EIRGRID

North-South 400kV Interconnection Development

Preferred Project Solution Report

July 2013

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GLOSSARY OF TERMS AND LIST OF ABBREVIATIONS

ABP	An Bord Pleanála
ACA	Architectural Conservation
ASSI	Area of Special Scientific Interest
CMSA	Cavan Monaghan Study Area
CA	Competent Authority
conductors	High capacity, high strength stranded cable/wire
constraint	Any physical, environmental, topographical, socio-economic or other condition that may affect the location, development and other aspects of a proposal
cSAC	candidate Special Area of Conservation
DCENR	Department of Communications Energy and Natural Resources
DOECLG	Department of Environment, Community and Local Government
earth/ground wire	Wire installed above live conductors at the top of a tower to minimise the likelihood of direct lightning strikes to conductors.
EIA	Environmental Impact Assessment
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
ES	Environmental Statement
EU	European Union
GDA	Greater Dublin Area
ha	Hectares
HVAC	High Voltage Alternating Current
HVDC	High Voltage Direct Current
ICNRP	International Commission for Non-ionizing Radiation
IEC	International Expert Commission
line design	Location and design of transmission infrastructure (e.g., tower positions and types)
MSA	Meath Study Area
MW	Megawatts
NHA	Natural Heritage Area
NI	Northern Ireland
NIE	Northern Ireland Electricity

NPWS	National Parks Wildlife Services
NRA	National Roads Authority
OHL	Overhead Line
OPGW	Optical fibres
PAC	Planning Appeals Commission
pNHA	proposed Natural Heritage Area
PM 10	Particulate Matter with diameter of 10 micrometres
receptor	Any element of the environment which is subject to impact
RMP	Records of Monuments and Places
RPS	Record of Protected Structures
RPA	Registered Protected Areas
RPS	Registered Protected Structures
SAC	Special Area of Conservation
SPA	Special Protection Area
sensitivity	The potential of a receptor to be significantly changed
transposition	Changes the physical position of the conductors on a transmission line
UGC	Underground Cable

EXECUTIVE SUMMARY

EirGrid plc [EirGrid] and Northern Ireland Electricity (NIE) are jointly planning a major cross-border electricity interconnection scheme. This scheme (defined as the "Scheme" for the purposes of this report) is a 400 kV overhead line (OHL) linking the existing 400 kV substation in Woodland, County Meath with a planned substation in Turleenan, County Tyrone and will provide a second high capacity electricity transmission line between Ireland and Northern Ireland. The Scheme consists of two separate but related and complementary projects. EirGrid will in due course apply for planning approval for that part of the Scheme located in Ireland ("North-South 400 kV Interconnection Development").

The Final Re-evaluation Report published on 16th April 2013 represents the culmination of a detailed re-evaluation process, undertaken by EirGrid and its consultants, of all aspects of the proposed North-South 400 kV Interconnection Development. The report concluded with the identification of an indicative line route for the transmission line within an identified preferred route corridor, linking the high voltage networks of Northern Ireland and Ireland, to be located in counties Monaghan, Cavan and Meath. However, no significant detail regarding the specific location and siting of this indicative line route was provided in the *Final Re-evaluation Report*.

Accordingly, following on from the *Final Re-evaluation Report*, this *Preferred Project Solution Report* provides detail as to the currently constituted preferred line design for the North-South 400 kV Interconnection Development. This preferred line design derives from the indicative line route as identified in the *Final Re-evaluation Report*, and also includes the identification of feasible locations for, and design of, the planned transmission line infrastructure, such as tower positions, tower types and associated construction related details (e.g., indicative access tracks).

It is intended that the preferred line design identified in this report will provide the focus for on-going landowner engagement, particularly in respect of the specific siting of structures on lands, as well as further environmental survey, design and assessment, in consultation with prescribed bodies, other stakeholders and members of the public. In addition, all interested parties will have an opportunity to provide feedback on the issues which they feel should be addressed in the Environmental Impact Statement (EIS), which will accompany the forthcoming application to An Bord Pleanála (ABP) for statutory approval of the proposed development. This process is in accordance with Stage 3 of EirGrid's Project Development and Consultation Roadmap.

The outcome of this next phase of landowner engagement and further survey, design and assessment work will be to fix the tower positions for the application for approval to be submitted to ABP. The final line design for the North-South 400 kV Interconnection Development will identify fixed tower structure positions. EirGrid will not be seeking planning permission within the planning application for approval to move tower positions post planning (previously referred to as "micro-siting"). Therefore, in requesting feedback in relation to the preferred line design, as detailed in this report, EirGrid is specifically seeking to engage with landowners on

those aspects of the identified route alignment that may directly affect those landowners. Issues of relevance in this regard include where and why it has been necessary to site structures away from sites of potential ecological importance, (e.g., away from hedgerows and wetlands) and into adjoining managed agricultural fields).

Localised alterations to the currently preferred line design may still be considered in accordance with the guidelines and considerations set out in **Section 2.4** of this report. Indeed, feedback from landowners to date has included requests to place towers on field boundaries/hedgerows, in the corner of a field, at a distance to existing farm buildings or closer to the existing roadways within the landholding etc. Where such modifications can be accommodated without creating additional impact, they will be further considered in dialogue with the landowner concerned and may, ultimately, comprise part of the application for planning approval. Where it is considered that any such alterations to the currently preferred line design would create additional avoidable significant impact(s), it is likely that it will not be possible for EirGrid to include such proposed alterations as part of the application to be made to ABP. However, EirGrid's view in relation to such proposed alterations will be carefully considered after dialogue with the relevant landowner(s).

The structure of the report is as follows:

Chapter 1

This chapter sets out the context for the joint project, between EirGrid plc (formally ESB National Grid) and Northern Ireland Electricity (NIE), to construct a major cross-border electricity transmission infrastructure development between the exiting high-voltage transmission networks of Northern Ireland and Ireland (the "Scheme"). This chapter also explains EirGrid's preferred project solution in the context of the *Final Re-evaluation Report*, this *Preferred Project Solution Report* and EirGrid's Project Development & Consultation Roadmap. It also outlines the scope and nature of stakeholder and landowner consultation in respect of the matters addressed in the Preferred Project Solution Report.

Chapter 2

This chapter summarises feedback received during engagement on the *Final Re-evaluation Report*. It also explains that due to the unique context of the North-South 400 kV Interconnection Development (in terms of the previous application for planning approval, and responses on the *Preliminary Re-evaluation Report*), there is already a considerable volume of written and oral submissions from prescribed bodies, other stakeholders, landowners and members of the public relevant to the line design process. The chapter outlines how all this information has been assimilated and, where appropriate, has informed the identification of the preferred line design. This chapter also explains how future line design modification requests will be dealt with and may inform the final proposal to be submitted for planning approval.

Chapter 3

This chapter outlines the background to the identification of the preferred line design of the North–South 400 kV Interconnection Development. It explains how the process generally involves consideration of a range of environmental and technical matters relevant to overhead line (OHL) design and how other considerations specific to the particular development (including feedback from stakeholders and landowners) have fed into the process. This chapter also includes reference to EirGrid's consideration of tower designs and the basis for confirmation of the IVI tower as the preferred support structure for the development. The chapter also explains that, where it has not been possible to secure access to lands to undertake surveys in order to determine the value of sites of potential ecological importance (e.g., hedgerows and wetlands), EirGrid has sited OHL infrastructure away from such sites and into adjoining fields.

Chapter 4

This chapter identifies the preferred line design for the North–South 400 kV Interconnection Development. It includes a description of sections of the preferred line design explaining the rationale for the particular characteristics of the alignment. The relevant descriptions are illustrated in maps included in **Appendix A** and **Appendix B** of this report.

Chapter 5

With the identification of a preferred line design, the North-South 400 kV Interconnection Development has reached a level of detail considered sufficient to allow EirGrid and its consultants to engage with the public (and landowners in particular) on the likely associated construction works and activities along the specific route alignment, and to seek feedback in relation to same. This chapter therefore provides an overview of the main construction elements, phases and activities likely to be associated with the construction of the proposed development.

Chapter 6

This chapter provides a summary of the Environmental Impact Assessment (EIA) process and an indication of the issues, which at this point, are considered likely to be addressed and included in the Environmental Impact Statement (EIS) for the North-South 400 kV Interconnection Development. The matters which are likely to be addressed, and included in the EIS, are identified based on the preferred line design and associated construction activities detailed in this report.

Chapter 7

This chapter explains that the output of the forthcoming consultation process on the preferred line design, along with on-going technical and environmental studies, will feed into the final project proposal which EirGrid will submit as an application for planning approval.

1 INTRODUCTION AND CONTEXT

1.1 PROJECT BACKGROUND

EirGrid plc (EirGrid) and Northern Ireland Electricity (NIE) are jointly planning a major cross-border electricity interconnection scheme (defined as the "Scheme" for the purposes of this report). The Scheme is a 400 kV overhead line (OHL) linking the existing 400 kV substation in Woodland, County Meath with a planned substation in Turleenan, County Tyrone and will provide a second high capacity electricity transmission line between Ireland and Northern Ireland. The Scheme consists of two separate but related and complementary projects, namely:

1. That part of the Scheme located in Northern Ireland; and
2. The North-South 400 kV Interconnection Development - that part of the Scheme located in Ireland and the subject of this Preferred Project Solution Report.

The overall Scheme is illustrated in **Figure 1.1**.

Figure 1.1 Proposed Second Interconnector (the Scheme)

(The Scheme is indicated in dashed red)

400 kV
275 kV
220 kV
110 kV

In December 2009, NIE submitted an application to the Northern Ireland Department of the Environment for that portion of the overall development occurring within Northern Ireland (Ref. O/2009/0792/F). A public inquiry was commenced by the Planning Appeals Commission (PAC) in March 2012 and stands adjourned as at the date of the publication of this report. At the public inquiry, the PAC made a number of requests with regard to the application. In response to these, NIE submitted a second associated application (Ref. O/2013/0214/F) and additional material relating to the original 2009 application to the Northern Ireland Department of the Environment Planning Service in April and June 2013.

EirGrid in due course will apply for planning approval for that part of the Scheme located within Ireland.

1.2 BACKGROUND TO THIS REPORT

On April 16th 2013, EirGrid published the North-South 400 kV Interconnection Development – *Final Re-evaluation Report*[1]. That Report reflects the culmination of a detailed re-evaluation of that portion of the Scheme proposed to be located between the border with Northern Ireland and the existing Woodland Substation. The re-evaluation process included consideration of submissions and feedback received during public and stakeholder consultation in respect of a *Preliminary Re-evaluation Report* published in May 2011, as well as written and oral submissions received during the previous planning application for the proposed North-South 400 kV Interconnection Development to An Bord Pleanála during the period December 2009 to June 2010.

The *Final Re-evaluation Report* concludes with the identification of an indicative line route (within an identified preferred route corridor) located in the counties of Monaghan, Cavan and Meath linking the high voltage networks of Northern Ireland and Ireland.

The indicative line route, as identified in the *Final Re-evaluation Report* does not include any significant detail regarding its specific location and siting. It is this *Preferred Project Solution Report* which provides greater detail in respect of what currently constitutes the preferred line design for the North-South 400 kV Interconnection Development, including the identification of what are currently considered by the EirGrid Project Team to constitute feasible locations for, and design of, the planned line infrastructure, such as tower positions, tower types and construction related requirements (e.g., access tracks).

Feedback received to date from landowners and other stakeholders in respect of matters concerning detailed line design has informed this line design process to date, and the conclusions of this report. It is intended that the detailed line design identified in this report will provide the focus for on-going landowner engagement, particularly in respect of the siting of structures, as well as further environmental surveying, design and assessment, in consultation with prescribed bodies, other stakeholders and members of the public.

[1] Available at www.eirgridprojects.com

1.3 PURPOSE OF REPORT

The purpose of this *Preferred Project Solution Report* is to document the process of moving from an indicative line route, as identified in the *Final Re-evaluation Report*, to a more detailed preferred line design. This report will now be the subject of consultation, including consultation with stakeholders, landowners and members of the public on the preferred line design. In addition, all interested parties will have an opportunity to provide feedback on the issues which they feel should be addressed in the Environmental Impact Statement (EIS) which will accompany the forthcoming application to An Bord Pleanála (ABP) for approval of the proposed development.

This report will be subject to an 8 week public consultation from 16th July to 9th September 2013. The topics covered in the *Preferred Project Solution Report* are:-

- Design considerations.
- Construction and access routes methodology.
- Environmental issues to be considered in the EIS.
- Any other feedback or comments on other issues relating to the project.

All feedback and submissions will be reviewed and considered by the project team and, where appropriate, will be incorporated into the proposed development which will be the subject of an application for planning approval to An Bord Pleanála. To facilitate this process all feedback should be received by 5pm on Monday 9th September 2013.

In seeking views on the preferred line design (which is detailed in this report), EirGrid is seeking in particular to engage with landowners on those aspects of the identified route alignment that may directly affect them, including the location and siting of structures. In this regard, EirGrid intends to progress further technical, environmental and other surveys and studies to confirm the specific locations for siting structures on landholdings. EirGrid will always endeavour to site structures on lands in consultation with landowners, in order to minimise the impact of the proposal with reference both to the siting of structures and likely construction work/activities (including location of temporary access tracks for tower construction) on current land use and farm/land management practices.

However, in the case of sites of potential ecological importance (e.g., hedgerows and wetlands) where it has not been possible to secure access to lands to undertake surveys in order to determine their ecological value, EirGrid has decided to take a necessarily cautious approach and will site OHL infrastructure away from such sites of potentially important ecological areas and into adjoining fields – generally, a modified habitat where the ecological sensitivity is low. The forthcoming process of landowner engagement (following publication of this report) will provide a further opportunity for landowners to provide feedback on the structure locations proposed on their land and, potentially, to seek modifications in respect of same. It is likely that any consideration of suggested modification will require on-site survey and appraisal.

In seeking to elicit responses on the scope of matters to be addressed in the EIS, EirGrid is looking to engage with all stakeholders (including members of the public). The process will, of necessity, involve a consideration of the project's potential environmental impacts, the alternatives considered, and identifying impacts which are likely to occur and which are likely to be significant. This is set out in **Chapter 6.0** of this report.

The current process of engagement in respect of the preferred project solution, including consideration of the relevant feedback received in respect of the *Final Re-evaluation Report*, corresponds with 'Stage 3 – Confirm Design' of EirGrid's Project Development & Consultation Roadmap (which is produced at **Figure 1.2** below). All feedback arising from public consultation and landowner engagement in respect of this report will flow into the confirmation of the nature, location and extent of the final project proposal.

Following the carrying out of technical and environmental studies, and further engagement with stakeholders, EirGrid will submit the final project proposal to ABP for approval. As part of that application process, there will be defined periods within which submissions or observations may be made to ABP in respect of the proposed development. ABP also has discretion to holding an oral hearing in respect of any such application for development consent.

Figure 1.2 EirGrid's Project Development & Consultation Roadmap

2 PUBLIC AND STAKEHOLDER ENGAGEMENT

2.1 INTRODUCTION

The overarching purpose of stakeholder consultation and engagement is to ensure that all people who are likely to be affected by a project, potentially affected by a project, or consider themselves to be affected by a project have an opportunity to meaningfully feed into its development, as appropriate.

EirGrid is committed to open and transparent engagement with stakeholders on all of its infrastructure development projects, including the North-South 400 kV Interconnection Development. EirGrid welcomes feedback from interested parties on any aspect of the project and all submissions received are recorded and considered by the project team.

Following the withdrawal of the previous application for approval in respect of the North-South 400 kV Interconnection Development Project in July 2010, EirGrid undertook a comprehensive re-evaluation of the project. The re-evaluation process included an eight week period of public consultation on the content and findings of a Preliminary Re-evaluation Report in May 2011. Having allowed sufficient time for the Independent Expert Commission (IEC) review on the cost of undergrounding all or part of the North-South 400 kV Interconnection Development and the associated Joint Oireachtas Committee hearing, EirGrid concluded this review process in April 2013 with the publication of the *Final Re-evaluation Report*. Submissions received during the public consultation on the *Preliminary Re-evaluation Report* and observations and submissions in respect of the previous application for approval, along with the findings of the IEC Review, the Government Energy Policy statement and the Joint Oireachtas Committee consultation, were considered by the project team as part of the re-evaluation process.

It was deemed appropriate to allow for an additional period of structured engagement on the content and findings of the *Final Re-evaluation Report* before moving to the next stage of the project having consideration for:

i) The time lapse between the *Preliminary* and *Final Re-evaluation Report*;

ii) The addition of new information to the *Final Re-evaluation Report* in light of the IEC Review; and

iii) Request from a representative group for additional engagement on the findings of the re-evaluation process.

This project has a unique planning context and has been the subject of extensive and comprehensive public and stakeholder consultation activities since it launched in autumn 2007. Submissions received as part of earlier consultations, including those received on the *Preliminary Re-evaluation Report* and during the previous application for planning approval, contained specific issues relating to the line design, including potential localised modifications to, or siting of, the alignment. The essential elements of these submissions are set out in **Section 2.3**.

2.2 PUBLIC ENGAGEMENT ON THE FINAL RE-EVALUATION REPORT

Following the publication of the *Final Re-evaluation Report*, EirGrid held a six-week period of public engagement (between 16th April 2013 and 27th May 2013) on the contents of that report.

The terms of reference for this engagement were:

- Comment on the content and findings of the *Final Re-evaluation Report.*
- Has EirGrid considered all relevant issues as part of the re-evaluation process? If not what other issues do you think EirGrid should consider?
- Provide feedback on how best to adopt community gain within transmission project developments and the North-South 400 kV Interconnection Development.

EirGrid is grateful to the parties and persons who took time to provide submissions in writing, via the project information service or by attending one of the nine open days held during this period of engagement on the contents and findings of the *Final Re-evaluation Report*. These submissions have been considered by the project team.

2.2.1 Overview of Communications Activities

A range of communication tools were used to facilitate as wide an engagement as possible. Interested parties were invited to participate via the project information centre network and service, at one of nine project information events, or at a pre-arranged project briefing.

2.2.1.1 Information Centre Network & Service

A comprehensive project information service has been in operation since autumn 2007 and facilitates all interested parties in contacting the project team to provide feedback or obtain information about any aspect of the project. This service can currently be availed of through the project phone line which is open between 9am and 5pm, Monday to Friday (Lo-call 1890 25 26 90); online at northsouth@eirgrid.com or via traditional mail at: C/O EirGrid NS Project Manager, Block 2, Floor 2, West Pier Business Campus, Dun Laoghaire, Co. Dublin.

Since 2008, EirGrid has had two established information centres, one in Navan, County Meath and one in Carrickmacross, County Monaghan. As part of this most recent round of engagement, EirGrid has expanded the information centre network with the addition of a new information centre in Kingscourt, County Cavan.

The information centres are staffed by project team members who are available to meet with anyone who wishes to visit the centre during the advertised opening hours (see **Table 2.1**). If any stakeholder requires a meeting with the team outside of these hours, every effort is made to accommodate that request.

Table 2.1 Information Centre Locations and Opening Hours

Centre	Address	Opening Hours
Navan Information Centre	10a Kennedy House, Kennedy Road, Navan, Co. Meath	Tuesday 12 noon to 7pm
Carrickmacross Information Centre	Carrickmacross Workhouse, Shercock Road, Carrickmacross, Co. Monaghan	Wednesday 12 noon to 7pm
Kingscourt Information Centre	Dún a Rí House Hotel, Station Road, Kingscourt, Co. Cavan	Thursday 12 noon to 7pm

2.2.1.2 Open Days

In order to provide all interested parties with an opportunity to obtain information about the project and meet with a variety of technical experts from the project team, a series of six open days, as detailed in **Table 2.2**, were planned and held during the engagement period. Following a request from Monaghan Anti-Pylon Committee an additional three open evening events were held in County Monaghan (detailed in **Table 2.2**).

Members of the project team were available at each open day to engage with members of the public and answer any queries or questions that might arise. As far as possible the project team endeavoured to capture the views and feedback provided by stakeholders during these events.

At each event technical experts were available to provide stakeholders with information on the following topics:

- Technology options;
- Electric and magnetic fields (EMF);
- Planning;
- Environmental matters including ecology and archaeology; Line design; and
- Landowner engagement including compensation, impact on land use and farming practices.

Tailored information displays were prepared by the project team for these events. The displays focused on providing information on the key findings of the *Final Re-evaluation Report*.

Technical experts used detailed mapping of the indicative line route, available at a 1:10,000 and 1:25,000, to provide stakeholders with specific information on the proximity of the line route to their particular areas of interest.

The details of the open days are outlined below in **Table 2.2**.

Table 2.2 Open Day Venues, Dates and Times.

Venue	Date and Time
Town Hall, Cavan Town	Tuesday, April 23rd 2013, 1pm – 8pm
Town Hall, Cavan Town	Wednesday, April 24th 2013,1pm – 8pm
The Workhouse, Shercock Road, Carrickmacross	Thursday, April 25th 2013, 1pm – 8pm
The Workhouse, Shercock Road, Carrickmacross	Friday, April 26th 2013, 1pm – 8pm
Navan Education Centre, Athlumney, Navan	Monday, April 29th 2013, 1pm – 8pm
Navan Education Centre, Athlumney, Navan	Wednesday, May 1st 2013, 1pm – 8pm
Cremartin GAA Centre, Castleblayney	Tuesday, May 22nd 2013, 4.30pm – 8.30pm
Aughnamullen GAA Social Centre, Carrickmacross	Wednesday, May 23rd 2013, 4.30pm – 8.30pm
Corduff-Raferagh Community Centre, Carrickmacross	Thursday, May 24th 2013, 4.30pm – 8.30pm

2.2.2 Public Engagement Approach

To facilitate members of the public and other parties participating in this round of engagement the following information was made available to all interested parties at the commencement of this round of engagement:

- A Community Update brochure, containing details of the IEC review, key findings of the project re-evaluation process, terms of reference for this engagement period and contact and event details. This was issued at the commencement of this stage of engagement as detailed in **Section 2.2.2.1** and was made available at the project open days, project website and information service;
- 1:25,000 mapping showing the indicative line route in the CMSA and MSA was made available on the project website, at the project information centre network, at the project information days and

upon request via the project information service. Bespoke maps were prepared and provided to stakeholders upon request;

- The *Final Re-evaluation Report* and associated appendices was available for inspection at the project information centre network and information days. The report was available on the project website and copies were provided upon request. In addition copies of the report were provided to the County Librarian in Meath, Cavan and Monaghan for display in their branches; and
- A frequently asked questions document was produced and made available on the project website. Copies of this document were also available from the project information service.

2.2.2.1 Proactive Engagement

A letter inviting participation in this stage of engagement and enclosing a community update brochure was sent to all the following groups of stakeholders:

- Elected members;
- Statutory and prescribed bodies;
- National representative groups;
- County representative groups;
- Local, business and community groups within 5km of the indicative line route;
- Members of the public including observers in respect of the 2009 application; and
- Landowners along the line route.

In addition, where contact details were available organisations and elected members were proactively contacted by phone or email.

2.2.2.2 Publicising the Engagement Process

Every effort was made to ensure that as many people as possible were made aware of the project and had an opportunity to participate, this was achieved through a combination of news releases to national and local print, broadcast and electronic media, placing seven advertisements in local press and 80 advertisements on local radio stations, and on-line on the EirGrid website.

2.2.3 Submissions Received

The submissions received have been reviewed and considered by the project team. The number and nature of submissions are detailed in **Table 2.3.**

Table 2.3 Number and Nature of Submissions Received on Final Re-evaluation Report

Method of Stakeholder Feedback	Number of Submissions
Project Briefing	18
Information Centres & Telephone Line	22
Written submissions (including email)	58
Open Days (Series 1) [2]	70
Open Evening Events (Monaghan) (Series 2) [3]	500
Total	**668**

For the purposes of this report the issues raised by stakeholders have been grouped as listed below:

- Submissions received from prescribed bodies on the *Final Re-evaluation Report*;
- Submissions relevant to the *Final Re-evaluation Report*;
- Submissions relevant to the *Preferred Project Solution Report* and subsequent stages;
- Submissions on other issues; and
- Submissions on community gain.

A detailed summary of submissions received is included in **Appendix C** and the high level summary and EirGrid's response to these is included, as appropriate, in the following sections.

2.2.4 Submissions Received from Prescribed Bodies on the Final Re-evaluation Report

Submissions from engagement with prescribed bodies on the *Final Re-evaluation Report* were collated from written submissions and meetings. The key points raised in written submissions are summarised in **Table 2.4**. It should be noted that engagement with prescribed bodies is on-going.

[2] This number is based on the number of attendees who registered their presence at the events.
[3] This number is based on the number of attendees who registered their presence at the events.

Table 2.4 Key Points Raised by Prescribed Bodies on the Final Re-evaluation Report

Prescribed Body	Key Points Raised	Response
National Roads Authority (NRA)	The indicative route traverses a number of national roads (M3 as well as the N2) and national secondary roads (N51 and N52). It also traverses the line of the Leinster Orbital Route (LOR) which is currently at feasibility stage. The LOR is supported in the Meath CDP, the GDA RPGs 2010-2022 and the NTA's GDA Draft Transport Strategy 2011-2030. The NRA acknowledged that the previous application examined the inter-relationship of the proposed North-South 400 kV Interconnection Development and the LOR. The NRA recommends that EirGrid re-examines the inter-relationship between the two infrastructure projects to take into account any alterations or modifications to the revised North-South 400 kV Interconnection Development for the LOR. The NRA also requests that EirGrid gives consideration to the following matters: (1) Identify the methods/techniques employed in traversing the existing national road network to ensure that the safety and standards of the national road network is maintained through appropriate best practice construction methods. (2) Ensure that proposed works do not impinge on the M3 Motorway and the Concession Operator; the NRA recommends that both the NRA and the M3 Concession Company are consulted during the development of the project concerning works proposed to be undertaken in proximity to the M3. (3) Ensure that the detailed scheme design provides sufficient clearance to facilitate the construction of the future LOR.	Consultations were undertaken with the NRA in relation to the preferred line route and possible crossings of the M3, N2, N51 and N52, in addition to the Leinster Orbital Route which is currently at feasibility stage. Further consultation was undertaken with the M3 Concession Company in relation to the M3. These roads were therefore taken into consideration for the preferred line design and engagement with both bodies will continue during the process of finalising the line design and preparation of the EIS. (1) The stringing of conductors across the national road network will be carried out in accordance with IEEE Std 524-*1992 Guide to the Installation of Overhead Transmission Line Conductors* incorporating a proven work methodology, which ensures that there is no significant effect on the safe passage of traffic on these roads. (2) and (3) As noted above, consultation will be undertaken with both the NRA and M3 Concession Company representatives during the process of finalising the line design and preparation of the EIS. Such consultation will address the satisfactory clearances between the finished surface of the M3 and the overhead conductor, at the crossing point. As matters stand, the intersection point remains unchanged from that of the previous scheme.
Inland Fisheries Ireland	The Inland Fisheries Ireland (IFI) comment that the proposed powerline passes through a number of river catchments such as the River Tolka, Boyne, Dee, Glyde, Erne, Dromore, and Fane catchments many of which contain valuable fishery habitat with stock of salmonid and coarse fish; noting that a number are protected under the Habitats Directive including Salmon and Lamprey. The IFI observe that in the event that there will be works in or near watercourses that EirGrid is directed to the Guidelines entitled *'Requirements for the Protection of Fisheries Habitat during*	EirGrid confirms that river catchments were considered as part of the re-evaluation process, and will continue to be a consideration in the preparation of an EIS. **Chapter 6** of this report identifies, in general terms, the type of issues which will be considered in the EIS, the nature of the assessment of impacts in respect of those particular issues and the potential associated environmental effects. The potential impact on water quality and fisheries will be assessed as part of the EIS and the wider EIA process.

Prescribed Body	Key Points Raised	Response
	Construction and Development Works at River Sites.' [published by the Eastern Regional Fisheries Board]. The aim of which is to identify the likely impact on fisheries habitat in the course of construction and development work, and to outline practical measures for the avoidance and mitigation of damage. The IFI are seeking to be kept informed of the proposal and would welcome the opportunity to comment further when more details are available.	EirGrid and its consultants have endeavoured to identify a preferred alignment which avoids or minimises works in or near watercourses. However, in preparing the application for approval and EIS, EirGrid will incorporate the provisions of the guidance document '*Requirements for the Protection of Fisheries Habitat during Construction and Development Works at River Sites'* produced by the Eastern Fisheries Board. EirGrid will keep IFI informed at all stages of the project, and will consult with them prior to lodgement of the application.
Geological Survey of Ireland,	The Geological Survey of Ireland (GSI) notes some clarifications in relation to the designation of geological heritage sites: The GSI recommends the use of the term '*recommended for NHA designation'* as the GSI is in the process of compiling a list (which is not finalised) of sites proposed for designation as National Heritage Areas (NHAs). The GSI note that they have also determined a secondary list of County Geological Sites (CGS) listed in Appendix 13b of the Meath CDP 2013-2019 and related chapter 9.7.7 (policy NH POL 12 refers). Within the MSA the GSI identifies two CGS (Altmush stream CGS & Boyne River CGS) which Route 3B-MSA traverses. The GSI comments that the features of interest are unlikely to be affected by works. A further two sites of interest are noted (Galtrim Morraine CGS & Nobber CGS) by the GSI who consider that no impacts are anticipated. The GSI recommend that they be contacted during the line design phase for mitigation measures, if applicable.	EirGrid confirms that designation of geological heritage sites was considered as part of the re-evaluation process, and will continue to be a consideration in the preparation of an EIS. In this regard, **Chapter 6** of this report identifies, in general terms, the type of issues which will be considered in the EIA, the nature of the assessment of impacts in respect of that particular issue and the potential associated environmental effects. The potential impact on soils, geology and hydrogeology will be comprehensively considered in the EIS and assessed as part of the EIA process, and this will include consideration and assessment of potential impacts on geological heritage sites (including those recommended for NHA designation). EirGrid will keep the GSI informed at all stages of the project.
Border Regional Authority	The Border Regional Authority draws the attention of EirGrid to Section 5.4.2.7 of the Regional Planning Guidelines and, in particular, the entire context and wording of policy INFP23, which states that Development Plans '*should facilitate the provision of energy networks in principle'* subject to meeting a number of environmental and technical criteria. It is noted that the Sinn Fein members of the Border Regional Assembly also made a submission (dated the 20th of May 2013). This is incorporated into the general feedback received in **Appendix C**.	It is noted that Policy INFP23 notes that Development Plans '*should facilitate the provision of energy networks in principle'* subject to meeting a number of environmental and technical criteria. **Chapter 6** of this report identifies, in general terms, that planning policy issues (including regional planning guidelines) will be considered in the EIS. Engagement with the regional authority will continue during the process of finalising the line design and preparation of the EIS.

2.2.5 Submissions from Other Stakeholders on the Final Re-evaluation Report

A number of submissions raised issues that were of relevance to, or in response to, the *Final Re-evaluation Report*. The issues are set out in **Appendix C** of this report and are grouped under three main headings as follows:

1. **Project Need/Scope**

   A number of submissions made observations and provided feedback in respect of the need for the project. Examples of the issues raised are set out in **Appendix C (Section 2.1).**

   Response: Project need is adressed in Chapter 2 of *The Final Re-evaluation Report.* The chapter sets out why the proposed second north-south electricity interconnector (the "Scheme") is a critical and strategically urgent transmission reinforcement on the island of Ireland. The chapter provides a summary of the benefits the Scheme provides to consumers on the island of Ireland. Section 2.2 in particular describes these benefits with reference to security of suppply, electricty market integration and facilitation of renewable energy. In addition, section 2.3 exclusively deals with the implication of the recent economic downturn on the need for the project. This section concludes that the key drivers for the project such as security of supply, electricty market integration and the longer term facilitation of renewable energy sources on the island are not signifiantly impacted by changes in short to medium term demand forecasts.

2. **Alternatives (in particular Technical Alternatives)**

   Many of the submissions questioned the alternatives which have been considered for the project, in particular the technical options considered. The specific issues related to:

   - Environmental and cost comparison of underground cables (UGC) versus overhead lines (OHL);
   - Routing suggestions for UGC;
   - Reference to international examples and advances in technology; and
   - Other options to meet the needs of the project.

   Examples of issues raised are set out in **Appendix C (Section 2.2).**

   Response: Technology options are addressed in Chapter 3 of the *Final Re-evaluation Report*. The chapter reviews latest studies on technology options available to the project and includes a comprehensive review of the findings of the International Expert Commission (IEC). Section 3.3 in particular provides a comparative assessment of the use of High Voltage Direct Current (HVDC) technology as an alternative to High Voltage Alternating Current (HVAC) technology and includes consideration of the findings of the IEC report. The results of this comparative assessment are

summarised in section 3.3.1 and highlight that the HVAC option is the preferred solution based on a range of criteria including cost, transmission network expansion and international best practice. In relation to the cost difference between HVDC and HVAC technology options in particular, the *Final Re-evaluation Report* noted that the IEC had confirmed that a HVDC UGC option would cost at least €333 million more than a comparable HVAC OHL option.

Since the publication of the *Final Re-evaluation Report*, EirGrid has also recently published a new study into the cost of undergrounding the proposed North-South 400 kV Interconnection Development. The study[4] by consultants Parsons Brinckerhoff follows from their recent study for the UK Government on *Electricity Transmission Costing*[5] and provides the most up-to-date information on the cost of a HVDC UGC solution for the project. In summary, the report further confirms that the cost of a HVDC UGC option would be significantly higher than that of a HVAC OHL solution and indicates that the range of cost difference for the Scheme (excluding the intermediate substation near Kingscourt) would be in the region of €670 million euro.

3. Study Area, Corridor Identification and Corridor Evaluation

Many of the submissions made observations and comments on the project study area and the corridor identification and evaluation processes. Examples of issues raised are set out in **Appendix C (Section 2.3).**

Response: The re-evaluation of the proposed study area is addressed in Chapter 4 of the *Final Re-Evaluation Report*. As noted under section 4.3 of this report, the re-evaluation included consideration of previously published material on the study area including an assessment of using the eastern coast as a boundary for the study area[6]. The chapter concludes in section 4.5 by stating that no new constraints information has arisen which would require the introduction of additional study area within which to route the proposed North-South 400 kV Interconnection Development. Section 4.4 of the *Final Re-evaluation Report* also outlines the rationale for the use of two study areas for the project and Appendix B of this report includes a specific response to a submission on this matter. In this regard, submission FS-2 contended that the two study areas "*should have been unified into one study area from Woodland to the border*"[7]. EirGrid's response to this contention clarifies that the continued division of the study area into two sections is provided primarily to "*facilitate review by the public and other parties of that portion of the scheme which is of most importance to them…".*

The re-evaluation of route corridor identification and comparative assessment is adressed in Chapter 6 and Chapter 7 of the *Final Re-evaluation Report* respectively. The aim of the corridor

[4] *Cavan-Tyrone & Meath-Cavan 400 kV Transmission Circuits – Technology and Costs Update*, available at http://www.eirgridprojects.com
[5] Available at http://www.theiet.org/factfiles/transmission.cfm
[6] Available at http://www.eirgridprojects.com
[7] Refer to *Final Re-Evaluation Report* – Appendix B, page B18, available at http://www.eirgridprojects.com

identification process is to identify feasible route corridors within the study area. This re-evaluation takes into consideration updates to the detailed constraints assessments previously undertaken and Chapter 6 concludes that no new significant information has arisen which would give rise to alternative route corridors being identified. The comparative corridor evaluation outlined in Chapter 7 then identifies the least constrained corridor option across both study areas between Woodland and Turleenan. This preferred route corridor is described in Chapter 7 as route corridor option A (CMSA) and route corridor option 3B (MSA). As described under section 4.2, the general location of the proposed intermediate substation is determined by the point of intersection of this least constrained route and the existing Flagford-Louth 220 kV OHL. This intersection guides the future siting of a substation in the vicinity of Kingscourt when the need arises.

In conclusion, in response to feedback received, the aim of the above summary is to provide further clarity on relevant conclusions reached within the *Final Re-evaluation Report*. Although a number of issues were raised in relation to the report itself and the conclusions reached, no new issues were identified during public and stakeholder engagement on the *Final Re-evaluation Report* which would alter, or cause reason to review, the conclusions of EirGrid and its consultants in respect of the technical nature of the proposed North-South 400 kV Interconnection Development location of the preferred line route.

It should be noted however, that as part of the Environmental Imapct Assessment (EIA) process, a number of key items adressed in the re-evaluation process such as technology alternatives and project need will be further addressed in documents to be submitted with the application for planning approval, including the EIS.

2.2.6 Submissions Relevant to the Preferred Project Solution Report

A number of submissions raised specific concerns or enquiries in respect of the alignment of the planned circuit, including potential localised modifications to, or siting of, the alignment as well as access during the construction phase. The issues raised are summarised below and set out in **Appendix C (Section 3)** of this report under the following headings:

1. Modifications

A number of submissions received from stakeholders related to the modifications made to the indicative line route since the last phase of landowner engagement in July 2011 and suggestions for further modifications to be made to the line route. General concerns in relation to the rationale for the modifications made, and how the modifications would impact specific landholdings or dwellings and farming activities, were raised by a number of stakeholders. Other concerns were more site specific. Examples of specific requests and issues raised in relation to the modifications are set out in **Appendix C (Section 3.1.1)** of this report.

Response: The line design process and the consequent modifications made to the indicative line route are addressed in detail in **Chapter 3** of this report. The line design process involves consideration of a

range of environmental and technical matters relevant to OHL design generally and others more specific to the particular project (including landowner feedback), in order to determine what constitutes the most suitable line design. Specific requests for modifications are currently being considered as per the process set out in **Section 2.4** and include the following:

- Some stakeholders felt that the modifications in the vicinity of Doohamlet as set out in **Table 3.2**, has resulted in a greater impact on their landholding or dwelling house and requested additional options are considered to make the required diversion;
- Some landowners advised of locations within their land that would either be unsuitable for locating structures or would significantly impact upon their farming practices or woodlands and requests for minor adjustments to the proposed alignment through their lands; and
- Request that partial undergrounding be considered from the intersection with the existing Oldstreet-Moneypoint line into Woodland substation.

In addition, this currently preferred alignment will be the subject of further landowner engagement, other public and stakeholder consultation and input, as well as on-going technical and environmental assessment and analysis. The final line design for the North–South 400 kV Interconnection Development to be submitted to ABP will be assessed and included in the EIS which will accompany the planning application for approval.

2. Information on the Line Route and Design and Location of Towers

Many submissions raised concerns regarding the proposed line route and the design and location of the tower structures. Queries included the location and footprint of towers, the distance between towers and the required clearance from the ground. Other specific requests and issues raised are set out in **Appendix C (Section 3.1.2)**.

Response: The line design process including the approach to siting towers and tower design is described in detail in **Chapter 3** of this report. It is intended to carry out further technical, environmental and other surveys and studies to confirm the specific siting of structures and inform the preparation of the EIS. Landowners, will therefore, have a further opportunity to influence the fixing of those tower structure positions which may directly affect them. The final line design for the North–South 400 kV Interconnection Development to be submitted to ABP for approval will identify fixed tower structure positions. EirGrid will not be seeking permission in its application to move tower positions post-planning (previously referred to as “micro-siting”).

3. Proximity to Dwellings and Other Receptors

Many submissions expressed concerns relating to the proximity of the line route to dwelling houses or other receptors, such as community facilities and schools. A large number of the attendees at the project information days also requested measurement of the exact distance of the indicative line route from their dwelling house or other receptors. The concerns were generally on the grounds of visual impact or health concerns. Specific requests and issues raised in relation to the proximity of the line route to dwelling houses or other receptors are set out in **Appendix C (Section 3.1.3).**

Response: EirGrid acknowledges landowner and householder concerns in respect of the project's potential impact on specific landholdings and dwellings. EirGrid endeavours to provide stakeholders with appropriate and relevant information in respect of the project. The potential impact of the project on individual dwellings, landholdings and other receptors, such as community facilities and schools will be assessed and included in the EIS which will accompany the planning application for approval.

4. Construction, Access to Lands

Construction methodology and land access were raised in a number of submissions. During the project information days a number of stakeholders also requested additional information on these topics. Queries included what steps EirGrid can take in the event of consent for access not being given by landowners. Some stakeholders also enquired whether EirGrid's rights extend to stringing towers over land without landowner consent and asked what rights the landowner maintained. Specific issues raised in relation to the construction process, land access and operational phase of the development, are set out in **Appendix C (Section 3.2).**

Response: Observations received in respect of the proposed construction process, including access to land (during construction and operation), have been considered in the preparation of **Chapter 5** of this report. In addition, EirGrid confirms that an agricultural advisor will be made available to all landowners should they wish to discuss the project and jointly explore ways of minimising the impact of the project on their farming practices. Landowners who wish to avail of this can find the relevant details in their landowner packs. The potential impact of the construction and operational phases of the North–South 400 kV Interconnection Development on landholdings will also be assessed and included in the land-use/agronomy section of the EIS.

2.2.7 Responses Relevant to the Environmental Impact Assessment Process

As part of this stage of public engagement, issues of relevance for the EIA were raised. Details of specific observations, constraints and considerations raised by stakeholders and of potential relevance for the EIA stage are set out in **Appendix C (Section 4)**.

1. Agronomy

A number of landowners raised concerns about potential farming restrictions that will apply to their land following the construction of the project. These stakeholders were concerned that the project would result in the sterilisation of farmland beneath and adjacent to the tower structures and the OHL circuit. Other concerns included the potential impact on animal health and the proximity of the indicative line route to farm buildings. Specific concerns raised by stakeholders in relation to these issues are outlined in **Appendix C (Section 4.1).**

2. Community and Socio Economic Impact

A number of submissions raised concerns that the project will give rise to unrest within their communities with some advising that any landowner who allows a tower will be in opposition to their community and that the project will result in divisions amongst neighbours. A number of stakeholders felt that the receiving community would not benefit from the project. In addition they raised concerns that the project would negatively impact businesses in the vicinity of the line route and in particular those that depend on tourists. Specific concerns raised by stakeholders in relation to community and socio-economic impacts are outlined in **Appendix C (Section 4.2)**.

3. Cumulative Impact

A number of submissions raised concerns regarding the cumulative impact of future development in the vicinity of the project. In particular, the substation in Moyhill, the future development of lines in the area and the development and extension of wind farms in proximity to the line route. Specific concerns raised by stakeholders in relation to cumulative impact are outlined in **Appendix C (Section 4.3)**.

4. Cultural Heritage & Archaeology

Concerns were raised regarding the project's potential impact on cultural heritage and archaeological sites in proximity to the line route. Specific sites identified by stakeholders for consideration by the project team during the EIA process are listed in **Appendix C (Section 4.4)**. Other stakeholders queried the diversion around the site of the Battle of Clontibret, advising that as this does not attract tourists they felt that this diversion resulted in a greater environmental impact.

5. Ecology

Submissions outlined general concerns regarding wildlife in proximity to the line, in particular birds, bats and fisheries. Specific ecological sites and features identified by stakeholders for consideration by the project team during the EIA process are listed in **Appendix C (Section 4.5)**. Other concerns included noise impact on bats, the impact on a locally important brown trout fishery and spawning beds of Lough Mourne.

6. Health

A number of submissions outlined general concerns about perceived health impacts due to the presence of overhead powerlines, specifically in relation to Electric and Magnetic Fields (EMF) including cancer, childhood leukaemia, and the impact on mental health including stress and depression, and human fertility. These concerns were typically raised in the context of the proximity of the proposed line route to the stakeholder's dwelling house or other receptors such as community facilities and schools. Specific queries and concerns raised about the potential health impacts associated with the project are outlined in **Appendix C (Section 4.6)**.

7. Landscape & Visual Impact

General concerns regarding visual impact and how the project could impact upon the visual amenity of the landscape in proximity to the line were expressed by a number of stakeholders. Stakeholders feel the line and associated structures would be unsightly and impact on scenic views of the countryside. Specific concerns relating to landscape and visual impact are outlined in **Appendix C (Section 4.7)** of this report.

8. Noise

Some stakeholders expressed concerns regarding the potential noise impact of the interconnection development particularly in relation to areas in close proximity to the line route and associated structures. Specific concerns raised in relation to potential noise impact associated with the North–South 400 kV Interconnection Development are outlined in **Appendix C (section 4.8).**

Response: These topics have been considered in the preparation of **Chapter 6** of this *Preferred Project Solution Report* and will be further considered by the relevant specialists in preparing the EIS to accompany the planning application to ABP for approval of the North–South 400 kV Interconnection Development.

As detailed in **Section 2.2.1.2** of this report, EirGrid had a range of technical experts including an EMF specialist available at the project information days to provide all interested parties with information and to answer any queries. As part of the consultation on this report, EirGrid will hold a further series of open days where various technical experts will again be available to meet with stakeholders and answer their queries.

In addition to this, stakeholders with specific enquiries can also contact the project information service to request information or set up an appointment to meet with relevant members of the project team.

Furthermore, with the identification of the preferred line design, the North-South 400 kV Project has now been developed to a level of detail considered sufficient to allow EirGrid and its consultants to consider where significant impacts are likely to arise and the issues which need to be addressed in the Environmental Impact Statement (EIS). Therefore, in **Chapter 6** of this report, EirGrid has identified, in general terms, the range of issues which are likely to be considered in the EIS, the nature of the assessment of impacts in respect of that particular issue and the potential associated environmental effects.

2.2.8 Feedback on Other Issues

As part of this stage of public engagement, a number of submissions raised general issues relating to the project. These are detailed in **Appendix C** and are grouped under the following headings:

- Public Engagement;
- Planning;
- Compensation; and
- Property.

2.2.8.1 Response

EirGrid endeavours to provide stakeholders with appropriate and relevant information in respect of the project. Specific maps detailing the requested information were provided in response to requests from stakeholders. EirGrid is also committed to ensuring that all stakeholders are aware of the opportunities to participate. The feedback received in relation to the promotion of this round of engagement has been considered and, where appropriate, incorporated into future project activities.

The potential impact of the project development on property will be addressed within the EIS which will be prepared for the application in accordance with existing guidelines. It is proposed that consideration of this issue will be included within the EIS chapter on Material Assets. **Section 6.2.4.8** of this report provides a summary outline of the proposed scope of this chapter for consultation. EirGrid also endorses the approach to loss of development rights set out in the ESB/IFA Code of Practice.

In the event that the proposed development receives planning approval and proceeds to construction, landowners of holdings which are directly affected by the routing of the alignment, either by way of having structures located on, or wayleaves across their lands, are entitled to statutory compensation. While agreement regarding compensation is always sought by EirGrid with landowners, there is also a process of independent arbitration, in the event agreement cannot be reached. The statutory entitlement to compensation is considered to offer an appropriate mitigation to landowners in respect of the impact, if any, upon property directly arising from the development of strategic transmission infrastructure on their lands.

2.2.9 Feedback on Community Gain

A number of stakeholders provided feedback relating to community gain, this is detailed in **Appendix C**. All feedback relating to community gain, has been collated and will be issued to the relevant parties (e.g., Department of Environment, Community and Local Government (DOECLG) and Department of Communications Energy and Natural Resources (DCENR)) for consideration as part of the decision making process for determining a suitable community gain model in respect of transmission projects. In this latter regard, it should be noted that any future policy in respect of Community Gain is likely to be in respect of major transmission projects in general, rather than specifically for the North-South 400 kV Interconnection Development Project.

2.3 PREVIOUS SUBMISSIONS RELEVANT TO THIS STAGE OF PROJECT DEVELOPMENT

Due to the unique context of the North-South 400 kV Interconnection Development (in terms of the previous application for planning approval and feedback arising from the Preliminary and Final Re-evaluation Reports) there is a considerable volume of written and oral submissions by prescribed bodies, other stakeholders, landowners and the general public. These submissions contain information which was useful to EirGrid in undertaking its review of the nature and location of the new development as part of the re-evaluation process and, ultimately, in the identification of the preferred project solution. These submissions also included specific issues relating to line route, including potential localised modifications to the alignment or siting of structures. These were acknowledged in the *Final Re-evaluation Report* as matters more appropriately associated with, and thereby addressed by, the process of route confirmation and preparation of the EIS.

As part of the line design process, each issue was subject to detailed review and assessment in line with the approach outlined in **Section 2.4**. Where the recommendation or request to modify the line design was determined to be environmentally and technically feasible, modifications to the line design have resulted**.** A summary of the issues and specific modification requests is set out in **Table 3.1, Table 3.2** and **Table 3.3 of Chapter 3**. In this regard, the report acknowledges issues and requests for modification of the line design by statutory bodies and other organisations that made submissions. However, in the context of EirGrid's legal obligations in respect of data protection, this report does not detail any requests which might reveal the identity of, or discussions or requests to modify the line route from, private individuals/landowners.

2.4 HOW SUBMISSIONS MAY INFORM THE LINE DESIGN PROCESS

It is EirGrid's experience of developing electricity transmission infrastructure, that individuals who live in close proximity to the line route, including landowners, will often make a request to maximise the distance from the proposed line to their dwelling. In addition, landowners will often express a preference as to where the line might cross their land; or request a change as to how or where a line is proposed to cross their land; and, in particular, where any structures might be located on their land (e.g. on field boundaries or in

hedgerows). In addition, other bodies and organisations (including prescribed bodies) often raise issues or concerns in respect of particular aspects of the proposed development, including tower positions.

Modification requests have and will continue to be dealt with as follows:

- From a technical perspective, the proposed tower position modification will be assessed using a Digital Terrain Model (DTM), Power Line Systems – Computer Aided Design and Drafting (PLS CADD), aerial photography, aerial LiDAR[8] and Ordnance Survey mapping to determine its feasibility. Implications for tower spans, tower heights, conductor clearance levels, separation distances to dwellings, etc. will also be assessed; and

- From an environmental perspective, the proposed modification is assessed by the relevant specialists – including ecologists, archaeologists, hydrologists, geologists, landscape architects, planners, agronomists and wayleave agents. Initially, a desk based assessment is undertaken which includes a review of environmental constraints using aerial photography, LiDAR and other environmental datasets. Field, vantage point and other site specific surveys are also carried out where applicable and, if possible, surveys are carried out on the lands with the consent of the landowner;

The guidelines for dealing with modification requests are set out below:

- All reasonable design change requests will be technically and environmentally assessed in accordance with the approach outlined above.

- In order to be acceptable, suggested design changes:

  - must meet general line design requirements[9] (this includes the environmental and technical considerations identified in **Section 3.3.2**);
  - must not result in an undue greater impact for nearby or adjoining dwellings/sensitive receptors;
  - should minimise the number of macro[10] changes to the overall line design; and
  - proposed modifications should be confined, where possible, to the landowner's property, unless otherwise agreed with adjoining landowners.

- A balanced judgement will be made based on technical, environmental and other considerations.

[8] LiDAR is a remote sensing technology that uses laser scanning to collect height and elevation data
[9] Priority is given to modifications to ensure compliance with relevant legislation (Codified Environmental Impact Assessment (EIA) Directive 2011/92/EU) and Habitats Directive ((92/43/EEC)).
[10] Representing a significant change over several hundred metres which has generally resulted in additional angle masts

The next phase of landowner engagement will provide a further opportunity for landowners to provide feedback on the proposed structure locations on their land. During this engagement, individual landowners may express a preference as to where structures might be relocated on their land. All reasonable design change requests will be technically and environmentally assessed (as detailed above). The appropriateness of further potential modifications to the line design will ultimately be confirmed in the application for approval in respect of the North-South 400 kV Interconnection Development. Where these can be accommodated, without creating additional impact, they will be further considered in dialogue with the landowner concerned, and may ultimately comprise part of the finalised proposal. Where it is assessed that they would create additional avoidable significant impact, it is likely that it will not be possible to include them as part of the final application for planning approval.

3 LINE DESIGN PROCESS

The *Final Re-evaluation Report* concluded that, on the basis of the re-evaluation of updated environmental constraints and other information, a viable and environmentally acceptable indicative line route for a 400 kV overhead line (OHL) exists. It also concluded that there are no significant implications which would warrant the use of underground cable (UGC) along any part of the indicative line route, other than on the identified section at the approach to Woodland Substation.

This chapter outlines the process and considerations involved in the identification of a preferred line design (or detailed route alignment) for the North-South 400 kV Interconnection Development including the identification of specific locations for tower structures (the latter process is often referred to as 'tower spotting'). The line design process involves consideration of a range of environmental and technical matters relevant to OHL design generally and others more specific to the particular project, including landowner feedback, in order to determine what constitutes the most suitable line design.

The line design process for the North-South 400 kV Interconnection Development has specifically been informed and determined by the following:

- Findings from the re-evaluation process;
- OHL components;
- Application of certain technical and environmental guiding principles for the design of OHL; and
- Consideration of feedback to date relevant to the line design process.

These elements are considered in detail below.

3.1 KEY FINDINGS OF THE RE-EVALUATION PROCESS

The re-evaluation process facilitated the review of issues and information raised since December 2009, which was the date upon which the original proposal was submitted for planning approval, and which were considered relevant for identification of an indicative line route within the identified preferred route corridor in respect of the updated proposal.

The re-evaluation process established that:

- The North-South 400 kV Interconnection Development shall generally take the form of a single circuit 400 kV AC OHL;

- The existing 400 kV Woodland Substation in County Meath shall be the southern terminus for the new high-capacity north-south interconnector circuit; and

- The need for the intermediate substation near Kingscourt is not now expected to arise for at least another ten years and will not, therefore, be included in the forthcoming application for planning approval, but rather will be the subject of a separate future application for approval (which will itself be the subject of an Environmental Impact Assessment (EIA)).

From a technical perspective, the *Final Re-evaluation Report* came to the following additional conclusions, all of which are relevant to the development of a detailed route alignment:

- While the North-South 400 kV Interconnection Development will generally take the form of a 400 kV single circuit AC OHL, a short section only of 400 kV cable is proposed to be installed within Woodland Substation for the first 250m approximately of the circuit;

- The new circuit shall enter Woodland Substation supported on existing lattice steel structures. These existing structures are designed for a double circuit 400 kV OHL, one side of which is currently in use supporting the existing Oldstreet to Woodland 400 kV circuit (formerly known as the Moneypoint–Woodland 400 kV circuit) and the other side of which is unused and available for the proposed new North-South 400 kV Interconnection Development. Approximately 2.8km of the new circuit will be supported on these existing double circuit structures;

- The remainder of the new circuit will be supported on new single circuit 400 kV OHL structures;

- A consequence of the deferral of the intermediate substation near Kingscourt is the establishment of a continuous 400 kV OHL circuit from Woodland to Turleenan and such a circuit will be more than 130km in length. A 400 kV circuit of this length is likely to benefit from one, or more, transposition points (refer to **Section 3.1.1** for details); and

- The emerging preferred support structure for use on the proposed 400 kV OHL is the lattice steel structure known as the 'IVI' tower. This is, however, subject to further consideration of alternative structures (refer to **Section 3.1.2** for details).

From a routing perspective, the indicative line identified within the preferred route corridor (i.e., Route Corridor Option A and 3B as identified in the *Final Re-evaluation Report*) is broadly similar to the previously proposed line route which formed the basis for the application which was submitted to An Bord Pleanála for approval in December 2009, but incorporates the following localised modifications:

- Modifications to the line route in order to take account of the construction and granting of permission for new houses developed since the preparation and submission of the previous application in December 2009;

- Modifications arising as a result of the decision not to proceed with the intermediate substation (in the area to the west of Kingscourt) as part of the proposed application for approval of the North-South 400 kV Interconnection Development; and

- Modifications arising from technical and environmental considerations during the re-evaluation process.

These modifications are all relevant to the development of a detailed route alignment for the North-South 400 kV Interconnection Development.

3.1.1 Transposition

Analysis by EirGrid shows that the operating performance of the proposed 400 kV OHL from Woodland in County Meath to Turleenan in County Tyrone will benefit from a single point of transposition and that the optimum location for the transposition alignment is in a general location 40 - 50km south of the proposed substation at Turleenan.

Transposition is the practice of transposing or rearranging the spatial arrangement of the three electricity wires or conductors that make up the three-phase circuit. The transposition takes place over four structures (the transposition alignment) as shown schematically in the **Figure 3.1**.

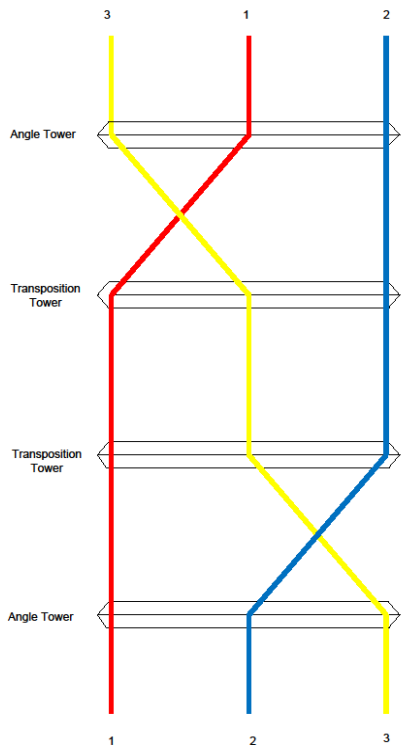


Figure 3.1 Schematic of Transposition Alignment

The three wires enter the transposition alignment orientated, left to right, 1 - 2 - 3 and exit the transposition alignment orientated, left to right, 3 - 1 - 2. A photograph of one of the existing transposition alignments on the Dunstown – Moneypoint 400 kV OHL circuit is shown in **Figure 3.2**.

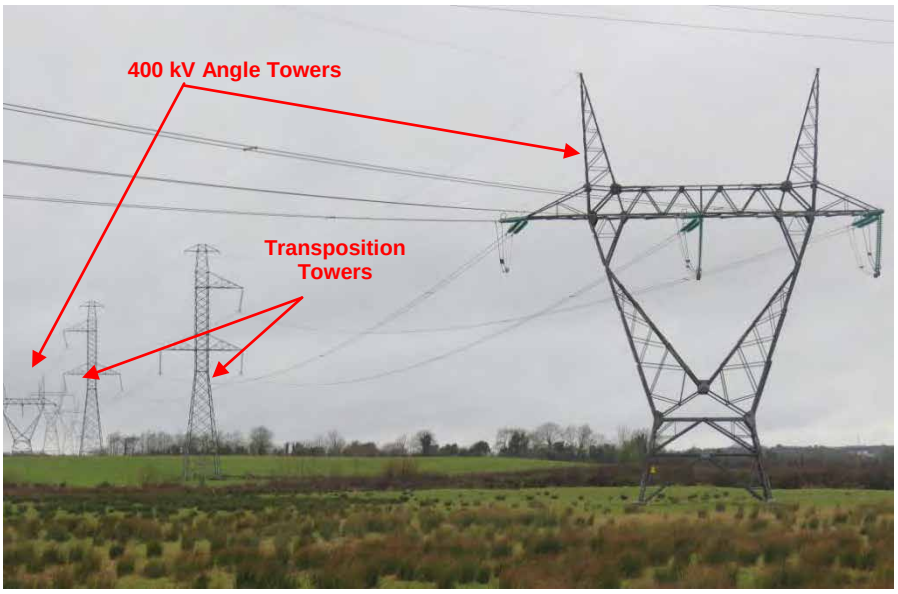


Figure 3.2 Transposition Alignment on an Existing 400 kV Overhead Line

The location of the transmission alignment approximately 40 - 50km to the south of the proposed Turleenan Substation required identification of a suitable straight section of the preferred line design capable of accommodating four structures installed in the following sequence, angle tower – transposition tower – transposition tower – angle tower. It also required consideration of the technical and environmental guiding principles outlined in **Section 3.3.2**. In line with these principles a design study considered three locations on the indicative route as appropriate to accommodate a transposition sequence. The proposed location was selected on the basis that the transposition sequence could be facilitated without having a significant impact on the environment, and without the requirement for additional structures. This is considered further in **Section 3.2.4**.

3.1.2 Identification of the Preferred Overhead Line (OHL) Support Structure

During the re-evaluation process, consideration was given to the identification of a preferred support structure type for the proposed 400 kV OHL. The *Final Re-evaluation Report* concluded that having considered a number of alternative structures, the lattice steel structure known as the 'IVI Tower' was deemed to be the emerging preferred option.

EirGrid's *Final Re-evaluation Report* also noted that in a report by the Government appointed International Expert Commission (IEC),[11] it was concluded that while a high voltage AC OHL "still *offers significantly lower investment costs than any underground alternative"* it *"could also be made more attractive by investing slightly more in new tower designs than the classical steel lattice towers now proposed".* The IEC also identified that it may be possible to *"reduce the visual impact of traditional lattice steel towers"* by *"painting the steel dark green or another colour somewhat matching the terrain around. This method is efficient to reduce the visibility as most people will see the tower with nature as a background."* On the basis of the findings of the IEC Report, in the *Final Re-evaluation Report*, EirGrid committed to giving further consideration to alternative structures before finalising its preferred project solution.

Separately to, and independent of, the North-South 400 kV Interconnection Development, EirGrid had commissioned the consultants Atkins (with LSTC as sub-consultants) to develop conceptual 400 kV and 110 kV steel monopole designs. In the course of this study, Atkins identified a conceptual design for a single circuit 400 kV steel monopole that is potentially suitable for use on the Irish transmission system.

[11] Available at www.dcenr.gov.ie

Figure 3.3 Atkins Monopole Design and Proposed IVI Lattice Tower

EirGrid commissioned ESBI to carry out a comparative assessment of the 'Atkins' monopole versus the IVI tower specifically for use on this proposed development. In addition, as the option was raised by the IEC in its report, EirGrid requested that ESBI comment on the effectiveness of the painting of galvanised steel OHL structures as a visual impact mitigation measure in the Irish landscape in general and for this proposed development in particular.

ESBI concluded that, in general, the 400 kV monopole design identified by Atkins is technically feasible for use on the Irish transmission system, including for use on the proposed North-South 400 kV Interconnection development. However, following a comparative assessment of the Atkins monopole versus the IVI tower for use specifically on the North-South 400 kV Interconnection Development ESBI found that:

- A monopole design may provide some advantages over a traditional lattice steel design when set in an urban or semi-urban landscape. This proposed development however is set entirely within a rural landscape and in such circumstances it is not clear that the Atkins monopole design would provide any advantages over that of the IVI tower design.
- It is considered that due to the nature and size of the monopole structures (which are of similar heights to IVI towers), and the requirement for about 25% more structures in the case of the monopole design, there may be increased visibility;
- The construction effort and consequently the environmental impact of the construction, is considerably greater in the case of the monopoles due to a combination of the larger size and weight of the steel members, the larger foundations and the greater number of structures required;

- The monopole design will be more costly to implement in comparison with the IVI design in terms of raw materials and number of individual structures; and
- The programme for delivery of the North-South 400 kV Interconnection Development will be six to eight months longer if a monopole design is used as opposed to an IVI tower design.

Accordingly, it was recommended that the IVI tower be adopted by EirGrid as the preferred structure for the North-South 400 kV Interconnection Development. That recommendation is accepted in this report.

It is technically feasible to construct the proposed OHL primarily using IVI towers and to use monopoles in very specific and localised areas where doing so would result in a lesser impact than that of the IVI towers. While ESBI is not currently aware of any section of the indicative route for the North-South 400 kV Interconnection Development where this might apply suitable candidate sections of the route may emerge during the preparation of the EIS and the completion of the EIA process, including on-going engagement with prescribed bodies, landowners, the general public and An Bord Pleanála (ABP) as statutory decision maker for this development.

The painting of towers as a camouflage effect and the use of specially treated non-shiny 'shadow' conductor can be a mitigation measure in specific situations. The identification of any sections of the route which might benefit from this should also emerge via the EIA process.

3.1.3 Partial Undergrounding

Following the conclusion of the re-evaluation process, EirGrid's instructions to its consultants were, firstly, to seek a viable and environmentally acceptable 400 kV OHL solution. The use of short lengths of 400 kV UGC was only to be considered in the event that an appropriate and acceptable entirely OHL solution could not be found. In other words, partial undergrounding, if required, would only occur along the overall identified (and primarily OHL) alignment. At the end of the re-evaluation process, EirGrid and its consultants concluded that a viable and environmentally acceptable indicative line route for a 400 kV OHL exists and there were no significant implications which would require the use of UGC along any part of the indicative line route, other than the immediate approach into Woodland Substation (within the substation compound).

EirGrid's policies and practices relating to the planning and development of OHL and UGC transmission infrastructure are set out in Appendix A of Grid25. This policy confirms that UGC will generally only be considered where an OHL solution is not practical or environmentally feasible, for example:

- In densely populated areas and where no alternative exists;
- In congested areas of infrastructure where no alternative exists (e.g., an area with a multiplicity of existing OHLs);

- To cross a relatively wide expanse of deep water; and

- Where no alternative exists other than to route through an environmentally sensitive area and undergrounding is deemed to be less of an impact to the environment.

As part of the line design process, EirGrid and its consultants have reviewed the potential for partial undergrounding. At the conclusion of this review, EirGrid is of the opinion that a viable and environmentally acceptable OHL line route exists within which to design the proposed North-South 400 kV Interconnection Development. However, partial undergrounding as a measure to mitigate potential significant residual environmental impacts will be further considered as part of the preparation of the EIS and within the broader EIA process.

3.2 OVERHEAD LINE (OHL) COMPONENTS

An OHL is made up of a number of elements, the design and approach to which is a primary consideration to the line design process. These elements are:

- Towers and associated foundations; and

- Conductors & shieldwires (wires) and associated hardware (including insulators and fittings).

3.2.1 Towers and Associated Foundations

Towers are one of the most significant components of OHL, in terms of their potential visibility and direct impact on land (i.e., their footprint). There are three types of tower proposed for use in this development. These are detailed below:

- **Intermediate or suspension towers** are only used on straight sections of line. Electricity conductors hang on, or are suspended from, the cross arms of these towers resulting in these towers being somewhat taller and slimmer than angle towers and typically requiring smaller foundations;

- **Angle/tension towers** are so-called because the electricity conductors pull off the crossarms (i.e., connecting to the towers under tension). This requires the angle tower to have a greater mechanical strength than the intermediate tower. These towers are used at points when the OHL changes direction, where the line terminates (such as at substations) or in order to break a long linear span. Angle towers use heavier steel members and can also be shorter than comparable intermediate towers (while still maintaining the same clearance between the ground and the electricity conductor). This gives the towers the appearance of being ‘stockier’ than the intermediate tower. Due to the

required increase in mechanical strength angle towers will also typically have much larger foundations than intermediate towers.

- **Transposition towers** change the physical position of the conductors on a transmission line while maintaining electrical phase separation and clearance.

Tower foundations (per tower leg) typically range from 3m to 3.5m in depth to the invert level of the foundation and anywhere from 2sq m to 5sq m in plan area depending on tower type. This depth allows for a reinforced concrete block of between 2m to 2.5m in height depending on tower type for each of the four tower legs. However, the type and size of the foundations will ultimately depend on the type of tower, ground conditions and terrain. Further detail relating to foundation types and their installation is outlined in **Section 5.2.6** and **Section 5.2.7.**

3.2.2 Conductors and Associated Infrastructure

The number of conductors (or lines) will depend on the operating voltage and the required power carrying capacity of the proposed circuit. Relevant conductor and associated infrastructure components include:

- **Earth/ground wire or shieldwire and optical fibres (OPGW)** are installed above the live conductors at the top of the tower to minimise the likelihood of direct lightning strikes to the conductors. They may include OPGWs used in respect of controlling the power system and communication;

- **Conductors** comprise high capacity, high-strength stranded cable/wire that carry the electricity; and

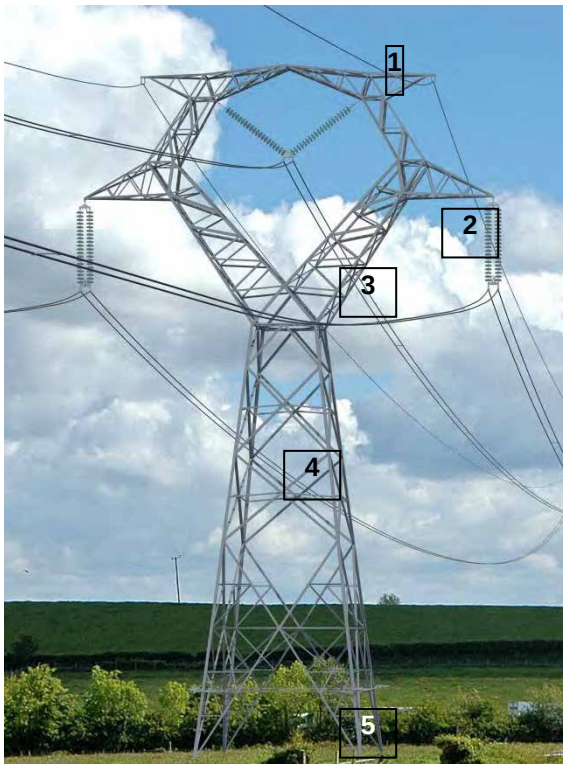
- **Insulators** support the conductors and have to withstand both normal operating voltage and surges as a result of switching and lightning strikes. For transmission lines these tend to be suspended below the structure and comprise a number of glass or composite disks, the number of which increases for the higher voltages.

3.2.3 Proposed Tower Type for the North-South 400 kV Interconnection Development

Tower design has implications for the maximum achievable span length, angles of deviation and clearance requirements over obstacles (all of which need to be in accordance with the current EirGrid tower designs and specifications, which in turn are based on best international practice). Therefore tower design is an important consideration for the detailed line design process.

The tower that is proposed for the North-South 400 kV Interconnection Development (for the new 400 kV single circuit line) is the 'IVI hot rolled' lattice steel tower design. The IVI design maintains the insulator configuration of the traditional ESB 400 kV design (i.e., 401 type structure), however, it raises the centre

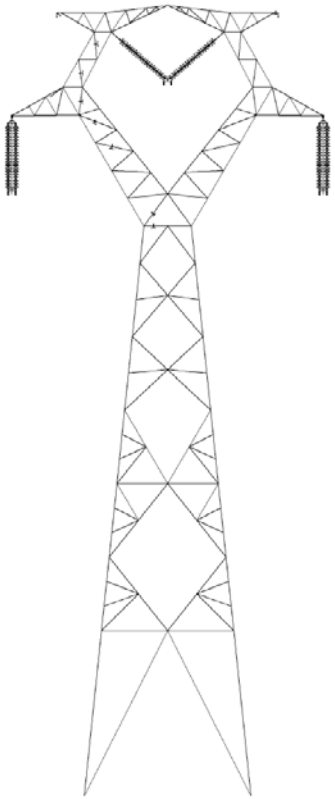
phase to increase the apparent height while reducing the width of the tower thereby ensuring a more slender proportion to the structure. The tower's overall shape comprises a diamond located at the top of a relatively narrow body. Located on either side of the diamond shape are two supporting arms for the outer conductors.. In both front and side elevation the tower forms a symmetrical structure comprised of a typical steel lattice framework composed of a large number of smaller members. The general arrangement for the selected IVI tower design is illustrated in **Figure 3.4**. This identifies the IVI components described in **Section 3.2.1** and **3.2.2** above.



1. Earthed Shield wires
2. Insulators
3. Conductors
4. Tower
5. Concrete foundation for each tower footing

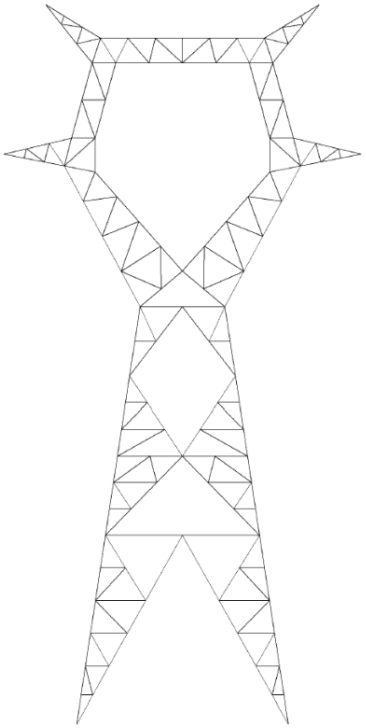
Figure 3.4 General Arrangement of an IVI Tower

The outline drawings of the three different tower types (i.e., intermediate, angle and transposition) proposed for the North-South 400 kV Interconnection Development are illustrated in **Figure 3.5**.



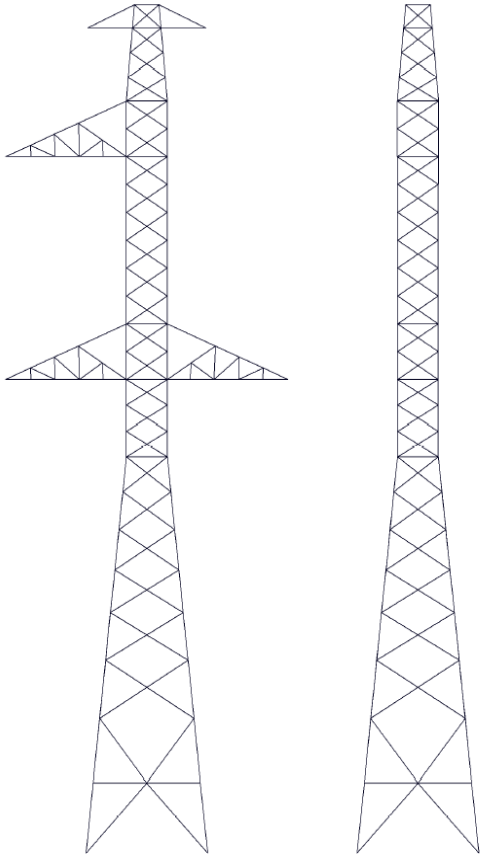
Front Elevation

Proposed Intermediate IVI Lattice Tower
Typical Height Range 27m - 43m
Footprint Range 6.4m x 6.4m to 11m x11m



Front Elevation

Proposed Angle IVI Lattice Tower
Typical Height Range 24m - 37m
Footprint Range 7.4m x 7.4m to 12m x12m



Front and Side Elevation

Proposed Transposition Tower
Typical Height Range 37m - 56m
Footprint Range 5.5m x 5.5m to 8.5m x8.5m

Figure 3.5 Tower Designs for the North-South 400 kV Interconnection Development (not to scale)[12]

[12] Tower heights are measured above ground level at the centre point of the tower to a height at the centre point of the tallest point of the tower. Small variances in measurement will naturally arise with uneven ground conditions

3.2.4 Selection of Transposition Location

A suitable location for the transposition alignment has been identified between towers 119 and 122 (refer to **Section 4.2**). The location is 39km south of the proposed Turleenan Substation. This meets the requirement of being *"in a general location 40 to 50 km south of"* Turleenan (refer to **Section 3.1.1**).

A transposition alignment consists of four structures in the following sequence angle tower – transposition tower – transposition tower – angle tower (refer to **Section 3.1.1**). A straight consisting of four structures (such as 119 to 122 (refer to **Chapter 4**)) is therefore the optimum choice for a transposition alignment as it avoids the requirement to insert an additional tower into the straight (transposition tower in the case of a three structure straight and angle tower in the case of a five or more structure straight). Avoiding the additional structure has both environmental and cost advantages.

Transposition towers are taller than intermediate towers while their respective foundations are similar in size (**Figure 3.5**). An environmental assessment found that inserting transposition towers in positions 120 and 121 instead of intermediate towers will result in a slight increased visual impact due to the taller structures. The environmental assessment also concluded that placing the transposition towers in position 120 and 121 would not result in any increase in environmental impact from an ecology, cultural heritage, and geology or water perspective.

3.2.5 Works on Existing Double Circuit Towers and Works within the Substation Site

The Scheme will link the existing 400 kV Woodland Substation in County Meath with a proposed new substation at Turleenan in County Tyrone. As part of the North-South 400 kV Interconnection Development, and as indicated in **Section 3.1**, it is proposed to enter Woodland Substation from the west using the free side of the existing double circuit towers for a distance of approximately 2.8km. An existing double circuit tower with free side is illustrated in **Figure 3.6.** A short section of 400 kV UGC is proposed to be installed within Woodland Substation for the first *circa* 250 metres of the circuit.

An extension of the existing Woodland Substation is necessary to allow the connection of the new 400 kV line. The existing substation has a total size of approximately 7 hectares, located within a landownership boundary of approximately 34 hectares. The proposed extension will take place entirely within the existing property boundary and will involve a 7,000sq m (0.7ha) extension of the inner compound.

The proposed works and construction activities associated with extending/modifying the existing double circuit 400 kV towers is described in **Section 5.2.9** which addresses stringing of conductors.

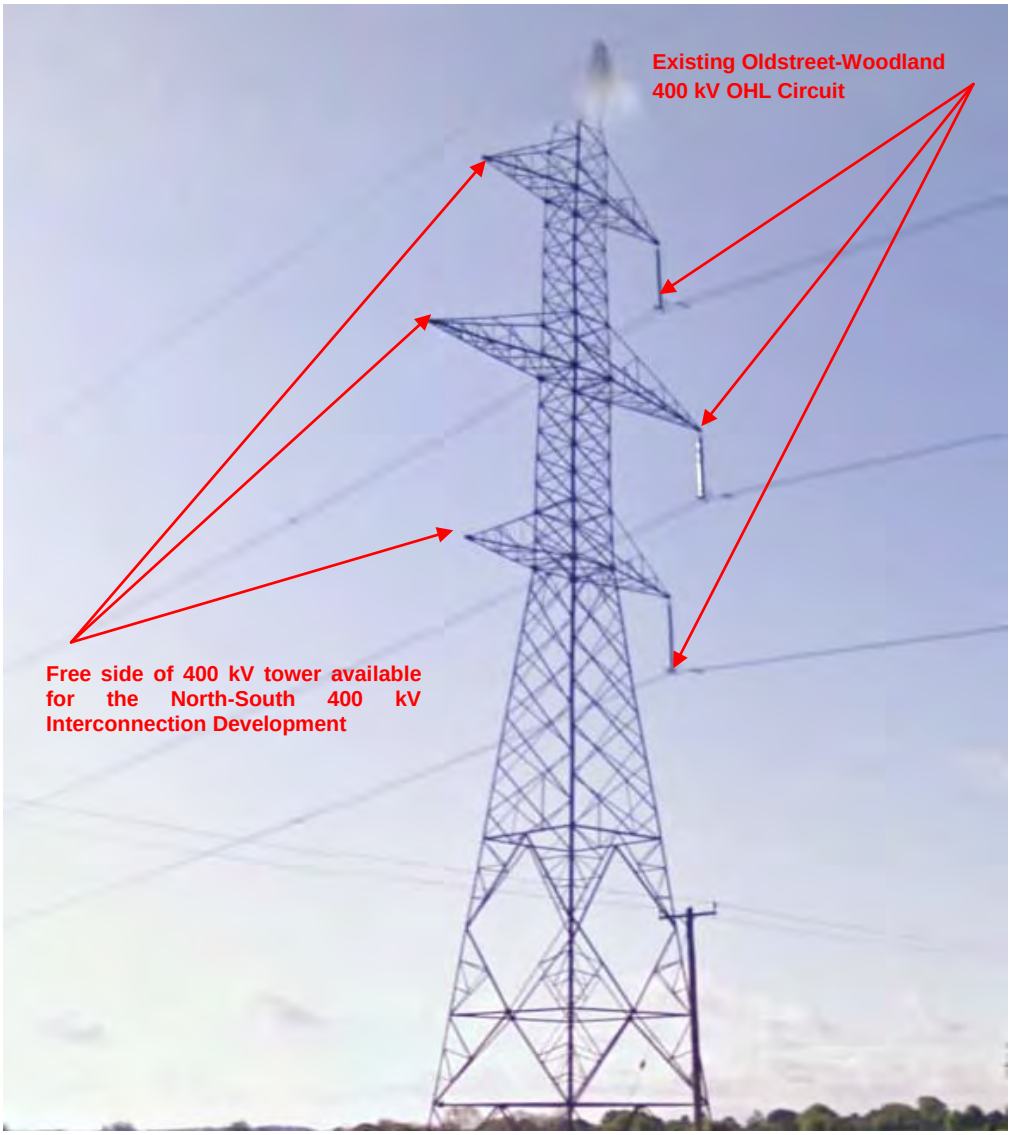


Figure 3.6 Existing 400 kV Double Circuit Tower near Woodland Substation

3.3 TECHNICAL AND ENVIRONMENTAL GUIDELINES AND LANDOWNER CONSIDERATIONS

3.3.1 Line Design Process

Technical and environmental assessment work has informed the decision making process for the project from an early stage. The identification of the route corridor and, subsequently, the indicative line route was environmentally led and set within the limits of broad technical constraints relating to existing infrastructure (e.g., Woodland Substation) and topography/land features. This is important because the most effective method of avoiding or minimising the environmental effects associated with an OHL is through appropriate route selection. Therefore, the line design approach to date is consistent with the general principles of EIA which emphasise the following:

- Avoidance - Impacts should be avoided through selecting the route which avoids creating the highest level of significant impacts.

- Reduction – Where impacts are unavoidable they should be reduced by applying mitigation measures to the particular environmental impact.

- Remedy – Where impacts cannot be reduced to an acceptable level they should be remedied through environmental compensation (i.e., sensitive habitats may have to be recreated at an alternative location).

Technical routing limitations and considerations are also particularly important for detailed line design process as they can influence tower locations and heights. These technical considerations are informed by *inter alia*:-

- Euronorm EN 50341 'Overhead Electrical Lines exceeding 1 kV and the associated National Normative Aspects (NNA) for Ireland' as defined by the Electro Technical Council of Ireland.
- CIGRE Document 'High Voltage Overhead Lines Environmental Concerns, Procedures, Impacts and Mitigations' (1999).
- UK National Grid Document –'Approach to the Decision and Routeing of New Electricity Transmission Lines' –which incorporates 'The Holford Rules' and supplementary notes.
- EU Council Recommendation 1999/519/EC on the limitation of exposure of the general public to electromagnetic fields (0 Hz to 300 GHz).
- Health & Safety Legislation.

3.3.2 Line Design Guidelines

Best practice route planning and design guidelines promote general principles for OHL transmission planning which can account for a wide range of different conditions and environments. Informed by matters outlined in **Section 3.3.1**, the main routing principles (focusing on technical, environmental and landowner considerations) which have guided the line design process for the North-South 400 kV Interconnection Development are set out below.

Technical Routing Considerations

- The minimum clearance for a 400 kV OHL shall be 9m over ground and 10m over major roads/railways. Clearance over canals/navigable waterways shall be 14.7m minimum.
- EirGrid's line design standard requirements and technical limits of existing tower designs include *inter alia* a requirement to achieve the appropriate span length for the kV (i.e., the maximum span length at 400 kV is 500m; however the average is 350m).
- Avoid sharp changes in direction in the line (or Angle of Deviation) and minimise the number of angle towers required, where possible.

- Minimise the number of crossings of other power lines, railway lines, roads and other infrastructure.
- Tower foundations should be located in stable flood free environments where possible with minimal erosion to avoid excessive costs related to highly reinforced or piled foundations and for long term maintenance access.

Environmental Considerations

- On the grounds of general amenity, where possible EirGrid will avoid routing overhead transmission lines close to residential areas.
- With respect to individual houses, EirGrid will seek, where possible, to achieve a lateral clearance of 50 metres from the centre of the proposed route to the nearest point of dwellings.
- Avoid known ecologically sensitive areas (e.g. cSAC/SAC/pNHA/NHA/SPAs) where possible.
- Sites of potential ecological importance (e.g. hedgerows and wetlands) shall be assessed by means of site survey. Where such surveys are not possible, EirGrid will site overhead towers away from the potentially sensitive areas and into adjoining managed agricultural fields where the ecological sensitivity is clearly low (see **Section 3.4.1**).
- Cause least disturbance and minimise impacts to identified natural heritage interests (including watercourses).
- Avoid major areas of highest amenity value and deviate around areas of lesser amenity value, where possible.
- Integrate the line within the landscape, where possible including *inter alia*: utilising natural background and foreground features to visually absorb towers (e.g., hills, forests, vegetation etc.); avoiding axial views, breaking the skyline and a concentration of 'wirescape' (arising from proximity to lower voltage or telephone lines); maintain uniformity of tower heights where possible, etc.
- When crossing a flat landscape characterised by a large visual field, poor complexity and a clear organisation of land pattern, it is preferable to use higher towers with longer span lengths (to match the simplicity of the landscape).
- Cause least disturbance to and minimise impacts to cultural heritage interests.

Landowner Considerations

- Minimise disturbance to current land use and farm/land management practices.
- Consult with landowners throughout the various stages of the design.
- Gather inputs from landowners on their farm practices and suggested locations for towers.

These guidelines inform and provide a starting point for identifying a potentially suitable line design which appropriately balances competing considerations.

Having regard to the above routing principles, a line design can then be developed by firstly assessing a tower location using a specialised computer aided design programme (PLS CAD) and ordnance survey mapping in order to determine its feasibility and to confirm it meets all technical requirements. The tower

locations are then passed on for further iterative assessment by relevant specialists including ecologists, archaeologists, hydrologists, geologists, agronomists and landscape consultants. Initially, a desk-based assessment is completed, which includes a review of aerial photography, LiDAR data and other environmental datasets. Following this, drive-by surveys and, where access is granted, site specific surveys are also carried out.

3.4 CONSIDERATION OF FEEDBACK TO DATE RELATING TO THE LINE DESIGN

As noted in **Section 2.3**, because of the unique context of the North-South 400 kV Development project (in terms of the previous application for approval and feedback arising from the *Preliminary Re-evaluation Report*), there is a considerable volume of written and oral submissions by prescribed bodies, other stakeholders, landowners and the general public. These submissions contained information which was useful to EirGrid in the line design process.

The findings of the re-evaluation process – specifically in relation to updated technical and environmental surveys – also resulted in modifications to the proposed line design. These are considered further below.

3.4.1 Stakeholder Feedback

During the course of the previous application, feedback from key stakeholders (including prescribed bodies) included direct and indirect requests to review and consider modifications to the line route as proposed.

For example, one submission made subsequent to the submission of the previous application for approval, was received from the National Parks and Wildlife Service (NPWS) of the Department of Arts, Heritage and the Gaeltacht (a designated prescribed body). The NPWS submission raised issues relevant to EIA, ecological surveys and Article 10 of the Habitats Directive, which requires Member States to improve "*the ecological coherence of the Natura 2000 network, to encourage the management of features on the landscape which are of major importance for wild fauna and flora*". As part of the re-evaluation process, EirGrid and its consultants have reviewed the submission and the potential implications for line design to be included as part of a new application for approval.

In this regard, existing guidelines[13] recommend that, as best practice, there should be ecological surveys undertaken of sites of known ecological importance (e.g., International, National and County value habitats) or potential ecological importance and/or sensitivities (e.g., hedgerows, woodlands and wetlands). The purpose of survey is to determine whether the proposed development has the potential to impact protected mammals or flora and to determine if/what specific mitigation may be required. A guiding principle for the line design of the North-South 400 kV Interconnection has been to seek to avoid any significant impact on sites of known ecological importance.

In the case of sites of potential ecological importance, site surveys and assessments have been carried out where possible. Where it has not been possible to secure access to lands to undertake such surveys, EirGrid is proposing to site the OHL structures away from areas of potential ecological importance (for example away from hedgerows and wetlands) and into adjoining managed agricultural fields, i.e., into a modified habitat where the ecological sensitivity is clearly low.

Modifications to the line design arising from the consideration of this particular environmental issue have resulted in the majority of tower structures being located in agricultural fields of low ecological importance and with sufficient separation distance from sites of potential ecological importance.

Feedback from other prescribed bodies was also reviewed and assessed as part of the re-evaluation process. Feedback directly or indirectly related to potential modifications to the line route is identified in **Table 3.1**, **Table 3.2** and **Table 3.3** below. The process of dealing with modification requests is set out in **Section 2.4**.

[13]EirGrid's Ecology Guidelines and Institute of Ecology and Environmental Management (IEEM) best practice recommendations. For more information go to: www.eirgridprojects.com and www.ieem.net

3.4.2 Landowner Feedback

In the context of the Preliminary Re-evaluation Report (published in May 2011), EirGrid and its consultants sought to engage with landowners along the indicative line route as identified in that Report. As a result, a small number of requests were made for the line route to be locally modified, with a specific focus on the siting of towers on individual landholdings. These requests have been considered in accordance with the process set out in **Section 2.4.** Some modifications have been adopted in the preferred line design as set out in this report.

Feedback from landowners included requests to place towers on field boundaries, in the corner of a field, at a distance to existing farm buildings or closer to the existing roadways within the landholding etc. Landowner feedback from the re-evaluation process has therefore influenced the preferred project solution. EirGrid intends to continue landowner engagement following the publication of this report, with a key emphasis on seeking, where possible, to locate infrastructure at locations in agreement with directly-affected landowners.

Table 3.1 Issue/Suggested Modifications – Affecting the Overall Line Design

Issue/Suggested Locations for Modification		Submission Reference/Rationale for Modification	Summary Findings of Assessment
This affects the majority of towers	Article 10 considerations	Re-evaluation process (ecology); consultation with prescribed body (NPWS)	The line design has been modified to minimise potential impact on sites of potential ecological importance (including hedgerows and wetlands). This has been achieved by siting towers away from sites of potential ecological importance (including hedgerows and wetlands) and into adjoining fields. The majority of the line design for the North-South 400 kV Interconnection Development occurs across fields, comprising improved/managed farmland – a modified habitat where the ecological sensitivity is low. **Outcome:** Modification incorporated as part of Preferred Project Solution.
This affects several towers	Separation distances to dwellings	Re-evaluation process (amenity)	The line design has been modified in several locations to maximise the lateral clearance from the centre of the proposed line route to the nearest point of dwellings. **Outcome:** Modification incorporated as part of Preferred Project Solution.

Table 3.2 Issue/Suggested Modifications – Affecting the Line Design in the CMSA

Issue / Suggested Locations for Modification **Note: tower numbers have been revised. Both are indicated for clarity**		Submission Reference / Rationale for Modification	Summary Findings of Assessment
This affects several towers and line straights at various locations.	Drumlin locations throughout County Monaghan	Monaghan County Council in a submission in relation to the 2009 application prepared a tower by tower assessment of the line from an environmental perspective. The general conclusion was that they were querying why towers were at specific locations, particularly where they crossed higher drumlins.	The submission by Monaghan County Council has been reviewed in detail. In general, in siting towers within the landscape of County Monaghan, EirGrid has sought to (a) achieve a balance between technical and environmental constraints having particular regard to landscape issues and (b) minimise the number of structures. The CMSA is dominated by a drumlin landscape and any route corridor options and overhead line routes in this area will encounter this type of landscape. In the CMSA, towers are often placed on drumlins, more typically on the lower slopes, as a result of the routing conflicts that arise primarily as a result of seeking to maximise the distance from residential dwellings and occasionally to avoid small lakes. For example, this type of routing conflict occurs in the vicinity of Lough Egish between towers 157 and 166. More elevated drumlins occur in the townland of Brackly and Tullynahinnera with a contour height of approximately 225m. The line is routed on the lower slopes of drumlins in this area to avoid Lough Egish, the associated scenic route / viewpoint and Boraghy lake and the drumlin in the townland of Cooltrimegish which has a contour height of 205m. Whilst it would be possible to put towers on lower slopes, this would require a significant number of additional angle structures and increase the potential environmental impacts. Given the objective of minimising environmental impacts it is considered that the current design represents an appropriate balance between technical design and environmental issues. Further amendments would create additional environmental impacts and are not being proposed. **Outcome:** No modification incorporated as part of Preferred Project Solution.

Issue / Suggested Locations for Modification **Note: tower numbers have been revised. Both are indicated for clarity**		**Submission Reference / Rationale for Modification**	**Summary Findings of Assessment**
2009: 111-125 **2013:** 103-117	Lemgare and Tassan Areas	Monaghan County Council; Feedback from Preliminary Re-evaluation Report.	The main issue in these particular cases is why the indicative route does not proceed in a straight line to where it meets the proposed NIE line at Lemgare and as a result passes through the Tassan and Derryhallagh areas. The main routing constraints in this area relate to dispersed rural housing, the identified site associated with the Battle of Clontibret and the area of higher ground in the Crossmore area. Whilst the full extent of the area associated with the Battle of Clontibret is not defined or protected, there is an area identified west of Clontibret which has an information board and associated amenity area. Having regard to this, it is considered that this constitutes a focal point for the battle site as there are no other identified sites. In this context it was considered that the line should avoid this area. Additionally, the area to the north around Crossmore has a marginally higher underlying elevation than the Tassan and Derryhallagh areas. Routing the line in these areas takes advantage of the slightly lower topography. As the line route in this area avoids potential impacts on a known cultural heritage/amenity area and minimises visual impacts in this area further amendments are not being proposed. **Outcome:** No modification incorporated as part of Preferred Project Solution.
2009: 99-118 **2013:** 110-131	Derryhallagh to Lemgare	Feedback from Preliminary Re-evaluation Report	
2009: 107-110 **2013:** 119-123	Cashel Bog	Monaghan County Council. Feedback from 2009 application.	In County Monaghan, peatlands and fens were, in previous years, frequently found throughout the county. Over time these features became either worked out or drained resulting in their loss. As a result, there are a small number of remaining bogs and fens in the county. These are identified in the Monaghan Fen survey 2008. Whilst not formally designated for protection in a National context, Cashel Bog is identified as having the characteristics of a pNHA. It would be possible to span the most sensitive part of the bog area but to do so, it would be necessary to locate a tower within the less sensitive area of the bog. Based on its ecological characteristics, and also having regard to residential constraints, the line route in this area has been amended to locate the line outside the bog. **Outcome:** The line has been diverted around the bog area as part of Preferred Project Solution.

Issue / Suggested Locations for Modification Note: tower numbers have been revised. Both are indicated for clarity		Submission Reference / Rationale for Modification	Summary Findings of Assessment
2009: 15-18 **2013:** 216-219	Corlea Bog	Monaghan County Council. Feedback from 2009 application.	Corlea bog is a small remnant of bog which is traversed by the line, however no structures are proposed to be located within any area of the bog, therefore there are no potential impacts on the bog. Therefore no amendments are being proposed in this area. **Outcome:** No modification incorporated as part of the Preferred Project Solution.
2009: 80-90 **2013:** 140-150	Doohamlet	Feedback from Preliminary Re-evaluation Report (FS-16); re-evaluation process. Granting of planning permission in Nov 2011 for a dwelling in the townland of Terrygreeghan, which is in the general Doohamlet area.	The main issue arising in this case is that the line route is more visible in this area as it crosses several drumlins. The considerations and conflicting constraints in routing the line through a drumlin landscape have been set out previously, such conflicts arise in routing the line in the Doohamlet area. Appendix B of the Final Re-evaluation Report outlines reasons why the indicative line route alignment in this area is considered to be most appropriate. As a result of balancing routing conflicts, it was considered that altering the route in this area would result in additional structures and increased visibility, therefore no significant line design modification is being proposed in this area. However, since the previous application in 2009, planning permission has been granted for a dwelling in the townland of Terrygreeghan which is in the general area around Doohamlet. In order to maximise the distance to this permitted dwelling it is proposed to amend the line to incorporate localised diversion. **Outcome:** A modification has been incorporated as part of the Preferred Project Solution
2009: 69-74 **2013:** 156-161	Scenic Viewpoint at Lough Egish	Monaghan County Councillors. Feedback from a submission to the Oral Hearing 2010	The main issue arising in this case is that it was suggested that the proposed development would create visual impacts when seen from the scenic viewpoint at Lough Egish. The current line route does not interfere with views of Lough Egish from the designated scenic route which is named “Scenic Views of Lough Egish” as it is located at distance of over 0.5km from this route. Modifications are not therefore considered necessary in this area. **Outcome:** No modification incorporated as part of Preferred Project Solution.

Issue / Suggested Locations for Modification **Note: tower numbers have been revised. Both are indicated for clarity**		Submission Reference / Rationale for Modification	Summary Findings of Assessment
2009: 70-74 **2013:** 156-160	Townland of Brackley (by Cremorne) semi natural wetland complex (Tower 72)	Re-evaluation process (ecology)	As set out above in relation to Cashel Bog the semi-natural wetland is considered to be of ecological significance. Similarly, whilst it would be possible to span the most sensitive part of the wetland area it would be necessary to locate a tower within the less sensitive area. Based on its ecological characteristics the line route in this area has been amended to locate the line outside the wetland area. **Outcome:** A modification has been incorporated as part of the Preferred Project Solution
2009: 10-17 **2013:** 217-224	Lough an Leagh	Cavan County Council. Feedback from 2009 application.	The CCC submission requested that consideration be given to undergrounding in this area, having regard to the number of lines and the proposed substation. The scenic view point referred to in the submission, Lough an Leagh is approximately 2km west of the line route. It is an elevated area with extensive panoramic views. The visual assessment indicates that visibility of the line from this location would be confined long distance views of the upper portions of some towers, these would be difficult to discern against the background landscape. There is therefore no strong justification for undergrounding in the vicinity of Lough an Leagh. **Outcome:** No modification has been incorporated as part of Preferred Project Solution. A photomontage from this viewing point shall be included in the EIS.
2009: 15-22 **2013:** 212-219	Muff Cross Roads/Muff Fair	Cavan County Council; Dr Ciaran Parker. Feedback from 2009 application.	The location of Muff Fair, whilst of historical significance, is not designated for protection as there are no significant features of cultural heritage in this area. Notwithstanding this potential alternative options in this area were reviewed. Any alternative route would require additional structures. As dispersed residential dwellings are a significant constraint in this area, additional structures would make the line more visible in this area. Therefore no amendments are being proposed in this area. **Outcome:** No modification has been incorporated as part of Preferred Project Solution.

Table 3.3 Issue/Suggested Modifications – Affecting the Line Design in the MSA

Issue / Suggested Locations for Modification **Note: tower numbers have been revised. Both are indicated for clarity.**		Submission Reference / Rationale for Modification	Review
2009: T.130 – 135 **2013:** T. 270 – 265	Brittas Estate	Meath County Council. Feedback from 2009 application.	Realignment options have been investigated in proximity to Brittas Estate in order to reduce the impact on this demesne. On balance given the achievement of the slightly reduced impact on the setting of the designed landscape, parkland and setting of Brittas House and reduced potential ecological impacts, it is recommended that a modification is made to the line design and be incorporated in the Preferred Line Route. **Outcome:** Modification incorporated as part of Preferred Project Solution.
2009: T. 135 – 144 **2013:** T. 265 – T. 256	Whitewood House	Meath County Council; Irish Georgian Society. Feedback from 2009 application.	Potential alternative options in this area were reviewed. However, if the line route is moved further to the west, it will impact on the setting of Cruicetown National Monument and Cruicetown House and demesne landscape. Any move to the east would result in a major rerouting in order to avoid Whitewood Lough, demesne and Nobber town. **Outcome:** No modification incorporated as part of Preferred Project Solution.
2009: T. 90 – 97 **2013:** T. 310 – 303	Teltown	Meath County Council. Feedback from 2009 application.	The DAU stated that the archaeological landscape is not currently referred to or protected in Irish legislation and current National Monuments Legislation does not allow for the protection of landscapes. Therefore the Zone of Archaeological Amenity (ZAA) at Teltown has no legislative basis. Whilst the Teltown area was therefore not included in the RMP, individual sites within the area are however included. These individual sites have been considered in the preferred line design and will continue to be a consideration in the formulation of the EIS. There will also be ongoing consultation with the DAU on this matter in advance of finalising the EIS. **Outcome:** No modification incorporated as part of Preferred Project Solution.

Issue / Suggested Locations for Modification **Note: tower numbers have been revised. Both are indicated for clarity.**		Submission Reference / Rationale for Modification	Review
2009: T. 88 **2013:** T. 312	Boyne Valley Drive	Failte Ireland. Feedback from 2009 application.	Potential alternative options in this area were reviewed. However, there are other constraints in this area e.g., Trim Airfield and new planning applications for dwellings. **Outcome:** No modification incorporated as part of Preferred Project Solution.
2009: T. 45A – 47 **2013:** T. 357 -354	River Blackwater Valley	Meath County Council. Feedback from 2009 application.	The River Boyne and Blackwater are crossed at two locations by the preferred line route. Other possible route corridors (1 and 2) cross the River Boyne and Blackwater at three separate locations. A Screening for Appropriate Assessment Report was completed for the previous application. This Report confirmed that the proposed development would not adversely affect the integrity of the River Boyne & Blackwater SAC. **Outcome:** No modification incorporated as part of Preferred Project Solution.
2009: T. 58 & T. 59 **2013:** T. 343 -341	Dunderry	Feedback from 2009 application.	This change was considered in light of the amenity value of the area and in particular that of the Shamanic Healing Centre. This change is technically possible and balances the impacts on the demesne landscape, the energy healing centre, the impacts on Dunderry Village, views from the public roads and the graveyard. **Outcome:** Modification incorporated as part of Preferred Project Solution.
2009: T.45 – 51 **2013:** T. 358 – 350	Bective Abbey	Meath County Council and Failte Ireland. Feedback from 2009 application.	Potential alternative options in this area were reviewed. However, they are constrained as any movement to the east would impact the Draft Tara Skyrne LCA and any movement to the west is constrained by Trim Airfield. In addition the River Boyne and River Blackwater cSAC also required consideration and towers have been located in this area to minimise the impact on the cSAC. **Outcome:** No modification incorporated as part of Preferred Project Solution.

3.5 FIXING OF TOWER POSITIONS

The final line design for the North-South 400 kV Interconnection Development to be submitted to An Bord Pleanála will identify fixed tower structure positions. Unlike the previous application for approval, permission for flexibility for movement of tower positions post–planning (often referred to as "micro-siting") will not be sought. This will provide clarity to landowners and other interested parties on the precise location of the OHL and associated infrastructure relative to particular landholdings, nearby dwellings, buildings, other structures and considerations such as environmental constraints.

It is intended to carry out further technical, environmental and other surveys and studies to confirm the specific siting of structures and inform the preparation of an EIS. Landowners will, therefore, have a further opportunity to influence the fixing of those tower structure positions which may directly affect them.

EirGrid considers landowner concerns in respect of the project's potential impact on specific landholdings. It continues to pursue consensus in relation to the routeing of the line, and in particular the location of towers, by proactively engaging with landowners to try and mitigate any potential impact on current farming practices and other land uses, while trying to balance other competing priorities such as environmental constraints and distance to dwellings.

3.6 CONCLUSIONS OF THE LINE DESIGN PROCESS

Having regard to all the above, including information and feedback considered during the re-evaluation process, the preferred line design for the North-South 400 kV Interconnection Development is outlined in **Chapter 4**.

The identified alignment and design constitutes EirGrid's current consideration of the most appropriate and feasible alignment for the proposed new 400 kV OHL. However, it is not necessarily the case that the preferred alignment will ultimately comprise the final proposed alignment, as this currently preferred alignment will be the subject of further landowner engagement, other public and stakeholder consultation and input, as well as on-going technical and environmental assessment and analysis.

4 PREFERRED LINE DESIGN FOR THE NORTH-SOUTH 400 KV INTERCONNECTION DEVELOPMENT

4.1 INTRODUCTION

As noted in **Section 1.1,** EirGrid and Northern Ireland Electricity (NIE) are jointly proposing the second high capacity electricity transmission line between Ireland and Northern Ireland. The full extent of the Scheme is shown in **Figure 4.1.**

Figure 4.1 The Scheme

That portion of the Scheme in Northern Ireland
North-South 400 kV Interconnection Development (CMSA)
North-South 400 kV Interconnection Development (MSA)

The Scheme consists of two separate but related and complementary projects broken up as follows:

1. That portion of the Scheme in Northern Ireland (i.e., towers 1–102) comprising:

   - A new 275kV/400 kV substation in Turleenan townland, north-east of Moy, County Tyrone.

   - A single circuit 400 kV OHL supported by 102 towers for a distance of 34.1 km from the proposed substation at Turleenan to the border.

   - Approx. 200m of OHL over sails Northern Ireland between towers 106 and 107 in the townland of Crossbane.

   The border crossings are illustrated in **Figure 4.2** and **Figure 4.3.**

2. The EirGrid element – known as the "North-South 400 kV Interconnection Development" (i.e., towers 103[14] - 402 and approx. 2.8km of conductor on existing double circuit at Woodland).

   Given the overall geographical extent of this linear development, EirGrid considers it appropriate to present the overall EirGrid element into two sectors. This will facilitate review by the public and other parties of that portion of the Scheme which is of most importance to them, rather than having to seek out this information as part of a much larger study area. These sectors are:

   - The CMSA element (i.e., towers 103 – 237) comprising:

     - A single circuit 400 kV overhead transmission line supported by 134 towers (30 angle towers and 104 intermediate towers) for a distance of 46.4km from the border (at a position between the townlands of Doohat or Crossreagh, County Armagh, and Lemgare, County Monaghan) and Tower 237 in the townland of Clonturkan, County Cavan.

   - The MSA element (i.e., towers 237 – 402) comprising:

     - A single circuit 400 kV overhead transmission line supported by 166 (46 angle towers and 120 intermediate towers) for a distance of 54.9km from Tower 237 in the townland of Clonturkan, County Cavan to Tower 402 at Bogganstown, County Meath.

[14] Excluding the 200 metre over sail within Northern Ireland between towers 106 and 107

- Approximately 2.8km of the new circuit supported on existing 400 kV double circuit structures. One side of these towers is currently in use supporting the existing Oldstreet to Woodland 400 kV circuit; the other side is spare and available for the proposed new North-South 400 kV Interconnection Development.

- An extension to the existing Woodland Substation including installation of approximately 250m of 400 kV underground cable within the substation compound to connect the line to an existing and already equipped 400 kV line bay

The preferred line design for that portion of the Scheme occurring within Ireland is described in detail in **Section 4.2** and **Section 4.3** below.

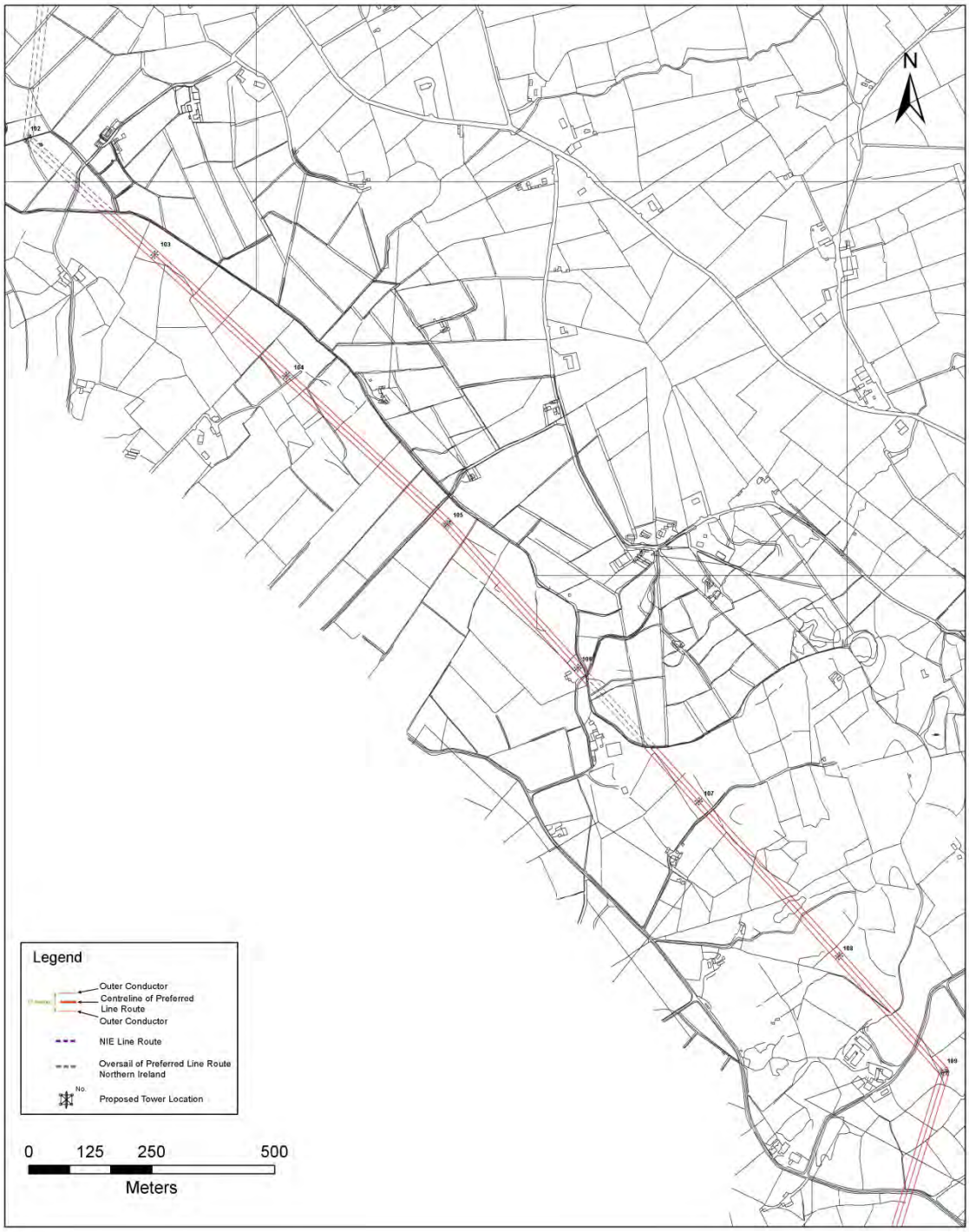
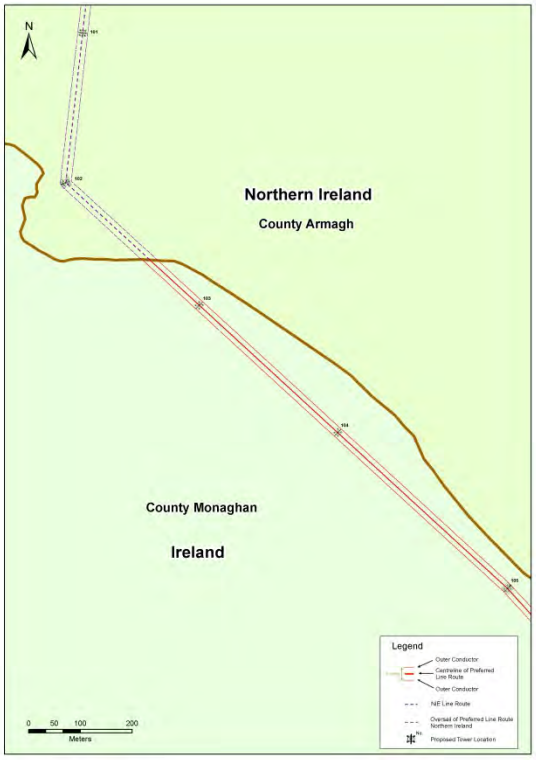
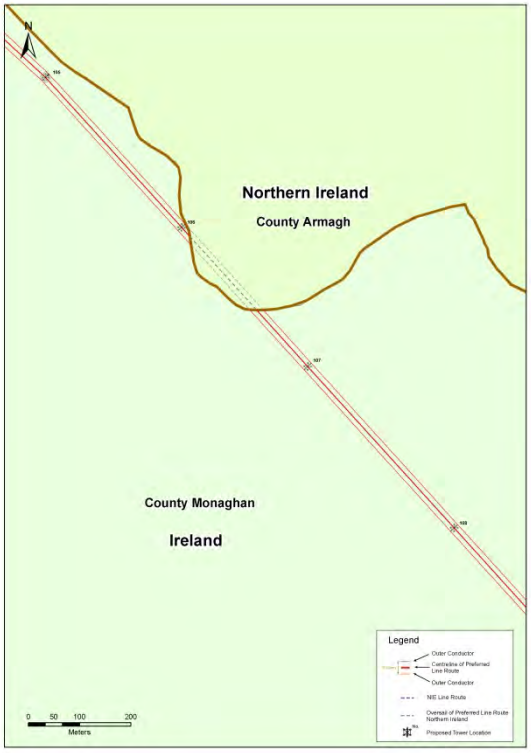


Figure 4.2 Border Overview

(Note: The black dashed lines represent those parts of the route forming part of NIE's planning application)



Towers 102 – 105



Towers 105 – 108

Figure 4.3 Border Detail

4.2 PREFERRED LINE DESIGN (CMSA)

As noted above**,** the Cavan Monaghan Study Area (CMSA) comprises a single circuit 400 kV overhead transmission line supported by 134 towers for a distance of 46.4km from the border (at a position between the townlands of Doohat or Crossreagh, County Armagh, and Lemgare, County Monaghan) and Tower 237 in the townland of Clonturkan, County Cavan. **Figure 4.3** provides an overview showing the relevant sections described below.

The preferred line design for the CMSA is summarised below and illustrated on **Figures 4.1 – 4.7 (CMSA)** in **Appendix A** of this report. Each map corresponds to the tower-to-tower sections described.

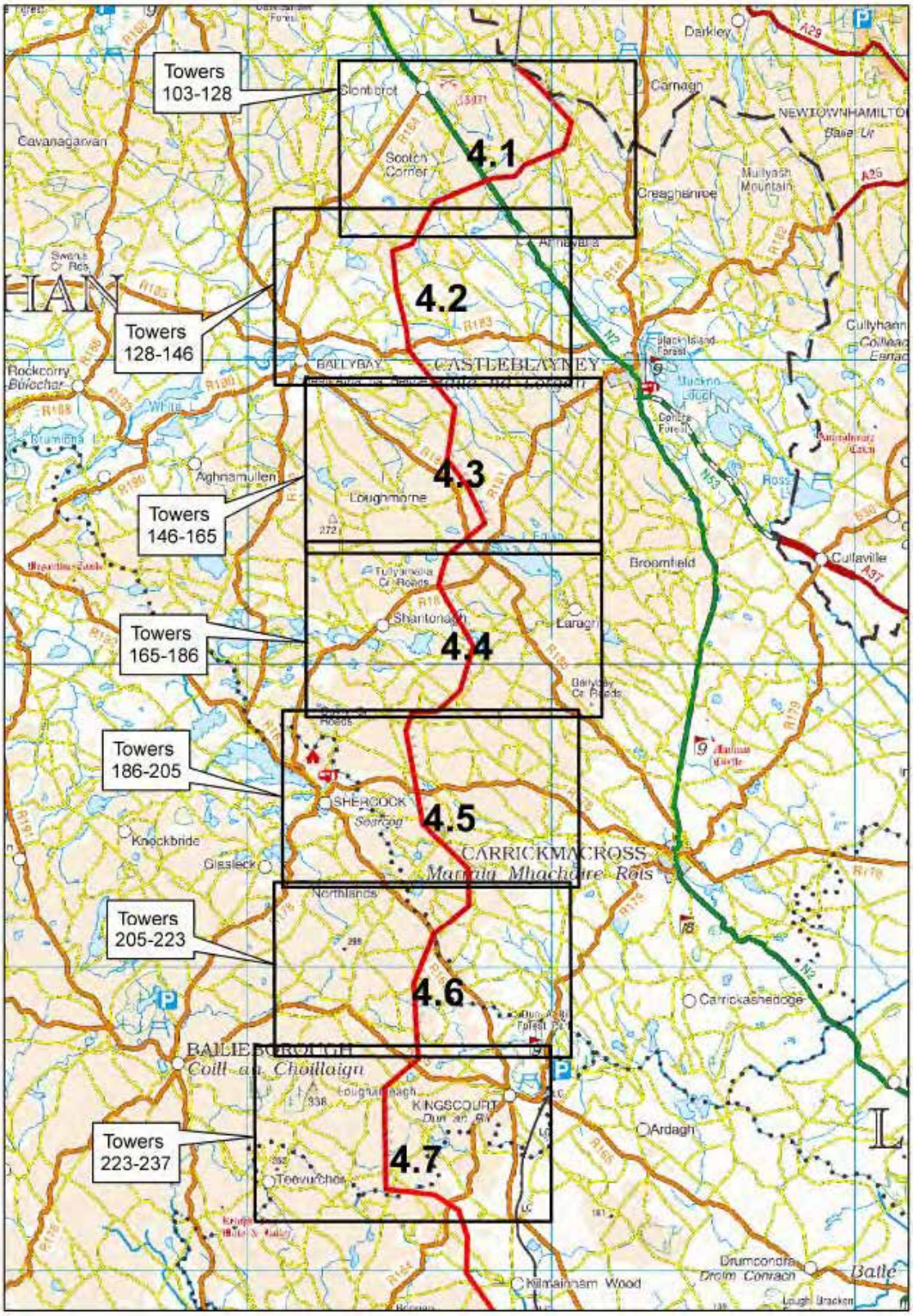


Figure 4.3 Overview CMSA Line Design

(Numbers in boxes refers to specific map reference included in **Appendix A**)

- **Lemgare to Clarderry Towers No. 103 to 128 – as illustrated on Figure 4.1 in Appendix A**

  Tower 102 is located in Northern Ireland in the townland of Doohat or Crossreagh in County Armagh and the alignment travels along the lower contours in a south-easterly direction in the townland of Lemgare in County Monaghan. There is a slight deviation to the line route at Tower 105. From this location the alignment over-sails the jurisdictional border in order to avoid an existing house. The alignment in the aforementioned section is routed in a valley which straddles the two jurisdictions. At Tower 110, in the townland of Lisdrumgormly, the line route deviates in a more south-westerly direction crossing a minor road on its way. At Tower 113 the line route diverts further to the south-west to avoid Tasson Lough to the south. Between straights 117 to 119, and 119 to 122, the line route "dog-legs" to the south in order to avoid the Cashel Bog complex. A location for the transposition alignment has been identified on the straight between 119 and 122 (refer to **Section 3.4.2**). The alignment reverts to a south-westerly direction in order to avoid both ribbon development extending from Cremartin, as well as the general site of the battle of Clontibret to the north. At Tower 127 the line route turns further south in the townland to Clarderry and crosses a minor road on its way towards Tower 128.

- **Clarderry to Clogher Towers No. 128 to 146 – as illustrated on Figure 4.2 in Appendix A**

  From Tower 128 to Tower 131 the alignment travels in a south-westerly direction in order to avoid cutover bog at Clarderry and Derryhallagh (Monaghan By). The alignment is routed in this location so as to avoid the drumlin at Derryhallagh and the lakes to the west of the line route and the lakes to the south. At Tower 131, the alignment turns further to the south-west, and crosses the existing Louth–Lisdrum 110 kV line. At Tower 133, the alignment turns in a southerly direction to meet up with Tower 137 in the townland of Cornanure (Monaghan By). Once again, the alignment deviates to the south-east and again slightly deviates south at Tower 141 in order to facilitate a house planning permission in the townland of Terrygreeghan. At Tower 143, the alignment deviates south-east and traverses the main R183 Castleblayney–Ballybay road, approximately 1.5km west of Doohamlet. The alignment is routed in this area in order to avoid the villages of Doohamlet and Ballybay, and to avoid close proximity to the church at Ballintra. The alignment thereby minimises the number of road crossings within the area, and is located at what is considered to be an appropriate distance from Lough Major, which is located to the east of Ballybay. The alignment traverses a local road in a south-easterly direction to Tower 146 in the townland of Clogher.

- **Clogher to Boraghy Towers No. 146 to 165 – as illustrated on Figure 4.3 in Appendix A**

From Tower 146 to Tower 149, the alignment traverses a valley and avoids a ridge line which follows the direction of the road to the west of the line route. The alignment route within this section avoids the wetland complex at Crinkill, as well as some fragments of mixed woodland located either side of the route. At Tower 149 in the townland of Drumguillew Lower, the alignment follows in a southerly direction, crossing two minor roads.

The alignment in this section is routed to avoid ribbon development that occurs along a minor road to the east of line straight 149 to 154. The alignment maintains a distance from Drumhowan GAA pitch and a megalithic tomb located to the east of the line route. At Tower 154, in the townland of Greagh (Cremorne By), the alignment deviates in a south-easterly direction, crossing a minor road where ribbon development occurs. The alignment deviates slightly at Tower 157 and joins up with Tower 161 in the townland of Cooltrimegish, in order to avoid cutover bog in the townland of Brackly (Cremorne By). The line in this section is also routed so as to avoid ribbon development which occurs on the main R180 from Lough Egish, and also to avoid the scenic route north of Lough Egish. The line route follows this alignment in order to avoid high ground at Lisduff, Tossy and Brackly (Cremorne By). At Tower 161, the alignment route turns in a south-westerly direction to cross the R180 Carrickmacross–Ballybay road, thereby avoiding ribbon development, and continues to Tower 165.

- **Boraghy to Sreenty Towers No. 165 to 186 – as illustrated on Figure 4.4 in Appendix A**

In this vicinity, the alignment crosses a minor road and continues across to Tower 166. At this tower location, the alignment turns south-west (crossing a minor road) and then deviates south-east at Tower 169 in order to cross the R181 Shercock to Lough Egish road. The alignment avoids the church at Lough Egish to the east and the houses located along the R181. The alignment continues through the townlands of Tullyglass and Tooa in order to avoid a scenic route located 1.5 km to the east of Shantonagh. The alignment crosses a minor road within this section and is routed in order to avoid Shantonagh Lough, and the scenic route at Beagh and Bock's Lough.

At Tower 176, the alignment turns south-west in order to avoid Bock's Lough, a wetland woodland complex of high local value. The alignment has been designed in this location in order to obtain an optimum crossing of the existing Louth–Shankill 110 kV Line and to circumvent the lakes to the east and west of Shantonagh Lough. The line route crosses the existing 110 kV line in that location in order to avoid the ribbon development located along the minor road to the north-west. At Tower 181 the line route turns south-west and then west at Tower 184 to meet up with Tower 186. The alignment crosses a number of minor roads in this section and is routed to avoid ribbon development to the south.

- **Sreenty to Corlea (ED Drumcarrow) Towers No. 186 to 205 – as illustrated on Figure 4.5 in Appendix A**

  From Tower 186, the alignment crosses a minor road to Tower 188 and, thereafter, it traverses in a southerly direction crossing two minor roads and the R178 Shercock to Carrickmacross road 3 km east of Shercock. The route is aligned in this direction in order to avoid Corduff and the high contours at Shanco (Farney By), and Greaghlatacapple and Corduff (Farney By) and to avoid established one-off housing.

  At Tower 197, the line route in the townland of Raferagh turns south-east and crosses two minor roads, thus avoiding the cluster of one-off housing in the same townland to the east of the line route. At Tower 203, the line route changes direction to the south.

  The alignment is routed in this area so as to avoid the lakes to the east and west of the alignment.

- **Corlea (ED Drumcarrow) to Collops Towers No. 205 to 223 – as illustrated on Figure 4.6 in Appendix A**

  From Tower 205 to Tower 207, the line route crosses a minor road. Thereafter, in the townland of Scalkill, the alignment turns south-west and proceeds to Tower 212 crossing on its path two minor roads and crossing the main R162 (Kingscourt–Shercock) road approx. 5.5kms north-west of Kingscourt and the Cavan-Monaghan county boundary, in order to circumvent the lakes west of the line route located at Northlands. The line route is also at a distance from the wetland complex of Greaghlone Lough in this area. At Tower 212, the line route crosses several minor roads, in order to avoid the ribbon development that emanates from the town of Kingscourt and the townland of Drumiller. At Tower 217, in the townland of Corlea (Clankee By), the alignment heads in a southerly direction and avoids the higher contours to the west at Cornamagh and the ribbon development on the lower slopes located to the west of the alignment and continues to Tower 223.

- **Collops to Clonturkan Towers No. 223 to 237 – as illustrated on Figure 4.7 in Appendix A**

At Tower 224, in the townland of Dingin, the alignment traverses to the south-west to cross the R165 Kingscourt- Bailieborough road (approximately 3.2 km west of Kingscourt), in order to avoid the ribbon development which extends from Kingscourt and to keep to the lower slopes of Lough-an-Lea, while maintaining a sufficient distance from Dún-an-Rí Forest Park. The alignment route crosses several minor roads and passes to the north of Muff Lough. At Tower 228, the alignment proceeds in a southerly direction crossing some minor roads and avoiding

Lough-an–Lea to the west and Ervey Lough to the east to meet up with Tower 237 in the townland of Clonturkan, County Cavan. The alignment crosses the existing Flagford–Louth 220 kV Line and follows this trajectory in order to avoid the ribbon development extending from Kingscourt.

4.3 PREFERRED LINE DESIGN (MSA)

As noted above, the Meath Study Area (MSA) comprises a single circuit 400 kV overhead transmission line supported by 166 towers for a distance of 54.9km from Tower 237 in the townland of Clonturkan, County Cavan to Tower 402 at Bogganstown, County Meath. **Figure 4.4** provides an overview showing the relevant sections described below.

The preferred line design for the MSA is described below and illustrated on **Figures 4.8–4.17 (MSA)** in **Appendix B**. Each map corresponds to the tower-to-tower sections described below.

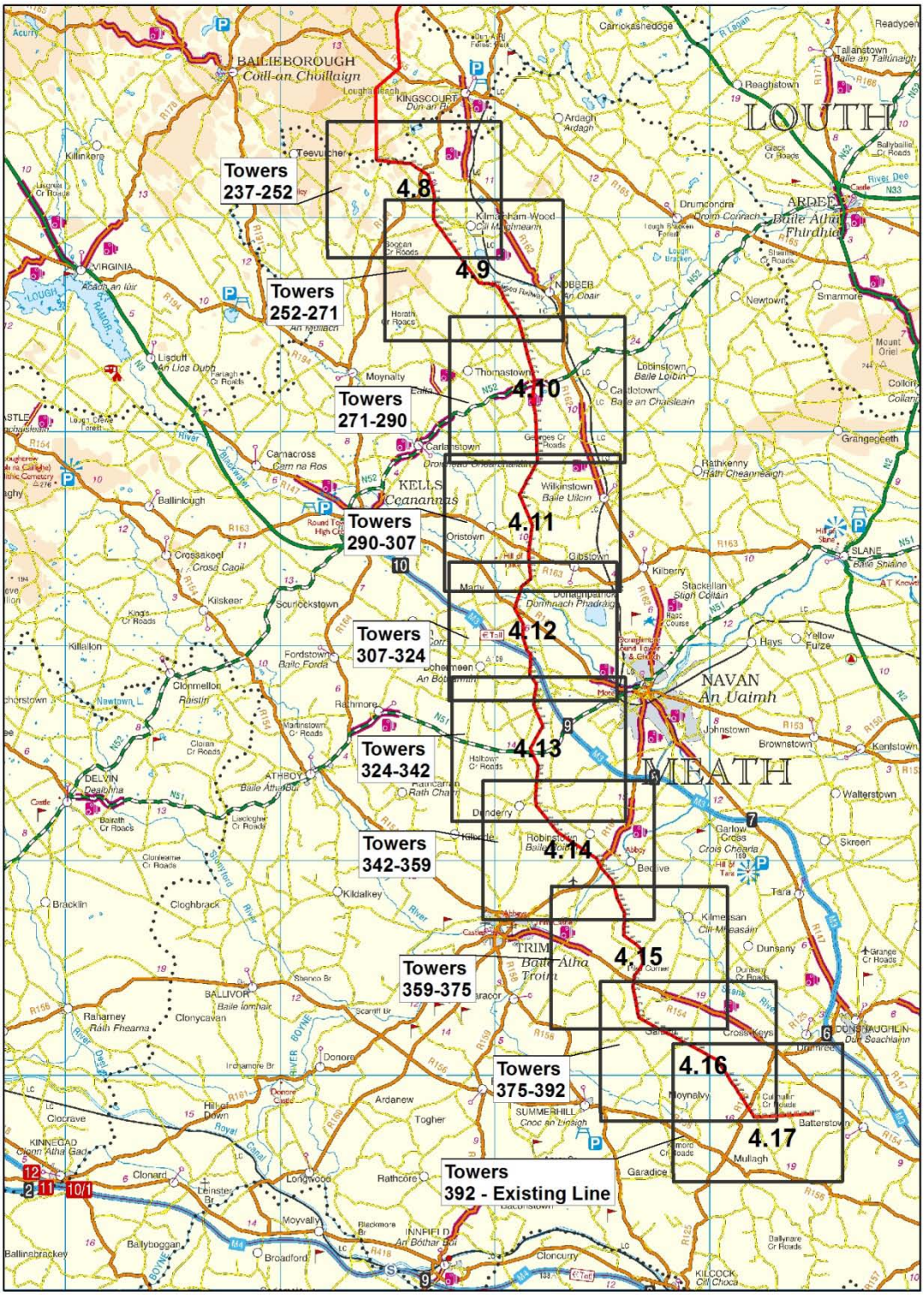


Figure 4.4 Overview MSA Line Design

(Numbers in boxes refers to specific map reference included in **Appendix B**)

- **Clonturkan to Shancor: Towers No. 237 to 252 as illustrated on Figure 4.8 in Appendix B**

  This section of the alignment commences at Tower 237 in the townland of Clonturkan, County Cavan, where a connection is made with the section of the overall circuit located within the CMSA. From Tower 237 the line route then proceeds in an easterly direction, avoiding an ecologically sensitive area to the north. Between Towers 237 and 242 in the townland of Tullyweel, the line route crosses two local roads. The line route turns south east at Tower 242 avoiding viewpoint VP21 (as detailed in the Meath Landscape Character Assessment). The line route crosses the R164 Regional Road between Towers 244 and 245, before turning south at Tower 245 in the townland of Lislea. Between Towers 245 and 248, the line route travels south south-east crossing agricultural land and small sections of forestry. Between Towers 248 and 252 the route aligns south, crossing two local roads (between Tower 249 and Tower 250 and between Tower 251 and Tower 252). The line route crosses Kilmainham River between Towers 251 and 252.

- **Shancor to Rahood: Towers No. 252 to 271 as illustrated on Figure 4.9 in Appendix B**

  The line veers in a south-easterly direction between Towers 252 and 262. Between Towers 253 and 254, the line route crosses two local roads and avoids the village of Kilmainhamwood. Between Towers 254 and 262, the line route crosses agricultural land avoiding a number of key viewpoints both to the east and west of the line route, as designated in the county development plan. This line route in this area also avoids Whitewood Lough, several Crannógs and Whitewood House. Between Towers 260 and 261, the line route crosses Altmush geological site (Towers are not located on this geological site) and a local road.

  The line route veers east at Tower 262 near the Altmush crossroads to avoid high ground and continues in this direction until Tower 265. Between Towers 265 and 266, the line route turns in a south-easterly direction crossing a tributary to the River Dee,

  Between Towers 266 and 271, the line route takes a series of slight bends avoiding high ground to the west and the village of Nobber and high ground to the east. The line route crosses at the edge of Brittas Demesne avoiding the core features of the demesne. The line route in this area avoids Cruicestown Lough, a National Monument and a designated landmark (as detailed in the Meath Landscape Character Assessment) which are located to the west of the line route.

- **Rahood to Dowdstown: Towers No. 271 to 290 as illustrated on Figure 4.10 in Appendix B**

  At Tower 271, situated in the townland of Rahood, the line route kinks slightly, travelling in a more southerly direction crossing agricultural land until reaching Tower 280 in the townland of Clooney. By making this slight alteration in direction, the line route bisects a gap between several houses clustered. This section of the line route crosses a local road between Towers 272 and 273 and avoids three viewpoints to the west.

  The line route deviates slightly at Tower 280, avoiding a farmyard to the west and a house to the east. It crosses the N52 to the west of Raffin Cross, and follows this route until arriving at Tower 282 in the townland of Clooney. The line route turns slightly east but continues generally south at Tower 282 until reaching Tower 284 in the townland of Drakerath where the route turns to an almost southerly direction and maintains this direction until reaching Tower 290. This section of the line route passes through the townlands of Drakerath and Mountainstown and avoids the villages of Castletown, approximately 3km to the east, and Carlanstown, approximately 6km to the west, and an ecologically sensitive area to the west.

- **Dowdstown to Gibstown: Towers No. 290 to 307 as illustrated on Figure 4.11 in Appendix B**

  The line route veers in a south-westerly direction between Towers 290 in the townland of Dowdstown and Tower 295 in the townland of Clongill, crossing two local roads (one between Towers 291 and 292 and the other between Towers 294 and 295) and avoiding a large ecologically sensitive area to the west.

  To avoid the villages of Clongill and Wilkinstown to the east and Oristown to the west, the line route changes to a south-easterly direction at Tower 295 in the townland of Clongill and follows this direction until reaching Tower 299 in the townland of Clongill. The line route crosses a local road between Tower 298 and 299.

  The line route changes direction at Tower 299 in the townland of Clongill to a south westerly route until reaching Tower 303 in Oristown. The line route crosses the R163, Regional Road between Towers 302 and 303. Between Towers 303 and 307, the route follows an approximately southwards bearing, avoiding the village of Gibstown to the east and viewpoint VP32b to the west (as detailed in the Meath Landscape Character Assessment).

- **Gibstown to Durhamstown: Towers No. 307 to 324 as illustrated on Figure 4.12 in Appendix B**

  In order to avoid the village of Donaghpatrick, the line route veers south-west at Tower 307 and maintains this direction until Tower 309 in the townland of Teltown, crossing a local road between Tower 307 and 308, in order to minimise the crossings of the River Blackwater. At Tower 309, the line route turns to a south south-westly direction continuing along this heading until reaching Tower 312 in the townland of Castlemartin, having made a crossing of the River Blackwater between Towers 310 and 311 and the old N3 between Tower 311 and Tower 312 approximately 600 metres west of Finnegans Cross Roads.

  The line route then veers south-east between Tower 312 in the townland of Castlemartin and Tower 314 in the townland of Tankardstown crossing a local road between Tower 313 and 314. The line route aligns south between Towers 314 and 316 in the townland of Tankardstown crossing a dismantled railway between Towers 314 and 315.

  The line route deviates to a south south-easterly direction at Tower 316 and follows this course until arriving at Tower 318 in the townland of Grange crossing a local road between Tower 317 and 318, avoiding several houses located along the local road. Between Tower 318 and Tower 319, the line route turns south-east to avoid several houses located to the south. The line route veers south at Tower 319, crossing the M3 to the west of Navan and then continuing south until reaching Tower 322 in the townland of Durhamstown. The line route crosses a local road between Towers 321 and 322 and avoids the aforementioned houses which are situated along this local road. Between Tower 322 and 324 in the townland of Durhamstown, the line route veers south east avoiding the Ardbraccan Demesne to the east.

- **Durhamstown to Philpotstown: Towers No. 324 to 342 as illustrated on Figure 4.13 in Appendix B**

  The line route turns to a south south-west heading at Tower 324 and maintains this direction until Tower 327 in the townland of Neillstown, crossing a local road between Tower 325 and 326 and avoiding housing clusters to both the east and west.

  Between Towers 327 and 330, the line route veers south-east crossing two local roads between Towers 327 and 328. The line route veers south-west between Tower 330 in the townland of Betaghstown and Tower 334 in the townland of Irishtown, just north of the N51 near Halltown Crossroads.

The line route changes direction at Tower 334, following a south-easterly path until Tower 336 in the townland of Halltown. This section of the line route crosses the N51 approximately 3km to the west of the town of Navan and avoids Jamestown Bog pNHA which is located approximately 3km to the west of the line route.

At Tower 336 the line route turns to a near southerly direction, until Tower 341 in the townland of Philpotstown. The line route then deviates slightly east between Towers 341 and 342 in the townland of Philpotstown, crossing a local road, avoiding Philpotstown Demesne and the village of Dunderry.

- **Philpotstown to Trubley: Towers No. 342 to 359 as illustrated on Figure 4.14 in Appendix B**

The line route follows a south-easterly direction between Towers 342 and 346 in the townland Dunlough running parallel to the eastern bank of the Clady River. A change in direction occurs at Tower 346 in order to avoid established one off housing and Trim Airfield, resulting in the line route travelling in a more easterly direction until reaching Tower 352 in the townland of Balbrigh crossing a local road between Towers 349 and 350 and crossing the Clady River between Towers 350 and 351.

The line route follows a south south-easterly direction between Tower 352 and Tower 354 in the townland of Rathnally, crossing the R161 Regional Road between Towers 353 and 354. At Tower 354 the line route turns to a south-easterly heading and follows this direction until Tower 357 in the townland of Trubley, crossing the River Blackwater, while avoiding the village of Bective and Bective Abbey to the east. To the west the line route also avoids Trim Airfield and the location of lands in respect of which a new planning application for two houses has been granted in the townland of Trubley. Between Towers 357 and 359, the line route travels in a south south-easterly direction crossing a local road between Towers 357 and 358.

- **Trubley to Branganstown: Towers No. 359 to 375 as illustrated on Figure 4.15 in Appendix B**

At Tower 359 the line route turns slightly east but maintains an overall south south-easterly direction until Tower 362 in the townland of Knockstown.At Tower 362 the line route aligns south until Tower 366 in the townland of Creroge, avoiding the village of Kilmessan to the east while also maintaining sufficient distance from the Hill of Tara to the east and the town of Trim to the west. The line route veers south-east at Tower 366 and travels in this direction until Tower 369. The line route follows a southerly direction between Towers 369 and 371 in

the townland of Marshallstown, crossing a local road which is a designated cycle route between Tower 369 and 370.

The line route turns south-west at Tower 371, following this direction until Tower 373 in the townland of Branganstown avoiding a number of one off houses. Between Towers 373 and 375, the line route follows a near southerly heading crossing the R154 Regional Road in the townland of Branganstown

- **Branganstown to Culmullin: Towers No. 375 to 392 as illustrated on Figure 4.16 in Appendix B**

The line route travels in a south south-easterly direction between Towers 375 in the townland of Branganstown and 380 in the townland of Boycetown crossing the Boycetown River between Towers 376 and Tower 377. The line route veers south-east at Tower 380, following this direction until reaching Tower 392 crossing two local roads, Galtrim Moraine and the Derrypatrick River and passing close to Derrypatrick Bridge.

- **Culmullin to Woodland: Towers No. 392 to Existing Line Route as illustrated on Figure 4.17 in Appendix B**

The line route deviates slightly at Tower 392 in Culmullin but maintains a south-easterly direction until reaching Tower 402 in the townland of Bogganstown, crossing the R125 Regional Road approximately 2km south of Culmullin Crossroads. The line route in this area avoids ecologically sensitive areas to the east and west between Towers 397 and 399.

The MSA preferred line design also includes 2.8km of the new circuit supported on existing 400 kV double circuit structures. One side of these structures is currently in use supporting the existing Oldstreet to Woodland 400 kV circuit; the other side is spare and available for the proposed new North-South 400 kV Interconnection Development. This is described below.

From Tower 402 the existing line route follows an easterly direction on the existing double-circuit structures of the Oldstreet-Woodland 400 kV circuit, crossing two local roads before connecting to the existing Woodland Substation in the townland of Woodland.

The proposed development also includes an extension to the existing Woodland Substation. The proposed extension will take place entirely within the existing property boundary and will involve a 7,000sqm (0.7ha) extension of the inner compound. The specific works proposed are:

- Erection of a gantry structure to allow the overhead line entry into the substation.
- Installation of the three surge arresters under this gantry structure and three cable sealing ends beside them.
- Installation of the three surge arresters and three cable sealing ends in the existing E3 line bay.
- Installation of approximately 250m of 400 kV underground cable within the substation compound to connect the line to an existing 400 kV line bay (E3).
- Extension of the substation fence to accommodate the new gantry structure, surge arresters and cable sealing ends.

5 CONSTRUCTION CONSIDERATIONS

5.1 INTRODUCTION

With the identification of a preferred line design, the North-South 400 kV Interconnection Development Project has now reached a level of detail considered sufficient to allow EirGrid and its consultants to engage with the public (and landowners in particular) on the associated construction works and activities along the specific route alignment, and to seek feedback in relation to same. In summary the main elements of the project are:

- A new single circuit, 400 kV Over Head Line (OHL) covering a distance of 101.3km from the border crossing in the townland of Lemgare, approximately 2km north-east of Clontibret, Co. Monaghan to an existing double circuit 400 kV OHL tower in the townland of Bogganstown, Co Meath;

- The installation of conductors on the free side of the existing double circuit towers for the final 2.8kms into Woodland Substation; and

- Works within Woodland 400 kV Substation to accommodate the proposed 400 kV circuit.

The main construction elements/phases of the project, as detailed above, are:

- Health and safety;
- Construction programme;
- Pre-construction works;
- Site enabling works including guarding and services;
- Access routes and tracks;
- Setting out and excavation of tower foundations;
- Installation of tower foundations;
- Erection of tower structures;
- Stringing of conductors;
- Reinstatement of land;
- Substation works;
- Waste management; and
- Maintenance of the OHL and towers.

The works and methodologies involved are outlined in **Section 5.2** below[15].

5.2 OVERVIEW OF CONSTRUCTION WORKS AND ACTIVITIES

5.2.1 Health and Safety

All completed design work, future design work, construction, and all other works of the proposed North-South 400 kV Interconnection Development comply with, and will continue to comply with, current health and safety legislation.

5.2.2 Construction Programme

The construction period for the proposed development is anticipated to be approximately three years from the commencement of the site works.

The construction of each tower will be undertaken in five general stages, according to the following sequence, on a rolling programme of estimated durations:

- Stage 1 – Preparatory Site Work (1 – 7 days);
- Stage 2 – Tower Foundations (3 – 6 days);
- Stage 3 – Tower Assembly and Erection (3 – 4 days);
- Stage 4 – Conductor/Insulator Installation (7 days per straight); and
- Stage 5 – Reinstatement of Land (1 – 5 days).

The construction methods carried out by ESB and its contractors will be in line with international best practice and will fully comply with relevant health and safety requirements. The principal OHL construction methods are outlined in this section and are based on ESB's long and successful OHL construction experience.

The ground conditions encountered vary along the proposed OHL route and hence the construction techniques and machinery/equipment required will vary to accommodate this.

[15]As indicated in Section 3.1, the proposal includes the installation of conductors on existing double circuit towers for some 2.8km near Woodland Substation. The construction related works on this section of the line will be limited to the stringing of conductors as described in Section 5.2.9.

Access to the site will be during hours of daylight for steel erection. There will be no anticipated Sunday or night working except for emergency works (pumping of excavations).

5.2.3 Pre-Construction Works

Pre-construction surveys will be undertaken during this construction phase, including ground investigations.

Prior to commencing the works, discussions will take place between the appointed landowner agents and landowners to ensure awareness of the specific works that will take place pursuant to the proposed development. Landowners will be contacted prior to access being required on their lands and a date of commencement for the works will be provided to the landowner before any work begins. The condition of land will be agreed and recorded with the landowner prior to the commencement of works.

5.2.4 Site Enabling Works including Guarding and Services

Site preparation works for OHL construction include formation of temporary access tracks to the tower positions (refer to **Section 5.2.5** below for further detail) and may include minor civil works around the tower location including *inter alia:*

- Clearing the site (e.g., removal of fences, cutting back of trees and vegetation etc.);
- Levelling of the tower foundation area: The towers are designed such that a difference in ground level can be accommodated from one side of the tower to the other, hence minimising the quantity of local disturbance. Where the gradient between two legs is greater than 1m, the tower will be installed with a leg extension. Depending on the particular gradient at each location, the tower may require a single leg extension, or it is possible to add an extension to any number of the four tower legs to overcome a gradient. Where the gradient is less than 1m, and the impact is moderate, consideration will be given to levelling the site foundation area. Prior to construction a site survey will be conducted at each structure location to confirm the requirement for leg extensions and/or site levelling;
- Diversion of field drains: Where existing drainage is present at the location of a tower foundation, typically this drainage will be removed from the tower foundation construction area. New drainage trenches will be dug to pass the tower foundations on one or as many sides of the foundations as required, or alternatively a number of drains can be replaced by a larger single drain inserted, which bisects the tower foundation;
- Delineation of any on-site working area (e.g., erection of temporary fencing, portaloos' etc.);

- Diversion of any existing utilities (e.g., underground water pipes, cables etc.);
- Over-sailing/undergrounding of lower voltage OHL; and
- Erection of guarding positions: Where the conductor is to be strung over roads, and possibly at river locations, protection will be erected prior to the commencement of stringing. These positions and the protection will be in the form of guard poles, scaffolding or a telescopic handler. The protection measures will be positioned both sides of a crossing and will be temporary in nature, for the duration of the stringing operation. The guarding locations will ensure that the stringing operation does not interfere with road users.

5.2.5 Access Routes and Tracks

Temporary accesses capable of accommodating construction plant, construction materials and personnel are required for the construction of each tower, installation of the conductor and the setting up of guarding locations.

There are four forms of proposed access types typically required for the construction of OHL:

- Access tracks: These are temporary accesses that will be used to gain access to the working areas from the public road network. The proposed access tracks will be selected to minimise disruption to agricultural land by using existing tracks and access points as far as possible. At this stage the location of access tracks is indicative. These indicative access tracks facilitate discussion and agreement with landowners.

- Access to stringing locations: Stringing locations will be accessed by stringing equipment. Generally access is directly from the proposed angle tower to the stringing location, where the two points are in the same fields and there are no obstructions. Where obstructions (e.g., a hedgerow) occur between the points, an alternative access has been chosen. All accesses are only indicative at this stage. This will facilitate discussion and agreement with landowners.

- Access to guarding locations: The guarding locations will be accessed by 4x4 vehicle and excavator with two trips, one for erection, and one for disassembly. The indicative access to these work sites are still to be identified. They will be identified during the preparation of the EIS.

- Access to LV crossing locations: These will be accessed by a tracked excavator in order to underground existing LV lines. The indicative access to these work sites are still to be identified. They will be identified during the preparation of the EIS. .

Access tracks enable the deployment of excavators or piling rigs together with foundation materials (shuttering, concrete, steel re-enforcement, piles), and for the removal of excess spoil. For tower erection, approximately 12.5 tonnes of steelwork will be delivered to each site and erected using a Gin/Derrick pole.

As noted previously, appropriate route and site selection is the most effective method of avoiding or minimising the environmental effects of development. With the identification of a preferred line design, the North-South 400 kV Interconnection Development Project has been developed to a level of detail considered sufficient to allow EirGrid and its consultants to identify indicative construction access routes/points and off-site construction compounds for the North-South 400 kV Interconnection Development and to seek feedback from the public (and landowners in particular) in relation to same.

The first part of the identification process is to develop some general principles to guide the decisions about identifying potentially suitable temporary access routes and tracks to construct the North-South 400 kV Interconnection Development. The general guidelines are similar to those outlined in **Section 3.3.2** and are set out below:

- Access tracks would be approximately 3m to 4m in width. The width of tracks and associated earthworks would be minimised where possible and where safety and design are not compromised;

- Defining the route of new temporary access tracks to structure locations (on private lands) will seek to:

    - Minimise disturbance to current land use and farm/land management practices, where possible;

    - Avoid sensitive areas where possible (e.g., cSAC/SAC/pNHA/NHA/SPAs);

    - Cause least disturbance to and minimise impacts to natural heritage interests (including watercourses);

    - Cause least disturbance to and minimise impacts to cultural heritage interests;

    - Minimise intrusion to and disturbance of the surrounding area and local communities;

    - Maximise use of existing farm entrances, farm tracks, roads and bridges, where possible. The use of private accesses to residential properties should be avoided wherever possible for safety and amenity reasons;

- Minimise the amount of new temporary entrances, and access tracks/roads, where possible; and

- Take appropriate precautions to protect animal welfare and crop fertility by avoiding the spreading of diseases and noxious and invasive plants between farms.

- Prior to commencement of construction, a full traffic management plan will be produced and implemented.

Based on the above guidelines, indicative temporary access tracks for the North-South 400 kV Interconnection Development have been identified and have been issued to affected landowners for their consideration and feedback. EirGrid is seeking feedback from landowners in relation to all relevant issues in determining the location and likely impacts arising from construction activities and works, including those relating to the identification and construction of access tracks on their landholdings.

The second part of the identification process will be to consider the likely nature of the required temporary access routes. In this regard, temporary construction tracks tend only to be built where there may be poor ground conditions, a sensitive receptor or sensitive land use. While the terrain of the North-South 400 kV Interconnection Development is generally undulating with favourable ground conditions likely to be encountered for a vast majority of the proposed route, construction techniques and machinery/equipment may vary to accommodate localised ground conditions along specific parts of the route and/or as a result of weather conditions during the construction period. Details of alternative types of track relative to land use, condition and having regard to specific environmental conditions are set out below. It is noted that a particular access track may incorporate different track types along its length.

- Good quality land (i.e., in areas of very dry pasture): In general, the construction of temporary tracks is not required. Using tracked machinery (low ground pressure vehicles where possible) usually means that access to tower sites can be achieved with relative ease.

- Relatively dry/peat land or sensitive areas. Where a defined track is required temporary ‘bog’ matting would be used. Low ground pressure vehicles would also be used where possible.

- Arable land (where topsoil removal is not required) and other sensitive situations. In these circumstances, aluminium road panels can be used.

- Very poor soft, boggy and or undulating land: In such conditions stone roads may need to be constructed. This involves the excavation of the topsoil and storage of this to one side of the

track. A geotextile reinforcement would be placed on the subsoil surface and stone placed on top and compacted to form the track. Alternatively, timber sleepers can be used.

Figure 5.1 Temporary Aluminium Panel Tracks

Figure 5.2 Temporary Stone Road

5.2.6 Setting Out and Excavation of Tower Foundations

The average duration of foundation works for a 'Base Construction Crew' of 4 - 6 workers is 6 days for an Angle Tower, 4 days for an Intermediate Tower and 10 days for piled foundations.

Excavations are set out specifically for the type of tower (e.g., angle, intermediate or transposition) and the type of foundation required for each specific site (depending on ground conditions). As noted in **Section 3.2.1** tower foundations typically range from 3m to 3.5m (per leg) in depth to the invert level of the foundation and anywhere from 2sq m to 5sq m in plan area depending on tower type. Each of the four corners of the tower stubs (i.e., lower part of the tower leg) will be separately anchored below ground in a block of concrete. The standard ESB/EirGrid practice is to use a concrete pipe lining in the foundation holes as an integral part of the foundation.

5.2.7 Installation of Tower Foundations

The foundation of the tower is the means by which the loads are transmitted from the structure into the surrounding soil. The foundation is designed to withstand the maximum uplift, compression; transverse shear; and, longitudinal shear loads imposed by the tower as derived from the tower design. The foundation will be stable enough to prevent any movement of the tower under the maximum load conditions.

A setting template is used to set and hold the tower stubs in position while the concrete is being poured and cured. After this the remaining part of the foundation, the shear block or neck is shuttered. The tower foundations are backfilled one leg at a time usually with the material already excavated. If the excavated material is deemed unsuitable for backfilling imported fill material may be used. Surplus spoil will be disposed of in a suitable location on site with the agreement of the landowner or off site in a licensed landfill. Once the tower base is completed and fully set, it is ready to receive the tower body.

Figure 5.3 Setting Template being prepared for Final Concreting

The first stage in the construction of the OHL, after preparatory works, is to construct a foundation for each tower. The foundations will be of a concrete pad and chimney type **(Figure 5.4).** However, depending on particular geological conditions, there may be the requirement to use (i) piled, (ii) auger or (iii) rock foundations:

(i) A mini-piled foundation consists of an array of raked piles, tied together in a pile cap;

(ii) An auger foundation consists of a single, vertical bored pile or pier. Typically, an auger foundation will be 0.7m to 1.5m in diameter and up to 10m deep; and

(iii) A rock anchor foundation consists of an array of vertical rock anchors drilled into the rock, which are then tied into a concrete cap.

The working area for tower sites will be fenced off prior to excavation to ensure the safety of the public and livestock.

Excavations will be undertaken for each leg on the tower. The dimensions of the excavation will vary depending on the tower type to be constructed and the ground conditions encountered. Some rock breaking could be required to achieve the required depths for the tower foundations.

Groundwater controls may be necessary to manage shallow groundwater. In these areas it will be necessary to depress the groundwater level by pumping to maintain a dry operational area for construction of the foundations. Pumping to allow the construction of the tower footings typically will continue for a short period of approximately 3 to 6 days. As the maximum depth of the foundations for the majority of the towers will be approximately 3.5m, the maximum drawdown required to provide a dry working area will be less than 3.5m.

Construction of each foundation takes up to 6 days. Tower erection can commence 21 days after foundation installation, when the concrete will have cured sufficiently.

Concrete will be delivered via the proposed access tracks to the tower position by a ready-mix lorry.

After the excavation is backfilled the site is levelled, leaving just the four tower stubs (lower part of the leg) protruding approximately 1m from ground level.

A standard suite of foundation designs have been developed for each tower to cater for a variety of soil conditions which may be encountered along the OHL.

- **Standard Foundation Installation**

The holes for the foundation will be excavated using a rubber tyre or tracked excavator. Depending on the location, a wheeled or tracked dumper may be used to deliver the ready-mix concrete to the work site. Each of the four legs of the tower will be separately anchored below ground in a block of concrete as shown in **Figure 5.4** below.

The installation of each tower stub (lower part of the leg) is a two stage process. Firstly, a length of large concrete pipe is placed upright in the excavated hole (as a form of shuttering) and concrete is poured around the outside of the pipe to fix it in place. In the second stage, the tower stub is placed into the pipe and located in place using either a setting template (refer to **Figure 5.3**) or the tower base (lower section of tower up to lowest horizontals). Steel reinforcement bars are then placed into the pipe and around the tower stub and the pipe is filled with concrete fixing the tower stub in place.

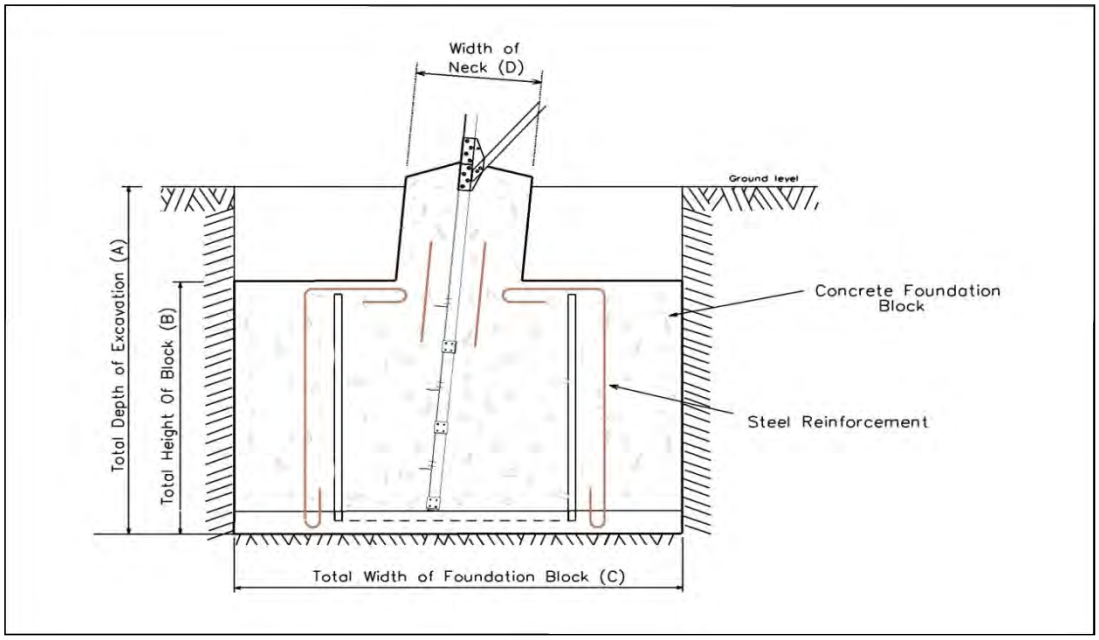


Figure 5.4 Pad and Chimney Foundation

- **Augured Foundations**

In locations where the soil investigation shows that the ground conditions do not conform to the bearing and/or ground conditions catered for by the range of generic pad and chimney foundations, either a piled, or rock augured site specific foundation will be required. To limit the use of stone, it will be engineering preference to use existing excavator with an attachable hydraulic hammer to install the piles. This will remove the requirement for any larger plant. The use of piled or rock foundation may require the drilling or ‘auguring’ of several holes for

each leg of the tower. In the case of piled foundations there will be two options. The holes are drilled and then reinforced with steel and concreted or grouted, or the contractor will use precast concrete piles and drive these into the ground. The piles form a stable base at ground level, upon which a typical foundation will be installed. In the case of rock foundation, a site specific rock anchor foundation will be designed. Rock anchors of a specified length are drilled and grouted into the bedrock.

- **Piled Foundations**

  Piled foundations can either comprise a single pile or a group of piles connected at or just below ground level by a reinforced concrete cap. Driven displacement piles may comprise a totally preformed section from steel, pre-cast concrete or timber. Alternatively, where hollow steel or pre-cast concrete sections are used, these are normally subsequently filled with concrete, or for steel H-sections, post grouted. Piles are used to provide a suitable bearing platform, upon which a typical tower foundation will be constructed. The quantity of concrete used will be no greater than the worst case quantity for that of a generic 'pad' and 'chimney' foundation for the particular tower location.

5.2.8 Erection of Tower Structures

The average duration of tower building works for 7 workers is 4 days for an Angle Tower and 3 days for an Intermediate Tower. Work will only be carried out during normal working hours.

Once the tower base is completed and fully set, the steel for the remainder of the tower is delivered to the site by lorry and various sections of the tower, depending on weight and method of construction of the tower, are pre-assembled on the ground beside the tower before lifting into position. The tower can be built using a derrick/gin pole and tractor winch or using a suitable crane.

Given the nature and type of terrain in Meath, Cavan and Monaghan, it is considered that the vast majority of the line towers can be erected using the derrick pole methodology. The derrick pole is a very simple and straight forward way to build the tower where small sections of steel are lifted into place using the derrick and a winch. As illustrated in **Figure 5.5** and **Figure 5.6** the derrick consists of either a solid or lattice aluminium or steel pole which is held in position using guy ropes anchored to the ground.

Figure 5.5 Derrick Pole at Tower Base

Figure 5.6 Lower Part of the Tower Head being Dropped into Position

5.2.9 Stringing of Conductors

The average duration of stringing works is typically 1 week per straight (i.e., the section between angle towers). This figure is approximately the same for all straights regardless of length as the most time consuming aspect is the movement and setup of stringing equipment. Stringing crews are typically quite large and could have as many as 15 workers. Work will only be carried out during normal working hours.

Stringing of OHL refers to the installation of phase conductions and shield wires/OPGW (optical fibres) on the transmission supporting structures or towers. This method requires the pulling of a light pilot line (nylon rope) which is normally carried by hand into the stringing wheels. This in turn is used to pull a heavier pilot line (steel rope) which is subsequently used to pull in the conductors from the drum stands using specifically designed “puller – tensioner” machines. The main advantages with

this method are (a) the conductor is protected from surface damage and (b) major obstacles such as road and rail crossings can be completed without the need for major disruption.

Once the conductor has been pulled into position on the appropriate tension fittings and insulator assemblies, the conductor is then cut from the puller-tensioner and sagged using a chain hoist and any bird flight diverters or warning spheres are added.

Figure 5.7 Puller – Tensioner Machine

Figure 5.8 Typical Stringing Equipment

5.2.10 Reinstatement of Land

Once all works are complete, the access route and the construction areas around the tower are restored to their original condition or better. Generally this work is carried out by a specialised agricultural contractor and is carried out in accordance with the relevant IFA agreements and in consultation with the landowner concerned.

5.2.11 Substation Works

The extension of the existing Woodland Substation is necessary to allow the connection of the new 400 kV line. The existing substation has a total size of approximately 7ha, located within a landownership boundary of approximately 34ha. The proposed extension will take place entirely within the existing property boundary and will involve a 7,000sq m (0.7ha) extension of the inner compound.

The basic principle in the design of a substation is that the layout of equipment should be simple, easy to follow and should generally be consistent with ESB standards.

5.2.12 Waste Management

As in common with any infrastructure project, there will be excavated material during the construction of the proposed towers. At the depths below ground at which tower foundation bases are installed, various types of soil, gravelly soil, and rock will be excavated. All topsoil excavated in the construction of tower foundations will be reinstated where possible. Where practical and appropriate, excavated subsoil will be used for associated construction and landscaping purposes on-site. All waste excavated material will be managed in accordance with the relevant waste management regulations.

All surplus spoil will be transported to a licensed landfill.

5.2.13 Maintenance of the Overhead Line and Towers

The normal maintenance of the proposed circuit will generally involve general inspections by helicopters and ground inspections. Access will be undertaken using suitable off road vehicles for routine inspections. These vehicles will use existing accesses.

Helicopter inspections are normal practice for OHL in Ireland and this line may be flown in future by helicopter. The flights will typically last no more than one day per inspection for the entire OHL.

Other types of maintenance will include replacement of conductors and replacement of fittings (as required).

5.3 CONCLUSION

With the identification of a preferred line design, the North-South 400 kV Interconnection Development has been developed to a level of detail considered sufficient to allow EirGrid and its consultants to consider the likely significant impacts arising as a result of the construction works and activities along the specific route alignment. EirGrid is interested to meet with all directly impacted landowners to discuss these issues further, including finalising the location of OHL on lands and likely impacts arising from construction activities and works.

6 MATTERS TO BE ADDRESSED IN THE EIS

6.1 BACKGROUND

Having regard to the provisions of the codified Environmental Impact Assessment (EIA) Directive and the relevant provisions of the Planning and Development Act 2000 (as amended) and the Planning and Development Regulations 2001 (as amended)[16], it is considered that the North-South 400 kV Interconnection Development will require an EIA to be conducted by the competent authority (CA), in this case, An Bord Pleanála (ABP). In this context, an Environmental Impact Statement (EIS) will be required to be submitted with the application for planning approval to be made to ABP. Whilst the terms EIA and EIS are often used interchangeably, it should be understood that EIA is the process of assessment undertaken by the CA, whilst an EIS is a statement prepared by the developer/applicant (referred to hereafter as the applicant) which is then submitted to the CA to assist it in its assessment. Furthermore, issues, submissions and observations to ABP raised by all other parties in respect of the proposed development will also form part of the EIA and ABP's ultimate decision making process.

This section provides a general summary of the EIA process and an indication of the matters, which at this point, are likely to be addressed and included in the EIS for the North-South 400 kV Interconnection Development. The matters to be addressed and included in the EIS (i.e., the scope of the EIS as identified by the applicant – EirGrid) are identified based on the preferred line design and associated construction activities detailed in this report. They also have regard to the following:

- Legislative requirements (e.g., the initial Directive 85/337/EEC and its three amendments have been codified by DIRECTIVE 2011/92/EU of 13 December 2011[17], the Planning and Development Acts and the Planning and Development Regulations);

- European Commission Guidance on *EIA Screening and Scoping* (2001) as well as *Guidance on Assessment of Indirect and Cumulative Impacts* (1999)[18];

- Relevant Guidelines (e.g., EPA *Guidelines on the Information to be Contained in Environmental Impact Statements* (March 2002)[19]; EPA *Advice Notes on Current Practice in the preparation of Environmental Impact Statements* (September 2003)[19]; *Guidance on the Application of the Environmental Impact Assessment Procedure for Large-scale Transboundary Projects* (May 2013)[20]; and – *Guidelines for Planning Authorities and An Bord Pleanála on carrying out EIA*

[16] Available at www.irishstatutebook.ie
[17] Available at www.eur-lex.europa.eu
[18] Both available at www.ec.europa.eu
[19] Available at www.epa.ie
[20] Available at www.ec.europa.eu

(March 2013)[21]). It is worth noting that the EPA Advice Notes include a list of topics usually addressed in EISs for particular project types. Project Type 20, as set out in the Advice Notes, includes 'Construction of Overhead Powerlines'.

- Stakeholder feedback (made during the previous application and/or as part of the re-evaluation process) to date;

- Baseline environmental studies and surveys undertaken/to be undertaken; and

- Alternatives considered. In this regard, it should be noted that consideration of certain technical and environmental alternatives has already occurred in the *Final Re-evaluation Report* and is further considered in this *Preferred Project Solution Report*. If any changes to the preferred solution arise as the project progresses these will be incorporated into the EIS.

6.1.1 Overview of Environmental Impact Assessment (EIA) Process

Whilst there are various stages in the EIA process, the process can be summarised as follows:

- The requirement for an EIS for the project is considered by the applicant, having regard to thresholds and other criteria (referred to as 'screening');
- The applicant may request an opinion (referred to as a 'scoping opinion') from CA (i.e. ABP) to say what should be covered by the EIS - information is provided by the applicant to assist the CA in formulating this opinion;
- The applicant must provide information on the potential environmental impacts of the proposed development – this is done in the form of an EIS;
- The environmental authorities, the public and affected Member States must be informed and consulted;
- The CA makes a decision taking into consideration the results of consultations; and
- The public is informed of the decision afterwards and can challenge the decision before the courts.

In Irish law, the provisions of the Planning and Development Act 2000 have been recently amended, by the insertion of section 171A, which sets out in detail, using almost identical wording to the EU Directive what the assessment must comprise of. The EIA must identify, describe and assess in an appropriate manner, in light of each individual case and in accordance with Articles 4 to 11 of the Environmental Impact Assessment Directive, the direct and indirect effects of a proposed development on the following:

[21] Available at www.environ.ie

(a) human beings, flora and fauna;
(b) soil, water, air, climate and the landscape;
(c) material assets and the cultural heritage, and
(d) the interaction between the factors mentioned in paragraphs (a), (b) and (c).

An EIS is defined in Irish law, as follows: *"environmental impact statement means a statement of the effects, if any, which proposed development, if carried out, would have on the environment and shall include the information specified in Annex IV of Council Directive No. 2011/92/EU".* An EIS provides information which the competent authority uses in determining whether or not to grant consent. This information is also used by affected parties to evaluate the acceptability of the development and its impacts.

6.1.2 Stages in the EIA Process

The first stage in the process is to determine if an EIA is required. This is referred to as 'screening'. Screening is the process of determining whether or not EIA is required for a particular project. Guidance in relation to screening is provided in European Commission 'Guidance on EIA Screening 2001'.

The second stage in the process is to identify the matters to be considered in the EIS. The process of identifying issues to be included in the EIS (or 'scoping') involves assessing the project's possible impacts, considering available alternatives and deciding which impacts are likely to occur and likely to be significant based on the proposed development. An initial scoping of possible impacts identifies those impacts considered to be potentially significant, whilst those considered not to be significant are generally eliminated. Refining the process to focus on the most potentially significant impacts continues throughout the preparation of the EIS. Guidance in relation to scoping is provided in European Commission 'Guidance on EIA Scoping 2001'.

An applicant can undertake an informal scoping exercise and consult with various parties in relation to this exercise. However, scoping, as understood by section 182A of the Planning and Development Act 2000, (as amended), is carried out by the CA (i.e., ABP). The CA shall on receipt of such a request from the developer provide such a scoping opinion in writing. The CA has the discretion to consult with various parties before providing such a scoping opinion. In order to assist the CA in carrying out this task, information in relation to the project is provided by the applicant. **Figure 6.1** shows the process followed by the applicant when considering the matters which should be addressed in the EIS.

Figure 6.1 Stages in the Identifying the Contents of the EIS

(Source: EPA Guidelines)

The third stage in the process involves the preparation of the EIS by the applicant for submission to the CA. This stage involves a baseline assessment to determine the status of the existing environment, impact prediction and evaluation, and determination of appropriate mitigation measures, including monitoring and reinstatement, where necessary. Irish legislation has been recently amended to make it absolutely clear that the CA and not the applicant carries out the EIA.

The fourth stage in the process follows the application for development consent. This stage concludes (i.e. the actual EIA stage) when a determination is issued by the consenting authority and the public is informed of the decision afterwards. This stage provides for public inputs and participation in the EIA process. There may however be conditions attached to any consent, which require post-consent monitoring and reporting and additional actions on foot of monitoring. The purpose of monitoring is to compare predicted and actual impacts, particularly if the impacts are either very important or the scale of the impact cannot be very accurately predicted.

6.1.3 Consultation and EIA

Consultation is an essential part of the EIA process, with the public and bodies with specific environmental responsibility being given an opportunity to comment and participate in the process of assessment (Article 6 of the EU Directive). Thus, consultation with the public, statutory bodies and interest groups provides an opportunity to:

- Identify concerns and measures about the project and uses these to inform the preparation of the EIS;
- Incorporate mitigation measures where possible into the design of the project in the early stages;

- Take into consideration the expertise and knowledge of local communities, experts and interest groups;
- Encourage participation in decisions yet to be made;
- Take into consideration concerns during the decision making process and make the decision and conditions on the decision accordingly; and
- Ensure members of the community are fully informed with up to date information about all aspects of the development throughout the full duration of the project.

6.1.4 Structure and Content of an Environmental Impact Statement (EIS)

The process for preparing the EIS takes place in a number of stages and consists of a systematic analysis of the proposed development in relation to the existing environment. This is carried out at a stage in the design process where changes can still be made to avoid adverse impacts, see **Figure 6.2.**

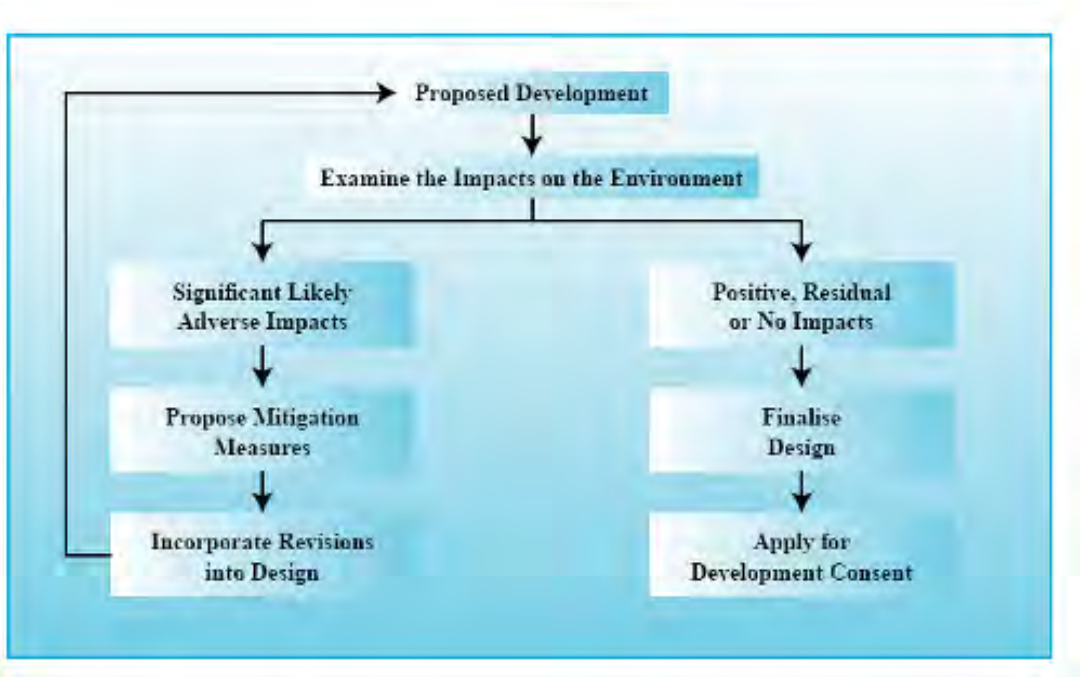


Figure 6.2 Stages in the EIA Process (Source: EPA Guidelines)

As referred to above, current legislation requires an EIS to identify, describe and assess in an appropriate manner, in light of each individual case and in accordance with Articles 4 to 11 of the EIA Directive, the direct and indirect effects of a proposed development on the following:

(a) human beings, flora and fauna;

(b) soil, water, air, climate and the landscape;

(c) material assets and the cultural heritage; and

(d) the interaction between the factors mentioned in paragraphs (a), (b) and (c).

The likely significant effects include the direct, indirect, secondary, cumulative, short, medium and long-term, permanent and temporary, positive and negative impacts of each stage of the project. The objective is to determine which of these impacts is likely to be significant, so that the EIA process can determine what studies are likely to be required and the level of detail required for such studies. The EIS, which will be submitted to ABP with the application for planning approval, will be compiled based on the outcome of the studies undertaken.

6.1.5 EIA Process and the North-South 400 kV Interconnection Development

6.1.5.1 EIA Screening for the Proposed Development

In this instance, an EIA is required, as the proposed development falls within the scope of Schedule 5 Part 1 of the 2001 Planning and Development Regulations (as amended) which require an EIA for projects involving "*construction of overhead electrical power lines with a voltage of 220 kilovolts or more and a length of more than 15 kilometres*".

6.1.5.2 Matters Identified by the Applicant to be Included in the EIS

As previously stated, EirGrid as the Applicant can only decide on the contents of the EIS, not the manner in which the EIA will be conducted. In terms of identifying such contents there is a long history associated with this project and a significant amount of baseline environmental information has been collected over a number of years. Information includes the EIS prepared for the previous application (this application was withdrawn), as well as all the other information related to that application which was submitted to ABP, including submissions from the public. Therefore, the identification of issues to be addressed in the EIS has drawn from this considerable body of information.

Furthermore, the re-evaluation process and associated public consultation which has been ongoing since 2011, has identified further issues which should be included in the EIS. Consultation with prescribed bodies and other consultees, as well as the public, has been a significant feature of the re-evaluation process to date.

In considering the issues to be included in the EIS for this project, the European Commission and EPA Guidelines are a significant consideration, as they provide guidance as to how an EIA can remain environmentally focussed. Some issues which have been raised during consultations to date do not directly relate to the environment but are issues of concern to parties who have raised them. Where these are not included in the EIS, they are considered elsewhere in the application documents.

It is recognised that environmental assessment is a continuing iterative process, which also incorporates design changes in the project as it progresses. Therefore, after preparation of this *Preferred Project Solution Report*, new issues may emerge or previously identified issues may no longer be relevant, before the final EIS is prepared. Such changes, if they occur, will be captured in the EIS submitted with the application for planning approval.

6.1.5.3 Proposed EIS Structure

For the North-South 400 kV Interconnection Development, an EIS will be prepared for submission as part of an application for approval to ABP who will be the competent authority and also the consenting authority. A single EIS will be prepared for the project but, for convenience of users and legibility, at this stage it is likely that it will be divided into two parts. It is likely that Part A will provide details of the project primarily as it passes through County Meath and Part B will provide details of the project primarily as it passes through Counties Cavan and Monaghan.

It should be noted that whilst the EIS will consider alternatives, the consideration of certain technical and environmental alternatives has already occurred in the *Final Re-evaluation Report*. The conclusions of that report are that the preferred solution is an OHL running from Woodland, County Meath to a point at the border with Northern Ireland, north-east of Clontibret, County Monaghan, where it will meet a proposed OHL being planned by Northern Ireland Electricity (NIE) as shown on **Figure 4.1** of this report. Alternatives are further considered in this *Preferred Project Solution Report* (e.g., in relation to tower design and micro routing alternatives). If any changes to the preferred project solution arise as the project progresses they will be incorporated into the EIS.

The final structure of the EIS, in terms of chapter titles, presentation and contents, has not been finalised at this point, however the anticipated chapter titles and contents (having regards to the requirements of the EIA Directive and all relevant guidance both EU and Irish) are set out on **Section 6.2** of this report.

6.1.6 Transboundary Considerations

The issue of transboundary considerations to be included within the EIA process is of significant importance in the context of the Scheme as it is a cross border project between Ireland and Northern Ireland. Article 7 of the consolidated EIA Directive 85/337/EU provides the basis for consultation between Member States in relation to the likely significant effects of proposed development states on the environment in another Member State. ABP, as the CA, is required to take the results of consultations and the information gathered pursuant to such transboundary consultation into consideration in the development consent procedure.

Accordingly, in relation to the proposed North - South 400kV Interconnection Development, due to the integrated nature of the development between Ireland and Northern Ireland, the EIS prepared in respect of the proposed development will have regard to the transboundary implications associated with the proposed development.

All potential impacts will be considered in the EIS which will be provided to the appropriate authorities in Northern Ireland, thereby permitting those authorities to make their views known to the CA, which will be taken into account in the development consent procedures.

All chapters of the EIS will contain a specific transboundary section. It is likely that there will also be a specific transboundary chapter. Cumulative impacts in respect of the transboundary aspects of the proposed development will also be detailed in the EIS.

Finally in this regard, EirGrid notes the recent publication by the European Commission of *Guidance on the Application of the Environmental Impact Assessment Procedure for Large-scale Transboundary Projects* (May 2013). EirGrid and its consultants will ensure that all relevant guidance is considered and adhered to in the preparation of the EIS for the proposed North–South 400 kV Interconnection Development.

6.2 MATTERS TO BE ADDRESSED AND INCLUDED IN THE EIS

This section details the matters proposed to be addressed and included in the EIS for the North-South 400 kV Interconnection Development. In identifying the matters to be considered, it should be re-iterated that the provisions of Annex IV of the Codified EIA Directive, Schedule 6 to the Planning and Development Regulations 2001 (as amended), and Project Type 20 in the EPA *Advice Notes on Current Practice in the preparation of Environmental Impact Statements* (September 2003) relating to OHLs have been used as a reference point. Recently issued guidance from the Department of Environment, Community and Local Government (DOECLG) – *Guidelines for Planning Authorities and An Bord Pleanála on carrying out EIA* (March 2013) and the European Commission – *Guidance on the Application of the Environmental Impact Assessment Procedure for Large-scale*

Transboundary Projects (May 2013), have also been considerations. It is re-iterated that there is a higher degree of certainty in relation to identifying the matters to be addressed in this EIS due to the history of the project and the considerable volume of information that is already in the public domain.

Issues are listed under a particular heading where they are likely to appear in the final EIS. However as EIA is an iterative process which involves consultation with prescribed bodies and other consultees including the public, the structure of the final EIS may be different to that as set out below.

6.2.1 Introduction

This section is intended to establish the background and terms of reference for the EIS. It will also outline the structure and assumptions which underline the EIS, the specialists who prepared each section and any technical difficulties or lack of data which were encountered. EIA guidance documents, both EU and Irish, note that developments of this class tend to be of environmental concern because their impacts are repeated over their length. Associated developments which may subsequently occur should also be borne in mind. Typical mitigation measures used for these types of projects relate to routing alternatives, design alternatives (materials, structures etc.), choice of construction season (with reference to flora and fauna), height of structures and use of light construction machinery necessitating less clearance and ground disturbance than conventional plant.

6.2.2 Project Description

A comprehensive project description will be provided which will include both construction and operational descriptions. This involves describing the location/site, design, size or scale of a proposed development and considering all its relevant phases (from construction through to operation) in sufficient detail to allow an understanding of the potentially significant environmental impacts which are likely to arise. Relevant construction issues include: site evaluation/testing, works at particular times of the year, duration and phasing, site preparation works, access, traffic, noise, dust and vibration, machinery and materials access, excavation/spoil deposition, temporary/permanent works, construction techniques, type and quantity of loads, materials (including sourcing, transportation and storage), containment/security methods, emergency procedures and spoil deposition. Relevant operational issues include: lifespan/cycle of components and decommissioning.

6.2.3 Consideration of Main Alternatives

An important requirement of the EIA process is to present an outline of the various alternatives examined and the justification of the final proposed development taking into account the environmental effects. As previously described, the main alternatives related to transmission, technological and route alternatives have already been addressed in the *Final Re-Evaluation Report* and additionally in this report.

6.2.4 Potential for Environmental Effects

In considering the content of the EIS, this section sets out the potential for effects, the basis for the assessment and the methodology which will be used for the assessment. The DOECLG - *Guidelines for Planning Authorities and An Bord Pleanála on carrying out EIA* (March 2013) recommend that the CA should consider effects on the environment without reference to any detailed mitigating measures which may be required and imposed as conditions, in order to reduce or avoid such effects. The EIS will be prepared in the context of this guidance.

6.2.4.1 Human Beings

Potential for Effects: There is potential for effects on amenities, settlement patterns and new land uses. Concerns have been raised in relation to a variety of other areas including tourism, economic activity, employment, property, agriculture and human and animal health.

Socio-Economic

Consideration: This section will take into account the statistical demographic profile of the study area, including population numbers, population change, age profile, employment and unemployment levels, and social class (which includes a study of the type of employment occurring).

Methodology: This will primarily comprise desktop analysis of the latest Census information of the Central Statistics Office (CSO). It will also be informed by reference to the latest Ordnance Survey Ireland (OSI) and other map data, as well as local knowledge and detailed visual and associated surveys along the route.

Land Use

Consideration: This will address such issues as loss of land, restrictions on land use and potential for impacts on agricultural, horticultural and forestry output and associated activities.

Methodology: This will comprise a desktop analysis supplemented by site visits and consultation with land owners/occupiers to prepare a detailed analysis of agricultural and other land uses and farm holdings along the route.

Tourism

Consideration: This will consider the potential for impacts on tourism and culture in the area where the development is located.

Methodology: This will use a methodology developed by Fáilte Ireland for Tourism Impact Assessment which is summarised as follows: impact on the attractiveness of an area or attraction (impact on image), impact on visitor numbers, impact on the range and quality of tourist attractions, activities and facilities; and impact on the visitor's experience/enjoyment/expectation of an area or attraction.

Electric and Magnetic Fields (EMF)

Consideration: This will weigh up the potential for impacts from Electric and Magnetic Fields (EMF) arising from the proposed development. The study area for this assessment includes a distance of up to 100m either side of the line. The assessment will also address the nature of electro-magnetic fields (EMF).

Methodology: This will be based on modelling/projections based on average and maximum line loading. Site specific modelling of EMF at a limited number of areas will be carried out. The results will be compared with the latest international scientific research and policy in this area including International Commission for Non-ionizing Radiation (ICNRP) and EU standards and guidelines.

6.2.4.2 Flora and Fauna

Potential for Effects: There is potential for effects on flora and fauna arising from disturbance during construction and/or operation and arising from habitat loss.

Consideration: This will be carried out having regard to three main areas as follows: compliance with the Habitats Directive, potential for impacts on habitats and species of conservation interest and potential for impacts on wintering birds (mainly Whooper Swans). Consultations have taken place, and will continue, with environmental bodies including National Parks and Wildlife Service (NPWS) and Inland Fisheries Ireland (IFI), following a review of their submissions in relation to the previous application, to ascertain how the EIS should address issues raised by those bodies.

Methodology: There are a number of stages in the ecological assessment to ensure the issues raised are adequately addressed. These are:

- Desk Based Assessment: The desk based assessment will gather existing ecological information available on the study area, to identify the likely significant issues and potential ecological constraints.

- Walkover Studies/Windscreen Surveys: The project ecologists will, where feasible, undertake field surveys at and surrounding proposed tower locations. Where this is not possible, it is intended that project ecologists will carry out field survey of tower locations from outside the landholdings, (i.e., from the public roads).

- Wintering Birds/Whooper Swans: The project ecologists/ornithologists have completed extensive Wintering Bird surveys over a five year period which has fed into route selection process.

- Appropriate Assessment: A Stage 1, Appropriate Assessment Screening Report will be completed to identify any potential impacts on Natura 2000 sites.

There are a number of relevant guidance documents to this assessment published by EirGrid, the DOEHLG, the European Commission, the Institute of Ecology and Environmental Management (IEEM) and the National Roads Authority (NRA).

6.2.4.3 Soil and Geology

Potential for Effects: There is potential for effects on soil stability and contamination of soil and features of geological interest.

Consideration: This will consider the potential for impacts on County Geological Sites (CGS) geological pNHAs, and underlying soils & geology as well as bogs and peatland areas including Cashel Bog.

Methodology: The assessment will be carried out in accordance with the methodologies of the EPA and Irish Geological Institute (IGI). It will include the collection of baseline data (soils and geology contained within the study area) focusing on a review of cartographic data for the study area, and a desktop review of GSI database maps for the region.

Relevant guidance documents to this assessment include publications by the EPA and the Institute of Geologists of Ireland (IGI) including *Geology in Environmental Impact Statements – A Guide* (September 2002)[22].

[22] Available at *www.gsi.ie*

6.2.4.4 Water

Potential for Effects: There is potential for effects on water arising from interference with water courses during construction and ground/surface water quality impairment due to leakages.

Consideration: This will comprise a desktop analysis supplemented by site visits to establish a baseline for ground and surface water in the study area, including water quality.

Methodology: The assessment will be carried out in accordance with the methodology set out in EPA guidance documents. It will include a desktop study and site investigations to assess the existing water environment. It will also consider groundwater impacts on wells, potential pollution from accidental spillages of fuels, oils etc. on groundwater.

Relevant guidance documents to this assessment include publications by the NRA and the IGI.

6.2.4.5 Air

Potential for Effects: There is potential for effects arising from noise (construction and/or operation) and dust (construction).

Consideration: This will consider the potential for impacts from noise and air quality dust arising from the proposed development.

Methodology: Baseline noise surveys for both daytime and night time will be carried out at selected locations. Baseline surveys will also be undertaken in the vicinity of the existing 400 kV line for comparative purposes. The results will be compared with the relevant standards and guidelines including in particular EPA Guidelines. In relation to air quality, existing baseline levels of SO2, NO2 and PM10 in the area will be detailed through a review of Local Authority and EPA monitoring data. An assessment of dust generating construction activities associated with the proposed development on air quality at sensitive receptors will also be carried out and compared with the relevant standards and guidelines including in particular EPA Guidelines.

6.2.4.6 Climate

The European Commission have recently published *Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment*. The application of this guidance to the proposed development will be considered as well as any other potential effects on climate as a result of the proposed development.

6.2.4.7 Landscape

Potential for Effects: There is potential for effects arising from vegetation/other clearance during construction, visual impacts of towers and changes of character in undeveloped areas.

Consideration: This section will take into account the potential for landscape and visual effects on areas directly and indirectly affected by the proposed development. It will consider the potential effects on the visual amenity of the study area as a result of new elements located in the landscape that cause visual intrusion (i.e., interference with or interruption of the view). Visual impacts will be assessed taking account of the sensitivity of the receiving environment, the visual contrast between the existing environment and the proposed development and the extent of the areas over which these effects will be discernible. The assessment considers an area 5km either side of the proposed line for general assessment, 1km either side of the proposed line for currently used public sites and 10km either side of the alignment for sensitive and elevated sites.

Methodology: The primary method adopted for Landscape and Visual Impact Assessment relies largely on a comparative visual technique, whereby representative and accurate photomontages incorporating the proposed development are compared to the existing corresponding baseline photograph so that an assessment of impact can be made. This process or method is referred to as a visual impact assessment. Judgements are also made on the impact of existing similar structures in the landscape. The assessments will be illustrated with figures showing relevant Landscape Character Areas and Types within the study area and Landscape Visual Impact Assessment Maps. Photomontages taken from selected viewpoints will illustrate the potential landscape and visual impact of the proposed development. Accompanying mapping will indicate the location of each viewpoint. The assessment will be undertaken as a combination of desk top studies and site visits.

6.2.4.8 Material Assets

Potential for Effects: There is potential for effects on property and existing infrastructure (including possible enhancements). It will also consider the effects from traffic, both construction and operational.

Consideration: This will comprise a desktop analysis supplemented by site visits to determine which assets have the potential to be impacted. It will also consider potential traffic generation including, modes of transport, traffic flows, estimation of the amount of construction traffic and impacts on the road network. It will consider the existing road infrastructure in the immediate vicinity of the proposed development and the haul routes within a much wider study area, which will be used to bring materials to work areas.

Methodology: This will include windscreen surveys in order to assess the existing road infrastructure in the immediate vicinity of the proposed development, identify potential construction routes within a much wider study area which will be used to bring materials to work areas, identify constraints i.e., bridges or roads not fit for construction vehicles and assess the potential for impact to the pavement structure, verges, boundary treatments etc. The results will be compared with the relevant NRA guidance documents.

6.2.4.9 Cultural Heritage

Potential for Effects: There is potential for effects arising from interference with archaeologically or otherwise culturally significant sites either directly or indirectly.

Consideration: This will consider potential impacts on the cultural resource of the study area, including archaeological heritage; architectural heritage and other cultural heritage.

Methodology: This will be undertaken in two main phases, desk based assessment and field inspections. Field inspection surveys will seek to verify the location and extent of known archaeological and architectural sites and to record the location and extent of any newly identified sites. Where access is not possible, it is intended that cultural heritage specialist will carry out field survey from outside the landholdings, (i.e., from the public roads).

Relevant guidance documents to this assessment include a Code of Practice between EirGrid and the DOEHLG as well as publications by the NRA and the DOEHLG.

6.2.4.10 Interaction of the Foregoing and Cumulative Impact

All environmental factors are inter-related to some extent. This heading draws attention to significant interaction and interdependencies in the existing environment. Interactions between one topic and another will be discussed under each of those topic headings as well as in a specific 'Interactions' section. For example, the potential effect of water pollution in plant life will be discussed under the heading of 'Flora and Fauna' and the potential visual effects will be discussed under the heading of 'Cultural Heritage'. The consideration of interactions will be undertaken having regard to relevant EU and Irish Guidance documents previously detailed, and in particular having regard to European Commission - *Guidelines for the Assessment of Indirect and Cumulative Impacts* (1999).

6.2.4.11 Consultation

This will focus on how consultation was undertaken for the project and the identification of issues relevant to the EIA through the on-going consultation process.

6.2.4.12 Non-Technical Summary

A summary in non-technical language of information contained within an EIS will be included in the EIS.

6.3 CONCLUSION

The EIS will be prepared by EirGrid having regard to all relevant legislation and guidelines. The matters to be addressed and included in the EIS, which will be prepared for submission to ABP, are detailed in this section of the report. It should be noted that, as EIA is a continuing iterative process, after preparation of this report, new issues may emerge or previously identified issues may no longer be relevant. Such changes, if they occur, will be captured in the EIS. In addition, issues might emerge following publication of the EIS which can also be taken into account in the on-going EIA process which will be undertaken by ABP.

Although the potential impacts will vary along the length of this linear project, based on current knowledge of the project, it is considered that the key potential and likely significant impacts associated with the OHL development will be visual and ecological impacts. Visual impacts will be permanent predictable impacts - the main way in which they can be mitigated is through route selection – this has been addressed in the re-evaluation process and also in this *Preferred Project Solution Report*. There is also potential for certain significant impacts on ecology, particularly on wintering birds (such as whooper swans), if appropriate mitigation measures are not implemented. Ecological impacts are less predictable than visual impacts as the behaviour of fauna cannot always be modelled. Route selection and placement of towers at specific locations are the main ways in which potential impacts can be mitigated. There is widespread concern that significant impacts will arise in relation to a number of other areas including agriculture, property, land use, cultural heritage, human health, noise and traffic. As a result of these concerns, these areas will be addressed in the EIS. During the construction stage there are likely to be temporary impacts (typical impacts include potential air quality issues, noise disturbance, traffic disruption, etc.). In addition, there may be a temporary to short term loss of land for production when towers are being constructed.

7 NEXT STEPS

A key purpose of this report is to document the process of moving from an indicative line route as identified in the *Final Re-evaluation Report* (April 2013) to a more detailed preferred line design.

All feedback arising from public consultation and landowner engagement in respect of this report will feed into confirming the nature, location and extent of the final project proposal that EirGrid will publish as part of the application for planning approval to An Bord Pleanála (ABP). This process is in accordance with Stage 3 of EirGrid's Project Development and Consultation Roadmap.

Once the planning application is submitted, the project will then move into a statutory consent phase. During that phase, ABP will set defined periods for the making of written submissions in respect of any proposed development. ABP also has discretion to decide whether to hold an oral hearing in respect of any application for proposed development.

7.1 ONGOING TECHNICAL AND ENVIRONMENTAL ANALYSIS AND ASSESSMENT

EirGrid will now be commencing further technical, environmental and other surveys and studies to confirm specific siting of structures on landholdings and to inform the preparation of the application for planning approval and the Environmental Impact Statement (EIS).

In seeking feedback on the preferred line design as detailed in this report, EirGrid is specifically seeking to engage with landowners on those aspects of the identified route alignment that may directly affect them, including the location and siting of structures and identification of temporary access routes for construction of the line. In this regard, EirGrid will not be seeking permission in its application to move tower positions post-planning (previously referred to as "micro-siting").

Local amendments to the preferred line design can still be considered in accordance with the guidelines and considerations set out in **Section 2.4** of this report. Feedback from landowners to date has included requests to place towers on field boundaries/hedgerows, in the corner of a field, at a distance to existing farm buildings or closer to the existing roadways within the landholding etc. Where such modifications can be accommodated without creating additional impact, they will be further considered in dialogue with the landowner concerned, and may ultimately comprise part of the final application for planning approval. Where it is considered that they would create additional avoidable significant impact, it is likely that it will not be possible to include them as part of the final proposal. Such determination will occur in dialogue with the relevant landowner(s).

7.2 ONGOING PUBLIC AND STAKEHOLDER ENGAGEMENT

In seeking feedback on the scope of matters to be addressed in the EIS which will accompany the forthcoming application to ABP, EirGrid is looking to engage with all stakeholders including members of the public, statutory bodies and interest groups. The process involves assessing the project's potential environmental impacts, the alternatives that can be considered, and identifying impacts which are likely to occur and likely to be significant.

Generally in response to issues relating to line design, EirGrid acknowledges landowner concerns (in particular) in respect of the project's potential impact on specific landholdings, and it continues to pursue consensus in relation to the routeing of the line, and in particular the location of towers, by proactively engaging with landowners to try and mitigate any potential impact on current farming practices and other land uses, while trying to balance other competing priorities such as environmental constraints and distance to dwellings.

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North-South 400kV Interconnection Development

Preferred Project Solution Report

APPENDIX A

CMSA Maps of the Preferred Line Design

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APPENDIX A

MAPS RELATING TO THE CMSA

Figure 4.1 (CMSA)	**Lemgare to Clarderry Tower No. 103 to 128**
Figure 4.2 (CMSA)	**Clarderry to Clogher Tower No. 128 to 146**
Figure 4.3 (CMSA)	**Clogher to Boraghy Tower No. 146 to 165**
Figure 4.4 (CMSA)	**Boraghy to Sreenty Tower No. 165 to 186**
Figure 4.5 (CMSA)	**Sreenty to Corlea (ED Drumcarrow) Tower No. 186 to 205**
Figure 4.6 (CMSA)	**Corlea (ED Drumcarrow) to Collops Tower No. 205 to 223**
Figure 4.7 (CMSA)	**Collops to Clonturkan Tower No. 223 to 237**

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APPENDIX B

MSA Maps of the Preferred Line Design

Part Funded by the EU-TEN-E Initiative

APPENDIX B

MAPS RELATING TO THE MSA

Figure 4.8 (MSA)	**Clonturkan to Shancor: Towers No. 237 to 252**
Figure 4.9 (MSA)	**Shancor to Rahood: Tower No. 252 to 271**
Figure 4.10 (MSA)	**Rahood to Dowdstown: Tower No. 271 to 290**
Figure 4.11 (MSA)	**Dowdstown to Gibstown: Tower No. 290 to 307**
Figure 4.12 (MSA)	**Gibstown to Durhamstown: Tower No. 307 to 324**
Figure 4.13 (MSA)	**Durhamstown to Philpotstown: Tower No. 324 to 342**
Figure 4.14 (MSA)	**Philipstown to Trubley: Tower No. 342 to 359**
Figure 4.15 (MSA)	**Trubley to Branganstown: Tower 359 to 375**
Figure 4.16 (MSA)	**Branganstown to Culmullin: Tower 375 to 392**
Figure 4.17 (MSA)	**Culmullin to Woodland: Tower 392 to Existing Line**

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Preferred Project Solution Report

APPENDIX C

The Final Re-evaluation Public Engagement Report

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1. SUBMISSIONS RECEIVED

EirGrid is grateful to stakeholders who took the time to provide their feedback during the structured engagement period on the *Final Re-evaluation Report*.

This appendix sets out a summary of the views, opinions and issues raised by stakeholders. **The opinions and views set out in the following sections are those expressed by stakeholders who provided feedback and do not necessarily reflect the opinions or views of EirGrid.**

All submissions made by stakeholders either in writing, on-line, at the information centres, open days or over the phone have as far as possible been captured, logged and reviewed by the project team and are summarised in the following sections. Members of the project team, including technical, environmental and EMF experts were available at each open day to engage with members of the public and answer any queries or questions that arose. As far as possible the project team endeavoured to respond to and capture the views and feedback provided by stakeholders during these events. This report, together with the complete submissions, has been reviewed by the project team in the preparation of the *Preferred Project Solution Report*.

In the context of legal obligations in respect of data protection, the personal details of consultees and the submissions they have made to EirGrid have not been published.

The issues raised by stakeholders have been grouped having regard to the Terms of Reference for this engagement period, and as listed below:

- Submissions relevant to the *Final Re-evaluation Report*;
- Submissions relevant to the *Preferred Project Solution Report*;
- Submissions Relevant to the Environment Impact Statement (EIS);
- Submissions on Community Gain; and
- Feedback on Other Issues.

Where issues raised are relevant to the current stage of the project it is responded to in **Chapter 2** of the main report. Where feedback received is relevant to subsequent stages, for example during the Environmental Impact Assessment (EIA) stage, it will be considered and responded to at such future stage, as appropriate.

2. SUBMISSIONS RELEVANT TO THE FINAL RE-EVALUATION REPORT

A large proportion of submissions raised issues that were of relevance to, or in response to, the *Final Re-evaluation Report*. The issues are grouped under three main headings as follows:

- Project need/scope;
- Alternatives; and
- Study area, corridor identification and corridor evaluation.

2.1. PROJECT NEED/SCOPE

During this engagement period many stakeholders made observations and provided feedback in respect of the need for the project. Specific issues included:

- Some stakeholders welcomed the project, acknowledged the need and requested information on potential employment opportunities and socio-economic benefits arising for the area. Other stakeholders advised that while they appreciated the need for the project, they were objecting to the technology proposed for this project.
- Other stakeholders did not accept the principle of the project. They advised that they did not believe that demand existed in Ireland for this project given the economic downturn and high levels of unemployment.
- A number of stakeholders raised concerns that the need for this project was driven to benefit and meet demand in the United Kingdom (UK), with some stakeholders referencing the export of wind energy to the UK market.
- Other stakeholders felt that there was no requirement for power transfer to Northern Ireland and advised that in their view, the project was proposed to fulfil the needs of the Greater Dublin Area (GDA). Others however referenced the recent outages in Northern Ireland and enquired about security of supply issues in Northern Ireland.
- General enquires were received regarding the ability of the project to improve competition. Specific points included:
    - How the transfer of electricity between jurisdictions would improve competition given that EirGrid is the system operator in both jurisdictions.
    - The relationship of the project with electricity supply/generation, tariffs paid for electricity generation and the source of the power to be transmitted through the proposed interconnector.

- o A number of stakeholders noted that they would like to see a reduction in electricity prices and enquired as to how these savings were calculated and would be passed on.
- o Other stakeholders felt that the cost of undergrounding the line should be borne by all electricity consumers in Ireland.

- Expressions of support for renewable energy and the integration of renewable energy with the transmission network were received. Specifically support was shown for the generation of wind energy in Ireland. In addition, some stakeholders enquired as to how EirGrid plans to reduce its dependency on fossil fuels and how Ireland's plans to increase renewable energy are progressing.
- A number of stakeholders questioned why the substation at Kingscourt has been deferred and sought clarification of EirGrid's future plans in the area.
- Some stakeholders enquired what benefits the project would bring to their community and local businesses.

2.2. ALTERNATIVES

Many of the submissions received questioned the alternatives which have been considered for the project, in particular the technical options considered.

The specific issues related to:

1. Environmental and cost comparison of underground cables (UGC) versus overhead lines (OHL);
2. Routing suggestions for UGC;
3. Reference to international examples and advance in technology; and
4. Other options to meet the need of the project.

2.2.1 ENVIRONMENTAL AND COST COMPARISON OF UGC VERSUS OHL

A number of stakeholders stated that it is their preference that the line be placed underground. In this regard, some stakeholders referenced the conclusion of the IEC review that undergrounding is technically feasible for the project. Some stakeholders questioned if EirGrid has not accepted the findings of this report and whether it has completely ruled out undergrounding, including the use of partial undergrounding, as an option for this project.

The benefits and disadvantages in respect of financial costs and environmental impacts for both UGC and OHL were raised by stakeholders. This included requests for further independent studies on the option of undergrounding.

1. Cost of Undergrounding

A number of stakeholders considered the key factor in deciding whether to propose OHL or UGC for this project is cost and suggested that the public would be willing to pay more for this project to be implemented using UGC. Some stakeholders advised that, as the project was funded by tax payer's money, they should have more input into the location and technology proposed for the project. Some stakeholders advised that, in their view, EirGrid would propose UGC if it was cheaper than OHL.

Other stakeholders referenced the different cost comparisons for OHL and UGC referred to by EirGrid since 2007 and suggested there was a lack of consistency. In doing so, stakeholders referenced continuing advances in technology and suggested that the cost differentials between the two technologies would likely decrease further in the future.

General enquires were received as to the basis of the cost comparison, including whether impacts on land value had been included in the comparison made, whether a detailed costing on UGC had been undertaken and how this compares with the projected cost savings to be achieved by the project.

Some stakeholders requested that the cost differential be provided in the context of an average projected increase on an electricity supply bill so they could establish the context.

2. Comparison of Environmental Impact

A number of stakeholders advised that they felt that placing the lines over ground would cost more in the long-term than undergrounding, due to its environmental impacts, community impact, health effects (particularly in respect of children) and/or property/land devaluation. Specific issues included:

- Stakeholders advised that unlike in the case of a road project, there is an alternative that they consider has a lower environmental impact, particularly in relation to visual impact and health.
- A number of landowners advised that they would have no concern with the construction of underground cabling through their land.
- Some stakeholders felt that the project was being progressed at the expense of their community, particularly in relation to health.
- Other stakeholders advised that, in their view, EirGrid has not adequately undertaken a comparative assessment of the impact of OHL versus UGC including the completion of an exhaustive study on the feasibility of an underground High Voltage Direct Current (HVDC) option.

2.2.2 UGC ROUTING SUGGESTIONS

A number of stakeholders suggested potential routing options for an UGC. The majority of these suggested co-location with existing infrastructure. Specific locations suggested include:

- Disused railway lines in Meath, Cavan and Monaghan.
- A 25m sterile corridor from Monaghan town to Aughnacloy along the N2. Stakeholders advised that landowners could provide additional land alongside the road.
- Investigation of an off-shore option or a route closer to the east coast.
- Existing linear corridors e.g. motorways or the route should have been combined with the recent gas pipeline project.

2.2.3 REFERENCE TO INTERNATIONAL EXAMPLES AND ADVANCES IN TECHNOLOGY

A number of stakeholders referenced international examples where UGC was used and referenced advances in UGC technology. Specific issues raised include:

- Some stakeholders made general enquiries regarding new electricity infrastructure in other countries and referenced recent projects in Spain, Denmark, Germany, the United Kingdom and Canada where UGC was selected as the technology of choice.
- Some stakeholders felt that EirGrid has and is continuing to ignore technological advances that would allow high capacity electrical infrastructure to be undergrounded with particular reference to VSC HVDC cable.
- General enquires were received as to why the United Kingdom can include longer sections of UGC than is feasible in Ireland and whether using lower voltage cables, e.g. 220 kV, rather than 400 kV would overcome any difficulties.

2.2.4 ALTERNATIVE OPTIONS TO MEET THE NEED OF THE PROJECT

A number of stakeholders questioned why other options such as the construction of new electricity generators between Dublin and Tyrone or additional wind farms along the west coast could not provide the same benefits of this project.

2.3. STUDY AREA, CORRIDOR IDENTIFICATION AND CORRIDOR EVALUATION

A number of submissions made observations and comments on the project study area and the corridor identification and evaluation processes.

With regard to the project study area, a number of stakeholders advised that in their view the re-evaluation process should have looked at the broad area again. Others advised that the study area should have been extended to the east to include the option of co-location along the existing M1 corridor and the east coast.

A number of stakeholders made general enquiries regarding the removal of the proposed substation at Moyhill and how this affected the study area and resulting corridors.

A number of stakeholders had general enquires on the corridor identification and evaluation processes. This included suggestions for the co-location of the project along existing infrastructure corridors such as routing of the project along the N2. Other stakeholders advised how they considered there was a lack of transparency in route corridor and indicative line route selection and requested information on how constraints were evaluated including the determination of priority constraints during corridor evaluation.

Some stakeholders also felt that there was no significant difference between EirGrid's original findings as they relate to the CMSA and the findings detailed in the *Final Re-evaluation Report*.

3. SUBMISSIONS RELEVANT TO THE PREFERRED PROJECT SOLUTION REPORT

3.1. LINE DESIGN

A large number of submissions raised specific concerns or enquiries in respect of the alignment of the planned circuit, including potential localised modifications to, or siting of, the alignment as well as access during the construction phase.

The issues are grouped under the following headings:

- Modifications;
- Information on the structure design and locations;
- Proximity to dwellings and other receptors;
- Construction and access to lands; and
- Operation of the line.

3.1.1 MODIFICATIONS

A number of submissions received from stakeholders related to the modifications made to the indicative line route since the last phase of landowner engagement in July 2011 and proposed further modifications to the line route.

Specific requests and issues raised include:

- Information was requested on the modifications, including the rationale for modifications, made since the previous round of landowner engagement.

- Some stakeholders felt that these modifications had resulted in a greater impact on their landholding or dwelling house; others felt that their previous concerns had been taken into account; others raised concerns that the modifications meant that the line would no longer cross their land.

- In particular, some stakeholders felt that the modifications in the vicinity of Doohamlet as set out in **Table 3.2** of this report, has resulted in a greater impact on their landholding or dwelling house and requested additional options are considered to make the required diversion.

- Information was requested on whether any further details could be provided on the proposed location of towers at this stage and what future input stakeholders can have in the modification of tower locations.

- Concerns were raised about the potential impact on farming activities in particular where the line route traverses the centre of a field or a small field. Some landowners advised of locations within their land that would either be unsuitable for locating structures or would significantly impact upon their farming practices or woodlands.

- Requests for minor adjustments to the proposed alignment over specific landholdings.

- Request that partial undergrounding be considered from the intersection with the existing Oldstreet-Moneypoint line into Woodland substation.

3.1.2 INFORMATION ON THE LINE ROUTE AND LOCATION OF TOWER STRUCTURES

Many submissions raised concerns regarding the proposed line route and the location of the tower structures.

Queries from stakeholders in relation to line design included a number of site specific issues relating to the location and footprint of towers, the distance between towers, the required clearance from the ground and the route crossing agricultural landholdings.

A number of stakeholders had queries and concerns relating to the line route selection process. These included:

- Ecology and other environmental constraints have been prioritised over dwelling houses and impact on communities.

- EirGrid has kept the line away from houses and picked a route with the least number of houses so that there would be fewer objectors.

- Why the line route is not straighter and what is the rationale for changes in direction within the line.

- Whether the tower locations can be amended after planning is granted.

Stakeholders enquired as to how the proposed line design will compare with existing lines in the area citing the existing interconnector and the Flagford-Louth 220 kV line as examples.

Other stakeholders requested information on the proposed tower design and advised that monopole structures, wooden pole structures or twin pole structures would be preferable.

Queries regarding whether the proposed conductor would be insulated, the material it would be composed of and its proposed diameter.

A number of stakeholders questioned the rationale for the siting of angle structures away from field boundaries and requested information on how towers are located.

3.1.3 PROXIMITY TO DWELLINGS AND OTHER RECEPTORS

Many submissions expressed concerns relating to the proximity of the line route to dwelling houses or other receptors. A large number of the attendees at the project open days requested measurement of the exact distance from their dwelling house or other receptor to the indicative line route. A number of submissions received concerned the proximity of the line route to dwelling houses and other receptors, such as community facilities and schools. A number of stakeholders raised concerns regarding the proximity of these receptors to the line route on the basis of visual impact and stated their concern about health impacts.

Specific feedback included:

- The stakeholders most concerned about the proximity of their dwelling houses were typically within 500m of the indicative line route. These stakeholders stated that they were concerned about the visual impact of the project and raised concerns about the health impact on their communities, their families and their neighbours.

- Stakeholders referenced the distance from the line route advising that the 50m aspirational distance used by EirGrid was insufficient and referred to practices in other countries where greater distances were achieved citing examples in Scotland and Holland where they advised that a 100m separation distance is used.

- Some stakeholders expressed concern about the proximity of the line route to other receptors including:

    - Doohamlet National School - concerns were raised that the school could see a reduction in numbers as a result of the proximity to the indicative line route;

    - Raferagh National School;

    - Annyalla National School;

    - Clontibret Goldmine;

- Clogher GAA pitch;
- Local alternative health clinic;
- Lough Egish Rod and Gun Club;
- Unmarked graveyard Corduff; and
- Flax mill in close proximity to the line route in Benagh.

3.2. CONSTRUCTION AND ACCESS TO LANDS

The construction process and land access were raised in a number of submissions and during the project information days a number of stakeholders requested additional information on these topics.

3.2.1 CONSTRUCTION ACCESS

A number of stakeholders made enquiries in respect of the legal rights of EirGrid to enter private lands. They queried what steps EirGrid can take in the event of consent for access not being granted by landowners. Some stakeholders enquired whether EirGrid's rights extend to stringing towers over land without landowner permission and asked what rights the landowner maintains.

A number of submissions by landowners advised that they did not want EirGrid to enter their land while others advised that they would only grant access if the project was undergrounded.

Specific queries and concerns raised include:

- Enquires regarding shared and private access tracks, how these will be utilised and how would owners be compensated;
- Concerns that the local roads were not suitable to support the construction traffic for this project;
- Enquires regarding the assessment of land damage during construction, how this would be undertaken and compensated;

- Concerns that a number of lanes and tracks in the vicinity of the line route currently experience difficulty with access for farm machinery and are not suitable for construction traffic;

- Enquiries relating to proposed traffic control measures to be implemented for the duration of the project and concerns about the impact of any additional traffic on local road users particularly cyclists and pedestrians; and

- Enquiries relating to the maintenance of the road network during the construction phase and reinstatement thereafter.

3.2.2 CONSTRUCTION PROCESS

A number of stakeholders requested information on the construction phase and provided feedback on this. Specific queries, feedback and requests for further information included:

- Requests for information on the cost of construction and how it would be funded;

- Requests for information on who is responsible for undertaking the construction, with some stakeholders advising of their negative experience with ESB during construction.

- Requests for information on the area required for construction (i.e., working area), and the approximate timeline for commencement and completion of the construction phase;

- The nature and extent of construction equipment and precautionary steps to avoid the spread of disease between farms;

- Concerns about damage to land during construction and requests for information regarding how tenants operating land will be compensated. Information was also requested on the timeline for land reinstatement following the construction phase;

- The storage of excavated soil and measures proposed to prevent contamination;

- The steps to be taken to prevent soil slippage;

- Details of the temporary construction site facilities that will be required and the number of construction workers on site at any one time; and

- The provision of security on site and details of insurance in the event an accident on site.

3.2.3 OPERATION

A number of submissions raised concerns about the operation and maintenance of the line following construction. Specific concerns included:

- Clearance from the ground:
    - A number of landowners raised concerns that the sag on the line would increase in wet weather and that this would lead to those working under the line being more susceptible to shocks; and
    - One stakeholder advised of being aware of persons receiving a “shock” from a disconnected electric fence and from a metal trailer which were close to an existing 400 kV overhead line. Also mentioned that it was possible to light a fluorescent tube by holding it up underneath a 400 kV line.
- The towers would attract lightning strikes;
- Safety concerns regarding the lines falling and in particular enquiries as to who is responsible if there is an accident due to a falling line;
- The health and safety of anglers using carbon fibre rods under the line;
- Whether there is heat generated from the line and how this would impact trees;
- Enquiry regarding the impact on radio frequency once the line is energised; and
- Enquiries as to how the pylons would be secured to prevent climbing on them.

4. SUBMISSIONS RELEVANT ENVIRONMENTAL IMPACT

Feedback of relevance to the Environmental Impact Assessment (EIA) stage in the project development process was received during this round of engagement. The majority of these relate to the potential impact of the proposed development on environmental concerns broadly covered by the following topics:-

- Agronomy;
- Community and Socio Economic Impact;
- Cumulative Impact;
- Cultural Heritage & Archaeology;
- Ecology;
- Health;
- Landscape & Visual Impact; and
- Noise;

4.1. AGRONOMY

A number of landowners raised concerns about potential farming restrictions that will apply to their land following the construction of the project. These stakeholders were concerned that the project would result in the sterilisation of farmland beneath and adjacent to the pylons and their lines.

Specific concerns included:

- Restrictions on slurry spreading under the line;
- Restrictions on the use of machinery in fields;
- Restrictions to growing crops and trees under the line and around the base of the structure, with one stakeholder referencing a study in England that found that an OHL influenced the quality of crops grown in proximity to them.
- Impact of the pylons and the line on grazing animals; and
- Restrictions on the construction of new farm buildings.

Other concerns included the potential impact on animal health. Specific concerns included:

- Impact on chicken houses - a number of stakeholders advised they understood that chicken houses could not be built within a specified distance of a 400 kV line;
- Impact on cows from the noise of the line and EMF with some stakeholders expressing particular concerns that the line would impact the fertility of their dairy cattle;
- Impact on fertility of pedigree cattle using artificial insemination; and
- Impact on bloodstock arising from EMF and the noise from the line.

Other stakeholders raised concerns about the proximity of the line to farm buildings including hen houses, sheep houses and cattle sheds.

4.2. COMMUNITY AND SOCIO ECONOMIC IMPACT

A number of submissions raised concerns that the project will give rise to unrest within their communities with some advising that any landowner who allows a pylon will be in opposition to their community and that the project will result in divisions amongst neighbours.

Other stakeholders advised that the receiving community was not benefitting directly from the project. They raised specific concerns including the potential loss of students to schools in close proximity to the line and the impact on their communities during the construction phase, particularly referencing construction traffic.

A number of stakeholders expressed concerns that the project would negatively impact the businesses in the vicinity of the line route in particular those that depend on tourists. Furthermore, some stakeholders raised concerns about how the project could impact upon community and tourism amenities including fishing, clay shooting and camping.

Other stakeholders enquired how this project would benefit the local communities particularly during the construction phase and whether any employment arising from same would benefit their communities.

4.3. CUMULATIVE IMPACT

Stakeholders raised concerns regarding the substation in Moyhill and the future development of lines in the area.

Other stakeholders raised concerns regarding the development and extension of wind farms in proximity to the line route.

4.4. CULTURAL HERITAGE AND ARCHAEOLOGY

Concerns were raised regarding the project's potential impact on cultural heritage and archaeological sites in proximity to the line route. Specific sites that stakeholders felt should be considered by the project team included:

- 12th Century cemetery in Cruicetown;
- The Hill of Tara;
- Bective Abbey;
- Telltown;
- The Brittas Demesne;
- Archaeological sites in the vicinity of Muff;
- Local archaeological sites such as monuments and ringforts; and
- Sites of industrial heritage such as a flax mill.

Other stakeholders queried the diversion around the site of the Battle of Clontibret, advising that this does not attract tourists and that they felt that this diversion resulted in a greater environmental impact.

4.5. ECOLOGY

General concerns regarding wildlife in proximity to the line were expressed, in particular birds, bats and fisheries. Specific ecological sites and features that stakeholders felt should be considered by the project team included:

- The impact on hedgerows during the construction phase;
- The impact on birds, with stakeholders advising of their concerns for:
    - Whooper Swans and their flight patterns;
    - Impact on Curlew in the vicinity of the line;
    - Black Lake is a cormorant roosting site;
    - Swan flight paths from Borraghy to Lough Egish;
    - Lakelands including Lough Egish;
    - Claderagh Bog and associated Woodcock and its ability to attract birds given its high ecological value. The stakeholder advised that in their view this bog was of higher ecological value than the Cashel Bog, which the line route now avoids.
- Noise impacts on bats – referencing the Nicholls and Racey (2007) paper on the impact of OHL on bats; and
- The impact on a locally important brown trout fishery and spawning beds of Lough Mourne.

4.6. HEALTH

General concerns about the health impacts due to the presence of overhead powerlines, specifically in relation to Electric and Magnetic Fields (EMF), cancer, childhood leukaemia, and the impact on mental health including stress and depression, and human fertility were expressed. These concerns were typically raised in the context of the proximity of the proposed line route to the stakeholder's dwelling house or other receptors such as community facilities and schools.

A number of stakeholders suggested that health impacts could be avoided by putting the project underground.

Specific queries and concerns raised include:

- Requests for information on the health impacts of the existing 400 kV with some stakeholders advising that they felt that EirGrid has not adequately assessed the health impact and that the receiving community has not been provided with any assurances as to the long term safety of living in proximity to a high voltage OHL.

- Concerns were raised by certain members of the public regarding studies which they understand to show an impact of power lines on the health of communities particularly in terms of cancer, dementia and the incidence of miscarriage.

- Advised that they understood that EirGrid staff and other workers in Ireland and the UK could only spend a limited amount of time working under a powerline for health and safety reasons.

- A number of stakeholders raised concerns about the impact of the project on children with autism, and suggested that the cumulative effects of EMF in areas should be taken into account.

- A number of stakeholders raised concerns about the impact of overhead powerlines on pacemakers and requested information on restrictions for individuals with pacemakers in place in the vicinity of the proposed project.

- Reference was made to a paper by Dr. Neil Cherry on the Impact of EMF on melatonin production in humans.

- Stakeholders living in the vicinity of the existing 400 kV line from Moneypoint to Woodland advised that they had observed an increased incidence of health issues, including miscarriages, increase in cancer, and mental health issues amongst their families and across the wider community.

4.7. LANDSCAPE & VISUAL IMPACT

General concerns regarding visual impact and how the project would impact upon visual receptors, views of the countyside and the landscape quality of areas in proximity to the line were expressed by a number of stakeholders.

Stakeholders felt the line and associated structures would be unsightly and spoil the scenic views of the countryside resulting in adverse impacts on their community.

Specific concerns relating to landscape and visual impact received included:

- Stakeholders advised how they believed opposition to the project was due to the visual intrusiveness of the lines;
- Enquiries regarding the height of the structures were made;
- Numerous stakeholders expressed their specific concern regarding the potential proximity of structures to their dwelling houses and some advised how the project will be visible to them from all viewpoints from their dwelling house and/or farm;
- Adverse impacts on stakeholders panoramic views of the countryside which they stated will be affected by the tower structures;
- Stakeholders felt that EirGrid should look at the viewpoints from their dwelling house and requested EirGrid to visit their property. Furthermore, some stakeholders requested that a photomontage be produced by EirGrid from their property;
- Visual impacts on properties in the area of Drumlane;
- Some stakeholders felt that Monaghan was not a suitable location for the project given its elevated position and presence of hilly areas;
- Concern was raised from some stakeholders that structures would be positioned on the highest viewpoints within their area, with the highest peak near Shanco provided as an example; and
- Stakeholders enquired why planning applications for dwelling houses within the area had to be well buried within the landscape yet the proposed structures would be situated on elevated areas.

4.8. NOISE

Stakeholders expressed concerns regarding to the potential noise they felt the project would introduce to the areas in proximity to the line and associated structures.

Specific feedback relating to the issue of noise included:

- Stakeholders advised that they currently experience adverse noise impacts from 110kV lines close to their dwelling house, in particular during periods of rainfall when buzzing sounds are audible from their dwelling house.

- A number of stakeholders raised concerns about the impact of the project on children with autism, advising that a number of autistic children live in close proximity to the line route. The key concern raised in relation to autism was the impact of noise with specific reference to the impact of existing powerlines in the area.

- Some stakeholders requested further information to be provided to them including:

    - The noise chapter of the EIS;

    - Details on the noise levels of the project;

    - Details of the corona affect with some stakeholders advising how they felt noise would be audible from distances as far away as over 1km from the line route; These stakeholders queried what distances the noise would potentially be audible from;

- A number of stakeholders expressed their concerns relating to potential adverse noise impacts on their family, particularly when combined with the noise they already experience from existing lines in proximity to their dwelling house. The impact on autistic children in this context was particularly raised as a concern.

- Some stakeholders were concerned about the potential noise impacts particularly during night-time periods.

- One stakeholder who expressed concern regarding noise impacts also raised a concern relating to air quality issues.

5. SUBMISSIONS ON COMMUNITY GAIN

As set out in the *Final Re-evaluation Report*, EirGrid is actively considering how best to adopt community gain within transmission project development and the Grid25 programme in general. As part of this consideration, EirGrid is currently engaging with key stakeholders including the Department of Environment, Community and Local Government (DECLG), Department of Communications, Energy and Natural Resources (DCENR) and An Bord Pleanála (ABP).

A number of stakeholders provided feedback relating to community gain. In particular this feedback related to who should receive community gain and how it should be administered. Specific feedback received included:

- The community living in close proximity to the proposed line route should receive the community gain rather than large towns that are typically 10km away from the line route.
- The fund should not be managed by the local authorities; suggested alternative administrators of the fund included the Leader initiative, local community groups and the Heritage Council.
- The system of community gain in operation by another developer was suggested as a successful model for EirGrid to follow. Other community gain initiatives identified by stakeholders included restoration of monuments and funding of community publications.
- A community gain fund would not be required if the project was put underground
- It was suggested that all 110 kV lines should be undergrounded in compensation for this project

That community gain would lead to them accepting the project.

6. FEEDBACK ON OTHER ISSUES

6.1. PUBLIC ENGAGEMENT

A number of stakeholders requested additional information about the project and provided feedback on the participation process. The majority of project information requests related to mapping. In particular, a number of stakeholders requested specific maps detailing the indicative line and the distance from their dwelling house or other receptors.

A number of stakeholders also provided feedback relating to the public information events, the promotion of the engagement period, and the ability of stakeholders to influence the project development.

Specific points raised by stakeholders included:

- A request that EirGrid consider using text messages to provide updates on the project to stakeholders.

- A request that EirGrid hold additional events in local communities along the indicative line route. In addition Kingscourt, County Cavan was suggested as a more appropriate venue for future public information days in County Cavan.

- A number of stakeholders felt that EirGrid has already made its decisions, is undertaking a public relations exercise and is not interested in listening to the views of their community.

- A number of stakeholders advised that they were previously unaware of the project or had not been sent information on the project previously.

- Other stakeholders felt that the consultation undertaken to date was not valid as the indicative route is broadly similar to the previous application.

- Some stakeholders felt that communities affected by this project had not had the same opportunities to participate when compared with the other EirGrid projects (e.g., Grid Link and Grid West).

6.2. PLANNING

A number of stakeholders enquired as to the planning process and who would determine whether the application would be granted or refused. Feedback was also provided on the previous application. A number of stakeholders felt that if the community objects to the project, ABP should not grant planning permission. A number of stakeholders felt that it was unfair that they had paid the fee to make a submission to ABP and that this was not refunded by EirGrid following the withdrawal of that application. Enquiries were also made about the planning process in Northern Ireland with some stakeholders suggesting that this project should be put on hold until NIE secures planning for the northern section of the line.

6.3. COMPENSATION

A number of stakeholders enquired as to the amount of, and structure of, the compensation arrangements for this project. Some stakeholders considered that the current compensation arrangement - whereby only directly impacted landowners are compensated - was unfair and suggested that a compensation package should be available to residents in close proximity to the line. Other stakeholders suggested that an inconvenience payment be made to landowners to facilitate access to the lands. Enquiries were also made as to the compensation package on the Northern Ireland section of the line and it was also suggested that the compensation package for all landowners and residents on the entire project should be the same.

6.4. PROPERTY

Stakeholders expressed concerns regarding impact on property values, loss of development potential and future development restrictions which may arise as a result of the project. Specifically some stakeholders requested clarification as to whether the project would impact their ability (and that of their family members) to obtain planning permission in the future. A number of stakeholders advised that as they felt that their property would be devalued, EirGrid should provide compensation.