a very high sensitivity to impacts. In order to reduce these impacts the line route was located as far to the east as possible without compromising existing constraints provided by Trim Airfield to the west and the Draft Tara Skryne Landscape Conservation Area to the east. The abbey occupies a site to the north of the River Boyne in good pasture land. Approaching the abbey from the car park, the principal view is towards the western range of the Abbey and the Bridge to the south. From the abbey looking west there will be as distant view towards the proposed development approximately 950m away. This view contains a house, agricultural buildings and existing overhead lines to the foreground with the proposed development in the background. The magnitude of the impact on the setting of the site was found to be modest. The overall significance of the impact on the setting of the site was found to be moderate.					
Mitigation Measures: None					
Residual Impacts: There will be a permanent, negative impact of moderate significance on the setting of the archaeological monument during the operational phase of the development.					

Table 14.75: Potential Operational Phase Impacts on Archaeological Monument SMR No. ME031-026001-, Castle - tower house

ME031-026001- Castle - tower house Designations – National Monument in the ownership or guardianship of the State					
County	**Townland**	**NGR**	**Distance to Route (m)**	**Nearest Tower (No.)**	**Distance to Structure (m)**
Meath	Bective	285950,259957	940	356	940
Potential Impacts on setting: The significance of the impact on the setting of this site was found to be moderate for details see SMR No. ME031-026.					
Mitigation Measures: None					
Residual Impacts: There will be a permanent, negative impact of moderate significance on the setting of the archaeological monument during the operational phase of the development.					

Table 14.76: Potential Operational Phase Impacts on Archaeological Monument SMR No. ME031-026002-, Castle - tower house

ME031-026002- Castle - tower house Designations – National Monument in the ownership or guardianship of the State					
County	**Townland**	**NGR**	**Distance to Route (m)**	**Nearest Tower (No.)**	**Distance to Tower (m)**
Meath	Bective	285963,259950	950	356	950
Potential Impacts on setting: The significance of the impact on the setting of this site was found to be moderate for details see SMR No. ME031-026.					
Mitigation Measures: None					
Residual Impacts: There will be a permanent, negative impact of moderate significance on the setting of the archaeological monument during the operational phase of the development.					

Table 14.77: Potential Operational Phase Impacts on Archaeological Monument SMR No. ME037-022----, Ringfort - rath

ME037-022---- Ringfort - rath Designations – Archaeological Monument					
County	**Townland**	**NGR**	**Distance to Route (m)**	**Nearest Tower (No.)**	**Distance to Tower (m)**
Meath	Branganstown	286260,254140	150	375	160
Potential Impacts on setting: The ringfort is located 250m to the south of the R154, set one field back from the road with adjacent field boundaries to the north and west, restricting any passing views. The monument itself is quite degraded with only a portion of the bank surviving to the south. The sites sensitivity to impacts on setting was found to be low to moderate. The proposed development passes approximately 110m to the east of the monument and tower 375 is located in the same field on the field boundary with no intervening screening. The magnitude of the impact on setting of the site was found to be substantial to major. The overall significance of the impact on the setting of the site was found to be moderate.					
Mitigation Measures: None					
Residual Impacts: There will be a permanent, negative impact of moderate significance on the setting of the archaeological monument during the operational phase of the development.					

Table 14.78: Potential Operational Phase Impacts on Archaeological Monument SMR No. ME037-023----, Earthwork

ME037-023---- Earthwork Designations – Archaeological Monument					
County	**Townland**	**NGR**	**Distance to Route (m)**	**Nearest Tower (No.)**	**Distance to Tower (m)**
Meath	Branganstown	286340,253910	120	376	120
Potential Impacts on setting: This earthwork is just over 100m to the west of Tower 376 and is located along a field boundary approximately 30m to the north of rath SMR No. - ME037-024. There is no public access to the site and it cannot be viewed from neighbouring roads. There is good screening from the field boundary to the north which will limit views of the tower from this direction, looking southwards however; the tower and wirescape will be prominent. The sensitivity of the site to impacts on setting was found to be low to moderate. The magnitude of the impact on the setting of the site was found to be substantial to major and the overall significance of the impact on the site is considered to be moderate.					

Mitigation Measures: None
Residual Impacts: There will be a permanent, negative impact of moderate significance on the setting of the archaeological monument during the operational phase of the development.

Table 14.79: Potential Operational Phase Impacts on Archaeological Monument SMR No. ME037-024----, Ringfort - rath

ME037-024---- Ringfort - rath **Designations – Archaeological Monument**					
County	**Townland**	**NGR**	**Distance to Route (m)**	**Nearest Tower (No.)**	**Distance to Tower (m)**
Meath	Branganstown	286336,253847	130	376	130
Potential Impacts on setting: This ringfort is located in relatively open pastureland and appears as a scarp in the field just to the north of the Boycetown River. The site is set back from surrounding roads and there are no views of it from any publicly accessible areas. The sensitivity to the site impacts on setting was found to be low to moderate. The development is located just over 100m to the east of the monument with Tower 376 located just to the east of the field boundary. The magnitude of the impact of the proposed development on the site was found to be substantial to major. The overall significance of the impact on the setting of the site was considered to be moderate.					
Mitigation Measures: None					
Residual Impacts: There will be a permanent, negative impact of moderate significance on the setting of the archaeological monument during the operational phase of the development.					

Table 14.80: Potential Operational Phase Impacts on Archaeological Monument SMR No. ME043-018----, Castle - motte

ME043-018---- Castle - motte **Designations – Archaeological Monument**					
County	**Townland**	**NGR**	**Distance to Route (m)**	**Nearest Tower (No.)**	**Distance to Tower (m)**
Meath	Culmullin	291500,249850	490	396	500
Potential Impacts on setting: The significance of the impact on the setting of this site was found to be moderate to significant for details see SMR No. ME043-018002.					
Mitigation Measures: None					
Residual Impacts: There will be a permanent, negative impact of moderate significance on the setting of the archaeological monument during the operational phase of the development.					

Table 14.81: Potential Operational Phase Impacts on Archaeological Monument SMR No. ME043-018002-, House - 16th/17th century

ME043-018002- House - 16th/17th century **Designations – Archaeological Monument**					
County	**Townland**	**NGR**	**Distance to Route (m)**	**Nearest Tower (No.)**	**Distance to Tower (m)**
Meath	Culmullin	291510,249815	480	396	500
Potential Impacts on setting: This site has a group value containing a possible motte, a font and a 16th / 17th century house all located within a site that appears on the first edition OSI maps as Culmullin Demesne. The nearby church (SMR No. ME043-01) and font (SMR No. ME043017001) are also included within the demesne landscape, however it is noted that the font now located in Culmullin House was originally situated in the nearby graveyard (SMR No. ME043017001). The house and its setting along with the castle motte and bailey have a general aspect towards the proposed development. However the church and graveyard are located in a well screened setting with no views towards the line route. The proposed development is located approximately 460m to the west of the house, where it crosses a ridge as it passes from north north-west to south south-west. Vegetation will screen much of the development as it approaches from the north but Tower 396 and the wirescape will be clearly visible from the house. The sensitivity of the site to impacts on setting was found to be high. The magnitude of the impact on the site was found to be substantial. The overall significance of the impact on the site was found to be moderate to significant.					
Mitigation Measures: None					
Residual Impacts: There will be a permanent, negative impact of moderate to significant significance on the setting of the archaeological monument during the operational phase of the development.					

14.5.4.2 **Architectural Impacts**

222 The following tables contain details of the potential impacts that the proposed development could have on the setting of designated architectural sites during the operational phase of the proposed development. In addition the tables contain mitigation measures that could reduce the significance of these impacts and detail the residual impacts to be expected.

14.5.4.2.1 Demesne Landscapes and Historic Gardens

Table 14.8229: Potential Operational Phase Impacts relating to Whitewood, Garden Survey Ref: ME-35-N-801886

Whitewood House **Garden Survey Ref: ME-35-N-801886**					
County	**Townland**	**NGR**	**Distance to Route (m)**	**Nearest Tower (No.)**	**Distance to Tower (m)**
Meath	Whitewood	280150,288450	850	259	1000
Potential Impacts on setting: Moderate, the line route will not directly impact on the demesne, described in the NIAH garden survey as having its main features substantially present-peripheral features unrecognisable. The main house faces east along a tree lined avenue, however the rear of the house overlooks Whitewood lough to the west and beyond towards the line route. There is some screening in the form of woodland to the rear of the house. The sensitivity of the demesne to impacts was considered high and the magnitude of the impact modest to substantial. The overall impact on the setting of the demesne was appraised as moderate to significant.					

Mitigation: none
Residual Impacts: There will be a permanent, negative impact of moderate significance on the setting of the demesne during the operational phase of the development.

Table 14.83: Potential Operational Phase Impacts relating to Brittas, Garden Survey Ref: ME-35-N-806867

Brittas Garden Survey Ref: ME-35-N-806867					
County	**Townland**	**NGR**	**Distance to Route (m)**	**Nearest Tower (No.)**	**Distance to Tower (m)**
Meath	Brittas	281024,286295	0	268	0
Potential Impacts on setting: Significant, the line route will directly impact on the demesne, described in the NIAH garden survey as having its main features substantially present-with some loss of integrity. The demesne will contain five towers running north-west / south-east to the west of the property, crossing over the entrance to the principal buildings. The main house is well screened by woodland. The sensitivity of the demesne to impacts was considered very high and the magnitude of the impact substantial. The overall impact on the setting of the demesne was appraised as significant. The impact on Brittas Demesne was the result of a number of constraints including the general topography, the presence of Cruicetown National Monument to the south-west and Moynagh lough and Nobber to the east.					
Mitigation: none					
Residual Impacts: The proposed development will directly impact on the demesne; the sensitivity of the demesne was considered high and the magnitude of the impact substantial. The overall impact on the setting of the demesne was appraised as significant.					

Table 14.84: Potential Operational Phase Impacts relating to Rahood, Garden Survey Ref: ME-35-N-814844

Rahood Garden Survey Ref: ME-35-N-814844					
County	**Townland**	**NGR**	**Distance to Route (m)**	**Nearest Tower (No.)**	**Distance to Tower (m)**
Meath	Rahood	281409,284219	0	274	0
Potential Impacts on setting: Moderate, the line route will traverse the demesne to the rear of the main house, the demesne described in the NIAH garden survey as having virtually no recognisable features, will contain two towers running north south along its western extent. The proposed development will have a direct impact on the setting of the demesne; the sensitivity of the demesne was considered low and the magnitude of the impact major. The overall impact on the setting of the demesne was appraised as moderate.					
Mitigation: none					
Residual Impacts: There will be direct physical impacts on the demesne. The residual impact on the setting of the demesne was appraised as moderate during the operational life of the interconnection scheme.					

Table 14.85: Potential Operational Phase Impacts relating to Mountainstown, Garden Survey Ref: ME-42-N-829790

Mountainstown House **Garden Survey Ref: ME-42-N-829790**					
County	**Townland**	**NGR**	**Distance to Route (m)**	**Nearest Tower (No.)**	**Distance to Tower (m)**
Meath	Mountainstown	282263,278963	0	289	0
Potential Impacts on setting: Moderate, the line route will traverse the demesne to the west of the main house, the demesne described in the NIAH garden survey as having its main features substantially present - peripheral features unrecognisable will contain a single tower, with two towers flanking its boundary to the north and south. The proposed development will have a direct impact on the setting of the demesne; the sensitivity of the demesne was considered high and the magnitude of the impact substantial. The overall impact on the setting of the demesne was appraised as moderate.					
Mitigation: none					
Residual Impacts: The proposed development will have a direct impact on the setting of the demesne; the sensitivity of the demesne was considered high and the magnitude of the impact substantial. The overall impact on the setting of the demesne was appraised as moderate.					

Table 14.86: Potential Operational Phase Impacts relating to Churchtown

Churchtown House **Garden Survey Ref: None**					
County	**Townland**	**NGR**	**Distance to Route (m)**	**Nearest Tower (No.)**	**Distance to Tower (m)**
Meath	Churchtown	281750,264061	90	337	110
Potential Impacts on setting: Moderate, the line route will not directly impact on the demesne, described in the NIAH garden survey as having its main features substantially present-peripheral features unrecognisable. The sensitivity of the demesne to impacts was considered moderate and the magnitude of the impact substantial. The overall impact on the setting of the demesne was appraised as moderate.					
Mitigation: none					
Residual Impacts: There will be permanent, negative impact of moderate significance on the setting of the demesne during the operational life of the proposed development.					

Table 14.87: Potential Operational Phase Impacts relating to Philpotstown, Garden Survey Ref: ME-42-N-823629

Philpotstown **Garden Survey Ref: ME-42-N-823629**					
County	**Townland**	**NGR**	**Distance to Route (m)**	**Nearest Tower (No.)**	**Distance to Tower (m)**
Meath	Philpotstown	281981,262886	0	341	0
Potential Impacts on setting: Moderate, the line route will directly impact on the demesne, described in the NIAH garden survey as having its main features substantially present - with peripheral features unrecognisable. The demesne will contain two towers running north south through the middle of the property, the main house is to the east and is well screened by woodland. The sensitivity of the demesne to impacts was considered moderate and the magnitude of the impact substantial. The overall impact on the setting of the demesne was appraised as moderate.					
Mitigation: none					
Residual Impacts: There will be permanent, negative impact of moderate significance on the setting of the site during the operational life of the proposed development.					

14.5.4.2.2 RPS and NIAH

Table 14.88: Potential Operational Phase Impacts relating to Whitewood House, Lodge and farm buildings, RPS Ref: MH005-104

Whitewood House, Lodge and farm buildings **NIAH Rating - National** **RPS Ref: MH005-104 / NIAH Ref: None**					
County	**Townland**	**NGR**	**Distance to Route (m)**	**Nearest Tower (No.)**	**Distance to Tower (m)**
Meath	Whitewood	280044,288627	1630		
Potential Impacts on setting: Whitewood Lodge and farm buildings are within a demesne described in the NIAH garden survey as having its main features present, the lodge is an impressive 18th century structure complete with outbuildings. The aspect of the front of the house is to the east with views along a tree lined avenue. To the rear of the house there are views westward across Whitewood Lough. The line route runs north north-west to south south-east approximately 1.6km to the west of the house. From a review of the first edition map, the house was originally surrounded by forestry, with two paths cleared to take advantage of views, one west towards the lough and the other to the south-west. The towers between 257 and 260 climb a ridge as the proposed development rises out of the Dee River Valley and into the hills of north Meath and into Cavan. There will be intervisibility between the house and the line route. Vegetation will limit some of the view from ground level but there will be significant views of the development from the windows of the upper floors of the house. The sensitivity of this property to impacts on setting was considered high and the magnitude of the impact modest. The impact on the setting was adjudged moderate.					
Mitigation: None					
Residual Impacts: There will be permanent, negative impact of moderate significance on the setting of the site during the operational life of the proposed development.					

Table 14.89: Potential Operational Phase Impacts relating to Bective Abbey, RPS Ref: MH031-107

Bective Abbey **NIAH Rating - National** **RPS Ref: MH031-107 / NIAH Ref: None**					
County	**Townland**	**NGR**	**Distance to Route (m)**	**Nearest Tower (No.)**	**Distance to Tower (m)**
Meath	Bective	285964,259953	950	356	950
Potential Impacts on setting: This national monument comprises a 12th century Cistercian abbey and a tower house on the banks of the River Boyne. The site is well sign-posted locally and has good access for visitors. Bective Abbey is a site of national importance and a significant local amenity. The site lies along a river valley and is 950m to the east north-east to the line route. There will be limited intervisibility between the abbey and the line route due to intervening screening provided by hedgerows and mature trees along field boundaries. This area has a high sensitivity to impacts and the magnitude of the impact of the OHL was considered modest.					
Mitigation: None					
Residual Impacts: There will be permanent, negative impact of moderate significance on the setting of the site during the operational life of the proposed development.					

14.5.4.3 Other Cultural Heritage

14.5.4.3.1 Bhaile Ghib Gaeltacht Area

223 The alignment passes through the Gaeltacht region of Bhaile Ghib. The Meath CDP acknowledges the importance of the Irish language and its associated cultural heritage to the Gaeltacht areas. The proposed development will have a neutral impact on the Gaeltacht region of Bhaile Ghib.

14.5.4.4 Operational Phase – Maintenance / Upgrade Works

224 There is the potential that archaeological, architectural or cultural heritage sites, monuments, structures or features in the vicinity of the line could be impacted on during maintenance or upgrade works that may be required throughout the operational phase of the proposed development.

14.5.5 Decommissioning Phase

225 The proposed development will become a permanent part of the transmission infrastructure. The expected lifespan of the development is in the region of 50 to 80 years. This will be achieved by routine maintenance and replacement of hardware as required. There are no plans for the decommissioning of the OHL. In the event that part of, or the entire proposed infrastructure is to be decommissioned, all towers, equipment and material to be decommissioned will be removed off site and the land reinstated. Impacts would be expected to be less than during the construction phase and would be of short term duration.

14.5.6 Indirect Impacts

226 No indirect impacts are predicted in the evaluation of impacts for the proposed development.

14.6 MITIGATION MEASURES

14.6.1 Construction Phase - Direct Physical Impacts

227 The best form of mitigation, preservation in situ, is achieved by routing to avoid direct, physical impacts upon archaeological, architectural and cultural heritage site, structures monuments and features. All designated archaeological, architectural and cultural heritage sites, structures, monuments or features have been avoided by the design team as far as was practicably possible, taking into account all the environmental constraints within the MSA.

228 The National Monuments Acts 1930-1994 require that in the event of the discovery of archaeological finds or remains that the relevant authorities, the National Monuments Service of the DAHG and the National Museum of Ireland, should be notified immediately. Allowance will be made for full archaeological excavation, in consultation with the National Monuments Service of the DAHG, in the event that archaeological remains are found during the construction phase.

229 In areas where there is the potential that archaeological, architectural or cultural heritage site, structures, monuments or features could be impacted on during the construction phase, one or more of the following mitigations measures have been recommended:

- Archaeological monitoring – in areas of moderate archaeological potential, excavations associated with construction works and / or facilitating access to the construction site and / or stringing areas will be monitored by a suitably qualified archaeologist. In the event that archaeological deposits are discovered, work in the area will cease immediately and the archaeologist will liaise with the National Monuments Service of the DAHG and the National Museum of Ireland.

- Archaeological testing – best practice in areas of high archaeological potential demands caution, to ensure that archaeological deposits are identified as early as possible, thereby ensuring that any loss from the archaeological record is minimised. Under a monitoring remit, an archaeologist will observe normal construction works, usually undertaken with a toothed excavator bucket. During archaeological testing a licensed eligible archaeologist supervises excavations undertaken with a toothless grading bucket, under licence to the National Monuments Service of the DAHG, thereby ensuring the early identification of archaeological deposits and minimal loss to the archaeological record. Undertaking this confirmatory surveying, will ensure that sufficient time can be allowed within the construction schedule for the excavation of any archaeological deposits discovered.

- Demarcation – where it has been identified that there is the potential that an archaeological, architectural or cultural heritage site, structure or monument could be impacted upon in gaining access to construct the proposed development, then demarcation has been recommended to prevent any inadvertent damage. A suitably qualified archaeologist will access the site prior to the commencement of construction works in the area and demarcate a buffer around the monument that will remain in place throughout any construction works in the vicinity.

- Confirmation of temporary access routes – at a number of locations confirmation of the proposed temporary access routes will take place, in consultation with the construction team and prior to commencement of construction works, to ensure that the surviving historic fabric of buildings is not impacted on in gaining access for construction activities. To this end the temporary access routes may be revised, sensitive features highlighted and demarcated or different construction machinery or methods used that can access the site without impacting on the historic fabric.

- Monitoring of tree surgery – in a couple of instances there is dense vegetation that will have be to be trimmed in the vicinity of upstanding remains of buildings that are indicated on historic mapping. This work will be monitored by a suitably qualified archaeologist to ensure that the historic fabric of the buildings is not impacted upon by the works.

230 It is recommended that a suitably qualified cultural heritage consultancy / consultant be appointed to oversee the effective implementation of the mitigation measures recommended in this chapter for the construction phase of the proposed development. The consultancy / consultant should maintain continuing liaison with the National Monuments Service of the DAHG throughout the construction phase of the development.

231 In line with the *Code of Practice Between the National Monuments Service of the DoEHLG (now DAHG) and ESB Networks* (2009), a project archaeologist will be appointed to oversee the effective implementation of the recommended archaeological mitigation during the proposed works. Appendix I of the Code of Practice defines the role of the project archaeologist and Appendix II sets out the relationship between the project archaeologist and the consultant archaeologist.

14.6.1.1 Teltown ZAA Mitigation

232 The Teltown ZAA is considered to be an area of high archaeological potential and as such a regime of archaeological testing under licence to the National Monuments Service of the DAHG will be undertaken to confirm, whether in accordance with the predicted impacts set out in the EIS, there are archaeological deposits that could be impacted upon by the construction of towers in the ZAA. In the event that archaeological deposits are discovered then the National Monuments Service will be notified immediately and time allocated within the construction schedule to allow for excavation of any archaeological material in full consultation with the National Monuments Service of the DAHG and the National Museum of Ireland.

14.6.1.2 Tower Locations and Associated Temporary Access Routes

233 For clarity, detailed site specific mitigation measures that relate to designated archaeological and architectural sites are contained in the tables in **Section 14.5**. A summary of the mitigation measures is contained in **Table 14.92**. The mitigation measures are listed by tower number, providing a summary of mitigation measures that apply to the construction of each tower and or

works that are associated with facilitating access to the tower. Towers where no mitigation is required are not contained in the table.

Table 14.90: Summary of Mitigation Measures Listed by Tower Number

Tower Number	Mitigation
237	Archaeological monitoring by suitably qualified archaeologist
239	Archaeological monitoring by suitably qualified archaeologist
242	Confirmation of temporary access tracks by suitably qualified archaeologist
243	Confirmation of temporary access track by suitably qualified archaeologist
245	Archaeological monitoring and confirmation of temporary access track by suitably qualified archaeologist and demarcation of nearby archaeological monument (SMR No. - ME002-044) along proposed access route and use of bog mats if necessary
250	Archaeological testing under licence to the National Monuments Service of the DAHG and demarcation of nearby archaeological monument (SMR No. - ME005-012)
257	Confirmation of temporary access track by suitably qualified archaeologist
261	Archaeological monitoring by suitably qualified archaeologist
267	Confirmation of temporary access track by suitably qualified archaeologist
268	Confirmation of temporary access track by suitably qualified archaeologist
269	Archaeological monitoring of excavations associated with the construction of the tower by a suitably qualified archaeologist. Should stripping of topsoil be required for the placement of access tracks, then a suitably qualified archaeologist will be employed to monitor this work.
270	Archaeological monitoring by suitably qualified archaeologist
271	Archaeological monitoring by suitably qualified archaeologist
272	Archaeological monitoring by suitably qualified archaeologist
273	Archaeological monitoring by suitably qualified archaeologist
274	Confirmation of temporary access track by suitably qualified archaeologist
278	Archaeological testing under ministerial under licence to the National Monuments Service of the DAHG
279	Archaeological testing of the tower location under licence to the National Monuments Service of the DAHG. No topsoil stripping or other excavation work will be carried out in order to access this tower for construction, other methods of access will be used and ground disturbance will be kept to a minimum.
280	Archaeological testing under ministerial under licence to the National Monuments Service

	of the DAHG
282	Confirmation of temporary access track by suitably qualified archaeologist
283	Confirmation of temporary access track by suitably qualified archaeologist
287	Should stripping of topsoil be required for the placement of access tracks, then a suitably qualified archaeologist will be employed to monitor this work
289	Confirmation of temporary access track by suitably qualified archaeologist
290	Confirmation of temporary access track by suitably qualified archaeologist
292	Should stripping of topsoil be required for the placement of access tracks, then a suitably qualified archaeologist will be employed to monitor this work
293	Archaeological monitoring by suitably qualified archaeologist
303	Archaeological testing under licence to the National Monuments Service of the DAHG
304	Archaeological testing under licence to the National Monuments Service of the DAHG
305	Archaeological testing under licence to the National Monuments Service of the DAHG
306	Archaeological testing under licence to the National Monuments Service of the DAHG
307	Archaeological testing under licence to the National Monuments Service of the DAHG
308	Archaeological testing under licence to the National Monuments Service of the DAHG
309	Archaeological testing under licence to the National Monuments Service of the DAHG
310	Archaeological testing under licence to the National Monuments Service of the DAHG
312	Archaeological testing under licence to the National Monuments Service of the DAHG
330	Archaeological monitoring by suitably qualified archaeologist
331	Confirmation of temporary access track by suitably qualified archaeologist
335	Archaeological monitoring by suitably qualified archaeologist
340	Confirmation of temporary access track by suitably qualified archaeologist
341	Confirmation of temporary access track by suitably qualified archaeologist
349	Confirmation of temporary access track by suitably qualified archaeologist
351	Archaeological testing under licence to the National Monuments Service of the DAHG and demarcation of nearby archaeological monument (SMR No. - ME031-017)
352	Archaeological monitoring by suitably qualified archaeologist and demarcation of nearby archaeological monument (SMR No. - ME031-017)
354	Archaeological testing under licence to the National Monuments Service of the DAHG and demarcation of potential archaeological monument to the south-east
355	Archaeological testing under licence to the National Monuments Service of the DAHG and demarcation of potential archaeological monument to the north-west

375	Archaeological testing under licence to the National Monuments Service of the DAHG and demarcation of nearby archaeological monument (SMR No. - ME037-022----)
376	Archaeological testing under licence to the National Monuments Service of the DAHG
377	Archaeological monitoring by suitably qualified archaeologist
379	Should stripping of topsoil be required for the placement of access tracks, then a suitably qualified archaeologist will be employed to monitor this work

14.6.1.3 **Guarding Areas**

234 A summary of the mitigation measures is contained in **Table 14.91**. The mitigation measures are listed by guarding area location and NGR with a summary of mitigation measures that apply to construction works associated with each guarding area. Guarding Areas where no mitigation is required are not contained in the table.

Table 14.91: Guarding Areas Mitigations

Guarding Area Location	NGR	Mitigation Summary
At Tower 249	277150/290790	Archaeological monitoring of ground works
North of Tower 250	277145/290750	Archaeological monitoring of ground works
South of Tower 250	277145/290600	Archaeological testing of guarding site, demarcation of adjacent enclosure (SMR No. - ME005-012) and monitoring of construction and dismantling of guarding
South and adjacent to Tower 261	279105/287135	Archaeological monitoring of ground works
East of Tower 262 (1)	279275/286945	Monitoring of access in the vicinity of the possible quarry site (MSA_CHS032) for the construction and dismantling of the guarding
East of Tower 262 (2)	279400/286930	Archaeological testing of possible quarry site (MA_CHS032) on the west side of the road
South of Tower 267	280360/286350	Archaeological monitoring of ground works
South of Tower 268	280530/286060	Monitoring of access for the construction and dismantling of the guarding
South of Tower 270	280900/285510	Archaeological monitoring of ground works
North of Tower 171	280940/285460	Archaeological monitoring of ground works
North of Tower 273	281205/284735	Archaeological monitoring of ground works
South of Tower 273	281250/284585	A suitably qualified archaeologist will confirm access
At Tower 278	281710/282895	Archaeological monitoring of ground works
North of Tower 280	281835/282420	Archaeological monitoring of ground works
North of Tower 282	281745/281655	A suitably qualified archaeologist will confirm access
South of Tower 288	281950/279195	Archaeological monitoring of ground works
South and adjacent to Tower 293	281480/277700	Archaeological monitoring of ground works

Guarding Area Location	NGR	Mitigation Summary
North of Tower 303	281565/274450	Archaeological testing under licence to the National Monuments Service DAHG
South of Tower 304	281595/273885	Archaeological testing under licence to the National Monuments Service DAHG
At tower 306	281630/273430	Archaeological testing under licence to the National Monuments Service DAHG
North-east of Tower 308 (2)	281515/273020	Archaeological testing under licence to the National Monuments Service DAHG
North-east of Tower 308 (1)	281490/273000	Archaeological testing under licence to the National Monuments Service DAHG
At Tower 309	281215/272755	Archaeological testing under licence to the National Monuments Service DAHG
North-west of Tower 314	281160/271305	Archaeological monitoring of ground works
South of Tower 317	281405/269995	Archaeological monitoring of ground works
South of Tower 321	281625/268865	Archaeological monitoring of ground works
North of Tower 328	281880/267070	A suitably qualified archaeologist will confirm access
At Tower 328	281905/267020	A suitably qualified archaeologist will confirm access
North of Tower 341	281875/262945	A suitably qualified archaeologist will confirm the access and monitor ground works
South-east of Tower 349	284005/260595	A suitably qualified archaeologist will confirm access
North-west and adjacent to Tower 350	284095/260535	A suitably qualified archaeologist will confirm access
South-east of Tower 366	286155/256410	Archaeological monitoring of ground works
East of Tower 402	292280/248055	Archaeological monitoring of ground works

14.6.2 Operational Phase

235 As has been noted previously in this chapter, impacts on setting are best mitigated through sensitive routing of the proposed development to avoid impacts on particularly sensitive archaeological, architectural and cultural heritage sites, structures, monuments, features or landscapes. From the earliest phases of this project every attempt has been made to minimise the impacts that it will have on the setting on the archaeological, architectural and cultural heritage of the region. Despite this, it has not been possible, given the large influence that an upstanding linear development such as has been proposed and other competing environment and social factors to avoid all impacts on setting. In most instances it is not possible to further mitigate the impacts that have been predicted in the **Section 14.5**.

14.6.2.1 **Brittas**

236 The proposed development passes through the demesne landscape associated with Brittas House (RPS No. - MH005-105) and in so doing traverses the entrance avenue to the main residence (approximately 175m from the main gates). It has been noted that the most significant impact will be on the visibility of the OHL entering or leaving the demesne. The clearance of existing vegetation will be minimised in this area and in consultation with the landowner appropriate screening will be planted on either side of lane to limit the views towards the proposed development.

14.6.3 Operational Phase – Maintenance / Upgrade Works

237 Potential impacts on archaeological, architectural or cultural heritage sites, monuments, structures or features during maintenance or upgrade works that may be required during the operational phase of the proposed development are best mitigated through ongoing liaison with the National Monuments Service and the Architectural Heritage Advisory Unit at the DAHG and local heritage and conservation officers within the County Councils.

14.6.4 Indirect Impacts

238 No indirect impacts were predicted in the evaluation of impacts for the proposed development.

14.7 RESIDUAL IMPACTS

14.7.1 Archaeological

14.7.1.1 **Construction Phase**

239 Following mitigation there will be no direct physical impacts on the upstanding remains of any known archaeological monuments during the construction phase of the proposed development. There is the potential that archaeological deposits in the vicinity of known archaeological monuments or in areas of high archaeological potential may be encountered during the excavation associated with the construction of tower foundations, guarding areas or other excavation works associated with the proposed development. Following mitigation these will be dealt with in accordance with best practice and in full consultation with the National Monuments Service of the DAHG and the National Museum of Ireland.

14.7.1.2 **Operational Phase**

240 There will be ongoing impacts on the setting of archaeological monuments throughout the operation phase of the development. **Table 14.92** lists archaeological monuments that are located in the vicinity of the proposed development and the impact that they will experience on

their setting. Only sites where the significance of the impact was considered to be moderate or higher are included in the table. Other sites / areas of note are dealt with individually below.

14.7.1.3 **The Teltown ZAA**

241 It was found that in each instance, the impacts on the setting of known archaeological or architectural sites within the Teltown ZAA would have a significance less than moderate. However, mindful of the unique mythological, historical and folkloric associations of the ZAA the region has a group value and it is considered that the proposed development will have an impact on the region as a whole. The significance of this impact was deemed to be moderate.

14.7.1.4 **National Monuments in State Care**

242 It was found that there will be an impact on the setting of Bective Abbey a National Monument in State care throughout the operation phase of the proposed development. The significance of the impact on the setting of the site was found to be moderate; given the proposed lifetime of the development the impact will be permanent.

14.7.1.5 **Archaeological Monuments**

243 There will be ongoing impacts on the setting of archaeological monuments throughout the operation phase of the development. **Table 14.92** lists archaeological monuments that are located in the vicinity of the proposed development and the impact that they will experience on their setting during the operational phase of the proposed development. Only sites where the significance of the impact was considered to be moderate or higher are included in the table.

Table 14.92: Residual Impacts on Archaeological Monuments

SMR No.	Classification	Residual Impact
ME002-027----	Enclosure	There will be a permanent, negative impact of moderate significance on the setting of the archaeological monument during the operational phase of the proposed development.
ME002-039----	Ringfort - rath	There will be a permanent, moderate to significant impact on the setting of the archaeological monument during the operational phase of the proposed development.
ME002-040----	Standing stone	There will be a permanent, negative impact of moderate to significant significance on the setting of the archaeological monument during the operational phase of the proposed development.
ME002-040001-	Ringfort - rath	There will be a permanent, negative impact of moderate to significant significance on the setting of the archaeological monument during the operational phase of the proposed development.
ME002-044----	Ringfort - rath	There will be a permanent, negative impact of moderate significance on the setting of the archaeological monument during the operational phase of the proposed development.
ME005-012----	Enclosure	There will be a permanent, negative impact of moderate significance on the setting of the archaeological monument during the operational phase of the proposed development.
ME005-013----	Ringfort - rath	There will be a permanent, negative impact of moderate significance on the setting of the archaeological monument during the operational phase of the proposed development.
ME005-041----	Enclosure	There will be a permanent, negative impact of moderate to significant significance on the setting of the archaeological monument during the operational phase of the proposed development.
ME005-089----	Ringfort - rath	There will be a permanent, negative impact of moderate to significant significance on the setting of the archaeological monument during the operational phase of the proposed development.
ME005-089001-	Cross	There will be a permanent, negative impact of moderate to significant significance on the setting of the archaeological monument during the operational phase of the proposed development.
ME005-090----	Ringfort - rath	There will be a permanent, negative impact of moderate to significant significance on the setting of the archaeological monument during the operational phase of the proposed development.
ME005-091----	Ringfort - rath	There will be a permanent, negative impact of moderate to significant significance on the setting of the archaeological monument during the operational phase of the proposed development.
ME005-092----	Ringfort - rath	There will be a permanent, negative impact of moderate to significant significance on the setting of the archaeological monument during the operational phase of the proposed development.
ME005-096----	Enclosure	There will be a permanent, negative impact of moderate significance on the setting of the archaeological monument during the operational phase of the proposed development.
ME005-098----	Ringfort - rath	There will be a permanent, negative impact of moderate significance on the setting of the archaeological monument during the operational phase of the proposed development.

SMR No.	Classification	Residual Impact
ME017-031----	Church (Ruins)	There will be a permanent, negative impact of moderate significance on the setting of the archaeological monument during the operational phase of the proposed development.
ME031-017----	Enclosure	There will be a permanent, negative impact of moderate significance on the setting of the archaeological monument during the operational phase of the proposed development.
ME037-022----	Ringfort - rath	There will be a permanent, negative impact of moderate significance on the setting of the archaeological monument during the operational phase of the proposed development.
ME037-023----	Earthwork	There will be a permanent, negative impact of moderate significance on the setting of the archaeological monument during the operational phase of the proposed development.
ME037-024----	Ringfort - rath	There will be a permanent, negative impact of moderate significance on the setting of the archaeological monument during the operational phase of the proposed development.
ME043-018----	Castle - motte	There will be a permanent, negative impact of moderate significance on the setting of the archaeological monument during the operational phase of the proposed development.
ME043-018002-	House - 16th/17th century	There will be a permanent, negative impact of moderate to significant significance on the setting of the archaeological monument during the operational phase of the proposed development.

244 Impacts on any archaeological sites, monuments, structures or features as a result of maintenance or upgrade works during the operational phase will be mitigated through ongoing liaison the National Monuments Service of the DAHG and local heritage officers.

14.7.2 Architectural

14.7.2.1 Construction Phase

245 There were four areas noted where there is the potential that construction traffic could inadvertently impact on structures associated with designated protected structures. These include Brittas (RPS No. - MH005-105), Mountainstown House (RPS No. - MH012-100), Dowdstown House (RPS No. – MH011-124) and Philpotstown House (RPS No. – MH030-107).

246 There are a number of sites where there is the potential that construction traffic could inadvertently impact on the surviving fabric of structures that appear in the historic maps and in such instances the access routes will be reviewed to ensure that such fabric is not impacted upon.

247 There will be an impact on some demesne woodland, demesne boundaries and field boundaries within demesne landscapes to achieve clearances required for the OHL. These include Brittas, Mountainstown House and Philpotstown House.

14.7.2.2 **Operational Phase**

248 There will be ongoing impacts on the setting of architectural sites throughout the operational phase of the proposed development.

249 Demesne landscapes and Protected Structures that are located in the vicinity of the proposed development and the impact that they will experience on their setting during the operational phase of the proposed development are as outlined in **Table 14.93** and **Table 14.94**. Only sites where the significance of the impact was considered to be moderate or higher are included in the table.

Table 14.93: Residual Impacts on Demesnes Landscapes

Site Name	Residual Impact
Whitewood	There will be a permanent, negative impact of moderate to significant significance on the setting of the demesne during the operational phase of the proposed development.
Brittas	There will be a permanent, negative impact of significant significance on the setting of the demesne during the operational phase of the proposed development.
Rahood	There will be a permanent, negative impact of moderate significance on the setting of the demesne during the operational phase of the proposed development.
Mountainstown House	There will be a permanent, negative impact of moderate significance on the setting of the demesne during the operational phase of the proposed development.
Churchtown House	There will be a permanent, negative impact of moderate significance on the setting of the demesne during the operational phase of the proposed development.
Philpotstown	There will be a permanent, negative impact of moderate significance on the setting of the demesne during the operational phase of the proposed development.

Table 14.30: Residual Impacts on the Setting of Protected Structures

Site Name	Site Number	Residual Impact
Whitewood House	MH005-104	There will be permanent, negative impact of moderate significance on the setting of the site during the operational life of the proposed development.
Bective Abbey	MH031-107	There will be permanent, negative impact of moderate significance on the setting of the site during the operational life of the proposed development.

250 Impacts on any architectural sites or structures as a result of maintenance or upgrade works during the operational phase will be mitigated through ongoing liaison with the architectural heritage advisory unit at the DAHG and the local authority conservation officer.

14.8 INTERRELATIONSHIPS BETWEEN ENVIRONMENTAL FACTORS

251 There are potential interaction with the following environmental topics:

- **Chapter 4** - Human Beings – Tourism and Amenity some of the more prominent archaeological, architectural or cultural heritage sites, structures, monuments or features may also be tourist attractions. The proposed development may be perceived as reducing the attractiveness of these sites by having an impact on their setting.
- **Chapter 6** - Flora and Fauna - the proposed development can impact on demesne boundaries or planted landscape features within a demesne. The proposed development may be perceived as reducing the attractiveness of these sites by having an impact on their setting.
- **Chapter 9** - Noise and Vibration - noise from high voltage OHLs can impact on the setting of archaeological, architectural or cultural heritage sites, structures, monuments or features. The proposed development may be perceived as reducing the attractiveness of these sites by having an impact on their setting;
- **Chapter 11** – Landscape - the proposed development will form a new feature in the environment and impact visually on sites which are of archaeological, architectural and cultural heritage importance, some of which will be prominent landscape features and may contain important views or prospects.

14.9 CONCLUSIONS

252 The archaeological, architectural and cultural heritage appraisal for the MSA evaluates both the direct and indirect impacts of the proposed development on the archaeological, architectural and cultural heritage resource in the vicinity of the proposed development. In accordance with the relevant legislation and DAHG policy, the main mitigation measures involves preservation in situ, thereby avoiding direct, physical impacts on known cultural heritage sites. All designated cultural heritage sites have been avoided as far as was practicably possible, with due regard to other disciplines and constraints. Recommendations to prevent or mitigate impacts include demarcating appropriate buffers around sites, supervision of vegetation clearance and / or archaeological pre-development testing or monitoring of ground works. These mitigation measures will be implemented at the construction phase to minimise and / or eliminate impacts.

253 The appraisal found that there will be no direct, physical impacts on the upstanding remains of previously recorded archaeological monuments. The closest monument to proposed ground works, an enclosure (SMR No. - ME005-012) is located approximately 50m from Tower 250 and 10m from a guarding area to the south of the tower. It was noted that there is the potential that subsurface archaeological remains associated with this site could be impacted on by the proposed development. The next closest recorded archaeological monument is located approximately 100m from the proposed development, with a total of 12 monuments located within approximately 200m of the proposed development. It was found that there is a potential that archaeological deposits associated with seven archaeological monuments could be directly, physically impacted upon during the construction stage. These impacts relate to construction traffic passing in close proximity to archaeological monuments and / or archaeological monuments that are located in close proximity to proposed ground works (<150m) where there is the potential that associated archaeological remains could be impacted upon. Appropriate mitigation will ensure there are no physical impacts on upstanding archaeological remains, that subsurface archaeological remains associated with previously recorded monuments are protected from construction traffic and inadvertent impacts and that in areas of high archaeological potential that archaeological deposits discovered during construction are dealt with in accordance with professional best practice in full consultation with the National Monuments Service of the DAHG and the National Museum of Ireland. Eight guarding areas are situated at the locations of no longer extant buildings depicted in the 1st or 2nd edition OS maps or cartographic features of unknown potential. There is the potential to encounter cultural heritage remains at these locations. Any archaeological deposits discovered during construction at these locations will be dealt with in accordance with professional best practice in full consultation with the National Monuments Service of the DAHG and the National Museum of Ireland.

254 With regard to architectural heritage, potential direct impacts may occur at four sites that are listed in the Record of Protected Structures for County Meath. These impacts all relate to construction traffic and appropriate mitigation will ensure there are no direct, physical impacts. Similarly construction work and access will be required within six demesnes that are listed in the NIAH garden survey.

255 Given the upstanding linear form of the proposed development it is acknowledged that the greatest potential for impacts constitutes negative impacts on the setting of cultural heritage sites during the operational phase. Sites where it was considered that the significance of the negative impact on their setting would be moderate or greater include 24 SMR's, six demesnes listed on the NIAH garden survey and two protected structures. The evaluation also found that here will be a negative impact of moderate significance on the setting of a region highlighted by the National Monuments Service as the Teltown ZAA.

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