Mullingar 110 kV Project

Constraints and Route Corridor Report

October 2010

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Mullingar 110 kV Project

Constraints and Route Corridor Report

Part A, B and C

October 2010

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Executive Summary

Constraints and Route Corridor Report (Part A, B & C)

Appendix 1- Constraints and Route Corridor Figures

Appendix 2- Detailed Environmental Studies Report

Glossary of Terms

BoCCI	Birds of Conservation Concern in Ireland
EIA	Environmental Impact Assessment
EIS	Environmental Impact Statement
DAU	Development Applications Unit
DoEHLG	Department of Environment, Heritage and Local Government
NPWS	National Parks and Wildlife Service
NHA	Natural Heritage Area
pNHA	Proposed Natural Heritage Area
SAC	Special Area of Conservation
SPA	Special Protection Area
MVA	Mega Volt Ampere (unit used for apparent power in electrical measurement)
Amps	Ampere (a unit of electrical current)
ACSR	Aluminum Conductor Steel Reinforced (Overhead Line conductor design)
XLPE	Cross-linked polyethylene (Underground cable design)
OPGW	Optical Ground Wire
EMF	Electro-magnetic fields

PART A-Planning and Methodology

1. Rationale for Project

Who is EirGrid?

1.1 EirGrid plc is the statutory operator of Ireland's national electricity grid (also called the 'Transmission System'). EirGrid is an independent, state-owned company.

1.2 EirGrid has several roles:

- To operate a safe, reliable, economical and efficient national electricity grid;
- To plan and develop the grid infrastructure needed to support Ireland's economy;
- To supervise the security of the national grid;
- To schedule electricity generation with power generators and stations; and
- To facilitate the market for renewable electricity in Ireland.

1.3 It is in this capacity that EirGrid is proposing the Mullingar – Kinnegad/Derryiron 110 kV electricity reinforcement.

GRID25

1.4 Grid25 – A Strategy for the Development of Ireland's Electricity Grid for a Sustainable and Competitive Future (2008) outlines EirGrid's high level strategy for upgrading Ireland's electricity network up to 2025, in response to the government White Paper.

1.5 Grid25 is a major initiative to put in place a safe, secure and affordable electricity supply throughout Ireland, supporting economic growth and utilising our renewable energy resource to its maximum potential. Development of the grid is essential to provide a platform for renewed economic growth and regional development, and is vital if we are to effectively tap into our abundant renewable energy resources. Under Grid25, €310 million will be invested in the development of the energy transmission infrastructure in the midlands region. Grid25

1.6 The transmission network in Ireland consists of a meshed network of high voltage lines and cables for the transmission of bulk electricity supplies around Ireland. The transmission system comprises 400 kV, 220 kV and 110 kV networks linked through transmission stations.

1.7 Grid25 and other studies carried out by EirGrid have identified development requirements in each region of the country. Power Systems studies undertaken by EirGrid have forecasted that the Mullingar voltage will be outside Transmission Planning Criteria (TPC) standards in the coming years. The nature of the voltage problems are described below:

- From winter 2010, low voltage violations will occur at Mullingar 110 kV station during an outage of Lough Ree Power generator at Lanesboro 110 kV station and the subsequent trip of the Corduff – Mullingar 110 kV line. By winter 2015, low voltage violations will occur for a single contingency (N-1) loss of either of the two 110 kV lines feeding Mullingar; and
- The level of demand at Mullingar will be such as to put the station at risk of voltage collapse in winter 2019 for the maintenance-trip combination of the Lough Ree Power generator and the Corduff – Mullingar 110 kV line.

Mullingar 110 kV Project

1.8 The Mullingar 110 kV Project will be carried out in line with Grid25. The Project will provide a sustainable solution to existing deficiencies by ensuring that adequate electricity supplies are available within Mullingar and its environs to support economic activity and growth in a manner that is fully compatible with national energy and environmental strategy and policies

1.9 Electricity demand in the region has placed continued strain on the transmission network, with the result that the existing 110 kV network is approaching its technical limit, which will be seen as a gradual decline in network performance and quality of the electricity supply in the region. These can be typically seen as lower voltages, and the increased potential for voltage dips, and a closer proximity to voltage collapse, which may result in damage to customer equipment (depending on equipment type) or compromise customer manufacturing in the region.

1.10 Mullingar is currently supplied by only two 110 kV Overhead Lines, this proposed project will deliver a third circuit to supply power to the area. This is the standard security approach for a town of Mullingar's size and without this circuit there is a risk to supply in the region. For example, if one of the two existing 110 kV lines is out of service for maintenance and the second line has a fault; supply to the area may be lost. This would affect both residential and business customers. The closest stations on the transmission network are Kinnegad and Derryiron. By adding the proposed 110 kV circuit to the existing transmission network feeding into Mullingar 110 kV Transmission Station via Kinnegad/Derryiron Transmission Stations, it will significantly improve the quality, power flow and security of supply to the study area. This phase of works is part of EirGrid's project proposal to energise the circuit by approximately the end of 2014.

2. Terms of Reference

2.1 In May 2008, Atkins was appointed as lead consultants by EirGrid for the Mullingar 110 kV project in accordance with the Framework Contract, ENQEIR078. Phase 1 will be the constraints and Phase 2 will be the route corridor report for a new 110 kV circuit from the existing Mullingar 110 kV Transmission Station, Irishtown, Co. Westmeath to either the existing Derryiron 110 kV transmission station in Rhode Co. Offaly or to the existing Kinnegad 110 kV Transmission Station at Killaskillen, Co. Meath. Phase 3 will be the production of the EIS and submission of the planning application for the preferred route for the new circuit.

2.2 This report is concerned with Phase 1 and Phase 2 works only. These are reported in four volumes i.e. an Executive Summary, a combined Constraints and Route Corridor Report consisting of Parts A, B and C plus two volumes of Appendices comprising of copies of sub-consultant reports and Figures in accordance with the Project Road Map outlined in Chapter 4 of this report.

Transmission Stations

Mullingar 110 kV Transmission Station

2.3 Mullingar 110 kV Transmission Station is located approximately 2 km north of Mullingar Town in Co. Westmeath. It is situated in the townland of Walshestown. The station is located in a quiet residential area adjacent to the local road. The Overhead Line entry to the Transmission Station is constrained by the existing 110 kV and low voltage overhead lines. The majority of these enter from the north west and north east to the Transmission Station. The Mullingar - Sligo railway runs in a north to south alignment approximately 500m to the east of the Transmission Station. The Royal Canal supply canal runs parallel and to the east of the railway line, from Loch Owel to the Royal Canal in Mullingar. Between the railway line and the N4 road the Loch Sheevor Corporate Park has been established and the existing 110 kV line to Corduff has been diverted and the existing 38 kV lines have been diverted across the site. Outline route studies have been developed to determine options for the entry to Mullingar Transmission Station for the new circuit and access to the Transmission Station is from this road. The options are discussed further in **Part B Chapter 12- Engineering Comparison of Overhead Lines and Underground Cables**.

Derryiron 110 kV Transmission Station

2.4 Derryiron 110 kV Transmission Station is located approximately 1.5 km north of Rhode village in Co. Offaly. The Transmission Station is situated in the townland of Derryiron and located at the end of the existing local access road into a privately owned power plant. The Offaly County Development Plan 2009-2015[3] indicates that area to the north of the plant will be developed. Plans include the construction of an industrial park and access roadway. Works are currently ongoing in the location. At Derryiron the new circuit entry is constrained by the existing 110 kV circuits with options for the new circuit entry either to cross over an existing 110 kV line or to terminate the new circuit in proximity to the Transmission Station and install a section of underground cable into the proposed line bay. These options are discussed further in **Part B Chapter 12- Engineering Comparison of Overhead Lines and Underground Cables**.

Kinnegad 110 kV Transmission Station

2.5 Kinnegad 110 kV Transmission Station is located approximately 4 km south of Kinnegad Town Co. Meath. The Transmission Station is situated in the townland of Killaskillen. The Transmission Station is located on a large open quarry operated by Lagan Cement Ltd. Access into the site is via a private road into the Lagan Cement Factory lands to the south of the Transmission Station. At Kinnegad the new circuit entry is constrained by the quarry operations. The only possible entry to the Transmission Station is from the western boundary and to terminate the circuit onto a

landing gantry. These options are discussed further in **Part B Chapter 12- Engineering Comparison of Overhead Lines and Underground Cables.**

3. Strategic Planning Context

3.1 The proposed electricity infrastructure must be considered in context of current regional and Local Planning Policy. The context for energy infrastructure is set within the framework of the Energy Policy Framework 2007-2020, National Development Plan 2007-2013, Midland Regional Authority - Regional Planning Guidelines and the County Development Plan of County Westmeath.

Strategic Infrastructure Act (2006)

3.2 The proposed scheme falls within the scope of Section 182A of the Planning and Development Act 2000 as amended by the Planning and Development (Strategic Infrastructure) Act 2006 being for the purposes of the transport of electricity by means of a 110 kV voltage circuit.

3.3 An application will therefore be submitted directly to An Bord Pleanála for approval. The majority of EirGrid projects fall under the provisions of this Act. Although An Bord Pleanála is the decision making body, the policies and zoning objectives that affects a specific project remains the responsibility of the local planning authority.

3.4 This Act is titled in part "*An Act to provide in the interests of the common good, for the making directly to An Bord Pleanála of applications for planning permission in respect of certain proposed developments of strategic importance to the State: to make provision for the expeditious determination of such applications, applications for certain other types of consent or approval and applications for planning permissions generally….".*

3.5 Section 4 of the act amends Part XI of the Planning & Development Act 2000 (the Principal Act) by inserting new sections following Section 182 of the 2000 Act, (Sections 182A-182E inclusive) which relate to Provision of Electricity Transmission and Gas Infrastructure.

The Government White Paper: Energy Policy Framework 2007 – 2020 - Delivering a Sustainable Energy Future for Ireland

3.6 The Energy Policy Framework 2007-2020 - Delivering a Sustainable Energy Future for Ireland also known as the government Energy White Paper sets out to deliver a sustainable energy future for Ireland. The report highlights that security of energy supply is crucial for the economy and society and states that we need robust networks and electricity generating capacity to ensure consistent supply to consumers and all sectors of the economy.

3.7 The underpinning Strategic Goals of the report include:

- Ensuring that electricity supply consistently meets demand;
- Delivering electricity and gas to homes and businesses over efficient, reliable and secure networks; and
- Being prepared for energy supply disruptions.

3.8 In relation to the goal of delivering electricity over reliable and secure networks, the White Paper states:

> *"We will continue to meet regional development requirements by supporting the major electricity investment programme underway and planned by ESB Networks in the high voltage transmission network and distribution network and connections to 2010 and beyond as approved by CER"*

3.9 In response to the government White Paper, EirGrid announced Grid25 – A strategy for the development of Ireland's electricity network up to 2025

3.10 The proposed scheme forms an integral part of the electricity investment programme and will facilitate the reinforcement of the transmission networks within the Midlands Region.

3.11 A key action from the paper is to ensure that the strategic network development approach is underpinned by co-ordinated local, regional and national approaches to issues, which balance local interest with the national imperative to deliver strategic energy infrastructure. This action is supported by new arrangements provided for in the Planning and Development (Strategic Infrastructure) Act 2006. The White Paper also sets the target of 33% of electricity being produced from renewable generation by 2020. This target was subsequently increased to 40%.

National Spatial Strategy (NSS) 2002-2020

3.12 The National Spatial Strategy (NSS) (Department of Environment, Heritage and Local Government, 2002) sets out Government policy in relation to achieving balanced regional development. "*The Strategy is a 20 year planning framework designed to deliver more balanced social, economic and physical development between regions*."

3.13 Under the National Development Plan, the NSS is mandated to identify broad spatial development patterns for areas, and set down indicative policies in relation to the location of industrial development, residential development, services, rural development, tourism and heritage.

3.14 The NSS requires that areas of sufficient scale and critical mass are built up through a network of gateways and hubs. In addition to the four previous identified Gateways within Ireland (Dublin, Cork, Galway, Limerick/Shannon), Mullingar/Athlone/Tullamore is identified as an "Intergateway" within the Strategy.

3.15 The Gateways are described as having "*strategic location, nationally and relative to their surrounding areas, and providing national scale social, economic and support services. "* The basic goals of the NSS are to:

- Provide a wider range of work opportunities;
- Provide a better quality of life; and
- Ensure effective urban and rural planning.

3.16 The objectives of the NSS are further reinforced at the Regional Authority level by the adoption of the Midlands Regional Planning Guidelines (MRPG's) and Eastern Regional Planning Guidelines (ERPG's). The key objective is to ensure the continued development within these Gateways by supporting physical, social and knowledge resources in a sustainable manner. This is supported by the development of transport, energy and communications infrastructure.

3.17 The National Spatial Strategy states in relation to the Midlands region that:

"Enhancing the level of critical mass in the Midlands region (Counties Laois, Offaly, Westmeath and Longford), by combining the complementary strengths of Athlone, Mullingar and Tullamore as a gateway at the heart of the region, is essential to boosting the region's overall economic strength. It will also be important to build on the central location of the Midlands and the key towns at the intersection of national road and rail routes, the attractiveness of the village structure in the Midlands and the natural and other resources of more rural areas."

NSS, Section 4.4–The Midlands Region

3.18 The National Spatial Strategy acknowledges that cities, towns, villages, communities and rural areas will all have to play a strategic role in delivering a more 'spatially balanced Ireland'. With specific regard to electricity networks, the National Spatial Strategy outlines the importance of reliable and effective energy systems in relation to regional development.

3.19 The following prime considerations from the NSS (NSS, Section 3.7.2 – Energy) endorse the construction of overhead lines in the area:

"Reliable and effective energy systems, such as gas and electricity to power industry and services, are key prerequisites for effective regional development. Ireland's electricity and gas networks are evolving in an integrated way, serving the whole island, while focusing on strategic locations. Prime considerations in terms of spatial policies relating to energy include:

- Developing energy infrastructure on an all-island basis to the practical and mutual benefit of both the Republic and Northern Ireland;
- Strengthening energy networks in the West, Border and North Eastern areas in particular;
- Enhancing both robustness and choice of energy supplies across the regions, through improvements to the national grids for electricity and gas."

"In relation to the relationship between local planning and electricity network planning, important points to consider include:

- The need to address electricity infrastructure in county development and local plans to facilitate national, regional and local economic progress; and
- The need to liaise with the operators of the transmission and distribution grids, particularly in the environs of towns, to ensure the continued availability of corridors for overhead cable and continuity of supply for existing and new users of electricity."

National Development Plan (NDP) 2007-2013

3.20 The Irish National Development Plan 2007–2013 entitled 'Transforming Ireland – A Better Quality of Life for All' highlights the development of key energy infrastructure as fundamental to the National Development Plan (NDP).

3.21 The NDP's economic infrastructure priority establishes an energy programme with the strategic objective of ensuring the security of energy supply nationally and regionally. The supply should be priced competitively in the long term while meeting a high level of environmental standards. The NDP also highlights that in relation to security of electricity supply, network upgrading under the Energy Programme of the Economic Infrastructure Priority will improve the position for households and businesses in many areas of the country, including rural communities.

3.22 The National Development Plan states that "*The infrastructure investments required and/or planned in the energy sector are of critical national strategic importance… Greater interconnection with the North and with Great Britain and the move towards establishing a Single Electricity Market for the island will also help to ensure security of supply and generate benefits for businesses and consumers from all parts of the island."*

3.23 The NDP prioritises investment to ensure the continuation of the programme of investment to upgrade and develop the energy transmission and distribution networks.

3.24 It is considered that the objectives of the NDP remain valid, despite the current economic downturn.

Midlands Regional Planning Guidelines 2010-2016

"The Midlands Regional Planning Guidelines are about building on and enhancing the competitiveness and attractiveness of the region that comprises the four Counties of Laois, Longford, Offaly and Westmeath."

3.25 Regional planning guidelines for the Westmeath County Council are contained in the Midlands Regional Planning Guidelines 2004-2010 (Midland Regional Authority, 2004), which, in line with the NSS, further strengthen policy support for continued development of the Gateways.

3.26 Offaly and Westmeath Local Authorities are working together to maximise the development potential of the Midlands Gateway of Mullingar, Athlone and Tullamore. They are working together to ensure that the linked Gateway will have the critical mass of population, services and infrastructure, the complementary strengths and attractions to compete with other gateway cities and towns in Ireland.

3.27 The Local Authorities agree that one of the key challenges that the Midlands region faces is generating self sustaining growth as opposed to commuter led growth. One of the key strategies to harness the potential of the Midlands region is to improve the physical infrastructure of the gateway towns in preparation for their accelerated development and ensuring that their development is effectively linked to other parts of the county and the region overall.

3.28 The Midlands Regional Planning Guidelines identify the fact that reliable and effective energy systems, such as electricity to power industry and services, are key prerequisites for effective and sustainable regional development.

3.29 The Midland Regional Authority tries to achieve enhanced, balanced and sustainable development and encourage balanced regional development. Priorities of the Midlands Regional Planning Guidelines include the improvement in reliability of supply to the North-West and Border and Northern Eastern parts of the country and strategic strengthening of the electricity grid serving particular clusters of employment related demand in peripheral areas.

3.30 They acknowledge that the region needs to focus on the implementation of the linked gateway (of Athlone, Tullamore and Mullingar) to deliver the level of critical mass needed to create more self-sustaining patterns of development where people both live and work within the region avoiding more recent patterns of longer distance commuting to Dublin.

3.31 The Guidelines support "*the appropriate building of network transformer stations and overhead lines*". The Guidelines emphasise that assessment is needed to determine what future wind generation may be available in the region. They also acknowledge that there are significant projects planned to upgrade high voltage circuits in the gateway towns and to enhance the supply in the region.

3.32 The planning guidelines highlight that;

> *"The linked gateway (Athlone, Tullamore & Mullingar) together with the principal towns of Longford and Portlaoise, will provide the focus for attracting business and population to the region. These are vibrant, well-established towns with existing infrastructure and a wide range of established functions and are best equipped to accommodate further development".*
>
> *MRPD 4.5- Town and Village Settlement*

Draft Regional Planning Guidelines 2010 - 2022 for the Midlands Region

3.33 The Regional Planning Guidelines provide a robust sustainable planning framework for the Midlands Region within the context of the Planning and Development Act, 2000 and the National Spatial Strategy 2002-2020. They provide a long-term strategic planning framework for the development of Midlands Region in the 12 year period up to 2022 within the National Spatial Strategy vision for 2020. The Regional Planning Guidelines have been devised and prepared having regard not only to the recommendations of the National Spatial Strategy for the Midlands Regions (Laois, Longford, Westmeath, Offaly), but also, importantly, for the regions surrounding the Midlands. As part of the overall Transportation and Infrastructure Strategy, Section 5

addresses the issues of Infrastructure including energy networks. Specifically in relation to the role the Midlands Region has played in energy production and transmission, particularly given the presence of peatlands and electricity transmission network. This is of particular significance given the Government Policy to ensure that renewable energy accounts for 40% of output by 2020.

3.34 The draft Guidelines highlight the potential in the Midlands Region to accommodate the transition from peat to other energy sources, mainly wind, resulting in spin offs in manufacturing, servicing and research development activities.

3.35 Furthermore, the draft Guidelines identify that an efficient, reliable and cost effective electricity supply is a key resource for regional development. The 'Energy Provision Section' makes reference to the Grid25 strategy and specifically the fact that without investment there will be no capacity or reliability of supply over the next five to ten years. The hindrance of this lack of capacity on renewable generation is emphasised. However, Grid25 addresses the lack of capacity by making provision for upgrading of network, new circuit builds and reinforcement to cater for continued demand in the Gateway & Principal towns such as Mullingar.

3.36 EirGrid's role is to analyse the requirement to provide infrastructure for connecting new generation, while at the same time looking at the requirement to secure local demand, and propose optimised solutions for both is recognised in the draft guidelines.

3.37 The Guidelines promote the improvement and expansion of the transmission network throughout the Midland Region. Section 5.8.4 sets out a 'Policy Framework for Electricity Provision' which states that County Development Plans should facilitate the provision of energy networks. This is a key policy to facilitate Grid25 and strategic transmission projects.

Westmeath County Development Plan 2008-2014

3.38 The purpose of a County Development Plan is to outline broad planning strategy to assist in planning land use and development. It interprets national and regional policies and provides a framework for the more detailed local plans that are produced by the county councils. On a hierarchical level the policies and objectives set out in a County Development Plan must not conflict with those of national and regional policies.

3.39 The Westmeath County Development Plan recognises that Ireland's electricity network is undergoing a major refurbishment program. The Plan also contains specifics to encourage different forms of renewable energy such as Wind and Solar Energy.

Conclusion

3.40 Subsequent to the above planning policy review the following conclusions can be drawn:

- The Energy Policy Framework 2007 – 2020 - Delivering a Sustainable Energy Future for Ireland highlights that security of energy supply is crucial for the economy and society and states that we need robust networks and electricity generating capacity to ensure consistent supply to consumers and all sectors of the economy;
- Mullingar is part of the Midlands Gateway which is made up of Mullingar, Athlone and Tullamore. This Gateway is defined by the NSS as having a *"strategic location, nationally and relative to their surrounding areas, and providing national scale social, economic and support services".* In other words Mullingar is strategically important and thus delivery of strategic infrastructure is key to its development and success;
- In this context the NDP, NSS and the Midland Regional Authority all highlight the requirement for upgrading and developing the energy transmission network in the region while the Westmeath County Development Plan recognises that electricity networks in the region are undergoing major refurbishment programs; and

- The Grid25 Strategy is endorsed in the Draft Midland Regional Planning Guidelines and therefore the importance of strategic infrastructure in this Region is acknowledged.

4. Methodology and Project Road Map

Feasibility Study

4.1 EirGrid commissioned ESB International (ESBI) in 2008 to undertake a feasibility study to ensure that the project was viable and identify possible route corridors which could potentially support 110 kV circuit between either Mullingar to Kinnegad or Mullingar to Derryiron. This report concluded that feasible routes did exist from Mullingar to Kinnegad or Mullingar to Derryiron and that the project should continue through to stage 1 capital approval.

4.2 The Mullingar 110 kV project is being carried out in three phases as described below and illustrated in Diagram 4.1. The methodology for identification of the study area, the Engineering and Environmental Constraints and the Preliminary Routes Corridors is outlined in Chapters 5, 6 and 7 respectively of Part A of this report.

Phase 1

4.3 Phase 1 sets out the strategic needs for the project and project rationale to understand the technical and environmental constraints and is concerned with the selection of study area and identification of a general constraints within the study area.

Phase 2

4.4 Phase 2 is concerned with the selection of a Preferred Route Corridor for the new 110 kV Circuit from the existing Mullingar 110 kV Transmission Station, Co. Westmeath to either the existing Derryiron 110 kV Transmission Station in Rhode Co. Offaly or to the existing Kinnegad 110 kV Transmission Station at Killaskillen in Co. Meath. Phase 2 includes the selection of the route corridor assessment, public consultations and selection of preferred route. Phase 1 and Phase 2 is reported in four volumes i.e. an Executive Summary, Constraints and Route Corridor Report consisting of Parts A, B and C plus two volumes of Appendices comprising of detailed environmental study reports and Figures.

4.5 The stages of work carried out in Phase 1 and Phase 2 and the work reported in each of the four volumes are described below:

Executive Summary

4.6 The Executive Summary provides a non technical summary of the proposed project, the work stages and results of the route selection process. It includes basic drawings showing the site location, major constraints and preferred routes.

Constraints and Route Corridor Report

4.7 The constraints and Route Corridor Report is subdivided up into three parts. Details of each part are outlined below.

Part A

4.8 Part A details the rationale for the project; it outlines EirGrid's role in the transmission of high voltage electricity in Ireland and details EirGrid's Strategy document 'Grid25' for developing Irelands long term transmission network needs and how the network will meet the country's growing demand of electricity. EirGrid has identified voltage problems in the Mullingar area and proposes a new 110 kV circuit to improve the quality, power flow and security of supply. Part A describes the strategic planning context of the project by highlighting where the need for energy production and transmission is emphasised in the Planning and Development Act 2000, Government Green Papers, National Strategy Documents, Regional Planning Guidelines and County Development Plans.

4.9 Part A identifies the study area which encompasses all three existing Transmission Stations and all physical constraints present in the surrounding landscape. Part A reports on the first of 3 public consultation processes carried out for the project. It describes all general environmental and engineering constraints within the study area and describes five preliminary Overhead Line Route Corridors plus minor variants and three Underground Cabling Route Corridors linking the existing Mullingar 110 kV Transmission Station to the existing 110 kV Transmission Stations in Derryiron and Kinnegad.

Part B

4.10 Part B provides an overview of the engineering design elements and site constraints affecting each of the preliminary route corridors (Overhead Lines and Underground Cabling Options). It provides a technical specification for the 110 kV circuit and a description of constraints particular to the Underground Cabling interfacing with water courses and motorways and a discussion of the options of Line entries from each of the three Transmission Stations.

4.11 Within Part B there is a comparison of Overhead Lines and Underground Cabling from an Environmental and Engineering perspective, this includes an evaluation of each route corridor and selection of the preferred route corridors from each discipline. The environmental comparison is a summary of the specialist studies carried out by the environmental team under the headings of Landscape and Visual, Fauna and Flora, Cultural Heritage and a section on the number and nature of Properties within each of the route corridors.

Part C

4.12 This provides a summary of preferred Overhead Lines and Underground Cabling options from both Environmental and Engineering work carried out in Parts A and B. The combined engineering and environmental preferred routes are compared against EirGrid's policy and practice on the use of High Voltage Underground Cabling and Overhead Lines. The three emerging preferred routes are described for display at Public Consultation. Following public consultation a preferred route is recommended to be taken forward for consideration for the EIS. The scope of the EIS will be decided in conjunction with An Bord Pleanála.

Appendices

Appendix 1

4.13 This volume includes the figures which are referred to throughout the Constraints and Route Corridor Report.

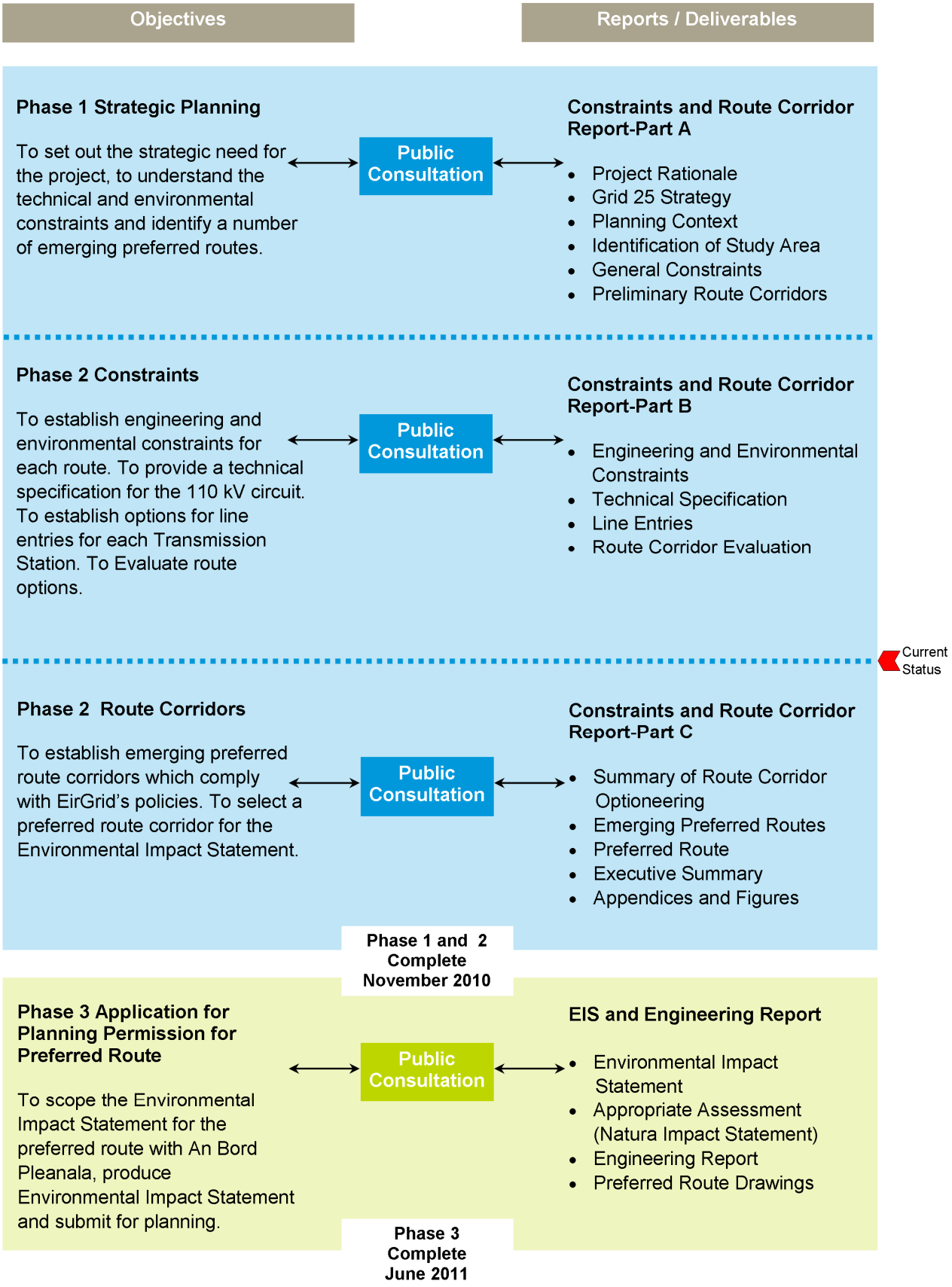
Appendix 2

4.14 This volume includes a copy of the detailed environmental study reports carried out for Phase 2 of the works in the key areas of Landscape and Visual, Ecology and Cultural Heritage.

Phase 3

4.15 Phase 3 is concerned with the scoping of the EIS for the preferred route in association with An Bord Pleanála, production of the EIS, public consultation and submission of the Planning Application for the new circuit.

Diagram 4.1. – Indicative Project Road Map



5. Summary of Communications

Statutory and Non Statutory Consultations

5.1 EirGrid is committed to ongoing consultation with interested parties, including statutory and non statutory consultees for the proposed new 110 kV circuit. A Communications Strategy was developed for the project. The purpose of the Strategy was to identify key interest parties and stakeholders to be consulted at specific stages of the project, to present the findings of the Constraints and Routing studies for the project and provide an opportunity for interested parties to comment on the constraints, the routing methodology adopted and the preferred route to be taken forward to the EIA stage.

5.2 Formal consultation was undertaken at the Phase 1 constraints stage and the consultees and stakeholders were asked to provide comments on the key environmental and planning issues relevant to the scheme and the study area.

5.3 The Project Communication Strategy document will be updated throughout the strategic routing stage of the project to describe the consultation process and demonstrate that where possible all comments and issues have been considered and resolved within the project. The Strategy will also note and summarise any comments and issues raised during any meetings held by the project team and key interest groups throughout the project programme.

5.4 As part of the consultation process an initial meeting was held with the National Roads Authority/Westmeath County Council Project Office (NRA/WCCPO). The purpose of the meeting was to discuss the options for the proposed circuit to cross over or under national, regional and local roads and the use of existing bridges within the crossings. The NRA/WCCPO described the presence of existing service duct crossings within the motorways of the study area (M4 and M6) which could be made available for electrical circuits, subject to EirGrid's cabling requirements, rather than excavation of recently constructed roads for installation of new ducts subject to being suitably sized. With regards to bridge crossings, the NRA/WCCPO generally did not favour incorporation of High Voltage cables within the bridge verges, decks or within ducts suspended from the bridges. This information was used in selection of the preliminary route corridors across the study area.

5.5 A second consultation letter was sent to the Statutory and Non-Statutory bodies listed in Table 5.1 below on 29th April 2010 in relation to Landscape and Visual, Ecology and Cultural Heritage requesting any information which could assist with the route selection process. Any information gathered from the consultations has been considered and incorporated within the text for each environmental study.

Table 5.1 - Statutory and Non-Statutory Bodies Consulted

Statutory and Non-Statutory Bodies Consulted	
Department of Environment, Heritage and Local Government	Eastern Regional Fisheries Board (ERFB)
Conservation Officer Westmeath, Offaly and Meath County Council	Bat Conservation Ireland
Heritage Officer/Tourism Officer Meath County Council	BirdWatch Ireland
Heritage Officer/Tourism Officer Westmeath County Council	The Irish Wildlife Trust

Statutory and Non-Statutory Bodies Consulted	
Heritage Officer/Tourism Officer Offaly County Council	Conservation Officer Meath County Council
An Taisce	Conservation Officer Westmeath County Council
Inland Waterways Association of Ireland	Conservation Officer Offaly County Council
Fáilte Ireland	National Parks and Wildlife Service (NPWS)

5.6 A summary of the key issues and meetings/discussions held to-date is outlined in Table 5.2 below.

Public Consultation

5.7 The first Public Consultation for the project took place in November 2009. A Plan of the general study area and a description of the project was placed in six local newspapers: The Westmeath Examiner, The Westmeath Topic, The Offaly Express, The Offaly Independent, The Offaly Topic and the Tullamore Tribune. No responses were received from the public.

5.8 Following the second Public Consultation further work will define the Preferred Route. Thereafter we will scope the EIS in association with An Bord Pleanála prior to submitting the project for planning permission.

Table 5.2 - Summary of meetings/discussions held and issued discussed to date

Meeting	Date	Purpose of the meeting/Issued discussed	Next Meeting	Document where response is/will be actioned
Phase 1- Mullingar 110 kV Project				
Westmeath County Council Planning Department	7th Aug 2009	This meeting was arranged to introduce EirGrid and Grid 25 Strategy to the local planning officers. EirGrid outlined a brief overview of the proposed project and the possibility of 110 kV circuit between Mullingar to Derryiron. In response to Atkins statutory consultation letter the department provided details of additional environmental constraints relevant to Westmeath. They stressed the importance that a detailed up-to-date planning search should be undertaken within the Study Area and referred to the Robinstown LAP and Ardmere LAP.	Prior to public consultation at the route selection stage	Environmental Constraints are illustrated and discussed in Atkins Doc 2885 DG002 Constraints and Route Corridor Assessment and Figure 2 in Appendix 1 of that Report.
An Bord Pleanála Strategic Infrastructure Board	10th Aug 2009	This meeting was arranged to introduce EirGrid and Grid 25 Strategy to An Bord Pleanála. Details of the project and proposed programme were also provided. The strategic nature of the project was discussed. An Bord Pleanála stated that the until the proposed preferred route is identified it can not be determined whether the project can be classified as a Strategic Infrastructure project. ABP also stressed the importance of consultation with all departments within the Local Authorities throughout the programme and to consult with all the statutory authorities.	Arrange a meeting once a preferred route has been decided	Planning route for project will be described in either the EIS or the Environmental Report for the Preferred Route.
Offaly County Council	21st Sept 2009	Pre planning meeting was held to introduce EirGrid and Grid 25 Strategy to the Local Planning Authority. EirGrid outlined a brief overview of the proposed project and the possibility of 110 kV circuit between Mullingar to Kinnegad. In response to Atkins statutory consultation letter the department provided details of additional environmental constraints relevant to Offaly County Council. These include the potential impact on the south facing views onto	Prior to public consultation at the route selection stage	Environmental Constraints are illustrated and discussed in Atkins Doc 2885 DG002 Constraints and Route Corridor Assessment and Figure 2 in Appendix 1 of that Report

Meeting	Date	Purpose of the meeting/Issued discussed	Next Meeting	Document where response is/will be actioned
		Croughlan Hill. It was advised to identify the proximity of any piggeries or quarries, and Seveso sites within the study area. The planners also highlighted to EirGrid that there are two planning applications within the study area, these include one application made by Bord na Mona at their Derrygreanah Power Station and Mount Lucas Wind Farm Development to the south of the study area.		
Meath County Council	24th Sept 2009	Pre planning meeting was held to introduce EirGrid and Grid 25 Strategy to the Local planning authority. EirGrid outlined a brief overview of the proposed project and the possibility of 110 kV circuit between Mullingar to Derryiron. In response to Atkins statutory consultation letter the department provided details of additional environmental constraints relevant to Meath County Council.	Prior to public consultation at the route selection stage	Environmental Constraints are illustrated and discussed in Atkins Doc 2885 DG002 Constraints and Route Corridor Assessment and Figure 2 in Appendix 1 of that Report
Bord na Mona	5th Oct 2009	A meeting was arranged with Bord na Mona to introduce EirGrid and Grid 25 Strategy to the company. EirGrid briefly outlined the need for the proposed 110 kV circuit between Mullingar to either Kinnegad or Derryiron. Bord na Mona is a major landowner within the Study Area. Bord na Mona provided details on the planning application that was lodged for Gas Power Station at Derrygreenagh. The station was considered a Strategic Infrastructure project. Bord na Mona also provided a copy of aerial photography of the lands.	Arrange a meeting once a preferred route has been decided	The significance of the Preferred Route in relation to Bord na Mona lands will be reported in the EIS or the Environmental Report for the Preferred Route
Lagan Cement	7th Oct 2009	A meeting was arranged with Lagan Cement to introduce EirGrid and Grid 25 Strategy to the company. EirGrid briefly outlined the need for the proposed 110 kV circuit between Mullingar to either Kinnegad or Derryiron. The Kinnegad Transmission Station is located next to Lagan Cement quarries. Lagan Cement noted that they have no issue with the proposed project connecting at the Kinnegad Transmission Station. They stated that their operations will	Arrange a meeting once a preferred route has been decided	The significance of the Preferred Route in relation to Bord na Mona lands will be reported in the EIS or the Environmental Report for the Preferred Route

Meeting	Date	Purpose of the meeting/Issued discussed	Next Meeting	Document where response is/will be actioned
		not be affected by the proposed 110 kV project.		
Mullingar Chamber of Commerce	24th Nov 2009	Introducing EirGrid and Grid 25 '*A Strategy for the Development of Ireland's Electricity Grid for a Sustainable and Competitive Future' to* sectors of local business, government agencies, local authorities and the general public that attended the meeting. EirGrid also provided a brief presentation and outlined the need for the proposed 110 kV circuit between Mullingar to either Kinnegad or Derryiron. Issues discussed included the comparison of an underground solution to an overhead solution and the programme for the works.	Public consultation at the route selection stage	Atkins Doc 2885 DG002 Constraints and Route Corridor Assessment Report will compare underground cable and overhead line options for the proposed circuit. The EIS or the Environmental Report for the Preferred Route will discuss the programme for the works.
Westmeath Roads Design Office	18th Jan 2010	A meeting was arranged with the Road Design Office to discuss issues regarding crossing National Primary/Secondary Roads. It was stated that generally NRA own duct crossings every 500 m along the M4 and M6 motorways. These crossings usually consist of 4 x100 mm diameter, and it would be preferable that these spare ducts are used rather than excavating for installation of new ducts. A formal request to use these ducts should be submitted via Westmeath Co. Co project office. It was also noted that road authorities are reluctant to allow any excavation of recently constructed roads to facilitate new ducts. It was also noted that initial feedback with the NRA indicate that they would have safety concerns over the installation of HV cables in such locations as there is approx 100 to 150 mm cover to these ducts. They also expressed concerns should HV cables be installed in bridge decks; there would be interference to other services due to EMF and the potential negative impact on the corrosion rate of the steel reinforcement within the bridge. Suspension of ducts from bridges will not be considered by the NRA.	To arrange a meeting with the NRA bridge Inspector to discuss bridge crossing in further detail	The need for ducting or crossing of National or Regional Roads will be discussed in Atkins Doc 2885 DG002 Constraints and Route Corridor Assessment Report and will be reported in the EIS or the Environmental Report for the Preferred Route.

Meeting	Date	Purpose of the meeting/Issued discussed	Next Meeting	Document where response is/will be actioned
		The NRA noted that a service agreement would be required to be signed with EirGrid/ESB Trenchless drilling may be used, this subject to agreement of NRA and the Local Authorities.		
Phase 2- Route Corridor Selection Consultation- Written Consultation and Arranged Meetings held to date				
Inlands Waterways Association of Ireland	10th June	A meeting was arranged with Inlands Waterways Association of Ireland (IWAI). IWAI explained that the Royal Canal is only opening in September after a substantial period of reconstruction which will now enable the canal to be navigable. The IWAI explained that they have no serious concerns about the project unless it resulted in the canal being closed for a substantial time i.e. longer than couple of days. EirGrid assured IWAI that any work which will require the canal to be closed will be kept to a minimum and further discussions can take place when a preferred route is agreed. It was also noted that the IWAI foresee no major problem areas with the potential crossing options considered.	Prior to public consultation at the route selection stage	The need and location for a canal crossing will be discussed in Atkins Doc 2885 DG002 Constraints and Route Corridor Assessment Report and will be reported in the EIS or the Environmental Report for the Preferred Route.
National Road Authority- Regional Design Office	24th June 2010	Following the meeting held with NRA RDO in Jan 2010, a call was received confirming that the office will not be interested in commenting on the scheme until the preferred route was selected and they would be then able to assist in determining the crossing points. It was noted however, that experience has suggested that the location of Motorways and roads were not regarded as a major constraint in the routing or construction of OH or cable routes	No meeting is necessary at this time however Atkins have agreed to call the RDO prior to Public Consultation taking place	The need for ducting or crossing of National or Regional Roads will be discussed in Atkins Doc 2885 DG002 Constraints and Route Corridor Assessment Report and will be reported in the EIS or the Environmental Report for the Preferred Route.
Department of Environment- Development Applications	Written Consultation received 15th June 2010	Nature Conservation Comments The DAU outlines the designated sites within the study area. They also provide a brief rating on the proposed route corridor options for OH and cable routing and have given	DAU comments are noted and no meeting is necessary at this	DAU comments are considered within the detailed Fauna and Flora Route Corridor Reports in

Meeting	Date	Purpose of the meeting/Issued discussed	Next Meeting	Document where response is/will be actioned
Unit	Ref: 2885/100/CI/33	their most favourable OH to be Route Corridor Option 3 and most favourable cable Option as Route Corridor Option 1. See consultation letter for further details	time. The DAU will be notified prior to public consultation	Appendix 2 of Atkins Doc 2885 DG002 Constraints and Route Corridor Assessment Report and will be reported in the EIS or the Environmental Report for the Preferred Route.
Department of Environment-Development Applications Unit	Written Consultation received 19th May Ref: 2885/100/CI/37	Archaeological Comments;- It was noted that EirGrid has a Code of Practice regarding archaeology with the DoEHLG. In keeping with the code and as part of an environmental review of the project this office will require a full archaeological impact Assessment to be carried out and the results of the same to be forwarded to DAU. The DAU has policy of preservation in situ for archaeology. It is noted that this may be difficult to achieve with an underground line. The Department outline in assessing impacts on the archaeological heritage must regard the National Monuments Act 1930-2004. For full details of the response refer to letter received	DAU comments are noted and no meeting is necessary at this time	DAU comments are considered within the detailed Archaeological Route Corridor Reports in Appendix 2 of Atkins Doc 2885 DG002 Constraints and Route Corridor Assessment Report and will be reported in the EIS or the Environmental Report for the Preferred Route.
Department of Environment-Development Applications Unit	Written Consultation received 20th May Ref: 2885/100/CI/36	Architectural Heritage Comments; The DAU notes that any proposal should take into account the effect on the architectural heritage of both sites of the individual transmission pylons and also the wider locality through which the proposed powerline will pass. It should be noted that EIA for the scheme requires taking into account on the “material assets, including the architectural and archaeological heritage, and the cultural heritage”. Since the adoption of the European Communties (Environmental Impact Assessment) (Amendment) Regulations 1999, SI 93 of 1999, which came into effect on the 1st may 1999, assessment of impact on architectural heritage is now an integral part of the EIA process. This requirement is also included in the later Planning and Development Regulations.	DAU comments are noted and no meeting is necessary at this time	DAU comments are considered within the detailed Archaeological Route Corridor Reports in Appendix 2 of Atkins Doc 2885 DG002 Constraints and Route Corridor Assessment Report and will be reported in the EIS or the Environmental Report for the Preferred Route.

Meeting	Date	Purpose of the meeting/Issued discussed	Next Meeting	Document where response is/will be actioned
		DAU also advice and detail aid to making such investigation and assessments refer to attached letter.		
Meath County Council- Conservation Officer	Written Consultation received 21st May 2010-06-25 Ref: 2885/100/CI/35	Written response was received and the following comments were noted:- According to the Route Corridor Options drawings provided to the officer, it would appear that the line in Meath County Council lands may run in proximity to the following recorded monuments; ME-046-001- Togher, ME046-002- Field system and ME046-003- Church. The council have advised these monuments should be avoided when siting poles or pylons and avoid stringing overhead cables in the vicinity of the church and graveyard. Please have regard to the advice of the National Monuments Advisory service regarding any mitigation measures that may be required	These comments are noted and no meeting is necessary at this time.	MCC Conservation officers comments are considered within the detailed Archaeological Route Corridor Reports in Appendix 2 of Atkins Doc 2885 DG002 Constraints and Route Corridor Assessment Report and will be reported in the EIS or the Environmental Report for the Preferred Route.

Meeting	Date	Purpose of the meeting/Issued discussed	Next Meeting	Document where response is/will be actioned
Westmeath County Council –Planning Section	Written Consultation received 17th May 2010-06-25 Ref: 2885/100/CI/38	To reflect the stage of the process the council have provided very general level of comments. These include ;- "At this stage it would be important to ensure that in addition to taking account of Assets designated under National Legislation (RPS, RMP, NHA's etc) and European Directives, (Habitats, Birds, Groundwater, Surface Water etc) that sites of local biodiversity (art 10 of the Habitats directive), protected views, landscape character areas, historic demesnes' and other locally distinctive features are given due consideration in drafting of your constraints study. Account will also need to be taken of the requirement to safeguard public health and residential amenity". Full details are outlined in the attached correspondence.	Arrange a meeting once the Route Corridor Selection has been completed	WMCC Planning comments are considered within the detailed Archaeological and Fauna and Flora Route Corridor Reports in Appendix 2 of Atkins Doc 2885 DG002 Constraints and Route Corridor Assessment Report and will be reported in the EIS or the Environmental Report for the Preferred Route.

6. Identification of Study Area

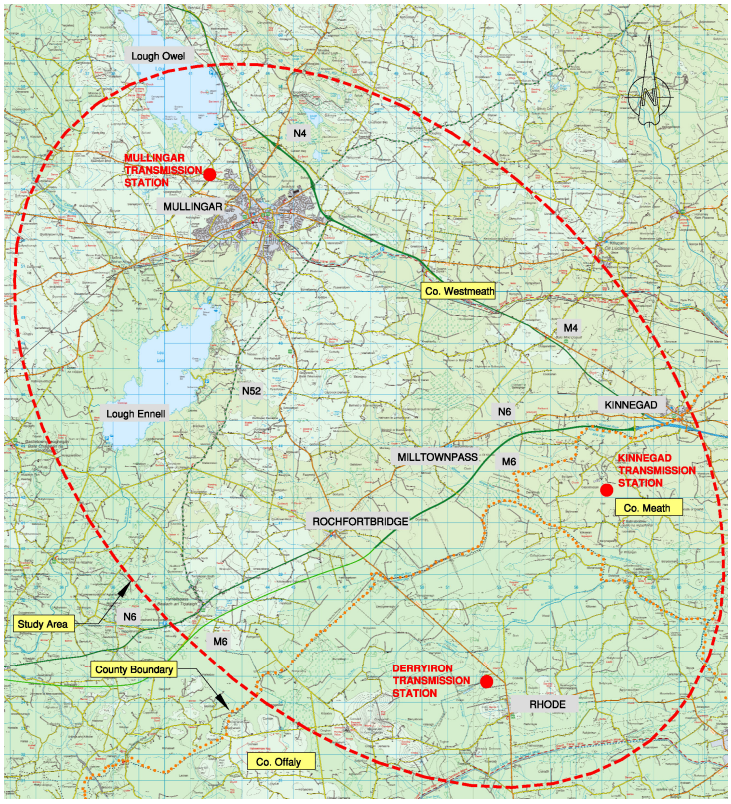
Desktop Study

6.1 In July 2009 Atkins commenced the constraints assessment by compilation of an Environmental and Physical Constraints drawing for the wider study area. The study area boundary was established and is shown in **Figure 6.1 Location of the Study Area**. A desktop study was undertaken as part of the initial constraints assessment, all service providers were contacted and utilities were identified, and an overview of ground conditions was carried in association with an understanding of environmental designations on a local, regional, national and international scale.

Study Area

6.2 The initial task of the project was to define the proposed study area. The study area extends over parts of three counties, Westmeath, Meath and Offaly covering approximately 548.6km^2 as shown in **Figure 6.1 Location of the Study Area**. The study area is bounded to the north of Mullingar by Lough Owel and to the south of the study area by the location of the Grand Canal. An initial desktop study detailed the major physical and environmental constraints within study area and these were mapped and assessed. Initial constraints identified included designated nature conservation areas, areas of archaeological and architectural significance, scenic routes, vulnerable and sensitive landscapes along with all developments, and infrastructure and utility services within the study area. These are shown on **Appendix 1 Figure 2-Engineering and Environmental Constraints**.

Figure 6.1 – Location of study area



Information Sources

6.3 Information sources used for the compilation of the environmental constraints include the following:

- Westmeath County Development Plan 2008 -2014[1];
- Meath County Development Plan 2007 – 2013[2];
- Offaly County Development Plan 2009 -2015[3] ;
- Meath Landscape Character Assessment[2];
- National Inventory of Architectural Heritage – Historic Gardens[4];
- Fáilte Ireland[5];
- OSI 1:50,000 Discovery Series Maps[6];
- The NPWS database[7];
- The EPA database [8];
- The National Biodiversity Data Centre database [9];
- Aerial photography[10] and local maps;
- National Monuments Lists from the DoEHLG[11];
- Sites subject to Preservation Orders from DoEHLG[12];
- Record of Monuments & Places database[13];
- Record of Protected Structures shapefiles from Meath, Offaly and Westmeath County Development plans [14];
- National Inventory of Architectural Heritage shapefiles[15] ; and
- First Edition Maps (circa 1830) from Ordnance Survey Ireland[16].

7. Identification of Constraints

Site Visits

7.1 Once the study area had been defined, roadside site visits were undertaken by Overhead Line and Cable Engineers and Environmental Consultants to verify the desktop constraints, to establish the feasibility of preliminary route corridors and to identify the potential road, rail and river and canal crossings.

Man Made Constraints

7.2 The study area is characterised by undulating pasture lands, lakes and peat lands. Urban areas include the towns of Mullingar, Miltownpass, and Rochfortbridge in Co. Westmeath, Rhode in Co. Offaly and Kinnegad and Castlejordon in Co. Meath feature in the study area. The study area crosses major infrastructure such as the regional roads, national roads and motorways such as the M4, N52, N6, M6, railway lines, gas lines, the Royal Canal, drainage and water mains systems and transmission lines including the Maynooth-Shannonbridge 220 kV line. There is also a closed landfill site situated in Marlinstown along the N4 approximately 4km north east of Mullingar town. Significant infrastructure and environmental designations within the study area are illustrated on **Appendix 1 Figure 2 Engineering and Environmental Constraints**.

7.3 The existing Kinnegad Transmission Station is located on a site next to a large operating open quarry and the existing Derryiron 110 kV Transmission Station is located next to a privately operated peaking power plant. Adjacent lands to the north west of the existing Transmission Station are currently being developed by North Offaly Development Fund; their plans include an industrial park with access roadway. At Kinnegad the Transmission Station will need to be enlarged to accommodate the equipment for the new 110 kV circuit, whereas at Derryiron the existing compound has space for the new 110 kV circuit connection.

7.4 At Derryiron the new circuit entry is constrained by the existing 110 kV lines with options for the new line entry either to cross over an existing 110 kV line or to terminate the new line close to the Transmission Station and install a section of underground cable to the proposed circuit bay.

7.5 The study area is largely rural in nature. Urban areas within the study area include the towns of Mullingar, Milltownpass, Rochfortbridge in Co. Westmeath, Rhode in Co. Offaly and Kinnegad and Castlejordon in Co. Meath. There is a predominance of one off housing and ribbon development along local roads within the study area. One of the main constraints in routing of Overhead Lines is avoiding existing residential developments such as houses, schools and hospitals. An estimate of the number of properties within 1km of each route corridor has been carried out to locate all residential buildings (and schools) to be avoided as part of the project constraints. There are approximately 16,058 properties within the study area[17]. These are shown in **Appendix 1 Figure 34-35 Properties and Schools in the Route Corridors.**

7.6 EirGrid aims to build the Overhead Lines a minimum distance of 50-60 metres from existing dwellings, schools, and hospitals from the centre of the Overhead Line. Underground Cabling is generally installed within public road side verges, roads or agricultural land in order to minimise disruption to private dwellings and private land owners.

7.7 In terms of EirGrid policy an Underground Cable will only be used if all the following four conditions apply;

(i) An Overhead Line is not environmentally, feasible;

(ii) A technically and environmentally acceptable route for Underground Cable can be found;

(iii) The effect that the electrical characteristics of Underground Cable have on the transmission network is acceptable and the relatively poorer 'availability' of underground cable is tolerable; and

(iv) The relatively high cost of the Underground Cable can be justified.

Environmental Natural Constraints

7.8 There is a diversity of landscape types and uses across the study area ranging from undulating hills and lakes, to peat lands, grasslands, and woodlands. High hedgerows and mature trees feature along the road corridors around the Mullingar area, the high hedges become less prevalent further south and the views become generally more expansive. Eskers are also a feature of the landscape character of the area. The main agricultural practices in the area are predominantly dairy and tillage. There is also evidence of peat bog harvesting both industrially by Bord na Mona and privately by farmers. It is understood that a local parachute club located in Clonbullogue Co. Offaly are known to operate in the vicinity of the study area.

7.9 Westmeath is known as the Lakeland County and there are two large lakes within the study area, Lough Ennell and Lough Owel, these are designated as '*High Amenity Areas*' within the Westmeath County Development Plan[1]. There are also a number of smaller lakes present within the study area. Sites designated of conservation importance were reviewed within the study area. These included Candidate Special Areas of Conservation (cSACs), Special Protection Areas for birds (SPAs) (both internationally important) Natural Heritage Areas (NHAs) and proposed Natural Heritage Areas (pNHAs) of national importance.

7.10 Candidate Special Areas of Conservation (cSACs) and Special Protection Areas for Birds (SPAs) are those sites that are deemed to be of European (i.e. international) importance. They form part of a network of sites to be designated across Europe in order to protect biodiversity within the community, known as Natura 2000 sites. cSACs are designated under the Habitats Directive (92/43/EEC), as transcribed into Irish law by the European Communities (Natural Habitats) Regulations, 1997, while SPAs are designated under the Birds Directive (79/4089/EEC). Natural Heritage Areas (NHA) and proposed Natural Heritage Areas (pNHA) are the basic designation for wildlife in Ireland. They are areas considered important for the habitats present or which holds species of plants and animals whose habitat needs protection. Under the Wildlife Amendment Act (2000), NHAs are legally protected from damage from the date they are formally proposed for designation.

7.11 There are three cSACs within the study area, namely Lough Ennell cSAC (Site code 000685) and Lough Owel (Site code 000688) and River Boyne/River Blackwater cSAC. There are two SPAs within the study area; these include Lough Ennell SPA and Lough Owel SPA.

7.12 There are a number of pNHA and NHA within the study area. These include the following;

- The Royal Canal pNHA (Site code 002103);
- The Grand Canal pNHA (Site code 002104);
- Lough Sheever Fen/Slevins Lough Complex pNHA (Site code 000690);
- Wooddown Bog NHA (Site Code 000694);
- Nure Bog NHA (Site Code 001725);
- Cloncrow Bog NHA (Site code 000677);and
- Black Castle NHA (Site code 000570);

7.13 In addition to the above mentioned there are a significant number of major watercourses and tributaries within the study area. These include but are not limited to the following;

- Lacy's Canal;
- River Brosna;
- Mongagh River
- Yellow River;
- Doo Lough;
- Gaybrook Demesne (lake);
- Yellow Lough;
- Milltown River;
- Kinnegad River;
- Riverstown River;
- Doolin Lough and
- Royal Canal

7.14 According the Westmeath County Development Plan [1]Schedule 8.1.2, there are 5 areas within the study area that have been designated as '*Views to be preserved or improved'*, these include those listed in Table 7.1.

Table 7.1 - List of Scenic views within Westmeath (Adapted from WMCDP, 2008)

Ref	View
19	View over Lough Ennell and neighbouring countryside from point on Mullingard-Dysart Road No. 256 at Barrettstown
20	View to north of County Road 462 at Gneevebane
21	View to south over Co. Offaly from Garrane Hill on Route N6 between Tyrrellspass and Rochfortbridge
22	View from Route N52 through La Mancha and Belvedere Estates over the northern portion of Lough Ennell
23	Scenic route through forest and woodlands from Butler's Bridge/Kilpatrick Bridge County Road No. 175

7.15 According to the Geological Survey of Ireland (GSI) Groundwater databases[18] a large extent of the study area is noted to have 'Regionally Important aquifers'. It was noted that the southern extent of the study area within County Offaly and County Meath contains "Moderate to Extreme" ground water vulnerability zones, with large pocket of lands identified in the vicinity of Derryiron and Rhode Village. The preliminary review of the study area has also identified a large number of private wells dispersed around the study area, in particular around the southern extent of the study area between Kinnegad and Rhode. According to the Office of Public Works National Flood Hazard Map,[1] the area to the west of Mullingar Town in particular is reported to have a substantial incidence of flooding.

7.16 A preliminary desktop review undertaken as part of the Route Constraints Assessment has identified the study area as having a high archaeological potential. The land in the area is

predominately undulating pastureland, bogland and lakes. There are a significant number of Record of Monuments and Places (RMP) and Record of Protected Structures (RPS) listed within the study area (See **Appendix 1 Figure 2 Engineering and Environmental Constraints**). A preliminary review of the study area indicated that these recorded sites consist mainly of Ringfort, Enclosures and Castles. Due to the nature of the landscape it is possible that further unrecorded archaeological sites remain undetected below the present ground surface. The National Monuments Acts 1930 – 2004 provide for the protection of archaeological heritage. The Acts also extends protection to all previously unknown archaeological items and sites that are uncovered through ground disturbance or the accidental discovery of sites located underwater.

Engineering Constraints

Derryiron 110 kV Transmission Station

7.17 The existing site and infrastructure is designed to accommodate a future 110 kV circuit, therefore no major constraints to construct new bay or associated control equipment are anticipated.

Kinnegad 110 kV Transmission Station

7.18 There is insufficient space within the existing station boundary to accommodate the additional bay equipment for the new Mullingar circuit. Therefore an extension to the original station perimeter fence will be required to allow existing infrastructure (main busbars) to be extended and new bay equipment to be installed. There are no issues identified in modifying the existing control equipment to accommodate the additional bay.

8. Identification of Preliminary Route Corridors

Factors to be considered in order to identify the most feasible route corridors options

8.1 EirGrid is statutorily obliged to provide Ireland with a safe, reliable and cost effective electricity system while having due regard for the environment. EirGrid has established policies and practices for the use of High Voltage Underground Cable and Overhead Line in Ireland. Whenever a new High Voltage circuit is proposed, policy guides the decision on whether to use Overhead Line or Underground Cables these are summarised in Chapter 7.

8.2 When the constraints were overlaid onto the study area drawing, a number of feasible route corridors were identified. These route corridors are shown in **Appendix 1 Figure 3-Overhead Line Route Corridor Options and Figure 4 Underground Cabling Route Options**.

8.3 Eight preliminary route corridors (plus minor variants) were identified within the study area; these include five preliminary Overhead Line and three preliminary Underground Cabling options. Each corridor is approximately 1 km wide. The corridors were identified using the 'Holford Rules' for consideration and evaluation within the context and constraints of major infrastructure, land use and planning issues, environmental designations, visual amenity and built environment within the Study Area.

- Distance to populated areas;
- Good access;
- Environmental Impact
- Visual Impact
- Geology and Soils
- Crossing with other existing Infrastructure;
- Topography;
- Protected or restricted areas;
- Landuse;
- Cultural Heritage; and
- Technical & Economical Basis.

8.4 The study also includes an initial assessment to ensure that there are no serious impacts or issues associated with each of the route options.

8.5 The background to the 'Holford Rules' is described in the Scoping Report for the South West Scotland Renewable Connection Project by Scottish Power Energy Networks, (2007) as:

> *"a series of planning guidelines first developed in 1959 by Lord Holford adviser to the then Central Electricity Generating Board (CEGB) in the United kingdom on amenity issues. They were reviewed in the 1990s by the National Grid Company (NGC). So far as the Executive is aware the rules are not published as a single work but they are referred to in a number of planning publications including Visual Amenity Aspects of High Voltage Transmission by George A. Goulty (1989) and Planning Overhead Power Line Routes by RJB Carruthers (1987) Research Studies Press Ltd, Letchworth."*

8.6 The Scoping Report describes the Holford Rules[19] as:

- "*Avoid altogether, if possible, the major areas of high amenity value, by so planning the general route of the line in the first place, even if the total mileage is somewhat increased in consequence*;
- *Avoid smaller areas of high amenity value or scientific interest, by deviation; provided that this can be done without using too many angle towers (i.e. the more massive structures which are used when lines change direction);*
- *Other things being equal, choose the most direct line, with no sharp changes of direction and thus fewer angle towers;*
- *Choose hill and tree backgrounds in preference to sky background wherever possible and when the line has to cross a ridge, secure this opaque background as long as possible and cross obliquely when a dip in the ridge provides an opportunity. Where it does not, cross directly, preferably between belts of trees;*
- *Prefer moderately open valleys with woods, where the apparent height of the towers will be reduced and views of the line will be broken by trees;*
- *In country which is flat and sparsely planted, keep the higher voltage lines as far as possible independent of smaller lines, converging routes, distribution lines and other masts, wires and cables so as to avoid a concatenation or "wirescape"; and*
- *Approach urban areas through industrial zones where they exist and where pleasant residential and recreational land intervenes between the approach line and Transmission Station, go carefully into the costs of undergrounding, for lines other than those of the highest voltage."*

Description of Each Route Corridor

8.7 The five Overhead Line Route Corridors (plus minor variants) are described below and illustrated on **Appendix 1 Figure 3 Overhead Line Route Corridors**. Route Corridors 1A, 1B, 2, and 3 links Mullingar 110kV Transmission Station to Derryiron 110 kV Transmission Station and corridors 4, 5A and 5B link Mullingar 110 kV Transmission Station to Kinnegad Transmission Station. Within the description of each corridor, constraints or aspects of the route which need further consideration by either an environmental specialist or through discussion with a local authority or a utility company have been identified.

8.8 The three Underground Cabling Route Corridors are also described below and illustrated on **Appendix 1 Figure 4 Underground Cabling Route Corridors**. Route Corridor 1 links Mullingar 110 kV Transmission Station to Derryiron 110 kV Transmission Station and Route Corridors 2 and 3 link Mullingar 110 kV Transmission Station to Kinnegad Transmission Station. Within the description of each corridor, constraints or aspects of the route which need further consideration by either an environmental specialist or through discussion with a local authority or a utility company have been identified. **Appendix 1 Figure 10 Soil and Geology** illustrates the presence of peat and bedrock outcrops which affect potential ground conditions for construction of trench routes and construction tracks.

Overhead Line Route Corridor 1A- Mullingar to Derryiron (Mullingar west via Castletown Geoghegan)

Mullingar 110 kV Transmission Station to Ballina

8.9 From the Mullingar 110 kV Transmission Station the corridor passes in a south-westerly direction through agricultural land, which for ease of construction and future maintenance of the line, it could be positioned parallel to the existing local road for approximately 2 km which leads from Walshestown to Ballina. The Overhead Line will pass over one at-grade the R393 regional road.

The corridor then passes into agricultural pasture lands to the north of Ballina, where it will cross over one regional road the R392, the Royal Canal (pNHA) and a water course draining into Lough Ennell just north of Ballina at Green Park Demesne. The corridor will pass to the west of Green Park Demesne. The extent and status of the Demesne must be considered further so that the Overhead Line does not affect the historic setting of the landscape or the character of the setting.

Ballina to Castletown Geoghegan

8.10 Southwest of Ballina the corridor will turn and head directly south, at this point it crosses over the R390 road, continuing on this path it crosses a disused railway line at Stokestown. The route will continue on and cross the R391 road at Dysart, approximately 4 km west of Lough Ennell SAC, and will maintain this direction approaching Castletown Geoghegan. The corridor will not pass into the Lough Ennell High Amenity Area (shown in detail on **Appendix 1 Figure 11 Lough Ennell Objectives**), it will not obscure the east facing designated 'Views to be protected or improved' at Dysart village, nor will it cross Nure Bog NHA. South of Castletown Geoghegan the corridor will cross a high pressure transmission gas pipe line running in a north easterly direction. Preliminary discussions were held with Bord Gais to clarify constraints on this crossing. Further ongoing discussions between EirGrid and Bord Gais are expected once the preferred route corridor is selected and the final preferred route option will be assessed as part of the Environmental Impact Assessment.

Castletown Geoghegan to Derryiron 110 kV Transmission Station

8.11 From Castletown Geoghegan the corridor will continue across undulating agricultural pasture land in a southerly direction towards Balrath where it will change direction and head in a south-easterly direction towards Split Hill. From here the corridor will continue on and cross the River Brosna at Aghyrassy and maintain this course running parallel but outside of the Split Hill and Long Hill Esker SAC/pNHA. The corridor will pass an existing 220 kV Power line, the N6 and the M6 approximately 3 km southwest of Tyrrellspass. There are a number of recorded monuments and structures in the vicinity of the corridor in this area which will require detailed consideration. At Garryduff the corridor will turn and run in a westerly direction towards the county border into Offaly crossing the Big River at this point. The corridor will cross through between two large parcels of forestry at Derrycoffey before crossing the Big River again and pass into the Croghan Hill, high amenity area. The corridor will continue in this direction crossing Bord na Mona worked bogs where ground conditions will have an impact on the construction of the line, then it approaches the existing 110 kV Derryiron Transmission Station from the west.

Overhead Line Route Corridor 1B- Mullingar to Derryiron (Mullingar west via Castletown Geoghegan and Ballykilmore)

Mullingar 110 kV Transmission Station to Ballina

8.12 From the Mullingar 110 kV Transmission Station the corridor passes in a south-westerly direction through agricultural land, or for ease of construction and future maintenance of the line it could be positioned parallel to the existing local road for approximately 2 km which leads from Walshestown to Ballina. The Overhead Line will pass over one at-grade regional road the R393. The corridor then passes into agricultural pasture lands to pass to the north of Ballina and will cross over one regional road the R392 and the Royal Canal (pNHA) and a water course draining into Lough Ennell just north of Ballina at Green Park Demesne. The corridor will pass to the west of Green Park Demesne. The extent and status of the Demesne must be considered further so that the Overhead Line does not affect the historic setting of the landscape or the character of the setting.

Ballina to Castletown Geoghegan

8.13 Southwest of Ballina the corridor will turn and head directly south, at this point it crosses over the R390 road, continuing on this path, it crosses a disused railway line at Stokestown. The route will continue on and cross the R391 at Dysart, approximately 4 km west of Lough Ennell SAC, and will

maintain this direction approaching Castletown Geoghegan. The corridor will not pass into the Lough Ennell High Amenity Area (shown in detail on **Part 3 Figure 11 Lough Ennell Objectives**), it will not obscure the east facing designated 'Views to be protected or improved' at Dysart village nor will it cross the Nure Bog NHA. South of Castletown Geoghegan the corridor will cross a high pressure transmission gas pipe line running in a north easterly direction. As previously mentioned preliminary discussions were held with Bord Gais, further ongoing discussions between EirGrid and Bord Gais are expected once the preferred route corridor is selected and the final preferred route option will be assessed as part of the Environmental Impact Assessment.

Castletown Geoghegan to Derryiron 110 kV Transmission Station

8.14 From Castletown Geoghegan the corridor will continue across undulating agricultural pasture land in a southerly direction towards Balrath where it will change direction and will head in a south-easterly direction towards Split Hill. From here the corridor will continue on and cross the River Brosna at Aghyrassy and maintain this course running parallel but outside of the Split Hill and Long Hill Esker SAC/pNHA. It crosses an existing 220 kV Power line, the N6 and the M6 approximately 3 km southwest of Tyrrellspass. There are a number of recorded monuments and structures in the vicinity of the corridor in this area which will require detailed consideration. The corridor will cross to the north of an area of forestry at Derrycoffey before crossing the Yellow River. The corridor will continue along this path crossing Bord na Mona bog, before it approaches the existing 110 kV Derryiron Transmission Station from the north.

Overhead Line Route Corridor 2- Mullingar to Derryiron (Mullingar east via N52 and Ballykilmore)

Mullingar 110 kV Transmission Station to Wooddown Bog

8.15 Route Corridor 2 will exit the Mullingar 110 kV Transmission Station from the north western perimeter and will impact on the existing distribution network and the 110 kV lines in the vicinity. The corridor will pass in a north easterly direction in to the '*Area of Secondary Visual Importance'* designated as part of the Lough Owel Lake Management within the Westmeath County Development Plan (shown in detail on **Appendix 1 Figure 12 Lough Owel Objectives**). Further consideration of the visual impacts of the Overhead Line will be required to determine if the line can be located parallel to the local access road or in the agricultural land at Ballyglass either side and avoid significant visual impacts. The corridor will cross over the Royal Canal, the River Brosna and the Mullingar to Sligo Railway line at a point where all three run in close proximity and parallel to each other and to the south of Culleenmore House a protected castle (WM019-009). The corridor will continue on towards the N4 and the local road alongside the N4. The Overhead Line crossing point will be next to the N4 junction at Culleen Beg. The corridor will run to the south of the area designated as Lough Sheever Fen/Slevin's Lough Complex pNHA and will not impact upon this sensitive site. The corridor will once again cross over the River Brosna a tributary of Lough Sheever. The corridor will run through open agricultural lands to the rear of the properties along the local road and the existing Overhead Lines may require alterations in this area, before crossing over the N52. There are a number of mature trees around this area; however there are no tree protection orders in the vicinity of the route. The route will continue along this path for a couple of hundred of metres before turning and heading southwards avoiding the Wooddown Bog NHA.

Wooddown Bog to N52

8.16 At a point west of the Marlinstown Closed Landfill the corridor will pass in a southerly direction over the N4 to join with the N52 national route to the eastern side of Pettiswood Manor in Mullingar town. The Overhead Line should run generally to the eastern side of this corridor to cross open agricultural land adjacent to the N52 road verges. At Plodstown the corridor passes over the Royal Canal and the Dublin to Mullingar railway line and continues across open flat agricultural land towards Lough Ennell.

8.17 At Tullanisky roundabout area corridor 2 passes into the eastern edge of the Lough Ennell '*Area of Secondary Visual Importance*' as designated within Westmeath County Council County Development Plan 2008-2014[1]. The corridor continues for approximately 8 km within this designation until Dalystown at the south eastern side of Lough Ennell. This section requires detailed consideration to assess possible visual impacts on the amenity of the area. The landscape is undulating with many high hedgerows and it is possible that the Overhead Line would be seen against a backdrop of dark trees and would not be visually intrusive. Additionally this corridor would pass close to Rochfort Demesne. The extent and status of the Demesne must be considered further so that the Overhead Line does not affect the historic setting of the landscape or the character of the setting.

8.18 At Dalystown the corridor passes over a high pressure transmission gas pipe line running in a north easterly direction then curves gently south to avoid the Cloncrow Bog NHA at Tyrellspass. From here the corridor crosses the N6, a 220 kV Power Line and the M6 motorway in quick succession approximately 1 km east of Ballykilmore. The corridor continues in a westerly direction towards the county border into Offaly. It will cross to the north of an area of forestry at Derrycoffey before crossing the Yellow River. The corridor will continue along this path crossing Bord na Mona bog, where it approaches the existing 110 kV Derryiron Transmission Station from the north.

Overhead Line Route Corridor 3- Mullingar to Derryiron (Mullingar west via Rochfortbridge)

Mullingar 110 kV Transmission Station to Walshestown South

8.19 From the Mullingar 110 kV Transmission Station the Overhead Line could pass in a south-westerly direction through agricultural land or, for ease of construction and future maintenance of the line it will be positioned through country side parallel to the existing local road which leads from Walshestown to Ballina. The Overhead Line will impact on low voltage distribution lines in this area and will pass over one at-grade regional road the R393.

Walshestown South to Lynn Cross Roads and the junction with the R400

8.20 After approximately 2 km the route corridor turns in a south-easterly direction. Within this section of the corridor the Overhead Line could be positioned parallel to the local road which leads to Lynn Cross Roads and the junction with the R400. Some alterations to the existing Overhead Lines in the corridor may be required to clear a route for the 110 kV line. According to the Westmeath County Development Plan, this corridor passes through an *'Area of Secondary Visual Importance'* which adjoins the area depicted as '*Mullingar Consolidated Settlement'* in the Lough Ennell, Lake Management Plan. The corridor does not enter into the adjacent High Amenity Area surrounding Lough Ennell (shown in detail on **Part 3 Figure 11 Lough Ennell Objectives**).

8.21 The corridor will impact on two regional roads, the R392 and R390, before passing over the Royal Canal, (pNHA Site code 002103) and disused railway line. From the canal the corridor will continue in south-easterly direction and run parallel to and north of a local road through a conifer plantation. The route will cross Lacy's Canal and a tributary of the River Brosna, both of which feed into Lough Ennell SAC. Thereafter the corridor crosses another regional road which merges with the N52. The Westmeath County Development Plan[1] has designated an area to the south of this corridor as a scenic area '*Views to be preserved or improved'*. The corridor will pass parallel to the existing local road which has an area of Coillte coniferous forestry either side screening views into the High Amenity area to the southwest. The visual impact of the Overhead Line within the '*Area of Secondary Visual Importance'* needs to be considered further, alternatively the impact would be reduced if the Overhead Line were to be positioned to the eastern edge of this corridor to avoid this scenic designation or if an underground option was considered.

N52/R400 to Rochfortbridge

8.22 Where the local road from Lynn's Cross joins with the R400 the corridor will continue southwards towards Gaybrook Village, the Overhead Line will run parallel to the R400 within the agricultural land. The corridor will pass near to Gaybrook Demesne. The extent and status of the Demesne must be considered further so that the Overhead Line does not affect the historic setting of the landscape or the character of the setting. Between Beggstown and Gibbonstown the Overhead Line passes across the underground high pressure gas main and impacts on the local low voltage distribution. The corridor continues in a southerly direction towards Rochfortbridge. Rochfortbridge village includes an Architectural Conservation Area (ACA), and is described in the Westmeath County Development Plan[1] as "*groups of structures or townscape of special interest and has a character worth preserving"*. As such the route of the Overhead Line passes around Rochfortbidge on the eastern side and cross the N6.

Rochfortbridge to Derryiron 110 kV Transmission Station

8.23 South of Rochfortbridge the corridor will continue parallel to the R400 and the Overhead Line could run in the agricultural pasture lands either side. The corridor will cross a 220 kV power line before crossing over the M6 motorway before crossing the Offaly county border. Bord na Mona lands run to the east and west of the R400 at Derrygreenagh and the Overhead Line will travel directly adjacent to the road to avoid disruption to future work operations within Bord na Mona lands. Continuing along the R400 the corridor will cross over several Bord na Mona private narrow gauge industrial railway lines and the Yellow River before entering the existing 110 kV Derryiron Transmission Station at Coolcor either across agricultural pasture lands from the North or along the existing local access route from the East.

Overhead Line Route Corridor 4- Mullingar to Kinnegad (Mullingar west via north of Milltownpass)

Mullingar 110 kV Transmission Station to Walshestown South

8.24 From the Mullingar 110 kV Transmission Station the Overhead Line could pass in a south-westerly direction through agricultural land or, for ease of construction and future maintenance of the line it could be positioned parallel to the local road which leads from Walshestown to Ballina. The Overhead Line will pass over one at-grade regional road, R393.

Walshestown South to Lynn Cross Roads and the junction with the R400

8.25 After approximately 2 km the corridor turns in a south-easterly direction. Within this section of the corridor the Overhead Line could be positioned parallel to the local road which leads to Lynn Cross Roads and the junction with the R400. This corridor passes through an *'Area of Secondary Visual Importance'* which adjoins the area depicted as '*Mullingar Consolidated Settlement'* in the Lough Ennell, Lake Management Plan outlined in the Westmeath County Development Plan[1]. The corridor does not enter into the adjacent High Amenity Area surrounding Lough Ennell (shown in detail on **Part 3 Figure 11 Lough Ennell Objectives**).

8.26 The corridor will cross two regional roads the R392 and the R390 before passing the Royal Canal, (pNHA Site code 002103) and disused railway line. From the canal the corridor will continue in south-easterly direction and parallel to a local road through a conifer plantation and crossing Lacy's Canal and a tributary of the River Brosna, both of which feed into Lough Ennell SAC. Thereafter the corridor crosses another regional road which merges into the N52. The Westmeath County Development Plan[1] has designated an area to the south of this corridor as a scenic area '*views to be preserved or improved'*. The corridor will pass parallel to the existing local road which has an area of Coillte coniferous forestry either side screening views into the High Amenity area to the southwest. The visual impact of the Overhead Line within the '*Area of Secondary Visual Importance'* needs to be considered further however the impact would be reduced if the Overhead Line were to be positioned to the eastern edge of this corridor to avoid this scenic designation. It is

considered that mid-sectional underground cabling is not a viable option along an Overhead circuits and therefore a cabling option is not considered an as an alternative along this stretch. .

R400 to N52 to Kinnegad Transmission Station

8.27 Route Corridor 4 will cross the R400 and will continue along the open countryside between two parcels of forestry woodland and crossing a small tributary over towards Catherinestown. The corridor will follow this direction for approximately 5 km either through open agricultural pasture parallel to a local access road towards Hightown. Subject to ground conditions and land access agreements the corridor could continue along the line of the local access road then back towards the Clonfad area. Otherwise the corridor could continue across open agricultural land and cross the high pressure gas pipe line in the Hightown area. The corridor passes the Athlone Road R161 and crosses the N6 national route and passes underneath an existing 220 kV line and crosses the Kinnegad River before entering into County Meath in a southerly direction. Thereafter the corridor continues on towards Baliteer and Baltinoran before turning and approaching the Kinnegad Transmission Station from the south west and will avoid direct impact on the working quarry.

Overhead Line Route Corridor 5A- Mullingar to Kinnegad (Mullingar east via N4 then north of Milltownpass)

Mullingar 110 kV Transmission Station to Wooddown Bog

8.28 Route Corridor 5A will exit the Mullingar 110 kV Transmission Station from the north easterly perimeter and will impact on the existing distribution and the existing 110 kV lines in the vicinity. The Corridor will pass in a north easterly direction in to the 'Area of Secondary Visual Importance' designated as part of the Lough Owel Lake Management within the Westmeath County Development Plan[1] (shown in detail on **Part 3 Figure 12 Lough Owel Objectives**). Further consideration of the visual impacts of the Overhead Line will be required to determine if the Overhead Line can be located parallel to the local access road or in the agricultural land at Ballyglass either side and avoid significant visual impacts. If the impacts are deemed to be significant, then underground cable within the access road towards Farranstick should be considered. The corridor will cross over the Royal Canal supply canal, the River Brosna and the Mullingar to Sligo Railway line at a point where all three run in close proximity and parallel to each other and to the south of Culleenmore House a protected castle (WM019-009). The corridor will continue on towards the N4 and the local road alongside the N4. The Overhead Line crossing point will be next to the N4 junction at Culleen Beg. The corridor will run to the south of the area designated as Lough Sheever Fen/Slevin's Lough Complex pNHA and will not impact upon this sensitive site. The corridor will once again cross over the River Brosna a tributary of Lough Sheever. The corridor will run through open agricultural lands to the rear of the properties along the local road and the existing Overhead Lines may require alterations in this area, before crossing over the N52. There are a number of mature trees around this area; however there are no tree protection orders in the vicinity of the route. The route will continue along this path for 2-3 km avoiding the Wooddown Bog NHA.

Wooddown Bog to Toranstown and to Kinnegad Transmission Station

8.29 At the Greatdown area west of The Downs corridor 5A will turn and head south crossing the N4 and the Royal Canal at the point where both corridors run parallel and close to each other. Currently at this point there is an existing footbridge over the Royal Canal and a 38 kV line runs over the canal. The corridor will continue southwards across an area of bog land and pass over the Dublin to Mullingar railway then head towards Cartronganny, Clownstown and Tornanstown.

8.30 The corridor will then head in a south-eastwards direction towards Hightown or Balloughter. There is a high pressure gas pipe line running in a north-easterly direction to the south of Hightown. The corridor will need to pass over this gas pipe line. From here the route will resume in a south easterly direction towards the N6 at Rattin. Here the corridor will cross the N6, M6 motorway and will maintain this orientation for approximately 1km and will pass underneath an existing 220 kV

line and Kinnegad River. The corridor will resume this direction crossing over the county border into County Meath and on towards Baliteer and Baltinoran and Kilkeeran. The corridor will turn in an easterly direction and approach the Kinnegad Transmission Station from the west. The Lagan Cement quarry is located directly to the north and east of the Transmission Station, this route will avoid direct impact on the working quarry.

Overhead Line Route Corridor 5B- Mullingar to Kinnegad (Mullingar east via N4 and west of Kinnegad)

Mullingar 110 kV Transmission Station to Wooddown Bog

8.31 Route Corridor 5B will exit the Mullingar 110 kV Transmission Station from the north eastern perimeter. The Corridor will pass almost immediately in to the '*Area of Secondary Visual Importance'* designated as part of the Lough Owel Lake Management within the Westmeath County Development Plan [1](shown in detail on **Part 3 Figure 12 Lough Owel Objectives**). Further consideration of the visual impacts of the Overhead Line will be required to determine if the line can be located either parallel to the local access road or in the agricultural land at Ballyglass either side and avoid significant visual impacts. If the impacts are deemed to be significant then undergrounding within the local road leaving the Mullingar 110 kV Transmission Station towards Farranstick should be considered. The corridor will cross over the Royal Canal supply canal, Mullingar to Sligo Railway line and River Brosna at a point where all three run in close proximity and parallel to each other and to the south of Culleenmore House a protected castle (WM019-009). The corridor will continue on towards the N4 and the local road alongside the N4. The crossing point will be next to the N4 junction at Culleen Beg. The corridor will run to the south of the area designated as Lough Sheever Fen/Slevin's Lough Complex pNHA and will not impact upon this sensitive site. The corridor will once again cross over the River Brosna a tributary of Lough Sheever. The corridor will run through open agricultural lands to the rear of the properties along the local road before crossing over the N52. There are a number of mature trees around this area; however there are no tree protection orders in the vicinity of the corridor. The corridor will continue along this path for a couple of hundred of metres before turning and heading southwards avoiding the Wooddown Bog NHA.

Wooddown Bog to Kinnegad Transmission Station west of Kinnegad town

8.32 From south of Wooddown Bog NHA to Kinnegad the corridor continues in a south easterly direction generally parallel to the N4 road and through flat agricultural pasture land. The corridor will cross one regional road R156 in the area of The Downs before crossing the Royal Canal, the Royal Canal Way and the Dublin to Sligo Railway at a point where these are in close proximity to each other. The corridor then continues in a south easterly direction passing to the north of Coralstown village, regional road R161 and the N4. Corridor 5B passes to the south of Mount Hevey SAC and does not impact upon this area.

8.33 The corridor passes around Kinnegad town to the western side into County Meath, passing over a high pressure transmission gas pipe line running in an easterly direction and then will cross the M4 Motorway before the road splits into M4/M6 at Kinnegad i.e. after junction 11. This corridor will require the crossing of two regional roads on the western side of Kinnegad (R161 and R401) and one national route (N4) before generally following a local access road.

8.34 The route will turn in an easterly direction and approach the Kinnegad Transmission Station from the north east, crossing the existing 220 kV line and entering into the Transmission Station from the west to avoid direct impact on the working quarry. Further discussions with Lagan Quarries are expected to ascertain the most efficient and least disruptive route to be taken to the Transmission Station, considering future quarrying activities.

Underground Cabling Route Corridor 1- Mullingar to Derryiron (Mullingar west via Rochfortbridge)

Mullingar 110 kV Transmission Station to Lynn Cross Roads

8.35 From the Mullingar 110 kV Transmission Station the corridor passes in a south-westerly direction along the lane towards the R393. A 38 kV underground cable has been laid along the first part of this lane and the lane has been resurfaced. The route alignment design for the new 110 kV cable will need to take this into account. After crossing the R393 the corridor continues along the lane towards Rathcolman but turns to the south west towards the cross roads before reaching Rathcolman.

8.36 The corridor then crosses the R392 and R390 roads in quick succession. The junction with the R392 has recently been realigned and resurfaced. The Royal Canal and the disused railway line to Athlone are crossed in quick succession and a directional drill under both may be considered.

8.37 The corridor continues to the Northwest of Loch Ennell following the line of the lane to Butlers Bridge over the Lacy's Canal. The line of the River Brosna was not easily identified at this point so any excavations could be expected to be quite wet in this vicinity. It is considered that there is insufficient depth within the bridge to accommodate the cable route. An alternative solution will be required to cross Lacy's Canal such as direction drilling or temporarily damming the Canal, laying the cable in an open trench then reinstating the watercourse. It should be noted that there is an existing Gas Main attached to the side of the bridge. The R156 is crossed at Lynn Cross Roads.

Lynn Cross Roads to Rochfortbridge

8.38 From Lynn Cross Roads the corridor follows the lane to the junction of the R400. Just before the junction the corridor crosses an underground gas main. As mentioned previously further discussions with Bord Gais will be held once the preferred route corridor is selected. The R400 road is then followed southwards towards Rochfortbridge.

8.39 Shortly after the corridor joins the R400, the road crosses the N52 on a new over bridge and if there is insufficient capacity to lay the cable in the bridge it will be necessary to drop down on to the verge of the N52 under the bridge and back up to the R400 road. There is a large school on the R400 at Gainestown and special consideration will need to be given if the excavations pass this school to ensure the safety of pupils and traffic and to minimise disruption to school transport.

8.40 The corridor continues along the R400 road and about 500m south of Beggstown the route is crossed by a gas main and further discussions will the held with Bord Gais. The section of the R400 into Rochfortbridge has a lot of significant mature trees along its route so arboreal advice would need to be taken to avoid damaging these trees. The corridor crosses the N6 in Rochfortbridge and a tributary of the Mongagh River is bridged on this junction.

Rochfortbridge to Derryiron 110 kV Transmission Station

8.41 The corridor leaves Rochfortbridge in a south westerly direction following the R400 road then it crosses the M6 Motorway. The existing motorway utility ducting is insufficient for the 110 kV circuit therefore the proposed corridor will either go over the road (for the Overhead Line) or within a new duct created by directional drilling (for the Underground Cable).

8.42 From the motorway, the corridor follows the R400 Bog Road for approximately 8 km towards Rhode for the majority of the distance to Derryiron 110 kV Transmission Station. This road provides the main transport artery for the Bord na Mona (BNM) peat workings which are extensive on both sides of the road. There are a large number of heavy vehicle movements along this road. The construction of this carriageway is uncertain as it passes over peat bogs and so reinstatement costs may be higher than anticipated compared to the rest of the route.

8.43 The corridor crosses the Mongagh River which is contained in a culvert approximately 6 m below the road surface and which will have no impact on the standard cable trench depth. Between the

Mongagh and Yellow Rivers, adjacent to BNM Offices, the corridor crosses an industrial railway system that moves the peat from the Workings. A single track railway line passes under a bridge along the R400 road. It is considered that there is insufficient cover to accommodate a cable in the existing bridge deck and alternative crossing of the private railway line will be necessary for example using open cut or directional drilling methods..

8.44 The corridor approaches Derryiron 110 kV Transmission Station from the North. A new access road has just been installed to the Generation Plant adjacent to the Transmission Station. But to avoid excavating the new road it may be possible to obtain a route for the cable to the western side of the Generation Plant.

Underground Cabling Route Corridor 2- Mullingar to Kinnegad (Mullingar east via N4 then north of Milltownpass)

Mullingar 110 kV Transmission Station to N52/N4 Junction

8.45 From Mullingar 110 kV Transmission Station the corridor crosses the field to the north of the Transmission Station and exits into the lane in the northeast corner. It then follows the line of the lane to Farranistick, to join the Ballyglass to Culleen More road south of Lough Owel. It then turns south west before turning east onto the L5704 road towards the N4 road. The corridor crosses the Mullingar - Sligo railway line and the feeder water supply to the Royal Canal from Lough Owel. Both crossings will be difficult and it may require two directional drillings. The corridor also takes in the site of a holy well, castle and graveyard on this section.

8.46 Access can be gained to the N4 by the embankment and once on to the line of the N4 a route would be established using a combination of the old road, slip roads and the verges of the N4.

8.47 The corridor passes two junctions. The first one gives access onto the R394 road to Mullingar and Castlepollard. The second one gives access to the N52 to Kells and Navan and the R400 road to Mullingar. At the third junction where the new N52 road that will eventually carry the traffic from Clonmore Industrial Estate at Mullingar joins the N4 the corridor turns south.

N52/N4 Junction to N6 at Rattin midway between Milltownpass and Kinnegad

8.48 The corridor follows the line of the new N52 through Marlinstown to Plodstown. Along this section the N52 crosses the Royal Canal and the Dublin - Mullingar Railway line via a new bridge. The bridge has not been investigated at this stage, thus it is unknown if it includes existing ducts: if this option becomes the preferred route, the subsequent route alignment design will involve the investigation of said bridge. Further negotiations will be at the route alignment design stage with the NRA/WCCPO to determine the feasibility of incorporating the cable within the structure or directional drilling to install a new duct under the Canal. Due to significant difference in levels between the Canal and the Railway line the crossing may have to be two separate drillings.

8.49 At Plodstown the corridor takes to following the lanes through to the N6 to the east of Milltown Pass. These lanes have wide verges in many places along the corridor and so the cables could be laid in a mixture of verges and carriageway. The corridor passes through Burnellstown, Ardillon, Burnellstown, Russellstown to Catherinestown then east to Tornanstown, Knockaville, Hightown. At Crossanstown the corridor turns south west through Clonfad to meet the N6 at Rattin, midway between Milltownpass and Kinnegad. The corridor follows the N6 eastwards for about 100 m before turning south.

N6 at Rattin midway between Milltownpass and Kinnegad to Kinnegad Transmission Station

8.50 As the corridor turns south it crosses the Maynooth - Shannonbridge 220 kV line on the approach to the M6 Motorway. Further negotiations are required with the NRA/WCCPO to determine the feasibility of incorporating the cable within the structure, directional drilling to install a new duct under the motorway or utilising an existing culvert carrying a tributary of Kinnegad River.

8.51 The corridor follows the line of the M6 for approximately 1 km before turning southeast. In this section the corridor crosses the Westmeath / County Meath boundary.

8.52 At Kilaskillen the corridor meets the access road to Lagan Cement and Asphalt and turns southwest to follow the access road to the Transmission Station.

Underground Cabling Route Corridor 3- Mullingar to Kinnegad (Mullingar east via N4 and west of Kinnegad)

Mullingar 110 kV Transmission Station to N4 National Road

8.53 From Mullingar 110 kV Transmission Station the corridor crosses the field to the north of the Transmission Station and exits into the lane in the northeast corner. It then follows the line of the lane to Farranistick, to join the Ballyglass to Culleen More road south of Lough Owel. It then turns south west before turning east onto the L5704 road towards the N4 road. The corridor crosses the Mullingar to Sligo railway line which is due to be electrified in the future and the feeder water supply to the Royal Canal from Lough Owel. Both crossings will be difficult and it may require two directional drillings. The corridor also takes in the site of a holy well, castle and graveyard on this section.

8.54 Access can be gained to the N4 by the embankment off the L5704 road.

Mullingar 110 kV Transmission Station to N4 National Road

8.55 The corridor follows the route of the N4 and it is anticipated that the cable route could utilise the old road, the verges and adjacent private land in one instance, to arrive at a road that crosses under the N4 just west of Griffithstown where the N4 changes to the M4.

8.56 The junctions provide the only obstructions to a cable route. The first one gives access onto the R394 road to Mullingar and Castlepollard. The second one gives access to the N52 to Kells and Navan and the R400 road to Mullingar. At the third junction the new N52 road that will eventually carry the traffic from Clonmore Industrial Estate at Mullingar joins the N4. The other junctions are carriageway crossings and linking should not provide any obstacles to a cable route.

8.57 There is an existing road underpass that crosses underneath the N4 just before Griffithstown which could provide a means for the cable route to cross the N4 subject to agreement with the NRA/WCCPO.

N4 National Road to Kinnegad Transmission Station

8.58 On leaving the line of the N4 road at Griffithstown the corridor follows the line of the lane that goes underneath the N4 to cross the N6 and the M6 at Monganstown. Between the N6 and the M6 the corridor crosses a small area of farmland to the motorway.

8.59 The options for crossing the M6 within the corridor are to carry out a directional drill, utilise a culvert carrying a tributary of Kinnegad River or to utilise any existing ducts that may exist providing they are a sufficient size.

8.60 After crossing the motorway the corridor crosses the Maynooth- Shannonbridge 220 kV line and the West Meath / County Meath boundary before turning southwest to Kilaskillen where it meets the access road to Lagan Cement and Asphalt and turns southwest to follow the access road to the Transmission Station.

9. Part A- Summary

9.1 This part of the Constraints and Route Corridor Report (Part A) has described the rationale for the project and the strategic planning context, and it has examined the project from conception to identification of general constraints and the selection of preliminary route corridors.

9.2 Part B examines the constraints affecting each of the preliminary routes corridors and their minor variant links (Overhead Lines and Underground Cabling Options) in the key areas of Landscape and Visual, Fauna and Flora, Cultural Heritage and includes Engineering Constraints.

PART B-Engineering and Environmental Constraints

10. Overview of Engineering Design and Route Corridors

Introduction

10.1 This section of the Constraints and Route Corridor Report, Part B, examines the constraints affecting each of the preliminary Route Corridors and their minor variant links (Overhead Lines and Underground Cabling Options) as described in Part A of the Report, in the key areas of Landscape & Visual, Flora and Fauna, Cultural Heritage and Engineering Constraints. This section makes conclusions on the Preferred Route Corridors. All figures are located in Appendix 1.

Landuse

10.2 There is a diversity of land uses within the study area, including grasslands, peatlands and woodlands. The footprint of the proposed structures will be lost to agricultural or potential agricultural use. The minimum vertical clearance along the route is 7 m which is in line with EirGrid's overhead line standards,[20] and is sufficient to accommodate all agricultural machinery. Where power lines traverse forestry land, there is a requirement to create a buffer zone of cleared land at ground level, following the potential route.

For under ground cables a corridor of 5M wide is generally required but this may need to be extended where obstructions, such as other utilities, are encountered on the route.

Health and Safety

10.3 EirGrid regard the protection of the health, safety and welfare of its staff and the general public as a core company value. The Irish Transmission and Distribution Systems are designed, constructed and operated in accordance with all national and EU Safety Regulation and in accordance with best international practice. Extensive studies have been undertaken on the health risks associated with high voltage circuits. Guideline Reference levels for exposure to electro-magnetic fields (EMF) have been set by the International Commission on Non-Ionising Radiation Protection (ICNIRP) who advise the World Health Organisation (WHO) on non-ionising radiation matters. EirGrid will adhere to international and national standards and guidelines, where feasible the proposed 110 kV circuit will be located at a minimum distance of 50 m from residences.

Summary of Engineering Circuit Design

10.4 The new 110 kV Overhead Line to be constructed between Mullingar and Derryiron or Kinnegad shall have a minimum conductor rating of 187 MVA or 1170 Amps which equates to EirGrid standard 430 mm^2 ACSR conductor (Bison or equivalent) operating at 80 Degree C. Alternatively for an 110 kV Underground Cable route this will be equivalent to 1000 mm^2 Copper XLPE cable laid in trefoil with joints at approximately 400m spacing.

10.5 The entire Overhead Line shall include double earthwires or OPGW. The 110 kV EirGrid line design specification for the above requirement is using standard wood pole portal construction for intermediate/suspension structures and lattice steel section/angle and terminal structures. Geometric outlines for such standard Single Circuit and Double Circuit structures are shown on **Appendix 1 Figures 5-9 Constraints Report**. A typical structure comprises a 110 kV Single Circuit lattice steel and wood pole portal construction.

Cables

10.6 For all Underground Cable Routes it will be necessary to install joint bays along the route to join up the drum lengths of cable. It is anticipated that each drum length will be a maximum of 400 m to maintain the weight to a safe lifting and handling limits. With 400 m on each drum they will weigh 6.4 tonnes approximately and there will be 6 stationed at each joint bay during the pull.

10.7 The inability to be able to pull the cable through tight angles will mean that there will be occasions where additional joint bays will be required to achieve cable installation.

10.8 Assuming drum lengths of 400 m there would be approximately 70 joint bays on Underground Cable Route Corridor 1; 75 on Underground Cable Route Corridor 2; and 60 on Underground Cable Route Corridor 3.

Directional Drilling

10.9 It is anticipated that directional drillings may be required at the following locations on the specified cable routes:

- Royal Canal and disused railway line – Kilpatrick Bridge. Underground Cable Route Corridor 1;
- M6 Motorway. Underground Cable Route Corridors 1, 2 and 3;
- Royal Canal supply stream and railway south of Faranistick. – Underground Cable Route Corridors 2 and 3; and
- Royal Canal and Mullingar to Dublin railway adjacent to N52 north of Plodstown. – Underground Cable Route Corridor 2.

10.10 A typical directional drilling section is shown in **Appendix 1 Figure 14 Typical Directional Drilling Section**.

Summary of Route Corridors

10.11 The five Overhead Line Route Corridors (plus minor variants) are summarised below and illustrated on **Appendix 1 Figure 3 Overhead Line Route Corridors**. Route Corridors 1A, 1B, 2, and 3 links Mullingar 110 kV Transmission Station to Derryiron 110 kV Transmission Station and corridors 4, 5A and 5B link Mullingar 110 kV Transmission Station to Kinnegad Transmission Station. Full descriptions of each of the Route Corridors are detailed in Chapter 8 within Part B Constraints Report. Within the description of each corridor, constraints or aspects of the route which need further consideration by either an environmental specialist or through discussion with a local authority or a utility company have been identified.

10.12 The three Underground Cabling Route Corridors are also summarised below and illustrated on **Appendix 1 Figure 4 Underground Cabling Route Corridors**. Route Corridor 1 links Mullingar 110 kV Transmission Station to Derryiron 110 kV Transmission Station and Corridors 2 and 3 link Mullingar 110 kV Transmission Station to Kinnegad Transmission Station. Within the description of each corridor, constraints or aspects of the route which need further consideration by either an environmental specialist or through discussion with a local authority or a utility company have been identified. **Appendix 1 Figure 10 Soil and Geology** illustrates the presence of peat and bedrock outcrops which affect potential ground conditions for construction of trench routes and construction tracks.

Overhead Line Route Corridor 1A- Mullingar to Derryiron (Mullingar west via Castletown Geoghegan)

General Corridor Constraints

10.13 Route Corridor 1A will leave the existing 110 kV Mullingar Transmission Station from the south westerly side and will pass in a south westerly direction through flat agricultural land to the west of Mullingar town and thereby avoiding the town itself. The corridor turns in a gentle south-westerly curve to cross the Royal Canal and passes to the west of Lough Ennell and avoids the Lough which is a Special Protection Area, Special Area of Conservation, proposed Natural Heritage Area and a High Amenity Area. It passes to the west of Nure Bog Natural Heritage Area (NHA) then curves in a south easterly direction running parallel but outside of the Split Hill and Long Hill Esker SAC/pNHA to pass Cloncrow Bog Natural Heritage Area (NHA) before passing to the north of but not within the Croghan Hill, High Amenity Area. This corridor then passes across an area of Bord na Mona land and into Derryiron 110 kV Transmission Station. As corridor 1A avoids the consolidated urban settlement of Mullingar and the major High Amenity Area and Ecologically Sensitive Areas of the study area an Overhead Line is being considered at this stage within this corridor.

Overhead Line Route Corridor 1B- Mullingar to Derryiron (Mullingar west via Castletown Geoghegan and Ballykilmore)

General Corridor Constraints

10.14 As for Route Corridor 1A, Route Corridor 1B will leave the existing 110 kV Mullingar Transmission Station from the south westerly side and will pass in a south westerly direction through flat agricultural land to the west of Mullingar town and thereby avoiding the town itself. The corridor turns in a gentle south-westerly curve to the west of Lough Ennell and avoids the Lough which is a High Amenity Area, Special Protection Area, Special Area of Conservation and proposed Natural Heritage Area. It passes to the west of Nure Bog Natural Heritage Area then curves in a south-easterly direction running parallel but outside of the Split Hill and Long Hill Esker SAC/pNHA to pass Cloncrow Bog Natural Heritage Area before passing between two areas of Bord na Mona land and into the Derryiron 110 kV Transmission Station from the northern perimeter. As corridor 1B avoids the consolidated urban settlement of Mullingar and the major High Amenity Area and Ecologically Sensitive Areas of the study area, an Overhead Line is being considered at this stage within this corridor.

Overhead Line Route Corridor 2- Mullingar to Derryiron (Mullingar east via N52 and Ballykilmore)

General Corridor Constraints

10.15 Route Corridor 2 will leave the existing 110 kV Mullingar Transmission Station from the north western perimeter and head in a north easterly direction through an '*Area of Secondary Visual Importance'* designated as part of the Lough Owel Lake Management within the Westmeath County Development Plan (2008-2014). The Corridor will then cross the Mullingar to Sligo Railway line, the Royal Canal supply canal, the River Brosna and the N4. The corridor then curves around the eastern side of Mullingar town generally parallel to the N4 and thereby avoiding the town itself. The corridor turns to the south at Marlinstown Closed Landfill and passes over the N4 and the Royal Canal and runs parallel to the N52. The corridor passes to the east of Lake Ennell which is a High Amenity Area, Special Protection Area, Special Area of Conservation and proposed Natural Heritage Area, and continues to run parallel to the N52 to Ballykilmore. From Ballykilmore the corridor runs in an easterly direction passing between two areas of Bord na Mona land and into the Derryiron 110 kV Transmission Station from the northern perimeter. Route Corridor 2 avoids the consolidated urban settlement of Mullingar and the major High Amenity Area and Ecologically Sensitive Areas of both Lough Owel and Lough

Ennell. However it does pass through an '*Area of Secondary Visual Importance'* associated with Lough Owel Lake management and due to the potential for visual impact a combination of both overhead line and underground cables are considered at this stage within this corridor.

Overhead Line Route Corridor 3- Mullingar to Derryiron (Mullingar west via Rochfortbridge)

General Corridor Constraints

10.16 Route Corridor 3 will leave the existing 110 kV Mullingar Transmission Station from the south westerly side and will continue in this direction through flat agricultural land to the west of Mullingar town and thereby avoiding the town itself. The corridor turns in a south easterly direction and avoids the Lake Ennell which is a High Amenity, Area Special Protection Area, Special Area of Conservation and proposed Natural Heritage Area. The corridor follows the route of R400 regional road passing to the east of Rochfortbridge. Route Corridor 3 avoids the consolidated urban settlement of Mullingar and the major High Amenity Area and Ecologically Sensitive Areas of the Study area however it does pass through an '*Area of Secondary Visual Importance'* associated with the Lough Ennell Lake Management within Westmeath County Development Plan[1].

Overhead Line Route Corridor 4- Mullingar to Kinnegad (Mullingar west via north of Milltownpass)

General Corridor Constraints

10.17 Route Corridor 4 will leave the existing 110 kV Mullingar Transmission Station from the south westerly side and will continue in this direction through flat agricultural land to the west of Mullingar town and thereby avoiding the town itself. The corridor turns in a south easterly direction and avoids the Lake Ennell which is a High Amenity Area, Special Protection Area, Special Area of Conservation and proposed Natural Heritage Area, then crosses the R400 regional road. From the R400 the corridor passes generally in a south easterly direction along local access roads and crosses the N6 national road and passes a 220 kV transmission line and M6 motorway before entering the Kinnegad Transmission Station via the access road. Corridor 4 avoids the consolidated urban settlement of Mullingar and the major High Amenity Area and Ecologically Sensitive Areas of the Study area however it does pass through an '*Area of Secondary Visual Importance'* close to Lough Ennell and due to the potential for visual impact, a combination of overhead lines and underground cables are considered at this stage within this corridor.

Overhead Line Route Corridor 5A- Mullingar to Kinnegad (Mullingar east via N4 then north of Milltownpass)

General Corridor Constraints

10.18 Route Corridor 5A will leave the existing 110 kV Mullingar Transmission Station from the north easterly side and will pass through an '*Area of Secondary Visual Importance'* designated as part of the Lough Owel Lake Management within the Westmeath County Development Plan. The Corridor will then cross the Mullingar to Sligo railway line, the N4 and the River Brosna. The corridor then curves around the eastern side of Mullingar town generally parallel to the N4 and thereby avoiding the town itself. The corridor turns to the south in the Greatdown townlands and passes over the Royal Canal and the N4 national route at a point where these are closest together. The corridor then passes south over the Dublin to Sligo railway line and after approximately 3 km turns southeast to follow local access roads, crossing the N6 national road, the M6 Motorway and passing under a 220 kV transmission line before entering the Kinnegad Transmission Station from the west. Corridor 5A avoids the consolidated urban settlement of Mullingar and the major High Amenity Area and Ecologically Sensitive Areas of both Lough Owel and Lough Ennell. However it does pass through an '*Area of Secondary Visual Importance'*

associated with Lough Owel Lake management and due to the potential for visual impact a combination of overhead and underground cables are considered at this stage within this corridor.

Overhead Route Corridor 5B- Mullingar to Kinnegad (Mullingar east via N4 and west of Kinnegad)

General Corridor Constraints

10.19 Corridor 5B will leave the existing 110kV Mullingar Transmission Station from the north easterly side and will pass through an '*Area of Secondary Visual Importance'* designated as part of the Lough Owel Lake Management within the Westmeath County Development Plan[1] (2008-2014). The Corridor will then cross the Mullingar - Sligo railway line, the N4, the Royal Canal supply canal, and River Brosna. The corridor then curves around the eastern side of Mullingar town generally parallel to the N4 and thereby avoiding the town itself. It then runs parallel to the N4 crossing the Royal Canal and the Dublin -Mullingar railway line. Near Coralstown the corridor turns south to cross the old N4 and the new N4. After crossing the M6 motorway the corridor crosses the 220 kV transmission line and turns south east towards Kinnegad Transmission Station. The corridor approaches the Transmission Station from the west. Corridor 5B avoids the consolidated urban settlement of Mullingar and the major High Amenity Area and Ecologically Sensitive Areas of both Lough Owel and Lough Ennell. However it does pass through an '*Area of Secondary Visual Importance'* associated with Lough Owel Lake management and due to the potential for visual impact a combination of overhead and underground cables are considered at this stage within this corridor

Underground Cabling Route Corridor 1- Mullingar to Derryiron (Mullingar west via Rochfortbridge)

General Corridor Constraints

10.20 Underground Route Corridor 1 will leave the existing 110 kV Mullingar Transmission Station from the south-westerly side of the Transmission Station and will pass either in the verge or carriageway in a south westerly direction along the lane to the crossroads with the R393 road to the west of Mullingar town and thereby avoiding the town itself. The corridor crosses the R393 road and follows the lane before turning south to Rathcolman Crossroads crossing the R392 and R390 before crossing the Royal Canal and the disused railway line to Athlone.

10.21 The corridor passes to the west of Lough Ennell in the vicinity of Butlers Bridge and avoids the Lake which is a High Amenity Area, Special Protection Area, Special Area of Conservation and proposed Natural Heritage Area. The corridor heads for the R400 road via Lynn Cross roads. The corridor then follows the R400 to Rochfortbridge, through the town and crosses the M6 Motorway south west of Rochfortbridge. The route then picks up the line of the R400 known as the Bog Road, through Bord na Mona land and into Derryiron 110 kV Transmission Station from the North.

Underground Cabling Route Corridor 2- Mullingar to Kinnegad (Mullingar east via N4 then north of Milltownpass)

General Corridor Constraints

10.22 Underground Route Corridor 2 leaves Mullingar 110 kV Transmission Station to the North East and follows the lane towards Farranistick either in the verge or carriageway where it crosses the Ballyglass to Cullen More road. It then follows the route of the local road L5704 in a northeast direction to join the line of the N4 National road. The corridor passes two junctions before turning south at the third junction of the N4, to follow the route of the N52. At Plodstown the corridor turns to the south east and follows the line of the lanes through Burnellstown and Ardillon to Knockbeg. The corridor turns east through the townships of Tornanstown, Knockville, Hightown,

Crossonstown before turning south east to cross the N6 just south of Clonfad. The M6 motorway is then followed in an easterly direction for a short while following approximately the line of the 220 kV transmission line before turning southwest into Kinnegad Transmission Station.

Underground Cabling Route Corridor 3- Mullingar to Kinnegad (Mullingar east via N4 and west of Kinnegad)

General Corridor Constraints

10.23 Along the N4 road it is envisaged that the cable route could utilise the old road, the verges of the N4 and adjacent private land in one instance. It is also anticipated that the existing road under the crossings could be utilised subject to being a suitable size for EirGrids needs.

10.24 The start and the end of this corridor are the same as for underground cabling Route Corridor 2.

10.25 Underground Route Corridor 3 leaves Mullingar 110 kV Transmission Station to the North East and follows the lane towards Farranistick where it crosses the Ballyglass to Cullen More road. It then follows the route of the L5704 road in a northeast direction to join the line of the N4 National road. The corridor passes along the N4 for some 13 km before turning south just before it changes to the M4 at Griffithstown.

10.26 The corridor crosses the N6 and the M6 motorway about 3.5 km west of Kinnegad. After crossing the M6 motorway the corridor crosses the 220 kV transmission line and then heads southeast to pick up the access road into Kinnegad Transmission Station.

11. Environmental Comparison of Overhead Lines and Underground Cables

Methodology

11.1 Detailed environmental studies were carried out of the 8 preliminary Route Corridors and their minor variant links (Overhead Lines and Underground Cabling options) in the key areas of Landscape and Visual, Ecology and Cultural Heritage to assess if a preferred corridor could be established on environmental grounds. Full reports in these areas are included within **Appendix 2 Detailed Environmental Study Reports**; a summary of the findings of each study is described below.

11.2 All routes have been assessed in terms of:

- Environmental Aspects of European, National and Regional importance (landscape and visual, ecology and cultural heritage); and
- Property count within each 1 km wide Route Corridor including residential, schools and hospitals.

Man-Made Constraints

11.3 An estimate of the number of properties within each 1 km wide corridor has been carried out An Post GeoDirectory[17] to locate all residential buildings, schools and hospitals to be avoided as part of the project constraints.

11.4 All residential properties, schools and hospitals to be avoided as part of the project constraints are shown in **Appendix 1 Figure 34 Properties and Schools in Overhead Line Route Corridors** and **Figure 35 Properties and Schools in Underground Cable Route Corridors**. Table 1.1 below shows the estimated number of properties and schools.

Table 11.1 - Estimated Number of Properties, Schools and Hospitals in each Route Corridor

	Overhead Route Corridors							Underground Cable Route Corridors		
	1A	**1B**	**2**	**3**	**4**	**5A**	**5B**	**1**	**2**	**3**
No. of Properties	400	467	728	350	346	434	461	835	1000	879
No. of schools and hospitals	1	1	1	2	1	-	1	3	-	1

Evaluation of Route Corridors

11.5 The study area is largely rural in nature apart from the town of Mullingar and the towns of Rochfortbridge, Kinnegad, Tyrellspass, Killucan, Rhode and Kilbeggan. There is a predominance of one off housing and ribbon development in the study area. One of the main constraints in routing of Overhead Lines is avoiding existing residential developments such as houses, schools and hospitals. Underground Cabling is generally installed within public road side verges, roads or agricultural land in order to minimise disruption to private dwellings and private land owners. An estimate of the number of properties within 1km of each route corridor has been carried out to locate all residential buildings (and schools) to be avoided as part of the project constraints. There are approximately 16,058 properties within the study area. Route Corridor 2 is the least

preferred Overhead Line Option, there are approximately 728 properties within the route corridor. The Underground Cable Route Corridors, 1, 2, and 3, also encounter a significant number of properties between 835-1000 and 1-3 schools/hospital within the 1 km corridor.

Preferred Route Corridor

11.6 EirGrid aims to site the Overhead Lines a minimum distance of 50 – 60 metres from existing dwellings, schools and hospitals from the centre of the line. Underground Cabling is generally installed within public road side verges, roads or agricultural land in order to minimise disruption to private dwellings and private land owners. Overhead Line Route Corridors 1A, 1B, 3, 4, 5A and 5B generally have between 346-467 properties and 1-2 schools, within 1 km route and are generally preferred.

Natural/ Environmental Constraints

Landscape and Visual - Overhead Line Route Corridors

Methodology

11.7 The assessment of the potential landscape and visual impacts of the various Overhead Line Route Corridors was carried out on a qualitative basis by: -

(i) Carrying out a desk-top study to assess the current character and landscape capacity of the existing landscape using aerial photography and 1:50,000 mapping;
(ii) Review of the relevant Development Plans[1,2,3], and current literature relevant to the study area and mapping of sensitive landscapes, Demesnes, walking and cycling routes, tree preservation orders, viewsheds of protected viewpoints and scenic driving routes, High Amenity Areas, and Natura 2000 sites;
(iii) Mapping of primary screening vegetation (woodland and commercial forestry);
(iv) Assessment of potential impacts of each corridor on the receiving landscape e.g. paralleling roads or natural linear features, impacts arising from proximity or cumulative effects, proximity to settlement and crossing of transport corridors;
(v) Assessment of opportunities for mitigation e.g. background and screening provided by topography or woodland, location of line within corridor to avoid sensitive features; and
(vi) Site survey to confirm findings of desk study.

Environmental Aspects

11.8 The character of the landscape is determined by flat topography, agriculture (with a strong network of hedges), lakes and bogland. The south eastern part of the study area is dominated by the bog landscape, associated coniferous forestry and commercial/private peat extraction. As the landscape within the study area is predominantly low lying, small hills tend to have landscape and archaeological significance e.g. Croghan Hill and the Hill of Uisneagh. Where there are no screening features such as topography or vegetation, there are opportunities for wide views. Wide views are also available from slightly elevated areas within the landscape however; the hedgerow network provides enclosure within the landscape in many areas.

11.9 Royal Canal Corridor is an important amenity feature within the northern portion of the study area and parts of the canal corridor are high in scenic quality with mature vegetation cover of hedgerows and tree lines. It is a policy of the Westmeath County Council (*P-EH54)* to "*protect the visual corridor of the canal by incorporating a visual assessment zone of 500 m on each bank of the canal in which all development proposals are assessed for their impact on landscape character of the Royal Canal ".*

11.10 Lough Owel and Lough Ennell are significant landscape features in the north-western part of the study area; they are Areas of High Amenity and provide recreation opportunities for the local population and visitors. A number of rivers also pass through the area including the River Brosna.

11.11 The study area contains a large number of Demesne landscapes, which contribute to the wooded character of some parts of the study area. These Demesne landscapes are in various states of intactness; the Belvedere estate is of particular importance and is open to the public as a popular attraction. The Character Areas and Sensitivity Ratings for Overhead Line Routes are shown on **Appendix 1 Figure 21 Landscape Character Areas and Sensitivity Ratings**.

11.12 There are a number of Scenic Views across the wider study area: nine view points within County Westmeath, and four within County Offaly. These are shown on **Appendix 1 Figure 22 Landscape and Visual Constraints and Scenic Viewsheds for Overhead Line Route Corridors.**

11.13 A graphic summary of the Landscape Sensitivity Hotspots is illustrated in **Appendix 1 Figure 23 Landscape Sensitivity Hotspots for Overhead Line Route Corridors**. This summarises the findings of the baseline study which is described in detail below. The landscape hotspots comprise of High Amenity Areas, up to 3 km of the viewshed of protected viewpoint, Demesne landscapes and a 500 m zone from walking / cycling / driving routes.

Evaluation of Route Corridors

11.14 A preliminary assessment was carried out of the five Overhead Line Route Corridors, with two associated deviations (Route Corridors 1A, 1B, 2, 3, 4, 5A and 5B). The length of each corridor which passes through, or potentially impacts upon designated or recreational landscapes or view points was measured and the number of river and road crossing was also considered. The interaction with ecologically designated sites and key cultural heritage features including demesnes, graveyards was also considered. Mitigation of impacts of the overhead route within the 1 km route corridor was discussed. These comprise maintaining a maximum distance from parallel roads, sites of scenic amenity and protected viewpoints; crossing the Royal Canal and walking/cycling routes in a perpendicular manner, making use of localised screening when positioning the over head line, avoiding Lough Ennell and Lough Owel, avoid disruption of skylines and ridges by Overhead Lines and where possible avoid demesne landscapes.

11.15 The residual impact of each route corridor was determined on a scale from Negligible, Low, Medium and High. Route Corridors 1A, 1B, 2 and 3 were assessed as having a **Low-Medium** residual impact and Route Corridors 4, 5A and 5B were assessed as having a **Low** residual impact.

Preferred Route Corridor

11.16 Based on the information assessed, the preferred Route Corridor from the Overhead Line options and which has least potential impact on landscape and visual amenity is Route Corridor 5A, with Route Corridor 5B a close second. Both have a predicted residual impact of **Low**. The difference between the two is the potential impact on the Royal Canal arising from Route Corridor 5B. These potential impacts could be minimised by locating the line on the northern edge of the corridor.

11.17 Route Corridor 4 is the third preferred route, but it passes through a sensitive landscape just north of Lough Ennell near Lacy's Bridge. Route Corridor 4 also has a predicted residual impact of **Low**.

11.18 Route Corridors 2 and 3 are less preferable due to their proximity to Lough Ennell their passing through the sensitive landscape near Lacy's bridge and a number of Demesne landscapes. Route Corridors 1A and 1B are the least preferable as they pass through the viewsheds of two

sensitive viewpoints. Route Corridors 1A, 1B, 2 and 3 were all assessed as having a **Low-Medium** residual impact.

11.19 It is recommended that the Overhead Lines routes which have been assessed as having a negligible or low residual impact on landscape and visual amenity should be considered further within the overall route selection process. Those are Route Corridors **4, 5A and 5B**.The impacts associated with these routes are not significant and can be mitigated by careful positioning of the Overhead Line within the 1 km corridor at the route alignment design stage of the project.

Fauna and Flora - Overhead Line Route Corridors

Methodology

11.20 The assessment of the potential impacts on fauna and flora of the various Overhead Line Route Corridors was carried out on a qualitative basis by: -

(i) Review of National Parks and Wildlife Services (NPWS) database of designated nature conservation areas to identify any designated sites i.e. SAC, SPA and NHA;

(ii) Review of Aerial photography of the study area to establish broad habitats occurring;

(iii) A windscreen survey of all the route corridors and surrounding study area to confirm the broad habitats present. Key areas of national and international significance and local ecological features of cutover bog, old demesne woodland and wetlands;

(iv) Desk-top study to assess the current character and landscape capacity of the existing landscape using aerial photography and 1:50,000 mapping;

(v) Review of the relevant Development Plans[1,2,3] and current literature relevant to the study area;

(vi) Mapping of primary screening vegetation (woodland and commercial forestry);

(vii) Assessment of potential impacts of each corridor on the receiving landscape e.g. paralleling roads or natural linear features, impacts arising from proximity or cumulative effects, proximity to settlement and crossing of transport corridors;

(viii) Assessment of opportunities for mitigation e.g. background and screening provided by topography or woodland, location of line within corridor to avoid sensitive features; and site survey to confirm findings of desk study.

Environmental Aspects

11.21 The wider study area is ecologically sensitive due to the presence of rivers, bogs, loughs, fens, canals, eskers and woods. In terms of designated sites shown on **Part 3 Figure 24 Designated Sites & Key Ecological Sites for Overhead Line Route Corridors**, the study area contains the following:

- 4 No. Special Areas of Conservation (SAC);
- 2 No. Special Protection Areas (SPA);
- 4 No. Natural Heritage Areas (NHA); and
- 13 No. proposed Natural Heritage Areas (pNHA).

11.22 Designated sites and key ecological features along each route corridor were rated broadly in accordance with the National Roads Authority's Guidelines for Assessment of Ecological Impacts of National Road Schemes (National Roads Authority, 2006)[21] and on a scale of importance ranging from Low Value- locally important, Moderate Value- locally important, High Value- locally important, Nationally Important and Internationally Important.

Evaluation of Route Corridors

11.23 The ecological impact of each of the route corridors was established by consideration of the ecological importance of sites and habitats along each corridor and the approximate distance between designated sites and Overhead Line Route Corridors. The residual ecological impact of each Route Corridor was determined on a scale from Imperceptible, Slight, Moderate, Significant and Profound.

11.24 It was assessed that Route Corridors 1A, 1B, 2, 4, 5A and 5B would result in an **Imperceptible/Slight** residual impact and Route Corridor 3 would result in a **Slight** residual impact. Based on the information gathered as part of the project research, knowledge of ecological features within the study area and the possibility of effective mitigation of impacts within each route corridor (described below) it is considered that Route Corridor 5B was slightly more preferred over the other routes for the Overhead Line.

11.25 Route Corridor 5A and 5B are quite similar in terms of potential ecological impact. Both corridors cross the Royal Canal (pNHA). These corridors also cross part of the Lough Sheever Fen / Slevin's Lough Complex (pNHA), although this could be avoided at route alignment design stage of the preferred route option. They also have potential to impact on Wooddown Bog (NHA) although this could also be avoided in route alignment design. Route Corridor 5A also has the potential to impact on Milltownpass Bog (NHA) although this could be avoided at route alignment design stage. Both these corridors run in close proximity to Lough Owel (approximately 195 m) but are located at a distance from Lough Ennell (approximately 5.4 km). Route Corridors 5A and 5B crossover fewer watercourses (approximately 10), in comparison to the alternative route corridors. Both route corridors run alongside Marlinstown Bog.

11.26 In comparing Route Corridors 5A to 5B, the 5A deviation potentially runs through woodland habitat in the townlands of Cartronganny and Knockaville although these could be avoided in route alignment design.

11.27 An existing 110 kV transmission line leaves the Mullingar Transmission Station in the direction of the Lough Sheever Fen / Slevin's Lough Complex. Along this stretch the existing line crosses the Royal Canal and runs adjacent to an area of young coniferous woodland. If Route Corridor 5B follows the route of this existing 110 kV line any impacts to these ecological areas can be minimised. Route Corridor 5B turns direction as it approaches Sheever Fen / Slevin's Lough Complex (pNHA). If the transmission line is located to the south of the route corridor in this area, which is predominantly grassland, it will not directly impact the Sheever Fen / Slevin's Lough Complex. The line would be located outside the Sheever Fen / Slevin's Lough Complex (pNHA) site boundary.

11.28 If Route Corridor 5B is located to the south of the route corridor, parallel to the existing N4, Wooddown Bog (NHA) will not be directly impacted. The line would lie outside the Wooddown Bog (NHA) site boundary. If Route Corridor 5B is located immediately parallel to the existing N4 road the Marlinstown Bog area, which is an important ecological area, can be largely avoided.

11.29 Route Corridors 1A and 1B are the longest route corridors (approximately 37.7 km and 38.2 km respectively); they are similar in terms of ecological impact and have the potential to impact on Spilt Hills and Long Hill Esker (SAC & pNHA), Walshtown Fen (pNHA) and Cloncrow Bog (NHA) (1B only) although this can be avoided in the route alignment design. They also run in close proximity to two of the areas most important lakes which are designated conservation areas; Lough Owel (approximately 380 m) and Lough Ennell (approximately 1.5 km). Both corridors cross several watercourses including tributaries of Lough Ennell which would result in negative impacts to key ecological features in the study area.

11.30 Route Corridor 2 and Route Corridor 4 are quite similar in terms of potential ecological impact. Both route corridors cross the Royal Canal (pNHA). Route Corridor 4 also crosses part of the Lough Sheever Fen / Slevin's Lough Complex (pNHA), has potential to impact on Wooddown

Bog (NHA) and runs in close proximity Lough Owel and Lough Ennell. Route Corridor 2 crosses several watercourses (approximately 11) including tributaries of Lough Ennell and areas of woodland at Tullanisky, Pasicktown and Dalystown. It has potential to impact on Miltownpass Bog (NHA) and Walshestown Few (pNHA), several watercourses (approximately 17) some of which are also connected to Lough Ennell. It also crosses woodland at Farranfolliot, Sraheary, Lynn, Tullanisky, Ardillon and Knockville.

11.31 Route Corridor 3 is the least preferable route as it directly crosses the Royal Canal (pNHA), has potential to impact Walshestown Fen (pNHA), runs in close proximity to Lough Owel and Lough Ennell and also crosses several watercourses (approximately 12) some of which are tributaries to Lough Ennell. It also has the most potential to impact numerous key ecological sites i.e. woodland and bog habitats, within the study area; it crosses several areas of woodland of high to moderate ecological value including at Farranfolliot, Lynn, Tullanisky, Gainestown, Gortumly, Rahanine, Sraheary, Derrygreenagh, Gaybrook Demesne and Dunboden Demesne. It also crosses re-colonising bog habitat / pools in the Knockdrin area.

Preferred Route Corridor

11.32 Based on the information assessed the preferred option from the Overhead Line Route Corridors which has least potential impact on fauna and flora is Route Corridor 5B, with Route Corridor 5A a close second. Both have a predicted residual impact of **Imperceptible/Slight**. Route Corridors 1A, 1B, 2 and 4 are less preferred however have a similarly predicted **Imperceptible/Slight** residual impact**.** It was predicted that Route Corridor 3 would have a **Slight** residual impact as it had greatest potential to impact on the highest number of sensitive sites. However the response received from Department of Environment, Heritage and Local Government (DoEHLG) on the routes under consideration for this study stated a preference for Overhead Line Route Corridor 3 above the other Overhead Lines.

11.33 It is recommended that the Overhead Lines routes which have been assessed as having an Imperceptible or Slight residual impact on fauna and flora should be considered further within the overall route selection process. Those are Route Corridors 1A, 1B, 2, 3, 4, 5A and 5B. The impacts associated with these routes are not significant and can be mitigated by careful positioning of the Overhead Line within the 1km corridor at the route alignment design stage of the project.

Cultural Heritage - Overhead Line Route Corridors

Methodology

11.34 The assessment of the Overhead Line Route Corridors in relation to archaeological, architectural and cultural heritage was based on a desktop study of published and unpublished documentary and cartographic sources, followed by windscreen survey and consultation with statutory stakeholders. World Heritage Sites and Candidate World Heritage Sites were also reviewed to see if any are located within the vicinity of the proposed development.

11.35 All known cultural heritage sites were mapped in GIS along with high resolution aerial photography and Ordnance Survey Ireland (OSI) First Edition Mapping (Circa 1830)[16]. Sites mapped included the following:

- National Monuments list from the DoEHLG[11];
- Record of Monuments & Places (RMP)[13] database;
- Records of Protected Structures[14] from Meath, Offaly & Westmeath County Councils;
- National Inventory of Architectural Heritage (NIAH) for counties Meath, Offaly & Westmeath available from www.buildingsofireland.ie; and
- Demesnes Landscapes and Historic Gardens indicated on the OSI First Edition Mapping[16].

11.36 All townlands located within 1.5 km of each route corridor were listed and cross referenced with:

- National Monuments Lists for counties Meath, Offaly and Westmeath[11]; and
- Sites subject to Preservation Orders from the DoEHLG[12].

11.37 All churches and graveyards which have the potential to be in the ownership of the Local Authorities were highlighted as potential National Monuments.

11.38 County Development Plans for Westmeath[1], Offaly[3] and Meath[2] were reviewed and several other documentary and literary sources were reviewed to ascertain a comprehensive understanding of the cultural heritage of the region.

11.39 Based upon all the information reviewed all sites were mapped in GIS and significant sites / regions / landscapes were highlighted for the further analysis during the windscreen survey.

11.40 Following a detailed desk study of the study area and route corridors a windscreen survey was undertaken to further assess the potential impacts that each corridor would have on the receiving cultural heritage environment. All mapping in GIS was loaded onto a laptop fitted with a GPS for review during the windscreen survey and any previously unrecorded architectural or archaeological features were noted. **Appendix 1 Figure 26 Cultural Heritage Constraints for Overhead Line Route Corridors** shows Cultural Heritage Constraints for the wider study area and those overlapping with the Overhead Line Route Corridors.

Environmental Aspects

11.41 The Mesolithic (middle stone age) people were the first inhabitants of Ireland, arriving about 9000 years ago. There is an increasing body of evidence to show that Mesolithic hunters frequented the Midland lakes. A number of sites belonging to the Late Mesolithic period have been discovered on the shores of Lough Derravaragh and Lough Kinale.

11.42 There is scant evidence of settlement in the Neolithic period in the study area and previous research in the area has been limited. Grogan et al, however, recorded a late Neolithic timber circle at Whitewell, Co. Westmeath, during works for the Gas Pipeline to the West (Grogan et al, 2007). The most well known of the Neolithic burial monuments, the passage graves, are represented in the general area by the cemetery on the Loughcrew Hills near Oldcastle close to the Westmeath-Cavan border. Additionally, Fanning suggests that the cairn on top of Croghan Hill in County Offaly could well turn out, on excavation, to be a passage grave. Should Croghan Hill transpire to be a passage tomb, this, along with the Whitewell site would indicate a significant, previously unknown expansion of Neolithic activity from the Boyne Valley into the midlands region. Nevertheless, this notable paucity of evidence suggests that the area was unattractive to the early farmers of the Neolithic who likely preferred the light soils of the upland regions.

11.43 The Bronze Age marks a defined and significant expansion of settlement in the study area, with three principal settlement areas developing. The best known of these areas is the area around the Hill of Uisneach, with two other notable zones around Killucan and Kilbeggan. Perhaps the best known Bronze Age monument in the region is the Hill of Uisneach, located outside the study area, five miles east of Ballymore. Here, the Catstone or Ail Na Mearainn is reputed to mark the centre or ‘navel’ of Ireland - the meeting point of the five ancient provinces. Uisneach was one of the great assembly places of pagan Celtic Ireland and is said to have been "christianized" by St. Patrick. The site is a candidate World Heritage Site.

11.44 Later Iron Age and Early Christian sites are exemplified in the vast majority of the recorded archaeological sites in the study area which consist of earthworks and enclosures or ringforts and raths, with a notable concentration on the higher ground to the north west. About 50 hillforts are known of in the general Midlands area. These sites typify the Iron Age period, the Black Pigs Dyke; a substantial Iron Age linear monument extends from the north east into the county as far as Slanemore.

11.45 With the arrival of Christianity, and the rapid spread of the monastic movement in the sixth and seventh centuries A.D., lands in the county were enclosed and farmed by the monks. Traces of early churches, some high crosses, burial grounds and the remnants of enclosing elements are evident throughout the study area. The high cross at Rattin is located within a graveyard at the south of Kinnegad. The site is associated with St. Etchen, who reputedly ordained Colmcille. The route of the Slí Mór through the area is uncertain with some commentators suggesting that it ran through the Pass of Kilbride in the south eastern part of the study area, although it is equally likely that the route passed to the south of the study area from Clonard, through Rhode and along the ridge of Croghan Hill and west.

11.46 Archaeological evidence from the M4 works demonstrate that the southern extent of the study area comprised frequent poorly drained areas with frequent tracts of good arable land, with particular evidence of cereal farming as well as livestock farming in the early medieval and late medieval periods. A significant number of demesnes are located within the study area. Although demesnes were widespread throughout Ireland in the medieval period, the vast majority of those extant or traceable today date from the 18th century when the concept of landscaped parkland was adopted by landowners.

11.47 Other cultural heritage features of note in the study area include the Royal Canal at the northern end of the study area, tower house, castles and mottes as well as barrows and numerous enclosures and other earthworks.

Evaluation of Route Corridors

11.48 The evaluation of type and quantity of cultural heritage sites associated with each route corridor was summarised in terms of potential physical impact to sites and potential impact on their setting and character and these are illustrated on **Appendix 1 Figure 27 Cultural Heritage Potential Impacts upon Setting from Overhead Route Corridors**. The Figure shows where a cultural heritage feature or site is physically located within an area where works take place and entails the removal of part, or all of the monument or feature. There is also potential for direct impacts on as yet undiscovered archaeological and architectural features. Direct impact can occur:

- Where the site or feature is physically located within the footprint of the 110 kV circuit and entails the removal of part, or the entire monument or feature; and
- Where enabling or access works entails the removal of part, or the entire monument or feature.

11.49 There is also potential for direct impacts on as yet undiscovered archaeological or architectural features, undiscovered remains may occur where:

- Sub surface remains exist with no visible trace above ground; and
- Unrecorded sites are present in areas that have not been surveyed and that may be covered by existing vegetation.

11.50 The greatest potential for direct impacts upon the cultural heritage would be during the construction phase for the excavation of foundations for towers, and for the construction of temporary site access roads and tracks.

11.51 Impacts were reported on a scale of Imperceptible, Slight, Moderate, Significant and Profound.

11.52 Route Corridor 1A and 1B were deemed to represent the most significant impact and their impacts were rated significant. This is principally due to the concentrations of ringforts, enclosures, barrows etc. within these route corridors with several clusters of cultural heritage sites noted, particularly at the north western end. Furthermore, these routes are closer to the Hill of Uisneach, a candidate World Heritage Site and at their south western end they pass to the north of Croghan Hill.

11.53 Route Corridors 2 and 3 were deemed to have a potential significant/moderate impact on the cultural heritage resource. There are a higher number of cultural heritage sites within these route corridors as well as a number of demesnes and demesne landscapes, some of which are difficult to avoid impacting upon. At their southern ends they also terminate to the north of Croghan Hill.

11.54 Route Corridor 4 was deemed to have a slight to moderate impact on the cultural heritage resource. Although the route corridor avoids proximity to Croghan Hill, it impacts on a number of demesnes and would have a potential impact on more cultural heritage sites than Routes 5A and 5B.

11.55 It was assessed that Route Corridors 5A and 5B would result in a **Slight** residual impact and Route Corridor 4 would result in a **Slight /Moderate** residual impact. Route Corridors 2 and 3 would result in a **Moderate/ Significant** residual impact and Route Corridors 1 A and 1B would result in a **significant** residual impact.

11.56 Overall, Overhead Line Route Corridors 5A and 5B would have the least potential impact on the cultural heritage resource and are preferred, they were deemed to have a **Slight** impact. There are less cultural heritage sites along these route corridors and fewer demesnes than the other route corridors.

Preferred Route Corridor

11.57 In terms of potential impacts on the cultural heritage, Overhead Line Route Corridors 5A and 5B are the preferred corridors. Appropriate project design and mitigation measures can be undertaken to ensure these routes do not have a significant direct impact on cultural heritage sites.

11.58 Direct impacts on known cultural heritage sites should be mitigated by avoidance at the design stage.

11.59 A full cultural heritage impact assessment will be implemented as part of an Environmental Impact Assessment for the selected Route Corridor. This will include detailed potential impacts for that specific route and appropriate mitigation measures.

11.60 It is recommended that the Overhead Lines routes which have been assessed as having an imperceptible or slight residual impact on cultural heritage should be considered further within the overall route selection process. Those are Route Corridors 5A and 5B. The impacts associated with these routes are not significant and can be mitigated by careful positioning of the Overhead Line within the 1km corridor at the route alignment design stage of the project.

Landscape and Visual- Underground Cable Route Corridors

Methodology

11.61 The methodology to assess the potential landscape and visual impacts of the various Underground Cable Route Corridors is as described in above in paragraph 11.3. Additionally it is noted that impacts on the visual amenity arising from the construction of the cabling trench and installation of the cable are highest during the construction period when the removal of vegetation and disruption to ground surfaces is highly visible. During the operational period the underground cable is not visible apart from when maintenance works are necessary.

11.62 The Character Areas and Sensitivity Ratings for Underground Cable Routes are shown on **Appendix 1 Figure 28 Landscape Character Areas and Sensitivity Rating for Underground Cable Route Corridors**. The Landscape and Visual Constraints and Scenic Viewsheds are shown on **Appendix 1 Figure 29 Landscape and Visual Constraints and Scenic Viewsheds for Underground Cable Route Corridors** and the graphic summary of the Landscape Sensitivity Hotspots is shown in **Appendix 1 Figure 30 Landscape Sensitivity Hotspots for Underground Cable Route Corridors**.

Environmental Aspects

11.63 The character of the landscape is as previously described in paragraph's 11.4-11.9.

Evaluation of Route Corridors

11.64 Underground Cable Route Corridors 1, 2 and 3 were evaluated according to the length of each option passing through designated and recreational landscapes and also by the number of road and river crossings. All three route corridors cross similar numbers of walking and cycling routes, roads, cross protected viewpoints (with resulting high impacts) and areas of high amenity. Route Corridors 2 and 3 do not cross significant protected viewpoints where the impacts would be very high and difficult to mitigate during construction. Route Corridors 2 and 3 have significantly less river and canal crossings and would disrupt less demesne landscapes than Route Corridor 1.

11.65 All routes were assessed as having a **Low** residual landscape and visual impact on a scale of Negligible, Low, Medium, and High; this is due to the cable being underground and not visible after maturity of vegetation which had been removed prior to construction.

11.66 Based on the information presented the preferred corridor is Route Corridor 3 primarily because of its opportunity to follow the N4 corridor although the potential impact on the Royal Canal will need to be carefully mitigated. Route Corridor 2 is the second preferred route, as it crosses on more Demesne landscape than Route Corridor 3 which would disrupt the landscape setting and historic landscape features.

11.67 Route Corridor 1 is less preferable due to its proximity to Lough Ennell, its passing through a number of Demesne landscapes and through Rochfortbridge village which has a valued townscape character.

Preferred Route Corridor

11.68 It is recommended that the Underground Cable Routes which have been assessed as having a Negligible or Low residual impact on landscape and visual amenity should be considered further within the overall route selection process. Those are Route Corridors 1, 2 and 3. The impacts associated with these routes are not significant and can be mitigated by careful positioning of the Underground Cable under the road where possible at the detailed design stage of the project.

Ecology - Underground Cable Route Corridors

Methodology

11.69 The methodology to assess the potential ecological effects of the various Underground Cable Route Corridors is as described in paragraph 11.16. Additionally it is noted that impacts on the ecological impacts arising from the construction of the cabling trench and installation of the cable are highest during the construction period when the removal of vegetation takes place causing temporary severance of habitats and linear corridors such as hedgerow. During the operational period the underground cable does not impact on the habitats or species at the surface apart from when maintenance works are necessary.

Environmental Aspects

11.70 The nature conservation value of the landscape is as summarised in paragraphs 11.17-11.18 and the designated sites are shown on **Appendix 1 Figure 31 Designated Sites & Key Ecological Sites for Underground Cable Route Corridors**.

Evaluation of Route Corridors

11.71 The three Underground Cable Route Corridors have been evaluated in terms of the presence of designated sites and key ecological features. The response letter received from the Development Applications Unit (16th June 2010), which evaluates each route corridor solely on the location of some designated sites, has been taken into consideration. An Appropriate Assessment

(Screening Stage) is required for all route corridors due to the close proximity of designated sites; Screening Reports are included within **Appendix 2 Detailed Environmental Study Reports**.

11.72 The ecological impact of each of the Cable Route Corridors was established by consideration of the ecological importance of sites and habitats along each route corridor and the approximate distance between designated sites and corridors.

11.73 It was assessed that Cable Route Corridors 2 and 3 would result in an **Imperceptible** residual impact and Route Corridor 1 would result in a **Slight /Imperceptible** residual impact. Based on the information gathered as part of the project research, knowledge of ecological features within the study area and the possibility of effective mitigation of impacts within each route corridor (described below) it is considered that Route Corridor 3 is the preferred for the cable route.

11.74 Route Corridor 1 which includes numerous important ecological features will have a slight / imperceptible impact. Although the majority of sensitive ecological features along the route can be avoided or mitigated against, the development has the potential to cause a noticeable change in the character of the existing environment (particularly demesne woodlands and bog habitat) and to affect their sensitivities.

11.75 Route Corridor 2 will have an imperceptible residual impact as this route follows the local rural road network and will not cause a noticeable change to the character of the existing environment although sensitive ecological sites along the route can be avoided without affecting their sensitivities through appropriate mitigation and route alignment design stage.

11.76 Route Corridor 3 will run next to the N4 road in the verge. Habitats within 1 km wide corridor of this infrastructure are generally more disturbed than those along local roads throughout the study area. This route runs alongside Marlinstown Bog and the Royal Canal and may result in a change to the character of the existing environment although appropriate mitigation measures could ensure their sensitivities are not impacted.

Preferred Route Corridor

11.77 It was assessed that Cable Route Corridors 2 and 3 would result in an **Imperceptible** residual impact and Route Corridor 1 would result in a **Slight /Imperceptible** residual impact. Based on the information gathered as part of the study and knowledge of ecological features within the study area it is considered that Underground Cable Route Corridor 3 is the preferred route corridor. The main reasons for choosing Route Corridor 3 over the other routes are detailed below. However the response received from Department of Environment, Heritage and Local Government (DoEHLG) on the routes under consideration for this study stated a preference for Underground Cable Route 1 above the other Underground Cable routes.

11.78 Route Corridor 1 is the least preferable route as it directly crosses the Royal Canal (pNHA) and Lough Ennell (SAC, pNHA, SPA). It also runs in close proximity to two of the areas most important lakes which are designated conservation areas; Lough Owel (approximately 940 m) and the length of Lough Ennell. Route Corridor 1 also crosses several watercourses. It also has the most potential to impact numerous key ecological sites i.e. woodland and bog habitats, within the study area (Refer to **Appendix 1 Figure 31 Designated Sites & Key Ecological Sites for Underground Route Corridors**). It crosses several areas of woodland of high to moderate ecological value including at Farranfolliot, Lynn, Tullanisky, Gainestown, Gortumly, Sraheary, Derrygreenagh, Gaybrook Demesne and Dunboden Demesne. It also crosses re-colonising bog habitat / pools in the Knockdrin area.

11.79 Route Corridor 2 directly crosses the Royal Canal (pNHA). This route also crosses part of the Lough Sheever Fen / Slevin's Lough Complex (pNHA), to mitigate the impact this can be avoided in route alignment design stage. Route 2 runs in close proximity to Lough Owel (approximately 125 m) but is located at a distance from Lough Ennell (approximately 2.5 km). This route follows the local rural road network in which the margins are relatively undisturbed and lined with established trees and hedgerows of moderate ecological value in places. Route Corridor 2 also

crosses several watercourses. It also crosses woodland at Knockaville and a small portion of Marlinstown bog.

11.80 Route Corridor 3 crosses the Royal Canal (pNHA). This Route Corridor also crosses part of the Lough Sheever Fen / Slevin's Lough Complex (pNHA), to mitigate the impact this can be avoided in route alignment design stage. Route Corridor 3 runs in close proximity to Lough Owel (approximately 195m) but is located at a distance from Lough Ennell (approximately 5.2 km). Route 3 also crosses several watercourses. Route Corridor 3 also crosses Marlinstown bog.

11.81 Route Corridor 3 has the ability to follow the N4 National Road for the majority of its length. Habitats along this infrastructure are generally more disturbed than those along local roads throughout the study area.

11.82 If Route Corridor 3 is located to the south of the Route Corridor, parallel to the existing N4, Lough Sheever Fen / Slevin's Lough (complex) will not be directly impacted. The cable route would be outside the Sheever Fen / Slevin's Lough (complex) pNHA site boundary.

11.83 If Route Corridor 3 is located immediately parallel to the existing N4 road the Marlinstown Bog area, which is an important ecological area, can also be largely avoided.

11.84 All proposed route corridors cross watercourses including the Royal Canal (pNHA). The Underground Cable Route should be fitted using horizontal directional drilling to reduce the environmental impact on sediments and fisheries. All proposed route corridors cross some mature hedgerows and tree lines. Appropriate mitigation measures would be to avoid these habitats where possible.

11.85 It is recommended that the Underground Cable routes which have been assessed as having an Imperceptible or Slight residual impact on fauna and flora should be considered further within the overall route selection process. Those are Route Corridors 1, 2 and 3. The impacts associated with these routes are not significant and can be mitigated by careful positioning of the Underground Cable within the 1km corridor at the route alignment design stage of the project.

Cultural heritage - Underground Cable Route Corridors

Methodology

11.86 The methodology to assess the potential effects on cultural heritage of the various Underground Cable Route Corridors is as described in paragraphs 11.30-11.36. Additionally it is noted that impacts on the ecological impacts arising from the construction of the cabling trench and installation of the cable are highest during the construction period when the removal of vegetation takes place causing temporary severance of habitats and linear corridors such as hedgerow. During the operational period the underground cable does not impact on the habitats or species at the surface apart from when maintenance works are necessary.

Environmental Aspects

11.87 The character of the landscape is as described in paragraphs 11.37-11.43 and Cultural Heritage Constraints for the wider study area and those overlapping with the Underground Cable Route Corridors are shown in **Appendix 1 Figure 33 Cultural Heritage Constraints for Underground Cable Route Corridors.**

Evaluation of Route Corridor Options

11.88 The evaluation of type and quantity of cultural heritage sites associated with each route corridor was summarised in terms of potential physical impact to sites and potential impact on their setting and character. There is also potential for direct impacts on as yet undiscovered archaeological and architectural features. Direct impact can occur:

- Where the site or feature is physically located within the footprint of the cable route and whether it entails the removal of part, or the entire monument or feature; and

- Where enabling or access works entails the removal of part, or the entire monument or feature.

11.89 There is also potential for direct impacts on undiscovered archaeological or architectural features, undiscovered remains may occur where:

- Sub surface remains exist with no visible trace above ground; and
- Unrecorded sites are present in areas that have not been surveyed and that may be covered by existing vegetation.

11.90 The greatest potential for direct impacts upon the cultural heritage would be during the construction phase for the excavation of cabling route and for the construction of temporary site access roads and tracks if the route crosses agricultural lands.

11.91 Impacts were reported on a scale of Imperceptible, Slight, Moderate, Significant and Profound.

11.92 All three Underground Cable Route Corridors were assessed as having an **imperceptible** residual impact on cultural heritage. However, given that Route Corridor 1 traverses Derrygreenagh Bog there could be a higher potential to encounter previously unrecorded archaeological features in the event that the cable is diverted away from the existing R400 roadway. There is no discernable difference between Route Corridors 2 and 3 in their potential to encounter previously unrecorded archaeology.

Preferred Route Corridor

11.93 In terms of potential impacts on the cultural heritage, Underground Cable Route Corridors 2 and 3 are preferred although all routes were assessed as having an **imperceptible** residual impact on cultural heritage. Appropriate project design and mitigation measures can be undertaken to ensure these routes do not have a significant direct impact on cultural heritage sites.

11.94 It is recommended that the Underground Cable routes which have been assessed as having an Imperceptible or Slight residual impact on cultural heritage should be considered further within the overall route selection process. Those are Route Corridors **1, 2 and 3**. The impacts associated with these routes are not significant and can be mitigated by careful positioning of the Underground Cable within the 1 km corridor at the route alignment design stage of the project.

12. Engineering Comparison of Overhead Lines and Underground Cables

Methodology

12.1 All routes have been assessed in terms of:

- Circuit entry into the relevant Transmission Station (and if there is sufficient space within the Transmission Station for the circuit entry or if a new planning application is required); and
- Engineering Constraints including major road and railway crossings, crossing of high pressure gas main, impacting on existing 220 kV, 110 kV, local network distribution and ground conditions for construction.

Overhead Lines: Technical and Operational Considerations

12.2 The typical constraints posed by the Overhead Line Route Corridors that have been identified include:

- Crossing existing Overhead lines; and
- Maintaining adequate clearance from roads, buildings, railway line, canals, water courses and woodland.

Evaluation of Overhead Line Route Corridors

12.3 From an Engineering aspect all the Overhead Line Route Corridors provide 'normal' construction challenges. To cross motorways and major roads the poles will have to be positioned to meet the current standards. The erection of conductors may require road closures.

12.4 . The route alignment design assessment will need to take account of the minimum physical and electrical space between the new 110KV and the existing 220KV lines and consider installation and maintenance procedures. More detailed surveys will be required to confirm the crossing position that has least impact on the existing 220 kV transmission line. If the statutary clearances cannot be maintained,it may also be necessary to consider raising the 220 kV Overhead Line to accommodate the 110KV undercrossing.. A further option is to terminate the 110 kV overhead line on one side of the crossing position and install a section of cable underneath the 220 kV overhead line and continue the cable on into the transmission station.

12.5 The ground conditions across the peat bogs seen during site visits indicate that special consideration will be required for the design of foundations for wood pole and tower structures that will be located in these areas. Details of loadings and the type of supports will be calculated to determine foundation requirements.

12.6 In order to evaluate the five potential Overhead Line Route Corridors and their minor variants the corridors were analysed against the following key engineering constraints: line entries into the proposed Transmission Stations; impacts upon the network, specifically the impact on existing low voltage, 110 kV and 220 kV lines; system impact on the transmission network; the crossing of roads, railways, water courses and the Royal Canal; access for construction; and ground conditions for structure foundations and construction. Each route was assessed against a qualitative impact assessment scale of Imperceptible; Low; Moderate; High and Severe/Unacceptable to facilitate comparison of any significant impacts which may be common from an engineering and environmental perspective and help in the selection of the route with the least over all impact.

Line entries Mullingar Transmission Station

12.7 The impact upon the existing line entries, which would have to be modified for the new Overhead Line connection were considered. The line entries of Route Corridors entering Mullingar Transmission Station from the west, 1A, 1B, 3 and 4, were deemed to have a **Moderate** impact, while Route Corridors 2, 5A and 5B, entering from the east, were deemed to have a **High** impact, and thus be less favourable. Schematic representation of the various line entry options have been developed and these are provided in **Appendix 1 Figures 15-18 Line Entry Options into Mullingar 110 kV Transmission Station**.

Line entries Derryiron Transmission Station

12.8 All of the potential corridors with line entries into Derryiron Transmission Station (Route Corridors 1A, 1B, 2 and 3) were considered to have **Moderate** impacts. Schematic representation of the various line entry options have been developed and these are provided in **Appendix 1 Figure 20 Option 1 Line Entry into Derryiron 110 kV Transmission Station.**

Line entries Kinnegad Transmission Station

12.9 All of the potential corridors with line entries into Kinnegad Transmission Station (Route Corridors 4, 5A and 5B) were considered to have **low impact**. However, it should be noted that entry can only be from the west due to the existing quarrying and site boundaries. Schematic representation of the line entry option has been developed and is provided in **Appendix 1 Figure 19 Option 1 Line Entry into Kinnegad 110 kV Transmission Station.**

Overhead Line Route Corridor Lengths

12.10 The approximate route lengths for the Overhead Line Corridors are:

- Route Corridor 1A is 37.5 km;
- Route Corridor 1B is 38.0 km;
- Route Corridor 2 is 36.6 km;
- Route Corridor 3 is 28.8 km;
- Route Corridor 4 is 24.6 km;
- Route Corridor 5A is 25.8 km; and
- Route Corridor 5B is 24.8 km.

12.11 The length of any Overhead Line route affects a number of factors: notably, the longer a line, the longer the construction period; the greater the potential for faults; and the greater voltage loss. Furthermore, the longer the line, the higher the volume of work with regard to project design and management. Thus, in terms of length, Overhead Line Route Corridors **3, 4, 5A and 5B** are significantly less than the others and are preferred.

Impact upon the existing network: low voltage (below 110 kV); 110 kV; and 220 kV line crossings.

12.12 The impact upon the existing network in terms of negotiating existing 110 kV, 220 kV and low voltage lines when constructing and operating the new 110 kV line was considered. It was considered that existing low voltage lines would pose a **Moderate** impact upon Route Corridors 1A, 1B, 2, 5A and 5B, and that Routes Corridors 3 and 4 would have **High** impacts from existing low voltage lines. Existing 110 kV lines were judged to have **Low** impact upon Route Corridors 1A, 1B, 3 and 4, and Route Corridors 2, 5A and 5B were deemed to have a **High** impact in comparison. For all Route Corridors, 220 kV lines were considered to have a **Moderate** impact as all routes cross a 220 kV line.

System impact on the transmission network

12.13 The impact of all of the route corridors upon the transmission network was judged as **Moderate**. All routes involve crossing existing lines of varying voltages and thus outages will be required to carry out modifications, dismantling and repositioning of existing towers, and alterations will be required. Disruption to supplies has not been studied at this stage.

Railway crossing

12.14 Crossing railway lines with Overhead Line requires achieving minimum clearance. Railway line closure or possession management will be required to install Overhead Lines over the Railway line. Route Corridors 1A, 1B, 3 and 4 were assessed as having a **Low** impact for railway line crossings as these route corridors do not cross passenger railway lines, only industrial and disused lines. Route Corridors 2, 5A and 5B were assessed as having a **High** impact as that they cross passenger Railway lines as well as industrial Railway line, thus any Railway line closure or possession management will pose a greater degree of impact on the Overhead Line construction and maintenance.

Road crossings: local, regional and national/motorway

12.15 The impact of local, regional and national road crossings within each corridor was assessed. For local road crossings, Route Corridors 2, 4, 5A and 5B (the eastern corridors) were assessed as having a **Low** impact and the remaining Overhead Line corridors to the west were assessed as more onerous with a **Moderate** impact as they contained more crossings. For regional road crossings, Route Corridors 1A, 1B, 2, 4, 5A and 5B were assessed as having a **Low** impact, while Route Corridor 3 was assessed as having a **Moderate** impact as it crosses more regional roads. With regard to national road/motorway crossings, Route Corridors 1A, 1B and 4 were assessed as **Moderate,** while the other routes would have a higher impact. Details of the number of road crossings have been reported in the landscape and visual assessment in **Appendix 2 Route Selection Report- Overhead Options, Table 3 page 16.**

Water courses river/ditch crossing

12.16 The majority of Overhead Line route corridors pose similar circumstances in relation to water courses, hence all route corridors (with the exception of Route Corridor 3) were assessed as having a **Moderate** impact upon construction and maintenance. Route Corridor 3, was assessed as having a **High** impact as it involves crossing a higher number of water courses/ rivers/ ditches than the other route options.

Royal Canal crossing

12.17 The impact of the Royal Canal upon Overhead Line design construction and operation is that a minimum clearance (negotiated with Waterways Ireland) has to be agreed and maintained between the lines and the highest water level. Therefore, larger structures may have to be used either side of the canal to achieve this clearance, and boat height restrictions may have to be imposed on the canal although existing bridges over the canals would place a limit on the boats that can travel along the canal. All of the Overhead Line route corridors have been assessed as having a **Moderate** impact for the 'canal crossing' category because all routes cross the Royal Canal and thus pose similar constraints in relation to this engineering constraint.

Access for construction

12.18 When considering the access available for construction purposes within each of the corridors, route 5B (Kinnegad to Mullingar) was considered to provide the best access for construction, and would result in a **Low** impact. Route Corridor 5B follows the N4 motorway for most of its length thus providing good access for construction plant and material deliveries. Route Corridors 4 and 5A were considered to provide moderate access for construction. Route Corridors 1A, 1B, 2 and 3 include large areas of peat which are more onerous for construction access and are assessed

as having a **High** impact, although this can be mitigated by provision of access accommodation through an increased cost.

Ground Conditions (based on desk-study assessment)

12.19 Ground conditions were assessed in light of aerial photographs, site visits and geological mapping. The more onerous the ground conditions found, the higher the impact. For example, construction through peat bogs and associated land damage, difficult terrain, sloping ground, rock outcrops would be more problematic and require greater technical intervention than construction in arable and grazing fields, therefore if a route corridor had large sections of peat bogs it would be assessed as having a higher impact. Route Corridor 5B (Kinnegad to Mullingar) was considered to have the most favourable ground conditions for foundations for tower structures. Special foundation designs will be required for deep peat areas and Route Corridors **1A, 1B, 2 and 3** will have a **High** impact.

Preferred Route Corridors

12.20 From the evaluation of all the Overhead Line options, Route Corridors **1A, 1B, 4 and 5B** are preferred after taking into account all engineering aspects. The final route can then be determined during route alignment stage. The final route can be accommodated within the 1km wide corridors for these preferred routes.

Underground Cable Routes: Technical and Operational Considerations

12.21 Constraints that are common to all of the Underground Cable Route Corridors that have been identified include:

- Existing Underground services;
- Underground high pressure gas pipelines; and
- The negotiation of road, railway line and water course crossings.

Evaluation of Underground Cable Route Corridors

12.22 To overcome such constraints, at route proving stage the service records identified during this study are to be verified so that existing underground cables and high pressure gas pipelines can be appropriately planned around. To cross infrastructure and waterways, direct lay, cable bridges and directional drilling should be considered to find the most technically and economically favourable solution.

12.23 Underground Cables are considerably more expensive and take longer to install than Overhead Lines. However, Underground Cables do have operational disadvantages. Most notably, when a fault does occur, the down time to identify the fault location and subsequent repair of the fault can be considerably longer and more costly compared to Overhead Line fault repairs.

12.24 The Underground Cable Routes in the Corridors will cause more disruption to traffic than the Overhead Line options and experience shows that the project delivery period is likely to be far longer for the underground works. Potentially depending on the labour resource available to the Contractor, the overhead line route could take 12 months and the underground cable 24 months to complete. Procurement can also have a significant impact on the starting date of the project. Project delivery period and progress of the construction for both Overhead Lines and Underground Cables is dependent on many factors. More detailed assessments would be carried out at route alignment and route alignment design stage.

12.25 Route 3 as the shortest route has potentially least impact on traffic as it is anticipated that the cable could be laid in the verge of the M4 or follow the old R161 road. Route Corridor 1 has potentially the greatest impact on traffic with traffic lights controlling 60 metre sections of

excavations for a considerable period of time. These restrictions would be imposed on the busy National R400 Road, particularly the HGV's on the Bog Road section.

12.26 Both routes that leave Mullingar 110 kV Transmission Station to the east have to cross the obstruction of the Mullingar – Sligo railway and the Royal Canal water supply near Ballyglass; Directional drilling may be required to overcome this.

12.27 The Underground Cable Route 2 crossing of the Dublin - Mullingar railway and the Royal Canal north of Plodstown is severely constrained by the difference in levels between the railway and the canal together in close proximity. This constraint will require careful consideration at detailed design stage to confirm the preferred crossing methodology.

12.28 Again on Cable Route Corridor 2, the ground conditions are very wet in the area of Butlers Bridge, Srahenry and Lacy's Canal and trench excavation in this area may be difficult.

12.29 For all the route corridors, it will be necessary to cross the M6 motorway and several options may be adopted although these could not be investigated and verified during the site visit. The main methods to cross the motorway are: utilising any available spare ducts; or existing culverts; or by directional drilling. It is likely that directional drilling would be the preferred methodology.

Line Entries Mullingar Transmission Station

12.30 The entry of all the Underground cable corridors into Mullingar Transmission Station were deemed to have a **Low** impact upon the existing line entries as alterations to existing towers would not be required to accommodate underground cables, however interruptions to the existing network will be required to install the terminations and associated equipment.

Line entries Derryiron Transmission Station

12.31 Only Underground Cable Route Corridor 1 enters into Derryiron Transmission Station, and this route was considered to have a **Low** impact, and that due to its underground nature interruptions to the network will be required to build the cable terminations and associated equipment.

Line entries Kinnegad Transmission Station

12.32 Route Corridors 2 and 3 which enter into Kinnegad were considered to have **Moderate** impact on the grounds and interruptions to the network will be required to build the cable terminations and associated equipment.

Underground Cable Route Corridor Lengths

12.33 The lengths of the Underground Cable Route Corridors are;

- Route Corridor 1 is 24.8 km;
- Route Corridor 2 is 28.2 km; and
- Route Corridor 3 is 24.6 km.

12.34 The length of any Underground Cable Route affects a number of factors: notably, the longer a cable, the longer the construction period; the greater the potential for faults; and the greater voltage loss. Furthermore, the longer the cable, the higher the volume of work with regard to project design and management. Thus, in terms of length, Underground Cable Route Corridors 1 and 3 are shortest and are preferred.

Impact upon the existing network: low voltage (below 110 kV); 110 kV; and 220kV line crossings

12.35 The impact upon the existing network in terms of negotiating existing 110 kV, 220 kV and low voltage lines when constructing and operating the new 110 kV route was considered. The impact of the underground cable route options was considered favourable in terms of 'crossing' existing

lines over all of the Overhead Line route options on the grounds that no interruption to the network will be required.

12.36 It was considered that existing low voltage lines would pose a low impact upon Route Corridors 1, 2 and 3. Existing 110 kV lines were judged to have **no impact** upon corridor 1, and corridors 2 and 3 were deemed to have a moderate impact in comparison. For all route corridors, 220 kV lines were considered to have a **Low** impact as all routes cross a 220 kV line on the grounds that minimal interruption to the transmission system will be required.

Railway Crossing

12.37 Negotiating railway lines with underground cables can involve either direct lay or directional drilling. Direct lay will require line closure and design approval by the railway owners. Route Corridor 1 was assessed as low impact for railway line crossings as this Route Corridor does not cross passenger railway lines, only industrial and disused lines. Route Corridor 2 was assessed as having a **High** impact, due to the proximity and the difference in elevations of the canal, N52 and the passenger railway line. Route Corridor 3 was assessed as having a **Moderate** impact as it crosses the passenger railway line and the canal at the same elevation below the N4. In order to limit disruption to railway operations, directional drilling or similar techniques are likely to be the preferred methodology when crossing passenger railway lines even though this method requires additional design considerations and is more expensive.

Road Crossings: Regional and National

12.38 The impact of regional and national road crossings within each corridor was scored. For regional road crossings, Route Corridor 1 was assessed as having a **High** impact, Route Corridor 2 was assessed as having a **Moderate** impact and Route Corridor 3 was assessed as having a **Low** impact. With regard to national road crossings, Route Corridors 2 and 3 were assessed as having a **High** impact and were less preferential to Route Corridor 1 which was assessed as having a **Moderate** impact, as they contained more crossings. Details of the number of road crossings were taken from the landscape and visual assessment in **Appendix 2 'Route Selection Report- Underground Options, Table 3 page 12.**

Water Courses / Rivers / Ditch Crossing

12.39 All underground route corridors pose similar circumstances in relation to water courses. Both Route Corridors 1 and 2 were assessed as having a **High** impact on water crossings during construction and maintenance of the cable routes. Route Corridor 3 was assessed as having a **Moderate** impact.

Canal Crossing

12.40 Constructing an underground cable route under a canal requires directional drilling. The canals in Route Corridors 2 and 3 were judged as posing **High** impacts on the cable route as both the Royal Canal and the Lough Owel Canal need to be negotiated, while Route Corridor 1 was deemed to experience **Moderate** impacts from canals as only the Royal Canal poses an issue.

Access for construction

12.41 When considering the access available for construction purposes within each of the corridors, Route Corridors 2 and 3 (Mullingar to Kinnegad) were considered to provide better access for construction, they were assessed as having a **Moderate** impact, compared to Route Corridor 1 (Mullingar to Derryiron) which was assessed as having a **High** impact in view of the corridor passing through peat areas and the presence of ground water.

Evaluation of Underground Cable Route Corridor Options

Preferred Route Corridors

12.42 Of all the Underground Cable Routes considered Route Corridor **1** is preferred by the majority of the engineering aspects and it is predicted that engineering solutions during route alignment design and construction can be best achieved primarily within the roads in the corridor.

Engineering Summary

12.43 None of the Overhead Line Route Corridors provide any exceptional design and construction challenges. Some of the individual Wayleave Grantors may be problematical to the routes but these cannot be identified at this stage. Of all the **Overhead Lines considered Route Corridors 1A, 1B, 4 and 5B are preferred** by the majority of the engineering aspects and it is predicted that engineering solutions during route alignment design and construction can be best achieved within the 1 km wide corridors of these routes.

12.44 Similarly of all the **Underground Cable Routes considered Route Corridor 1 is preferred** by the majority of the engineering aspects and it is predicted that engineering solutions during route alignment design and construction can be best achieved within the 1km wide corridor of this route.

12.45 An additional aspect to be considered between Overhead and Underground solutions is the reliability of the cable system. Whilst cable systems are less susceptible to outside influences such as the weather, when a fault does occur then the down time for the fault location and repair can be a significant influence on the decision.

13. Transmission Stations

Line Entries - Mullingar

13.1 The Route Corridors approach the Transmission Station from the north either from the east or the west with both line entry options being constrained by the presence of urban areas, existing 110/38kV and LV Lines, and major infrastructure such as railways, canals and highways. Overhead Line Route Corridors 2, 5A and 5B approach Mullingar 110 kV Transmission Station from the north east and Overhead Line Route Corridors 1A, 1B, 3 and 4 approach Mullingar 110 kV Transmission Station from the north west.

13.2 The site visit has identified options for line entries to Mullingar 110 kV Transmission Station these are briefly described below:

Option 1 – North Easterly approach to Mullingar: Single Circuit Connections

13.3 This option as shown on **Part 3 Figure 15 Option 1 Line Entry into Mullingar 110 kV Transmission Station** requires the diversion of the existing Corduff 110 kV feeder to the north and the new 110 kV Overhead Lines adopting the existing 110 kV route into Mullingar. The new line will require terminating prior to the Transmission Station with cable sealing end platforms and a short cable route to the line bay.

13.4 The existing 110 kV Corduff feeder is unearthed construction and is not suitable for the new 110 kV Overhead Line. A new section along the existing corridor will be necessary.

13.5 The diverted section of the existing 110 kV Corduff feeder will require adopting a section of an existing 38 kV Mullingar – Loughanalia route with the adopted section being terminated and transferred to underground cable. The route will terminate onto the existing 110 kV terminal tower outside Mullingar 110 kV Transmission Station maintaining the connections into Mullingar. A tower design study including foundations will be required to check the loadings on the existing terminal tower from the line entry of the diverted route.

13.6 Further detailed studies will be required to accommodate the line work and modifications at Mullingar 110 kV Transmission Station.

13.7 This option will require extensive planning for 110 kV, 38 kV and LV outages to enable this connection to be made.

13.8 An alternative to Option 1 above would be to cross the existing 110 kV Corduff feeder and take the new 110 kV line along the diverted corridor.

Option 2 – North Easterly approach to Mullingar: Double Circuit Tower Line

13.9 This option as shown on **Appendix 1 Figure 16 Option 2 Line Entry into Mullingar 110 kV Transmission Station** requires the existing 110 kV Corduff feeder and the new 110 kV Line to merge onto a new Double Circuit 110 kV Tower line along the existing route from a merging position east of the N4 road.

13.10 The new 110 kV circuit will require a sealing end platform mounted on the southern side of the new Double Circuit Terminal tower with a short cable connection into Mullingar line bay. The existing 110 kV Circuit can span onto the existing 110 kV Terminal Tower outside Mullingar 110 kV Transmission Station maintaining the connections into Mullingar.

13.11 Further detailed studies will be required to accommodate the line work and modifications at Mullingar 110 kV Transmission Station.

13.12 This option will require extensive planning for 110 kV, 38 kV and LV outages to enable this connection to be made.

Option 3 – Westerly approach to Mullingar: Single Circuit Connection

13.13 This option as shown on **Appendix 1 Figure 17 Option 3 Line Entry into Mullingar 110 kV Transmission Station** requires a new 110 kV Overhead Line to be constructed parallel to the existing Lanesbrough 110 kV feeder into Mullingar 110 kV Transmission Station. The new line maybe terminated on a terminal tower with sealing end platform and a short cable connection or with a set of slack spans down-leads to a Gantry in Mullingar 110 kV Transmission Station.

13.14 The southerly section of the new route will need to adopt the route of an existing 38 kV Line between Mullingar and Ashe road with the 38 kV line being terminated and undergrounded. The underground section will require crossing regional roads, the Royal Canal and a disused railway line.

13.15 Further detailed studies will be required to accommodate the line work and modifications at Mullingar 110 kV Transmission Station.

13.16 This option will require extensive planning for 38 kV and LV outages to enable this connection to be made.

Option 4 – Westerly approach to Mullingar: Double Circuit Tower Line

13.17 This option as shown on **Appendix 1 Figure 18 Option 4 Line Entry into Mullingar 110 kV Transmission Station** requires the existing Lanesboro 110 kV feeder circuit to merge with the new 110 kV Circuit onto a Double Circuit 110 kV Tower line from a merging position 1-2 km west of Mullingar 110 kV Transmission Station.

13.18 The double circuit line will terminate outside the Transmission Station with the existing circuit landing onto the existing 110 kV terminal tower outside the Transmission Station and the new circuit on a sealing end platform and a short cable route into Mullingar Line Bay.

13.19 Further detailed studies will be required to accommodate the line work and modifications at Mullingar 110kV Transmission Station.

13.20 This option will require extensive planning for 38 kV and LV outages to enable this connection to be made.

Option 5 – Cable entry to Mullingar Transmission Station

13.21 The cable entries to Mullingar Transmission Station do not provide any problems from the north east or north west apart from the normal Wayleave considerations. The field behind the Transmission Station is criss-crossed by overhead lines of all voltages so it may be necessary to underground or switch out for the duration of the excavation of the chosen route.

13.22 At the south side of the Transmission Station the cables would access onto the rural lane with houses on both sides. From the scars in the carriageway it appears that some of the 38 kV overhead lines have been undergrounded with the cables laid in this lane and the surface has been reinstated. This may cause a problem with the available space and the Highway Authority may object to the road surface being disturbed again.

Line Entry – Kinnegad 110 kV Transmission Station

13.23 The new 110 kV Overhead Line as shown on **Appendix 1 Figure 19 Option 1 Line Entry into Kinnegad 110 kV Transmission Station** will approach the Transmission Station from the west and terminate on a terminal tower outside the Transmission Station with slack span down-leads onto a gantry in the extended Transmission Station compound.

13.24 Further detailed studies will be required to accommodate the line work and modifications at Kinnegad Transmission Station.

13.25 This will require planning for 110 kV Transmission Station modifications to enable this connection to be made.

Line Entries- Derryiron 110 kV Transmission Station

13.26 The new 110 kV Overhead Line as shown on **Appendix 1 Figure 20 Option 1 Line Entry into Derryiron 110 kV Transmission Station** will approach the Transmission Station either from the west or from the North East. Each line entry into the compound is constrained by existing 110 kV circuits.

13.27 The new overhead line,from the North East will either terminate in proximity to the existing 110 kV Overhead Line with a tower complete with a sealing end platform and a short cable section into Derryiron 110 kV Transmission Station or cross over the Existing 110 kV Overhead Line with a terminal tower outside the Transmission Station compound and slack span down-leads to a gantry inside the Transmission Station .

13.28 The route from the West to the Transmission Station will require a terminal tower complete with a sealing end platform outside the Transmission Station compound with a short length of cable from the tower for the connection into Transmission Station equipment.

13.29 The effect that the electrical characteristics of underground cable will have on the transmission network will be determined through detailed technical study carried out once a preferred cable route has been established.

14. Construction and Operational Phase

Overhead Lines Construction and Maintenance

14.1 The proposed line will be constructed using a mixture of wood poles with galvanised steelwork bracings and lattice steel towers both supporting three phase conductors with two over running earth wires.

14.2 The positioning of the wood pole supports will depend on terrain and local ground conditions as well as the need to avoid ecological areas and, wherever possible, place poles on the edge of field boundaries.

14.3 Construction of the overhead line will generally progress in the following sequence:

- Survey, design and setting out of the final route;
- Access development for construction traffic;
- Temporary diversions or undergrounding of low voltage lines;
- Delivery of materials and pole dressing;
- Excavation, pole erection and backfilling;
- Erect temporary support systems across obstructions;
- Install pull bonds, string and sag conductor;
- Make off all clamps and joints;
- Outages for all existing lines that are to be crossed; and
- Outages at Stations for line entry connections.

14.4 Access for construction will be required and maintained to each pole location during the construction phase.

14.5 Future access arrangements for maintenance and fault repairs will be arranged with the relevant landowners.

14.6 Construction is anticipated to take approximately three to four weeks per kilometre.

14.7 A wood pole line generally requires very little maintenance. It is regularly inspected to identify any unacceptable deterioration of components so that they can be replaced.

14.8 Experience indicates that a new overhead line of this type would require refurbishment after approximately forty years, depending upon the severity of pollution and local weather conditions.

Underground Cable Construction and Maintenance

14.9 The route of the Underground Cable would depend on the terrain, local ground conditions and location of railway lines, roads, waterways and environmental land designations. Engineering constraints such as roads, railway lines, canals and watercourses would only be crossed/ negotiated where necessary, and where such constraints must be addressed, a solution that is both technically and economically feasible, without having adverse impacts on the environment, would be sought.

14.10 Following the pre-construction establishment of waiting and parking areas for contractor vehicles and temporary equipment storage, as well as welfare facilities, construction of an underground cable would typically progress as follows.

- Traffic management: installation of temporary traffic lights and signage, and organisation of road/ lane closure and diversions where necessary;
- Trench excavation;
- Steel plates will be employed as necessary to temporarily cover excavations;
- Ducts installed and backfilled each day with a temporary surface, steel plates left in place for heavy traffic where necessary;
- Cable pulling pits will be required at suitable intervals to enable the cables to be pulled through the ducts following the completion of duct installation;
- Pulling pits will be excavated during the duct installation operations, backfilled, re-excavated for cable pulling and then finally permanently reinstated with the main work;
- Installation of joint bays;
- Cable jointing utilising the joint bays; and
- Testing and commissioning.

14.11 During cable installation, access to residential properties will be maintained with as little inconvenience as possible; the use of barriers and traffic lights will be required to control traffic flow; and all excavated material will be temporarily removed from site and returned for re-use where possible.

14.12 Future access arrangements for maintenance and fault repairs will be arranged with the relevant landowners and local authority Road Departments or the National Roads Authority where appropriate.

14.13 Construction of underground cables in carriageway typically takes approximately 6-7 weeks per kilometre and 2-3 weeks per kilometre in 'normal' ground. However, it should be noted that these are only typical time estimations included for indicative purposes only and will depend greatly on ground conditions, access and technical constraints.

14.14 The maintenance of underground cables is more problematic and costly compared to the maintenance of overhead lines because general maintenance and fault repair requires re-excavation followed by reinstatement.

14.15 It is anticipated that new underground cabling would have an in service life of at least 40 years. It is difficult say beyond this as XLPE cables have only been in service since the 1980's and have given satisfactory service until now.

15. Part B- Summary

15.1 Part B of the Constraints and Route Corridor Report has provided an overview of the engineering aspects of the project including location of Overhead Line or Underground Cable in relation to population, land use, health and safety, circuit design, cabling and directional drilling.

15.2 The report contains an evaluation of the preliminary route corridors and their minor variant links (Overhead Lines and Underground Cabling Options) in the key areas of Landscape and Visual, Fauna and Flora, Cultural Heritage and recommends preferred routes for both the Overhead Line Route Corridors and Underground Cabling Route Corridors. A similar evaluation process was carried out for the Engineering aspects of the project.

15.3 Part C compares the preferred Overhead Lines to the preferred Underground Cabling Options and applies EirGrid's polices and practices for the use of High Voltage Underground Cable and Overhead Line in Ireland in order to select emerging preferred routes. Public consultation will take place to discuss the emerging referred routes.

PART C- Emerging Preferred Routes

16. Consultants Preferred Conclusions and Recommendations

16.1 Part B of the Constraints and Route Corridor Report has provided an overview of the engineering aspects of the project including location of Overhead Line or Underground Cable in relation to population, land use, health and safety , circuit design, cabling and directional drilling.

16.2 Part B also contains an evaluation of the preliminary routes corridors and their minor variant links (Overhead Lines and Underground Cabling Options) in the key areas of Landscape & Visual, Fauna and Flora, Cultural Heritage and recommends preferred routes for both the Overhead Line Route Corridors and Underground Cabling Route Corridors. A similar evaluation process was carried out for the Engineering aspects of the project.

16.3 Part C compares the preferred Overhead Lines to the preferred Underground Cabling Options and applies EirGrid's polices and practices for the use of High Voltage Underground Cable and Overhead Line in Ireland in order to select emerging preferred routes. Public consultation will take place to discuss the emerging referred routes

Natural/Environmental Comparative Analysis of Overhead Line and Underground Cable Preferred Route Corridors

Landscape and Visual

16.4 Overhead Line Route Corridors which have been assessed as having a **Negligible or Low** residual impact on landscape and visual amenity and which should be considered further within the overall route selection process are Route Corridors **4, 5A and 5B**. The impacts associated with these routes are not significant and can be mitigated by careful positioning of the Overhead Line within the 1 km corridor at the route alignment design stage of the project.

16.5 Similarly Underground Cable Routes which have been assessed as having a **Negligible or Low** residual impact on landscape and visual amenity are Route Corridors **1, 2 and 3**. The impacts associated with these routes are not significant and can be mitigated by careful positioning of the Underground Cable within the 1 km corridor at the route alignment design stage of the project.

Fauna and Flora

16.6 It is recommended that the Overhead Line Route Corridors which have been assessed as having an **Imperceptible or Slight** residual impact on fauna and flora should be considered further within the overall route selection process. Those are Route Corridors **1A, 1B, 2, 3, 4, 5A and 5B**. The impacts associated with these routes are not significant and can be mitigated by careful positioning of the Overhead Line within the 1 km corridor at the route alignment design stage of the project.

16.7 Similarly Underground Cable Route Corridors which have been assessed as having **Imperceptible or Slight** residual impacts are Route Corridors **1, 2 and 3**. The impacts associated with these routes are not significant and can be mitigated by careful positioning of the Underground Cable within the 1 km corridor at the route alignment design stage of the project.

Cultural Heritage

16.8 It is recommended that the Overhead Line Route Corridors which have been assessed as having an **Imperceptible or Slight** residual impact on cultural heritage should be considered further within the overall route selection process. Those are Route Corridors **5A and 5B**. The impacts associated with these routes are not significant and can be mitigated by careful positioning of the Overhead Line within the 1 km corridor at the route alignment design stage of the project.

16.9 Similarly Underground Cable Route Corridors which have been assessed as having an **Imperceptible or Slight** residual impact on cultural heritage are Route Corridors **1, 2 and 3**. The impacts associated with these routes are not significant and can be mitigated by careful positioning of the Underground Cable within the 1 km corridor at the route alignment design stage of the project.

Man Made Comparative Analysis of Overhead Line and Underground Cable Preferred Route Corridors

Properties within the Route Corridors

16.10 In terms of the number of properties within the 1 km wide route corridors which could potentially be affected, Overhead Route Corridor 2 and Underground Cable Route Corridors 1, 2 and 3 are all least preferred due to the high number of residential properties present. All other Overhead Line Route Corridors i.e. Route Corridors 1A, 1B, 3, 4, 5A and 5B, generally have between 346-467 properties and 1-2 schools within the 1 km route and are generally preferred.

Engineering Comparative Analysis of Overhead Line and Underground Cable Preferred Route Corridors

16.11 None of the Overhead Line Route Corridors provide any great design and construction challenges. Of all the **Overhead Lines considered Routes 1A, 1B, 4 and 5B are preferred** by the majority of the engineering aspects and it is predicted that engineering solutions during route alignment design and construction can be best achieved within the 1 km wide corridors of these routes.

16.12 Similarly of all the **Underground Cable Routes considered Route Corridor 1 is preferred** by the majority of the engineering aspects and it is predicted that engineering solutions during route alignment design and construction can be best achieved within the 1 km wide corridor of this route.

General Summary

16.13 A general summary of the results of the environmental and engineering studies is shown in Table 16.2.

Table 16.1 - General Summary of Results of the Preliminary Environmental and Engineering Studies

	Overhead Route Corridors							Underground Cable Route Corridors		
	1A	**1B**	**2**	**3**	**4**	**5A**	**5B**	**1**	**2**	**3**
Aspects Considered	Mullingar - Derryiron	Mullingar - Derryiron	Mullingar Derryiron	Mullingar - Derryiron	Mullingar - Kinnegad	Mullingar - Kinnegad	Mullingar - Kinnegad	Mullingar - Derryiron	Mullingar Kinnegad	Mullingar Kinnegad
Landscape and Visual	x	x	x	x	√	√	√	√	√	√
Fauna and Flora	√	√	√	√	√	√	√	√	√	√
Cultural Heritage	x	x	x	x	x	√	√	√	√	√
Residential Properties, Schools and Hospitals	√	√	x	√	√	√	√	x	x	x
Engineering Design and Construction impacts	√	√	x	x	√	x	√	√	x	x
	√ = acceptable routes (see Chapter 2, 3 and 5, Part 2 Constraints and Route Corridor Report) with predicted Negligible/Imperceptible or Low/Slight residual impacts which can be mitigated within 1km wide corridors									
	X = unacceptable routes (see Chapter 2, 3 and 5, Part 2 Constraints and Route Corridor Report) with predicted Medium/Moderate/ Significant or Profound/ High residual impacts which cannot easily be mitigated within 1km wide corridors									

16.14 Overhead Line Route Corridor 5B is preferred by all aspect considered i.e. landscape and visual, fauna and flora, cultural heritage residential properties/ schools/ hospital and engineering design/ construction. Overhead Line Route Corridors 4, 5A and 5B and Underground Cable Route Corridor 1 are also preferred by a majority of aspects shown.

16.15 For the purposes of selection of a series of emerging preferred routes for Public Consultation it is necessary to revisit Part A of this Constraints and Route Corridor Report which describes EirGrid's policies and practices for the use of High Voltage Underground Cable and Overhead Line in Ireland. EirGrid's policies and practices state that:

16.16 'In terms of the policy an Underground Cable will only be used if all of the following four conditions apply -

(i) An Overhead Line is not environmentally, feasible;

(ii) A technically and environmentally acceptable route for Underground Cable can be found;

(iii) The effect that the electrical characteristics of Underground Cable have on the transmission network is acceptable and the relatively poorer 'availability' of underground cable is tolerable; and

(iv) The relatively high cost of the Underground Cable can be justified.'

16.17 In relation to condition (i) of EirGrid's policies and practices, Chapter 2 of Part B of this Constraints and Route Corridor Report describes that Overhead Lines Route Corridors 5A and 5B are environmentally feasible and that predicted impacts are acceptable i.e. Negligible/Imperceptible or Low/Slight residual impacts and which can be mitigated within 1km wide corridors. As such condition (i) does not apply.

16.18 In relation to condition (ii) of EirGrid's policies and practices, Chapters 2 and 3 of Part B of this Constraints and Route Corridor Report describes that Underground Cabling Route Corridors 1, 2 and 3 are technically and environmentally feasible and that predicted impacts are acceptable i.e. Negligible/Imperceptible or Low/Slight residual impacts and which can be mitigated within 1km wide corridors. As such condition (ii) does apply.

16.19 In relation to condition (iii) of EirGrid's policies and practices, the effect that the electrical characteristics of underground cable will have on the transmission network will be determined through detailed technical study carried out once a preferred cable route has been established. As such condition (iii) cannot be confirmed at this stage.

16.20 In relation to item (iv) of EirGrid's policies and practices, in EirGrid's experience the costs associated with constructing Underground Cable circuits have been typically significantly more expensive then Overhead Line solutions. The final costs will only be known once a route corridor is known. As such the relatively high costs of an Underground Cable cannot be justified at this stage. As such condition (iv) does not apply.

16.21 In summary, EirGrid's policy on the use of High Voltage Underground Cable and Overhead Line in Ireland state that all four of EirGrid's conditions must apply for an Underground Cable to be used within a proposed circuit. As described above, all four conditions do not apply. It is therefore recommended that Underground Cable Route Corridors 1, 2 and 3 should not be considered further within this study.

16.22 Correspondingly Overhead Line Route Corridors 4, 5A and 5B which are preferred by a majority of the environmental, engineering and land use aspects in this study should be taken forward for Public Consultation and for more detailed consideration.

17. Emerging Preferred Route Corridors

17.1 Overhead Line Route Corridors 4, 5A and 5B have emerged as preferred Route Corridors from work carried out to date in Parts B and C of the Constraints and Route Corridor Report. All three Overhead Line Route Corridors comply with EirGrid's policies and practices for the use of High Voltage Underground Cable and Overhead Line in Ireland. All three Route Corridors link the existing Mullingar 110 kV Transmission Station to the existing Kinnegad 110 kV Transmission Station.

17.2 Overhead Line Route Corridors 4, 5A and 5B were assessed as acceptable routes for by the Landscape and Visual and Fauna and Flora specialists with predicted Negligible/Imperceptible or Low/Slight residual impacts which can be mitigated within 1km wide corridors. The number for residential properties, schools and hospital affected by the proposed routes was lower for Overhead Line Route Corridors 4, 5A and 5B and these routes were also preferred by this aspect.

17.3 Overhead Line Route Corridors 5A and 5B were preferred by the Cultural Heritage specialists and Overhead Line Route Corridors 4, and 5B were preferred in relation to the Engineering aspects considered.

17.4 By taking account of all preferences the Overhead Line Route Corridor 5B is preferred by all specialists considered in the study to date. Constraints around the transmission stations may require the use of under ground cable sections into the stations though.

Public Consultation

17.5 Following the second Public Consultation further work will define the Preferred Route. Thereafter we will scope the EIS in association with An Bord Pleanála prior to submitting the project for planning permission.

18. References

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