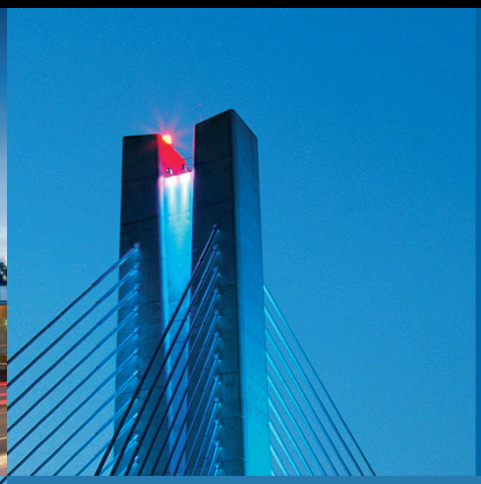
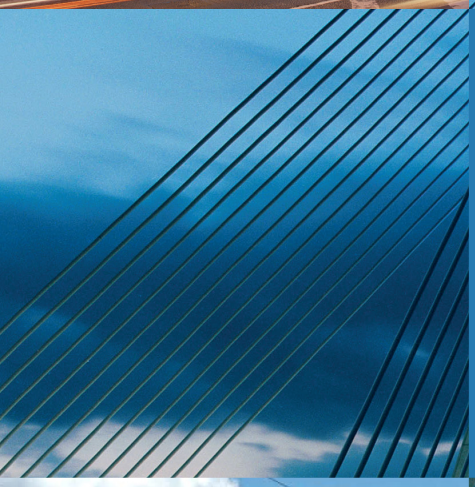
EIRGRID



North-South 400kV Interconnection Development



Final Re-evaluation Report

April 2013

Part Funded by the EU-TEN-E Initiative

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FOREWORD

The development of a second interconnector between Ireland and Northern Ireland is fundamental to the delivery of a sustainable, competitive and secure electricity supply to homes, businesses and industries across the island.

The publication of this Final Re-evaluation Report is an important step in the planning and delivery process for the project in Ireland. The report captures the key findings of EirGrid and its consultants on a range of technical, environmental and other matters related to the project.

In reaching its conclusions, EirGrid has considered responses and feedback from stakeholders at all stages of the project to date, including the consultation period which followed the publication of a Preliminary Re-evaluation Report on the project in May 2011. During this period, EirGrid requested feedback on all aspects of the project, including the identified study area, the route options and the preferred technical options for the project. EirGrid's response to this important feedback is included as an appendix to this Final Re-evaluation Report.

Separate to EirGrid's re-evaluation, the Government appointed an Independent Expert Commission to investigate the case for, and cost of undergrounding the second interconnector. Following the publication of a report by the Independent Expert Commission in January 2012, a significant period of consultation took place between all stakeholders on the findings of the report. EirGrid fully participated and engaged in this consultation and our response to matters raised is also included in this report.

In July 2012 a "Government Energy Policy Statement on the Strategic Importance of Transmission and Other Energy Infrastructure" was published. EirGrid is fully supportive of this policy statement and is committed to comprehensive public and stakeholder engagement on all aspects of the second Interconnector as the project proceeds through the planning process.

A period of six weeks is now provided to allow for feedback on the findings of this Final Re-evaluation Report. EirGrid welcomes any feedback received and will consider this feedback in the preparation of a Preferred Project Solution Report which will be published for further consultation in due course.

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GLOSSARY OT TERMS AND LIST OF ABBREVIATIONS

ABP	An Bord Pleanála
ACA	Architectural Conservation Area
ASSI	Area of Special Scientific Interest
CBSA	Cross Border Study Area
CGS	County Geological Site
CHS	Cultural Heritage Site
Cigré	Council on Large Electrical Systems
CMSA	Cavan-Monaghan Study Area
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
EIS	Environmental Impact Statement
ES	Environmental Statement
EU	European Union
GSI	Geological Survey of Ireland
HVAC	High Voltage Alternating Current
HVDC	High Voltage Direct Current
IAA	Irish Aviation Authority
IEC	International Expert Commission
IGI	Institute of Geologists of Ireland
LCA	Landscape Character Area
LCA	Landscape Character Assessment
MLCA	Meath Landscape Character Assessment
MSA	Meath Study Area
MW	Megawatts
NESA	North East Study Area
NHA	Natural Heritage Area
NI	Northern Ireland
NIAH	National Inventory of Architectural Heritage
NIE	Northern Ireland Electricity

OHL	Overhead Line
PAC	Planning Appeals Commission
PM 10	Particulate Matter with diameter of 10 micrometers
pNHA	proposed Natural Heritage Area
Receptor	Any element of the environment which is subject to impact
RES	Renewable Energy Source
RMP	Records of Monuments and Places
RPS	Record of Protected Structures
ROI	Republic of Ireland (Ireland)
RPA	Registered Protected Areas
RPS	Registered Protected Structures
SAC	Special Area of Conservation
SEM	Single Electricity Market
Sensitivity	The potential of a receptor to be significantly changed
TAO	Transmission System Owner
TSO	Transmission System Operator
UGC	Underground Cable

EXECUTIVE SUMMARY

EirGrid and Northern Ireland Electricity (NIE) are jointly planning a major cross-border electricity interconnection scheme. This scheme is a 400 kV overhead line 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).

EirGrid plc has undertaken a comprehensive re-evaluation of the North-South 400 kV Interconnection Development Project. The re-evaluation process included a review of a previous application to An Bord Pleanála for planning approval (of what was then referred to as the Meath-Tyrone 400 kV Interconnection Development), in order to ascertain whether the scope, content, conclusions of, and rationale for that previous application remain applicable for the purposes of informing and shaping a new application for approval of the planned North-South 400 kV Interconnection Development (otherwise referred to in this document as "the North-South Interconnector Project").

As part of this review process, EirGrid published a Preliminary Re-evaluation Report in May 2011, which concluded with the identification of an indicative line route within an emerging preferred route corridor. The Preliminary Report was the subject of a period of consultation, in order to obtain feedback from landowners, stakeholders and members of the public, primarily in relation to any new issues arising, or new insights on aspects of the North-South Interconnector Project, subsequent to the withdrawal of the previous application for planning approval.

EirGrid has also considered documents issued since the publication of the Preliminary Re-evaluation Report, which are relevant to the overall re-evaluation process and the conclusions of which are consequently addressed in this Final Re-evaluation Report. These documents include the "*Report of the International Expert Commission"* (IEC), Government Policy Statement, "*Grid25 Implementation Programme"* (IP) and accompanying Strategic Environmental Assessment (SEA) and EirGrid's *"Project Development and Consultation Roadmap*".

In addition, a number of issues were raised during, and subsequent to, the consultation process on the Preliminary Re-evaluation Report, which it was considered would benefit from further consideration in this Final Re-evaluation Report.

This Final Re-evaluation Report concludes the re-evaluation process.

The **structure of this report** is as follows:

Chapter 1: Introduction and Context

This chapter sets out the context for the joint project, between EirGrid plc (formerly ESB National Grid) and Northern Ireland Electricity (NIE), to construct a major cross-border electricity transmission infrastructure development between the existing high-voltage transmission networks of Northern Ireland and Ireland. It explains the purpose and scope of this re-evaluation process. It covers recent Irish Government and EirGrid publications that were issued subsequent to publication of the Preliminary Re-evaluation Report. This chapter also provides an overview of EirGrid's engagement with key stakeholders, and identifies its Project Development and Consultation Roadmap, which constitutes a general framework for the development of its larger transmission infrastructure projects.

Chapter 2: Strategic Need, Rationale and Justification for the Interconnection Development

This chapter examines the strategic need, rationale and justification for an additional high-capacity North-South interconnector. It provides a summary of the range of benefits which underline the need for the interconnector and the national and European Union (EU) policy objectives which support their effective delivery. It also considers alternative options raised by third parties during consultation and explains why the second North-South Interconnector is the only option that will fully address the strategic need identified.

Chapter 3: Technology Options

This chapter explains that EirGrid is obliged, pursuant to the terms of its licence as Transmission System Operator, to develop the electricity transmission system using least cost, technically and environmentally acceptable solutions. It identifies the project objectives/design criteria required of the proposed North-South Interconnection Development and considers and assesses the technology options including the form of electrical current (AC or DC) and design (such as overland, undersea, OHL, and underground cable (UGC)) against these predefined objectives and criteria. It also considers the option of using a hybrid solution - that is a combination of AC underground and AC overhead line. It provides an update on reliability statistics for high voltage AC UGC and OHL, and updates on the world's longest high voltage AC XPLE cable circuits and the cost comparison between AC underground cable and AC overhead line. It identifies an emerging preferred support structure for a 400 kV overhead line and indicates that further consideration of alternative structures will be carried out prior to finalising the preferred project solution.

Chapter 4: Identification of Project Study Area

This chapter outlines the background to the identification of the study area within which to route the planned Interconnection Development. Given the necessity for connection into points of the existing electricity transmission network, it remains the case that the proposed Interconnection Development will extend between the existing Woodland substation in County Meath and the planned Turleenan substation in County Tyrone (which will connect to the existing transmission network in Northern Ireland). As a consequence, the overall study area for the project occurred within a Mid-Country Study Area comprising the counties of Tyrone, Armagh, Monaghan, Cavan and Meath. Concerning that portion of the overall project within Ireland, the chapter explains that the previously termed North East

Study Area (NESA) (i.e. that part of the overall study area encompassing Woodland substation, and north as far as the area south of the existing Flagford-Louth 220 kV overhead line) is now to be termed the Meath Study Area (MSA), while the previously termed Cross Border Study Area (CBSA) (i.e. that part of the overall study area north of the existing Flagford-Louth 220 kV overhead line, and south of the jurisdictional border with Northern Ireland), is now to be termed the Cavan-Monaghan Study Area (CMSA). The nominal interface between the two portions of the study area within Ireland occurs at, or in the vicinity of, the existing east-west oriented Flagford – Louth 220 kV line.

Chapter 5: Identification of Environmental and other Constraints within the Project

This chapter reviews all key environmental and other constraints in the study area (i.e., in the CMSA and MSA) in order to ensure that no new environmental or other constraints have been identified which would prevent the identification of potentially feasible route corridors within which to route the planned Interconnection Project. It outlines the ***natural constraints*** (naturally occurring landscapes and features) previously identified which continue to influence the location of any route corridor within the overall study area. It also outlines that the most significant ***artificial constraints*** (forming part of the built environment) in the overall study area are the major settlements and features of cultural heritage. This chapter confirms that key environmental and other constraints in the overall study area will continue to be avoided where possible (particularly those categorised as primary constraints), and have been given full consideration in the route corridor identification process.

Chapter 6: Identification of Feasible Route Corridor Options

This chapter identifies and confirms the feasible route corridor options (i.e. wider corridors within which a potential line route could be identified), avoiding where possible those identified environmental and other constraints. These route corridor options are mapped and assessed. It provides an evaluation of the route corridor options by undertaking a high-level assessment of the identified constraints within each corridor. This includes the undertaking of site visits to the area and vicinity of each of the route corridor options, in order to supplement existing mapping and information obtained during the desktop study. It is acknowledged that a number of identified potential constraints within the route corridors are site- or area-specific, rather than being general to the overall corridor, and potential impacts can therefore be minimised through appropriate subsequent route selection and design. Such constraints do not materially concern the high-level process of corridor identification.

Chapter 7: Comparative Evaluation of Feasible Route Corridors

This chapter provides an evaluation of each route corridor against the identified constraints (referred to as a “multi-criteria evaluation”), so that a recommendation can be made as to which corridor is emerging as the preferred corridor. It notes that the term “preferred” is a generally accepted industry term for infrastructure route selection (also for example used in development of road or rail corridors), by which is meant the “least constrained” or “best-fit” option. It concludes with the identification of the preferred (‘best-fit’) route corridor for the Interconnection Development as is considered to strike the most appropriate balance between the various technical, environmental and community evaluation criteria.

Chapter 8: Indicative Line Route

This chapter outlines the background to the identification of an indicative line route. It explains that the current re-evaluation process has facilitated the consultants in undertaking a process to address issues/information raised since December 2009 (i.e., the date upon which the previous application for approval was submitted to ABP), which are considered relevant for the identification of an indicative line route within the identified preferred route corridor. This chapter confirms 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 OHL exists within the identified preferred route corridors, and there are no significant material implications which would require the use of underground cable along any part of the indicative line route other than on the identified section within Woodland Substation. The indicative line route identified in this Re-evaluation Report is broadly similar to that previously proposed line route, but incorporating important localised modifications, arising from:-

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

- Modification 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 Interconnection Development; and

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

Chapter 9: Overall Conclusions of this Re-evaluation Report

This report is the culmination of a detailed re-evaluation of all aspects of the North-South Interconnector Project. The chapter confirms that the identification of an indicative line route for the North-South 400 kV Interconnection Development, within an identified preferred route corridor, is the focus for further detailed design and survey work. In particular, a more detailed preferred line design for the North-South 400 kV Interconnection Development will be identified separately in a Preferred Project Solution Report, to be published in due course; and the Preferred Project Solution Report will form the basis of further public, stakeholder and landowner engagement.

The output of this further consultation, along with ongoing and additional technical and environmental studies, will feed into the final project proposal that EirGrid will publish as part of the application for planning approval to An Bord Pleanála.

1 INTRODUCTION AND CONTEXT

1.1 BACKGROUND

EirGrid plc (formerly ESB National Grid) and Northern Ireland Electricity (NIE) are jointly proposing the construction of a major cross-border electricity transmission infrastructure development between the existing high-voltage transmission networks of Northern Ireland and Ireland. Known as the North-South 400 kV Interconnection Development (and also referred to as the North-South Interconnector Project), this transmission development will comprise the second high-capacity electricity interconnector between the two networks. The existing interconnector, a 275 kV double circuit overhead line (OHL), connects between Tandragee and Louth Substations (as shown in blue on **Figure 1.1** below).

The joint North-South Interconnection Project has been developed over a number of years. It is planned primarily to comprise a high-voltage transmission circuit between a proposed new substation at Turleenan, County Tyrone, and the existing Woodland 400 kV Substation, near Batterstown, County Meath. The new circuit, and associated infrastructure, is planned to traverse the counties of Tyrone, Armagh, Monaghan, Cavan and Meath, as indicated in bold red on **Figure 1.1**.

In December 2009, NIE submitted an application to the Northern Ireland Planning Service for that portion of the proposed cross-border transmission infrastructure development occurring within Northern Ireland (Ref. O/2009/0792/F). This application was accompanied by an Environmental Statement (ES). The project scope proposed by NIE primarily consists of:-

- A new 275/400 kV substation at Turleenan, Co. Tyrone;
- Connection of the existing Tandragee-Magherafelt / Tamnamore 275 kV double circuit OHL into the new Turleenan Substation, by means of 2 no. new 275 kV terminal towers; and
- A 400 kV single circuit OHL extending approximately 40 km across lands in Counties Tyrone and Armagh, from the new substation at Turleenan to the two locations where the circuit crosses the jurisdictional border - in the townland of Mullyard, County Armagh in Northern Ireland, and the townland of Lemgare, County Monaghan in Ireland.

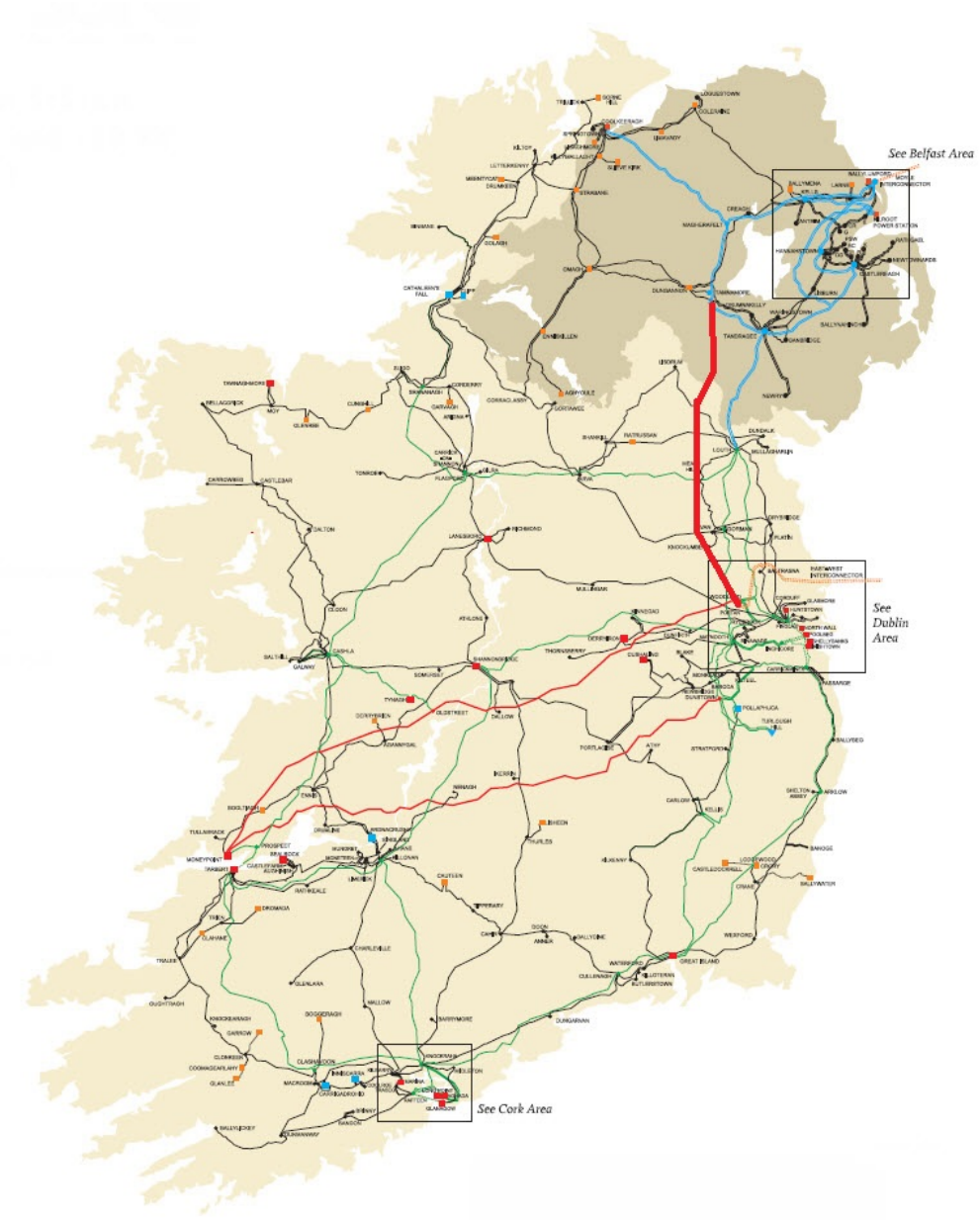

Figure 1.1: Proposed North-South Interconnection Development (in bold red)

In August 2010, the Northern Ireland Environment Minster referred the NIE application to the Planning Appeals Commission (PAC) for a public inquiry. In October 2010, further information was requested in respect of the application. Addenda to the application were submitted by NIE in January 2011 and October 2011. The public inquiry commenced in March 2012, and currently stands adjourned.

Also in December 2009, EirGrid plc submitted an application to An Bord Pleanála for planning approval of that portion of the proposed cross-border transmission infrastructure development located within Ireland (An Bord Pleanála Reference VA0006). That application, known as the Meath-Tyrone 400 kV Interconnection Development, was accompanied by an Environmental Impact Statement (EIS). The project scope previously proposed by EirGrid primarily consisted of:-

- The continuation of the 400 kV single circuit OHL from the locations where the circuit crosses the jurisdictional border in the townland of Lemgare, County Monaghan, to the existing 400 kV substation at Woodland, County Meath, traversing lands in counties Monaghan, Cavan and Meath;
- A new 400 kV substation in the townland of Moyhill, County Meath, in the vicinity of the proposed intersection of the north-south oriented transmission circuit with the existing east-west oriented 220 kV OHL between Flagford and Louth Substations;
- The associated diversion of the existing Flagford-Louth 220 kV OHL into the planned Moyhill Substation, thereby providing a connection between the two transmission circuits; and
- Works required in the existing Woodland Substation to accommodate the proposed 400 kV circuit.

During the period January-March 2010, An Bord Pleanála invited written submissions from identified prescribed bodies, other stakeholders, members of the public and all other parties. In May 2010, An Bord Pleanála commenced an Oral Hearing in respect of the proposed development. However, in June 2010, the EirGrid application was required to be withdrawn due to the discovery of an inadvertent error in the public notices. As such, the application for approval was not determined by An Bord Pleanála.

EirGrid now intends to submit a new application for planning approval of that portion of the overall Interconnection Development project within Ireland that will ultimately link with the existing and planned high-voltage electricity transmission network in Northern Ireland.

1.2 THE PURPOSE AND SCOPE OF THIS RE-EVALUATION PROCESS

Any new proposal for the planned strategic electricity transmission infrastructure must be based on the most up-to-date information. However, given the nature of the previous application for planning approval of the Meath-Tyrone 400 kV Interconnection Development which was submitted in December 2009, it is the case that a very considerable body of work undertaken in respect of that application remains relevant. In particular, the information contained in the EIS, and other technical and environmental studies, remains relevant to the process of identifying the nature, extent, and location of the proposed development, and assessing the main effects which any new proposal is likely to have on the environment. The EIS, and technical, environmental, planning and other documents associated with

the previous planning application were all publicly available and, indeed, remain available for public review and reference.[1]

In addition, a considerable volume of written and oral submissions were presented by or on behalf of prescribed bodies, landowners, members of the general public and other stakeholders, during the period of the previous application. These submissions contain information which remains useful to EirGrid in undertaking its own review of the nature and location of the proposed development.

In addition, a number of documents have been issued subsequent to both the withdrawal of the previous planning application in June 2010, and the publication of the 'Preliminary Re-evaluation Report' in May 2011, and which directly or indirectly concern the North-South Interconnector Project. The re-evaluation process undertaken by EirGrid has also considered all information provided to, or obtained by, EirGrid, subsequent to the withdrawal of that previous application.

1.2.1 Review of the Previous Application for Statutory Approval

A key element of this re-evaluation process is to carry out a comprehensive review of the previous application for planning approval of the Meath-Tyrone 400 kV Interconnection Development, including (but not restricted to):-

1. The subject matter of that planning application;
2. The EIS, and other technical and environmental studies accompanying the application;
3. Alternatives considered in that application; and
4. Third party and other submissions made to An Bord Pleanála in respect of the application.

In specific respect of the fourth item identified above, **Appendix A** to this Final Re-Evaluation Report contains a list of written and oral submissions made to An Bord Pleanála during the previous applications process. Indeed, as part of its re-evaluation process, EirGrid, together with its consultants, reviewed these submissions, in order to satisfy itself that all issues raised in the submissions had been taken into consideration in the re-evaluation process.

1.2.2 Report of the International Expert Commission

In July 2011, the Minister for Communications, Energy and Natural Resources commissioned an International Expert Commission (IEC) to review and report on the case for, and cost of, undergrounding all or part of the Meath-Tyrone 400 kV Interconnection Development. The IEC's Report was published in January 2012. A more detailed consideration of the content and conclusions of the IEC Report is contained at **Chapter 3** below. However, the key conclusions of the IEC's Report included:-

[1] Available at http://www.eirgridprojects.com

- The Commission recommends against fully undergrounding using an Alternating Current (AC) cable solution;
- If the option is to underground the connection along the whole, or main part of the route with today's technology, the best solution is a VSC HVDC solution combined with XLPE cables;
- An overhead line still offers significantly lower investment costs than any underground alternative and could also be made more attractive by investing slightly more in new tower designs than the classical steel lattice towers now proposed;
- The relative cost of an underground cable (UGC) DC solution is approximately €330 million more than that for an equivalent overhead line (OHL) solution for the project.

Following publication of the IEC Review, the Minister for Communications, Energy and Natural Resources facilitated a period of consultation, under the auspices of the Joint Oireachtas Committee (JOC) on Communications, Natural Resources and Agriculture. Contributors to the consultation process, held in Leinster House in February 2012, included representatives from the International Expert Commission, ESB Networks, EirGrid, DCENR and community groups opposed to the North-South Interconnector, including North East Pylon Pressure Campaign and the County Monaghan Anti-Pylon Committee.

1.2.3 Report of the Joint Oireachtas Committee

In June 2012, the Joint Oireachtas Committee (JOC) on Communications, Natural Resources and Agriculture published a report on its consideration of the IEC Review and subsequent consultation process. The key conclusions of the report include as follows:-

- There is broad agreement on the need for an interconnector, in order to ensure security of supply of electricity on the island of Ireland, and to allow wind power to be better integrated into the network;
- What is disputed is whether the power line should be laid underground or established overhead. Proponents of the overhead line (OHL) – including EirGrid - contend that as a proven technology, it is a cheaper and better option. Opponents of the OHL oppose establishing the line overhead rather than installing the cable underground. Installing the cable underground will require a switch in technology from AC (alternating current) to High Voltage Direct Current ("HVDC");
- Both proponents and opponents of the OHL acknowledge that the underground option is technically feasible. However, EirGrid, expressed concerns as to the technical feasibility of switching to HVDC for this particular project;

- Proponents of the OHL argue that the underground option is too costly and would diminish the benefits of the project. Opponents of the OHL argue that delaying the line is costly and that if EirGrid would agree to undergrounding the project, it could be put into place sooner;
- The OHL is unacceptable to many of the people who live along the proposed route. Undergrounding of the route does appear to be acceptable to the same individuals; and
- Early and continued engagement with stakeholders should involve maximising transparency and making as much information as possible available to the general public.

1.2.4 Government Policy Statement

In July 2012, the Department of Communications, Energy and Natural Resources published a 'Government Policy Statement on the Strategic Importance of Transmission and Other Energy Infrastructure'. This Policy Statement notes that *"starting now, over the coming years, Ireland needs to deliver a world class electricity transmission system in all the regions which meets the needs of Ireland in the 21st Century*".

Of particular note in this regard, the Policy Statement states that:-

> *"The Government endorses the major investment underway in the high voltage electricity transmission system under EirGrid's Grid 25 Programme. Grid 25 is the most important investment in Ireland's transmission system for several generations and will position our energy system for decades to come. The Grid25 projects, including GridWest in Mayo, the Meath-Tyrone transmission line and GridLink in the South and East are vital developments for the regions and for the economy and society as a whole. The benefits include:*
>
> • *securing future electricity supply for homes, businesses, farms, factories and communities*
>
> • *Underpinning sustainable economic growth and new jobs in the regions*
>
> • *enabling Ireland to meet its renewable energy targets and reducing the country's dependence on imported gas and oil and reduce CO_2 emissions".*

Of equal importance, the Policy Statement notes that "*The Government in underlining the need and urgency for new energy infrastructure in the national interest and in the interests of individual consumers is equally conscious that public acceptability of such infrastructure is a major challenge. Social acceptance and understanding of the need for new infrastructure is critical".* It goes on to state that "*The Government underlines the imperative for the State Companies, and all developers of energy projects, of early and ongoing engagement and consultation with local communities and all stakeholders*

before entering planning". Public and stakeholder consultation and engagement have been, and will continue to be, a cornerstone of development of this and all EirGrid projects.

The Government Policy Statement refers to *Building Community Gain Considerations into Energy Infrastructure planning and Budgeting*, noting that *"the Government would like to see enhanced co-operation with local authorities on the potential for delivering landscape, biodiversity and civic amenity benefits as part of Grid 25 and other energy infrastructure development. Delivering long lasting benefits to communities is an important way of achieving public acceptability for infrastructure".*

It is a matter of some importance that, while the term *Community Gain* is not explicitly defined in the Policy Statement, the following statement is made:-

> *"The Government considers that greater focus needs to be given to co-operative work with local communities and local authorities on landscape, biodiversity and civic amenity benefits bringing long lasting benefits for communities. The Government therefore underlines the appropriateness for the State Companies and energy project developers to examine appropriate means of building community gain considerations into their project budgeting and planning. The Government is therefore fully supportive of a community gain approach in the delivery of energy infrastructure".*

The conclusion of the Policy Statement includes the following statement:-

> *"While the Government does not seek to direct infrastructure developers to particular sites or routes or technologies, the Government endorses, supports and promotes the strategic programmes of the energy infrastructure providers, particularly EirGrid's Grid 25 investment programme across the regions, and reaffirms that it is Government policy and in the national interest, not least in the current economic circumstances, that these investment programmes are delivered in the most cost efficient and timely way possible, on the basis of the best available knowledge and informed engagement on the impacts and the costs of different engineering solutions".*

The findings of the IEC review, the subsequent JOC report and the Government Policy Statement have been considered by EirGrid in this Re-evaluation Report.

1.2.5 The Grid25 IP 2011-2016 and SEA

In May 2012, EirGrid published the 'Grid25 Implementation Programme' (IP) *2011-2016*, a practical strategic overview of how the early stages of 'Grid25' are intended to be implemented. The publication of this document, and an associated Strategic Environmental Assessment (SEA), followed a national-scale public consultation process in respect of a draft IP and SEA. The IP identifies the best current

understanding of those parts of the transmission system that are envisaged as likely to be developed over the next five years to give effect to current Government policy. The IP identifies the issues, objectives and associated processes that will need to be adopted when making decisions about how and where developments will occur. In this way, it establishes the parameters and criteria for the processes by which subsequent decisions will be made. The North-South 400 kV Interconnection Development is specifically referred to in the IP.

Section 4.15 of the Environmental Report of the SEA sets out *Overall Development Potential Rating*, which provides a high level assessment of the main constraints associated with the development of the transmission system. In addition to the constraints, Opportunity Areas were included to identify locations which represent potential opportunities to develop transmission infrastructure with a reduced environmental impact. Using Geographical Information System (GIS) software, each of the constraints and opportunities were given a value and overlaid upon each other. Figure 4.23 of the Environmental Report, reproduced below as **Figure 1.2**, shows the Overall Development Potential Rating at a national level. Areas of constraints are indicated by red colours while areas of opportunities are indicated by green colours. In general, and on a national level, constraints occur in greatest concentrations in the western half of the country while opportunities occur in greatest extents in the eastern half of the country.

The area of the north-east of Ireland – where it is proposed to construct the North-South 400 kV Interconnection Development is identified in the Overall Development Potential Rating map as generally of low, or localised constraint.

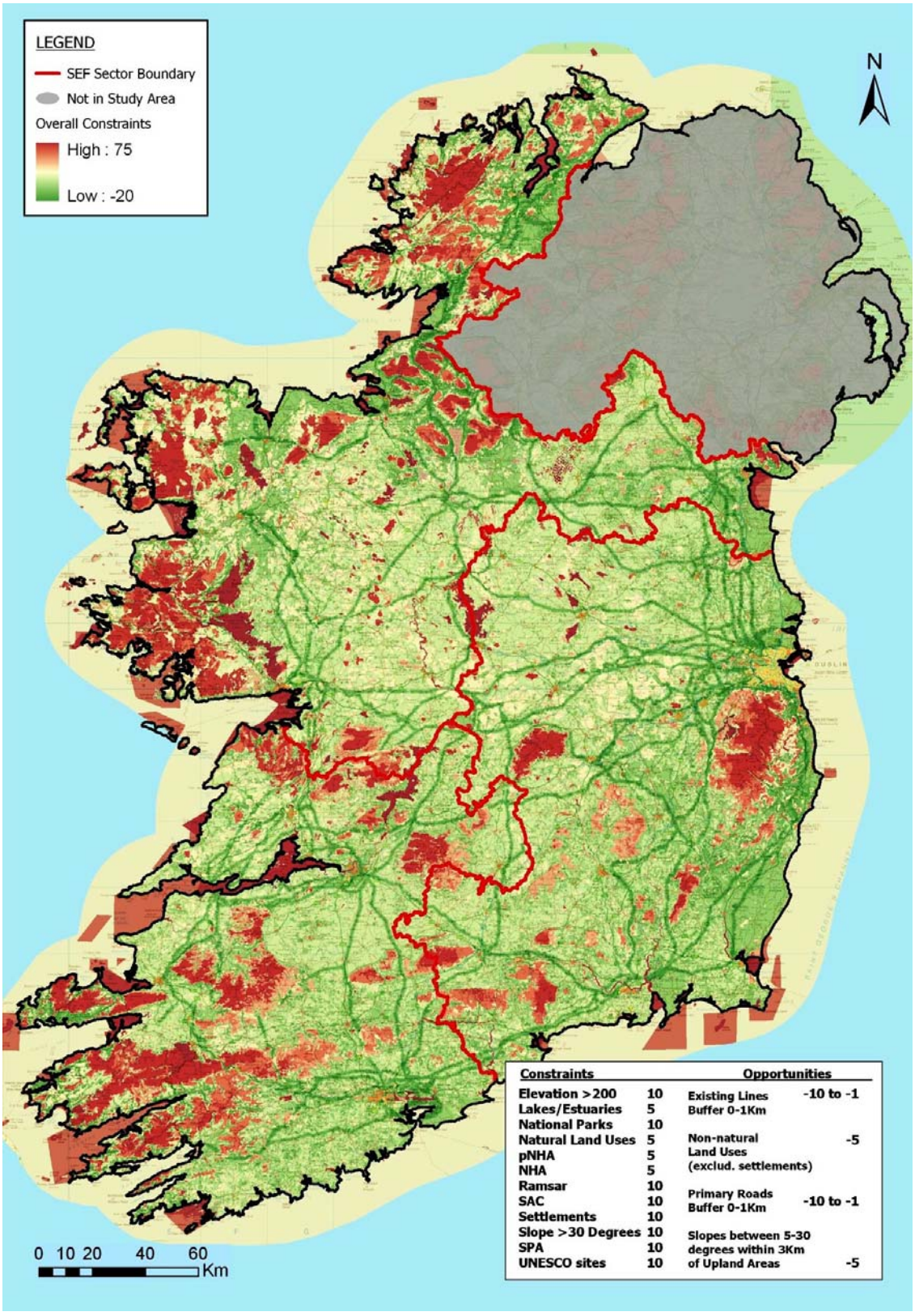

Figure 1.2: National Overall Development Potential Rating (Fig. 4.23 of SEA Environmental Report)

1.3 THE CONSULTATION PROCESS

1.3.1 EirGrid's Project Development and Consultation Roadmap

The context for the re-evaluation process, in which a project solution has been identified by EirGrid, is different to that of other projects. EirGrid is therefore in a position to bring forward a preferred project solution that has the benefit of the previous planning process, as well as a comprehensive process of re-evaluation of the information and particulars generated in respect of that planning process.

EirGrid has developed a Project Development and Consultation Roadmap (**Figure 1.3**) as a general framework for the development of its larger projects. The essential purpose of this Roadmap is that the development of a project occurs within a clear and structured process, with public and stakeholder consultation occurring from its earliest stage of "Information Gathering", and focusing upon key deliverables in each stage. This allows transparency in terms of understanding the issues and feedback that has shaped the development of a project, with key decision-making on the detail of a project really only occurring in the latter stages of project development. The Roadmap is outlined in more detail in EirGrid's document 'Approach to the Development of Electricity Transmission *Infrastructure'* available at www.eirgridprojects.com.

In a normal scenario of project development, with reference to EirGrid's Project Development and Consultation Roadmap, the following occurs:-

- **Stage One** includes identification of a study area to meet the needs of that particular project; the identification of environmental and other constraints within that study area; and the identification of potential route corridors which seek to avoid those identified constraints to the greatest extent practicable or feasible. It also generally includes, what in the opinion of the technical and environmental consultants, comprises the least constrained route corridor option. The progression of Stage One, and its conclusions – an identified emerging preferred project solution, is captured in a Stage One Report. This forms the basis for public consultation and engagement. Earlier consultation in respect of various aspects of Stage One may also have occurred.

- **Stage Two** involves consideration of feedback arising in respect of the Stage One Report consultation, further review of previous options, further evaluation and endorsement of a preferred (taken to mean "best fit") route corridor, and identification of a potentially feasible indicative line route within that preferred route corridor. These elements are generally captured in a Stage Two Report, which is subject to another round of public and stakeholder consultation. Stage Two generally includes the commencement of landowner engagement along the identified preferred indicative line route.

Figure 1.3: EirGrid's Project Development and Consultation Roadmap

- The latter stages of the Roadmap (**Stages 3 and 4**) are primarily concerned with confirmation of the final line route, and associated preparation of technical and environmental assessments. This includes consideration of feedback arising in respect of consultation on the Stage Two Report as well as ongoing engagement with landowners, seeking agreement where possible for the location of structures on landholdings. The final proposal is then submitted to the appropriate authority (generally An Bord Pleanála) for development consent.

Notwithstanding its somewhat unique circumstances and context, it is the case that the overall re-evaluation process undertaken in respect of the North-South Interconnection Development effectively constitutes Stages One and Two of EirGrid's 'Project Development and Consultation Roadmap'. The re-evaluation process has comprised a review of all issues and submissions concerning the previous application, and information received and issues arising since June 2010. It has also included technical and environmental analysis undertaken by EirGrid and its consultants.

In particular, the 'Preliminary Re-evaluation Report', published in May 2011 for public consultation, set out EirGrid's position regarding the need for the project, and potentially feasible technological alternatives (including EirGrid's emerging preferred alternative); it identified a study area for the planned development, and the rationale for same; it identified environmental and other constraints within that study area, and potentially feasible route corridors which avoided those constraints to the greatest extent practicable or feasible. Finally, it identified an indicative overhead line route within the identified emerging preferred route corridor.

The Preliminary Re-evaluation Report of May 2011 was published for public and stakeholder consultation and input. Feedback received in respect of the Preliminary Report was considered in the preparation of this Final Re-evaluation Report, a summary of which is included at **Appendix B** of this Report. In addition, all written and oral submissions received by An Bord Pleanála in respect of the previous application for statutory approval were also considered in the preparation of this Final Report, and are included as **Appendix A** of this Report.

In addition to considering feedback in respect of the Preliminary Re-evaluation Report, EirGrid also undertook additional technical and environmental analysis, which combined has resulted in the identification of a preferred route corridor, and indicative line route therein. This is now captured in this Final Re-evaluation Report.

The Final Re-evaluation Report will be the subject of additional public, stakeholder and landowner engagement, to obtain further feedback which will feed into the design confirmation process that comprises Stage Three of EirGrid's 'Project Development and Consultation Roadmap'. The Final Report will also comprise the focus of intended pre-application consultation with An Bord Pleanála, in accordance with the provisions of the Planning and Development Acts.

EirGrid is satisfied that the overall re-evaluation process in respect of the North-South Interconnection Development is consistent with the framework of its Roadmap process, particularly where the content and conclusions of the Preliminary and this Final Re-evaluation Report have been, and will continue to be, subject to public and stakeholder input and feedback. In addition, the latter stages of route identification, environmental assessment, and preparation of a new application for development consent will also occur in accordance with the framework of the Roadmap.

1.3.2 Consultation and the Re-evaluation Process

EirGrid put the 'Preliminary Re-evaluation Report', and thereby, **the indicative project solution**, before stakeholders (including the general public and landowners), in order to obtain feedback primarily on new issues arising or new insights on aspects of the project. Initial landowner engagement was based upon the identified indicative line route. Technical, environmental and other surveys and studies were carried out to confirm that the indicative project solution was feasible, taking into account often competing environmental, technical and other issues.

This process of landowner engagement also facilitated some discussion with affected landowners regarding potential options for the siting of structures on landholdings.

The Terms of Reference of this process of public and stakeholder consultation and landowner engagement focussed on three questions in respect of the content and conclusions of the Preliminary Re-evaluation Report:-

1. Has EirGrid considered all relevant criteria in determining that the optimum technical solution for this project is an overhead line? If not, what additional information should EirGrid consider or what viable, cost-effective, technically appropriate, and environmentally sensitive alternative would you suggest?

2. Have all environmental criteria been appropriately considered? Is there anything else that you think should be looked at?

3. Are there any other key issues that EirGrid should consider before submitting a new application to An Bord Pleanála?

The feedback received during this consultation process, and EirGrid's response to that feedback, has been summarised in a document entitled 'Response to Submissions and Other Engagement arising during the Re-evaluation Process', and which is included as **Appendix B** to this Final Re-evaluation Report.

In this regard, a number of issues were raised during the consultation process which EirGrid considered would benefit from additional consideration in this Final Re-evaluation Report. In addition there have been a number of localised modifications to the indicative alignment arising from, *inter alia*, the process of landowner engagement in respect of the Preliminary Re-evaluation Report. It needs to be understood, however, that the indicative alignment is suggestive of the final alignment and has been identified for the purposes of ongoing technical and environmental analysis, as well as public and landowner consultation and engagement.

Much of the feedback received during the consultation process related to specific issues of line routing and potential environmental impacts – often relating to specific landholdings. Such issues, relating to the specific alignment of the planned circuit, including potential localised modifications to, or siting of, the alignment, are matters more appropriately associated with, and thereby addressed by, the process of route confirmation and environmental impact assessment which will occur subsequent to this re-evaluation process, in consultation with landowners and other stakeholders. As such, while these issues are of clear concern, both to EirGrid, affected landowners, and other parties, they are not matters that are most appropriately resolved in this strategic re-evaluation process.

As noted at **section 1.2** above, the overall re-evaluation process includes EirGrid's own ongoing re-appraisal of issues. Of particular note in this context is consideration of the contents and conclusions of the 'Review of the case for, and cost of, undergrounding (all or part of) Meath-Tyrone 400 kV power lines', prepared by a Government-appointed International Expert Commission (IEC), and published in January 2012, (available at www.dcenr.ie). This IEC Review was the subject of hearings before, and a consequent report prepared by, the Joint Oireachtas Committee (JOC) on Communications, Natural Resources and Agriculture. On the 18th July 2012, the Minister for Energy also published a 'Government Policy Statement on the Strategic Importance of Transmission and Other Energy Infrastructure'. Key issues arising from the IEC Review, JOC Report and Government Policy Statement are addressed at **Chapter 3** of this Re-evaluation Report.

As with other elements outlined in **section 1.2** above, it is acknowledged by EirGrid that these documents were not available for public consideration during the period of the public consultation process in respect of the Preliminary Re-evaluation Report. As such, and as set out in **Figure 1.4** below, there are two parallel (though not concurrent) processes which have fed into EirGrid's reappraisal culminating in this Re-evaluation Report – the public and landowner feedback in respect of the Preliminary Re-evaluation Report, and the separate Government Review and associated process. This has necessarily, but appropriately, resulted in some delay between the publication of the 'Preliminary Re-evaluation Report', and publication of this Final Re-evaluation Report, in circumstances where EirGrid wished to consider all issues arising from these processes in the overall process of re-evaluation of the North-South Interconnector Project.

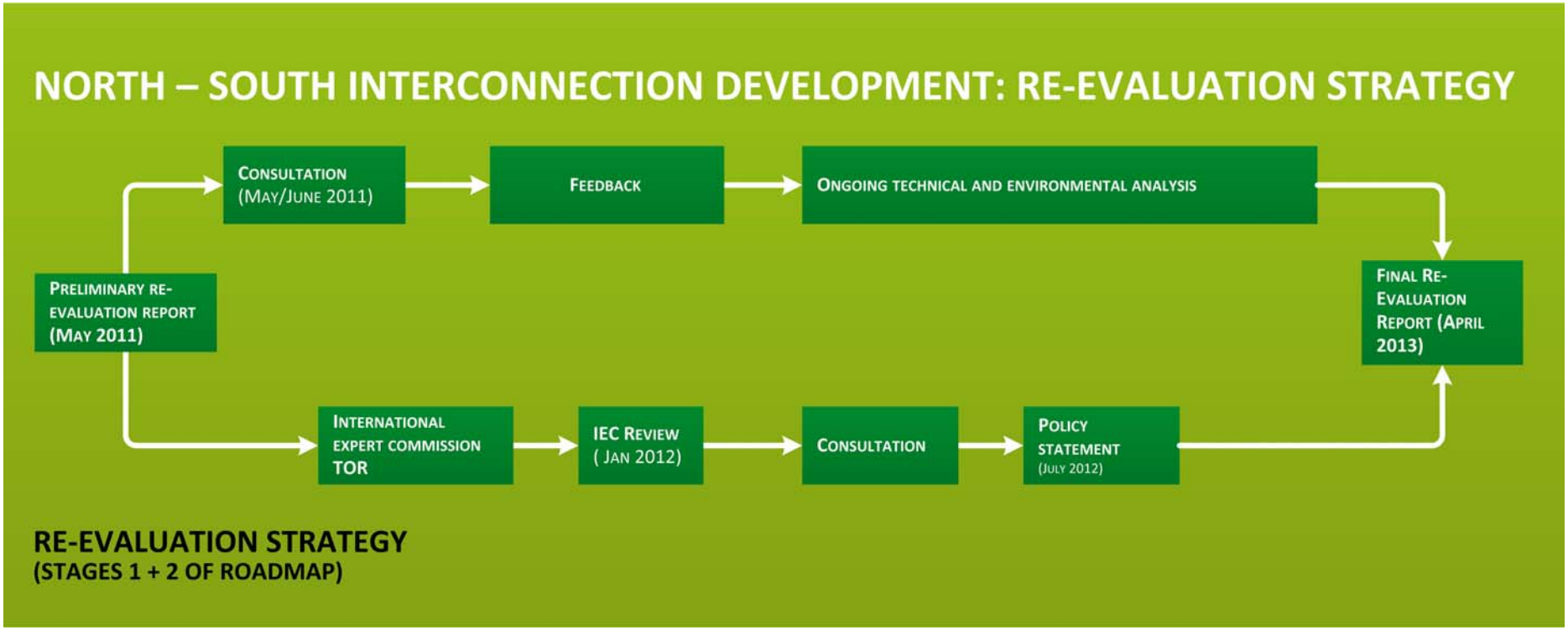

Figure 1.4: Re-evaluation Process for the North-South 400 kV Interconnection Development

The indicative line route identified at **Chapter 8** of this Re-evaluation Report forms the basis for identification of EirGrid's **preferred project solution** for the new North-South Interconnection Development. As noted above, the term "preferred" should continue to be taken to mean a "best-fit" or "least constrained" option which meets the parameters of the project. This is consistent with the conclusions of Stage Two of EirGrid's Project Development and Consultation Roadmap, and the commencement of Stage Three of the Roadmap.

By definition, the indicative line route does not include any significant detail regarding the specific location or siting of transmission infrastructure, such as tower positions. The process whereby the indicative line route will be progressed to identify a more detailed line design will be presented in a Preferred Project Solution Report to be published in due course. The line design, to be presented in a Preferred Project Solution Report, will form the basis for further public, stakeholder and landowner engagement, as well as environmental assessment in accordance with Stage Three of the Roadmap. Thereafter, the preferred project solution will then progress to detailed design and survey work, in consultation with An Bord Pleanála, prescribed bodies, other stakeholders, landowners and the general public. This process will ultimately lead to a **final proposal** which will form the basis for a new application to be submitted to An Bord Pleanála for development consent, as per Stage Four of EirGrid's Project Development and Consultation Roadmap.

The overall re-evaluation process, and progression towards submitting an application to An Bord Pleanála for Statutory Approval, is summarised in **Figure 1.5**.

This Final Re-evaluation Report has been compiled jointly by EirGrid, and its consultants (RPS Group, Socoin/Tobin Consulting and ESBI). EirGrid has undertaken the re-evaluation of high level issues such as strategic need for the project, technology alternatives, and decisions which guide the general strategic location of the required linear infrastructure; EirGrid's consultants have undertaken the re-evaluation of relevant environmental and other material, which contributed to the identification of a preferred route corridor, and indicative line route therein, for the North-South 400 kV Interconnection Development.

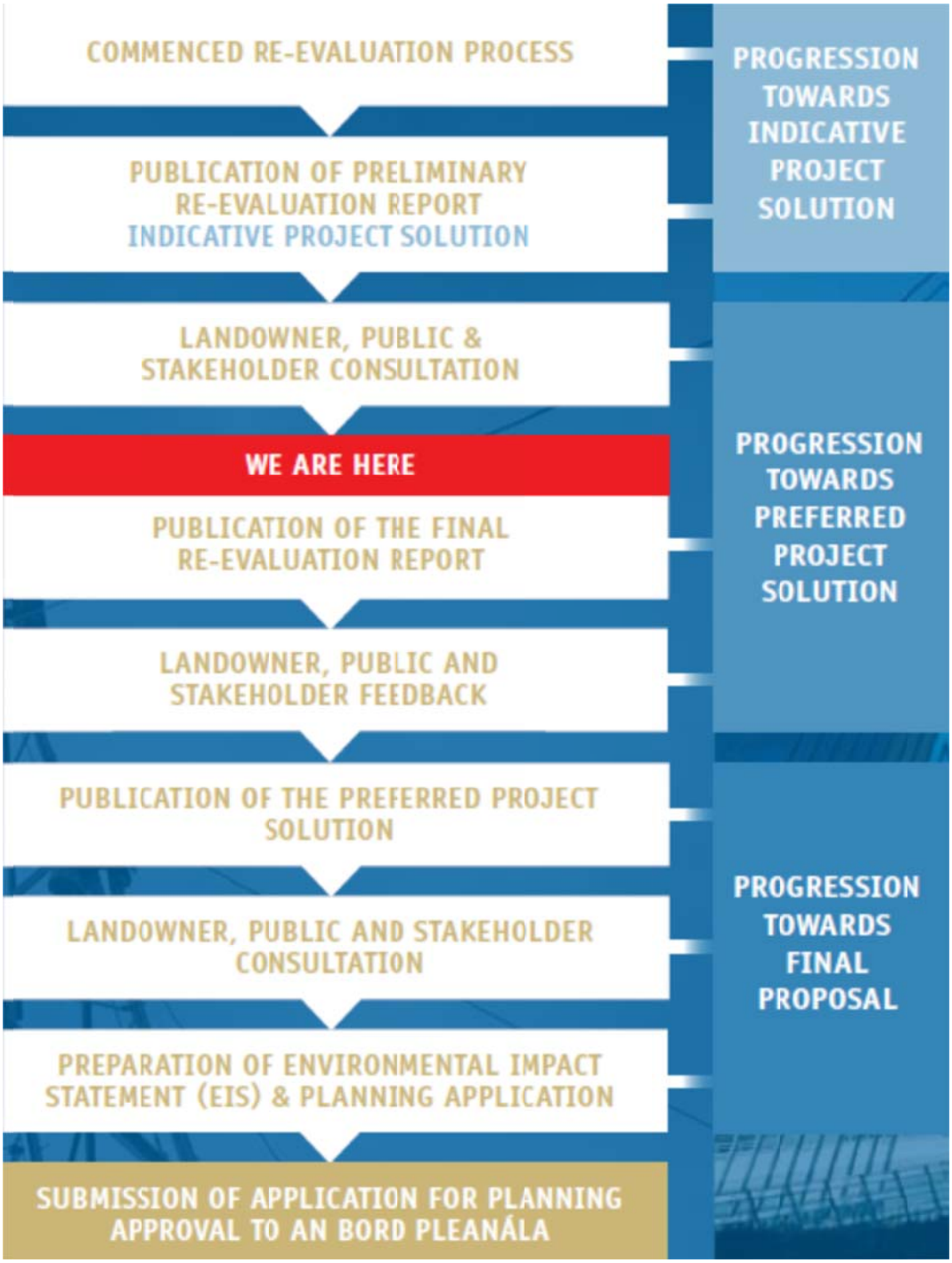

Figure 1.5: Re-evaluation Process and Progression towards an Application for Approval

1.4 SCOPE AND METHODOLOGY OF THIS RE-EVALUATION REPORT

As noted above, this Final Re-evaluation Report primarily consists of a review of all aspects of the Meath-Tyrone 400 kV Interconnection Development, including previous studies and reports submitted, or referenced, as part of the previous application, and new information that has emerged since the production of those reports. The steps included in the re-evaluation process are set out below.

The **first step** of this final re-evaluation process was to confirm the strategic need, rationale and justification for the North-South Interconnector Project, including a review of applicable EU, national and other policies for strategic electricity interconnection and transmission development. There is also a review of the specific objectives of the North-South Interconnector Project, and its appropriateness to meet such strategic need.

The **second step** is to confirm the technological nature of the Interconnection Development, which comprises a re-evaluation of key options including the form of current (AC or DC), and design (such as overland, undersea, OHL, and underground cable (UGC)). This occurs from a review of studies undertaken in respect of the previous proposed Meath-Tyrone 400 kV Interconnection Development, as well as a review of recent international studies – a number of which were referenced by third parties during the previous application process – and the review and report on the case for, and cost of, undergrounding all or part of the Meath-Tyrone 400 kV Interconnection Development by the Government-appointed International Expert Commission.

The **third step**, having confirmed the technological nature of the proposed development, is to identify the general study area within which to route the planned Interconnection Development. This primarily derives from the re-evaluation of the technical need and rationale for the project, as well as from a review of previous studies. For convenience, as with the previously proposed Interconnection Development, the overall study area is divided into a northern and a southern section – in general, the alignment of the existing east-west Flagford–Louth 220 kV OHL now represents the interface between these two sections.

The **fourth step** is to confirm the nature and extent of key environmental and other constraints within the identified overall study area (which, for convenience, is separately referred to in this report by means of the two identified study area sections). This process includes identifying all previously considered constraints and all updated environmental designations and studies. Accordingly, a desktop survey was undertaken to review all of the key environmental constraints, particularly taking account of current statutory and other relevant policies and recent field studies (e.g. wintering bird surveys). These key environmental constraints have been documented, mapped and overlain onto Discovery Series Mapping. These maps are contained in **Appendix C** and **Appendix D** to this report.

The **fifth step** is to identify and confirm the feasible route corridor options avoiding, where possible, those identified environmental and other constraints. These route corridor options are mapped and assessed. The evaluation of the route corridor options occurs by undertaking a high-level assessment of the identified constraints within each corridor. This includes the undertaking of site visits to the area and vicinity of each of the route corridor options, in order to supplement existing mapping and information obtained during the desktop study.

The **sixth step** comprises a comparative evaluation of the identified route corridor options, thus identifying a preferred ("best fit") route corridor. The identified preferred route corridor is considered at this stage by EirGrid and its consultants to constitute the most appropriate balance between the various (and often competing) technical, environmental, economic and other criteria and constraints.

The **seventh step** identifies an indicative line route within the identified preferred route corridor. This primarily occurs by taking into account:-

- All previous studies completed on the previous preferred line routes;
- Consultation with prescribed bodies;
- Engagement with landowners;
- Review of updated aerial photography;
- The considerable volume of written and oral submissions presented by prescribed bodies, other stakeholders and members of the public in respect of the previous application (including the Oral Hearing), as well as during consultation in respect of the Preliminary Re-evaluation Report; and
- The conclusions of the Government Review.

The relevant stages in the scope and methodology for the compilation of this Final Re-evaluation Report are summarised in **Figure 1.6**.

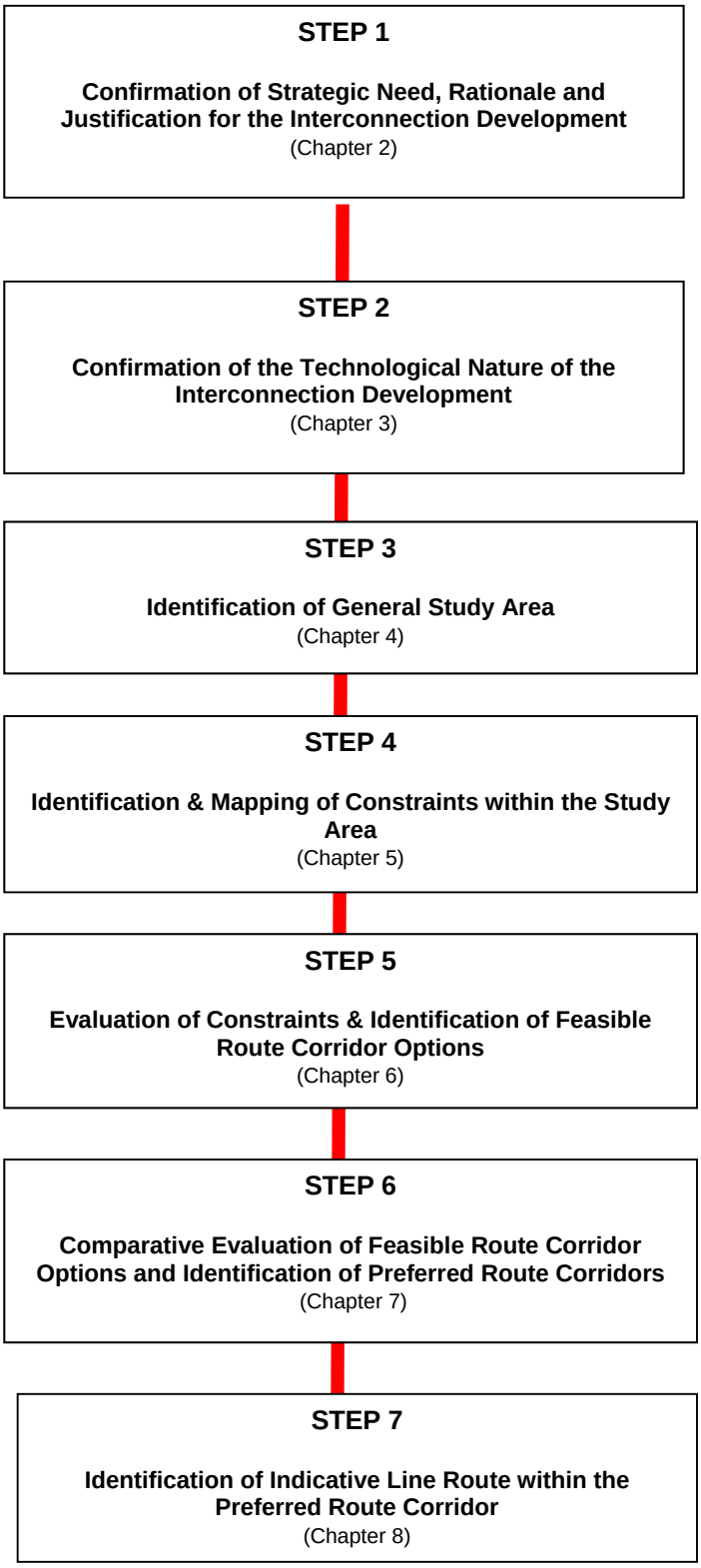

Figure 1.6: Relevant Stages in the Scope and Methodology of this Final Re-evaluation Report

1.5 CONCLUSIONS

In summary, the initial output of this re-evaluation process involved the preparation of a Preliminary Re-evaluation Report, published in May 2011. Thereafter, EirGrid engaged in a programme of consultation with landowners, members of the public and stakeholders in respect of that Preliminary Re-evaluation Report, in order to obtain feedback, primarily on any new issues arising (including modification to the proposal notified therein), or new insights on aspects of the project previously published.

The feedback, and EirGrid's response to same, has been summarised in a separate document, included as **Appendix B**, which in turn has fed into this report. This Final Re-evaluation Report concludes with the identification of an indicative line route for the new North-South 400 kV Interconnection Development, which forms the basis for development of a more detailed line design and which, in turn, will form the basis for further landowner engagement and technical and environmental assessment, all of which will ultimately feed into preparation of an application to be submitted to An Bord Pleanála for planning approval.

Overall, therefore, whilst this document comprises a re-evaluation report, it must be recognised that the North-South Interconnector Project has had an unusual planning history of almost six years; a significant number of submissions have been made directly to EirGrid over this time; and almost 1,000 written submissions, and a considerable number of oral submissions and observations were also made to An Bord Pleanála in the context of the previous application for approval.

The Report therefore includes input from a significant range of contributors, including interested stakeholders, landowners, and the general public, as well as EirGrid's ongoing technical and environmental studies and assessment, both strategic and project-specific. It also includes the input and conclusions of various Reports and other documents from the International Expert Commission, Joint Oireachtas Committee, and Department of Communications, Energy and Natural Resources.

In this latter regard, in **section 1.2.4** EirGrid has noted the conclusion within the Government Policy Statement on the Strategic Importance of Transmission and Other Energy Infrastructure in respect of Community Gain. Also as noted in **section 1.2.4**, *"community gain"* is not defined in the Policy Statement. Whilst EirGrid is aware of various models for community gain, it is equally clear that there is no single exemplar model for community gain, and particularly in respect of extensive linear infrastructure, as opposed to a more site-based or area-based project.

EirGrid is also conscious of the fact that the issue of community gain will not be restricted to the North-South Interconnection Development project, but must be considered in respect of the overall roll-out of the Grid25 strategy over the next decade and beyond. In this regard, it could well transpire that the

model for community gain ultimately decided upon in respect of the North-South Interconnection Development may not be appropriate for other projects across the country.

Therefore, EirGrid is actively considering how the issue of community gain may be best applied across the overall Grid25 strategy, rather than on a project-by-project basis. Clearly, the project process for the North-South Interconnection Development, and in particular the current public and stakeholder consultation in respect of this re-evaluation process and progression to a preferred project solution, will include a mechanism for the public and other stakeholders to provide EirGrid with their views as to how community gain may best be applied in respect of this linear project.

2 STRATEGIC NEED, RATIONALE, JUSTIFICATION FOR AND BENEFITS OF THE INTERCONNECTION DEVELOPMENT

2.1 INTRODUCTION

The proposed second North-South electricity interconnector is a critical and strategically urgent transmission reinforcement. There are multiple benefits which underline this need and this chapter provides a summary outline of these benefits and the national and European Union (EU) policy objectives which support their effective delivery. In summary, the addition of the new Interconnector will remove existing restrictions limiting cross-border power flows between Ireland and Northern Ireland. Removing this restriction will enhance cross-border support in the event of a shortage of electricity in either jurisdiction, thus enhancing security of electricity supply throughout the island of Ireland. This security of supply benefit is highlighted in the latest "All Island Generation Capacity Statement 2013-2022"[2], which outlines the importance of the second Interconnector for generation adequacy in Northern Ireland from 2016 onwards. The resulting increase in cross-border interconnection capacity will also allow consumers on the island of Ireland to fully benefit from the Single Electricity Market (SEM) and the proposed EU Target Model[3]. In addition, it is projected that the amount of wind generation across the island of Ireland will reach an installed capacity of between 4,800 MW and 5,300 MW by 2020[4]. There are a range of operational[5] and network developments currently underway to ensure that the all-island grid can be operated in a safe, secure and reliable fashion under this evolving plant scenario. The second North-South Interconnector is a critical component of the planned network delivery programme which supports this strategic renewable target.

2.2 STRATEGIC NEED AND BENEFITS OF AN ADDITIONAL INTERCONNECTOR

The EU energy policy objectives of competitiveness, sustainability and security of supply are set out in the 2006 green paper 'A European Strategy for Sustainable, Competitive and Secure Energy'.[6] These policy objectives have been implemented in this country and framed the 2007 Irish government energy policy white paper 'Delivering a sustainable energy future for Ireland'.[7] Most recently, the European Commission outlined its energy strategy in its November 2011 communication 'Energy 2020: A Strategy for Competitive, Sustainable and Secure Energy'.[8] This latest blueprint places renewed focus on the need for energy infrastructure development and increased cross-border interconnection in order to meet the key policy objectives of competitiveness, sustainability and security of supply. In line with

[2] Available at http://www.eirgrid.com/media/All-Island_GCS_2013-2022.pdf

[3] For further information on the Target Model refer to http://ec.europa.eu/energy/gas_electricity/internal_market_en.htm

[4] Available at http://www.eirgrid.com/media/Annual%20Renewable%20Report%202012.pdf

[5] Available at http://www.eirgrid.com/operations/ds3/

[6] Available at http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2006:0105:FIN:EN:PDF

[7] Available at http://www.dcenr.gov.ie/NR/rdonlyres/54C78A1E-4E96-4E28-A77A-3226220DF2FC/30374/EnergyWhitePaper12March2007 .pdf

[8] Available at http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:52010DC0639:EN:HTML:NOT

this stated need, in March 2013 the European Commission adopted its latest regulation on 'Guidelines for trans-European energy infrastructure'.[9] A key aim of this regulation is to ensure that strategic priority energy networks in Europe are completed by 2020.

In line with these European policy objectives, it is Irish Government policy that an additional high capacity electricity interconnector should be established between Ireland and Northern Ireland. This policy objective is specifically referenced in a number of national policy documents such as:-

- DCENR (November 2004). 'The All-Island Energy Market, A Development Framework'. Publically available from http://www.dcenr.gov.ie (p.5);
- Irish Government (2007). 'The National Development Plan 2007-2013'. Publically available at http://www.ndp.ie (p.139); and
- DCENR (March 2007. 'Delivering a Sustainable Energy Future for Ireland – White Paper)'. Publically available from http://www.dcenr.gov.ie (p.49).

The most recent endorsement of the policy objective by the Government can be found in the 'Government Policy Statement on the Strategic Importance of Transmission and Other Energy Infrastructure' (July 2012).[10]

The Government affirms its policy in that statement in the following terms: "*the case for proceeding urgently with energy infrastructure in line with overall economic social and energy policy goals is profoundly in the national interest*".

The Government's policy statement goes on to identify the "*Meath-Tyrone transmission line*" (now known as the North-South Interconnector) as a vital development "*for the regions and for the economy and society as a whole*". Thus, the Irish national policy objective for the establishment of a second north-south electricity interconnector implements a number of obligations of EU energy law, such as:-

- Directive 2005/89/EC concerning measures to safeguard security of electricity supply and infrastructure investment;
- Directive 2009/28/EC on the promotion of the use of energy from renewable sources; and
- Directive 2009/72/EC concerning common rules for the Internal Market in Electricity Directive.[11]

EirGrid is satisfied that the development of an additional high-capacity electricity interconnector between the electricity networks of Ireland and Northern Ireland is required in order to comply with, and implement the obligations of, these EU and national energy policy guidelines.

[9] Available at http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:52011PC0658:EN:NOT
[10] Available at http://www.dcenr.gov.ie
[11] Available at http://europa.eu/legislation

In this strategic policy context, EirGrid has identified that such a second north-south interconnector provides many technical and other benefits which support the delivery of the key policy objectives of competitiveness, sustainability and security of supply for both Ireland and Northern Ireland. At present, in order to ensure system stability across the island of Ireland, power flows on the existing interconnector are limited to a value well below its installed capacity. This limit is applied due to the potential impact on security of supply if an unexpected outage of the existing interconnector arises at higher power flows. Under this scenario, a large energy imbalance between both jurisdictions could arise leading to unacceptable voltage and frequency stability issues. The second North-South interconnector will help to resolve this risk, as it provides a separate power flow independent of the existing interconnector, which significantly reduces the risk of system separation.

There are a number of benefits which arise as a result of the removal of existing constraints on power flow transfers between Ireland and Northern Ireland. These benefits include:-

1 Improving competition by reducing the constraints restricting efficient performance of the all-island Single Electricity Market;

The all-island Single Electricity Market (SEM) was established in November 2007. The aim of the market is to promote cross border trading in electricity for the benefit of all consumers on the island of Ireland.[12] The absence of a second North-South Interconnector at present means that a significant infrastructure bottleneck exists that restricts power flows between the two systems. By reducing the existing infrastructure constraint between both jurisdictions, the second interconnector would remove this unnecessary congestion and would allow SEM to operate more efficiently, in line with its design objectives. Studies by EirGrid have calculated annualised benefits to the market from the delivery of the second North-South Interconnector of the order of €20m per annum in 2020 rising to closer to €40m over the following decade. The on-going need to resolve this congestion issue is addressed in the latest consultation on the proposed re-design of SEM.[13]

2 Improving security of supply by providing a reliable high capacity link between the two parts of the all-island transmission system;

Currently, the transmission systems of Northern Ireland and Ireland are connected via one 275 kV double circuit and two smaller 110 kV connections. While this arrangement affords many benefits to both jurisdictions, it is restricted by the physical capacity of the lines, by the extended transmission systems on both sides, by planned and unplanned outages, by the need to allow for unexpected changes in generation/demand and by the significant risk of the two systems separating and the destabilizing effect this would have on each region. Therefore, the level of security of supply support that can be provided by each system to the other is limited. The latest 'All Island Generation Capacity Statement 2013-2022' published jointly by EirGrid and SONI

[12] Available at http://www.allislandproject.org/en/about_us_overview.aspx
[13] Available at http://www.allislandproject.org/GetAttachment.aspx?id=55ea759a-d769-4ed5-99d2-20d8ed10652a

highlights how, for Northern Ireland, with this limited support, the availability of generation to meet forecast demand is subject to significant risk from 2016 and will be in deficit from 2021.

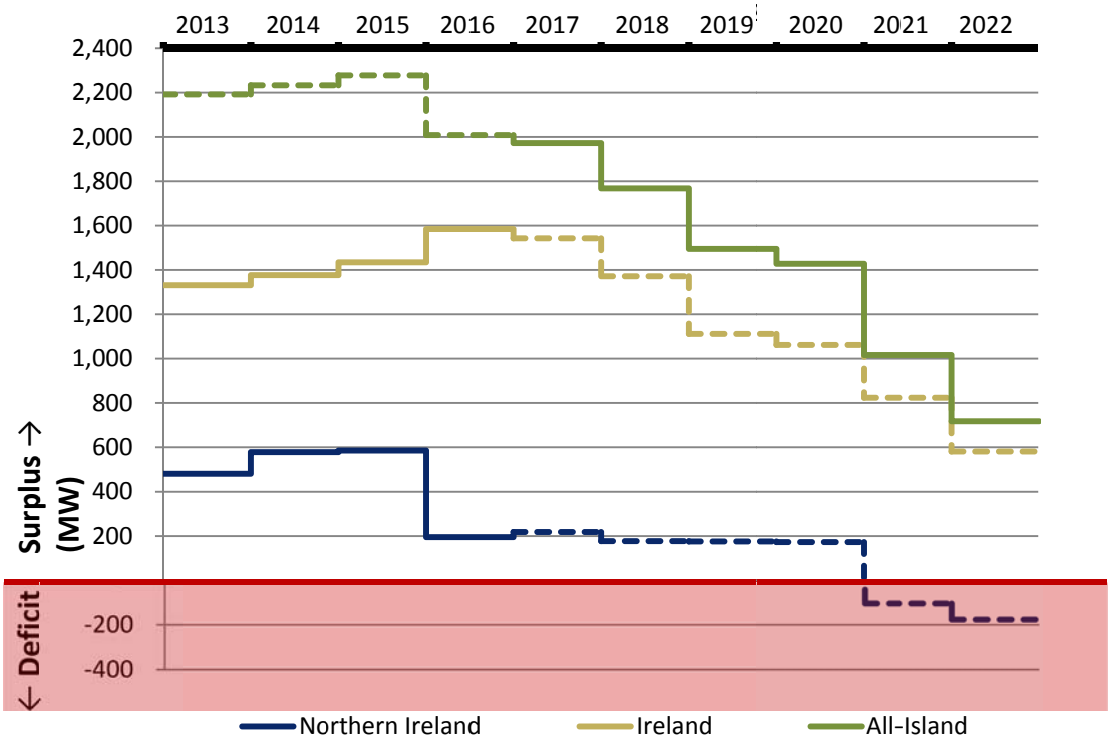

Figure 2.1: Forecasted Generation Capacity on the Island of Ireland, 2013-2022

Source: All-Island Generation Capacity Statement 2013-2022

The graph highlights how Northern Ireland is in surplus up to the end of 2015 (blue line). Following the closure of plant at Ballylumford at the end of 2015 and the introduction of emissions restrictions on plant at Kilroot at the start of 2016, the Northern Ireland adequacy position is close to deficit with surpluses reduced to modest levels of circa 200 MW. This means Northern Ireland is at risk in the event of a prolonged outage of a large generation plant or the Moyle Interconnector, even with a 200 MW reliance on Ireland being available to Northern Ireland. From 2021, further emissions restrictions on plant at Kilroot have a large effect on system adequacy, and push Northern Ireland into deficit. This deficit could be alleviated if the second North-South Interconnector was in place. This is shown in **Figure 2.1** where the trend for all-island generation adequacy (green line) includes the second interconnector. This highlights the importance of the second North-South Interconnector project to maintain security of supply in Northern Ireland[14].

[14] Available at http://www.eirgrid.com/media/All-Island_GCS_2013-2022.pdf, p 45

3 Supporting the development of renewable power generation by enhancing the flexible exchange of power flows over a large area of the island.

In order to meet 2020 Renewable Energy Source (RES) targets, it is projected that the amount of wind generation across the island of Ireland will reach an installed capacity of between 4,800 MW and 5,300 MW by 2020.[15] At these levels, Ireland and Northern Ireland will have one of the highest penetrations of renewable generation, as a percentage of system size, in the world. In order to successfully operate the system in a secure and reliable fashion under this scenario, it will be necessary to ensure that the all-island electricity transmission network is sufficiently developed. As noted, the absence of the second interconnector at present restricts the level of transfer capability between the two systems on the island of Ireland. As more renewable sources such as wind generation are included in the all-island plant portfolio this transfer limitation may impact on the operational performance of both the Irish and Northern Irish systems. By resolving this limitation the second interconnector contributes to all-island system stability as the level of Renewable Energy Sources (RES) installed on the island increases to meet EU and Irish national targets.

In summary, based on these significant technical and economic benefits, there remains a clear strategic need for a second north-south interconnector. These benefits align and support the implementation of the binding EU objectives of competitiveness, sustainability and security of supply.

2.3 IMPLICATIONS OF THE ECONOMIC DOWNTURN

During public consultation in respect of the previous application for approval of the Meath-Tyrone 400 kV Interconnection Development, the 'need' for the development was, understandably, questioned in light of the decline in electricity consumption as a result of the economic downturn. The recent economic downturn commenced in the second half of 2008. It resulted in a significant and general decline in electricity consumption in Ireland. Having observed this decline, in July 2009, EirGrid issued an update to its 'Generation Adequacy Report 2009 – 2015'.[16] In this revised report, it was forecasted that there would be a reduction in demand of between 4% and 5% in 2009 and a further reduction of between 0% and 1% in 2010 and that demand would recover slowly thereafter. Most recently, EirGrid has published its All-Island Generation Capacity Statement (2013-2022) which provides a latest demand forecast for both Ireland and Northern Ireland. The report shows relatively slow growth recovery in Ireland with demand not expected to reach 2008 levels again until 2018. A similar pattern is also predicted in Northern Ireland with return to moderate growth in 2015 based on median projections. A forecast of All-Island Total Electricity Requirements (TER) has also been calculated based on these projections:

[15] Available at http://www.eirgrid.com/media/Annual%20Renewable%20Report%202012.pdf
[16] Available at http://www.eirgrid.com

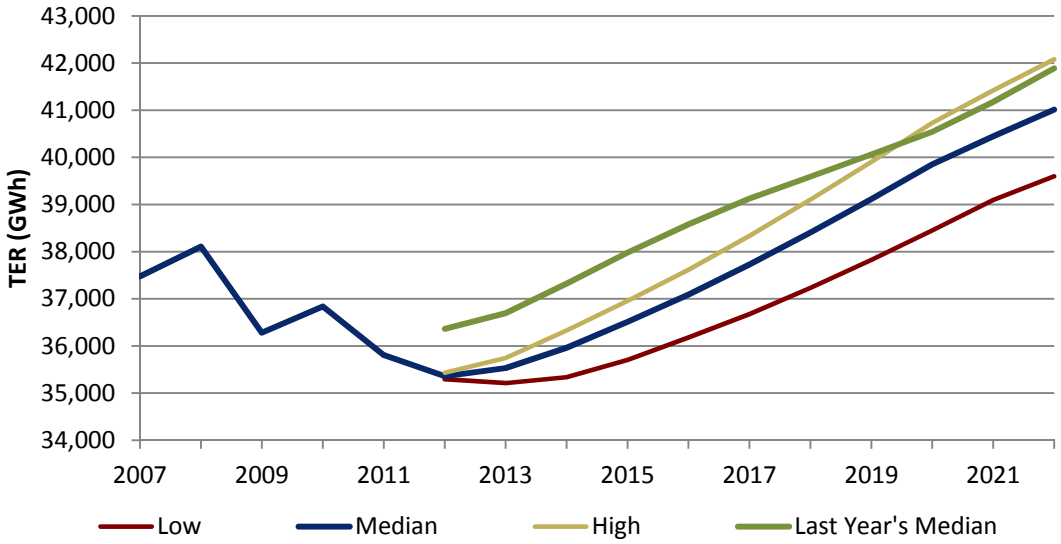

Figure 2.2: Combined All-Island TER Forecast

Source: All-Island Generation Capacity Statement 2013-2022

While the moderate growth pattern assumed in the latest Generation Capacity Statement does influence generation adequacy requirements in Ireland this is a separate issue and does not directly influence the critical and urgent need for the second Interconnector. In **section 2.2** for example, the need and role of the interconnector in resolving the emerging security of supply issue in Northern Ireland was highlighted. The moderate demand scenario projected above does not detract from this urgent security of supply role. Furthermore the critical role of the Interconnector in relation to both resolving congestion issues in the all-island market and as an infrastructure reinforcement which supports long term facilitation of renewable generation is not affected by changes in short to medium term demand forecasts. The recent economic recession therefore does not negate the 'need' for the interconnector, or make a case for delaying its development.

2.4 SECURITY OF SUPPLY IN THE NORTH EAST

It is clear from **section 2.3** above that the drivers for the establishment of a second North–South Interconnector are not diminished to any material degree by the decline in national electricity consumption that has resulted from the economic downturn. The decline in electricity consumption in the north-east area has, however, an obvious and significant effect on the need from a security of supply perspective for the reinforcement of the transmission network in that specific area.

In the Strategic Issues Review document of November 2008[17], it was explained how the existing Louth 220 kV Substation is not only the southern terminus for the existing high capacity North-South interconnector, but is also the most strategically important transmission substation in the north-east area of Ireland. It was noted that the peak electrical load on the existing 220 kV circuits that connect to this substation had already reached critical levels and, as a result, the reliability and quality of the electricity supply to the entire north-east area of the country was at risk. EirGrid is required by licence to plan the transmission system in accordance with established transmission planning standards and, in order to comply with these transmission planning standards, a need for the reinforcement of the transmission network in the north-east area for security of supply reasons was clearly established at that time.

As part of the re-evaluation of the proposed North-South Interconnection Development, which has been undertaken since the withdrawal of the previous planning application in June 2010, EirGrid has re-examined the security of supply risk in the north-east area in light of the economic downturn. Using the summer 2012 peak demand as a base, and projecting forward for a decade using the median growth rates identified in the most recent 'All Island Generation Capacity Statement 2013 – 2022', it was found that the peak demand in the area will still be below the critical level for at least a decade. Therefore, unless there is a stronger recovery in the economy in the area and/or one or more new large industrial consumers emerge, reinforcement of the network in the area for security of supply reasons is not likely to be required within the current planning horizon, i.e., within the next ten years.

Although the need to reinforce the north-east area for security of supply reasons is no longer an immediate driving factor for the delivery of the North-South Interconnector Project (as that reinforcement is not now expected to be required for at least a decade), the early presence of the Interconnector will nevertheless provide reinforcement to the area by increasing interconnection between Ireland and Northern Ireland. Further detail on how the interconnector provides this benefit is provided in **section 4.1** of this Report. Based on current predictions, such reinforcement will provide sufficient additional transmission capacity in the area to cater for growth in electricity consumption for many years (assuming median growth rates) and will also put the north-east area in a good position if an even stronger economic recovery should emerge in the coming years.

2.5 CONSIDERATION OF THIRD PARTY SUGGESTIONS FOR DELAY OF THE NORTH-SOUTH INTERCONNECTOR

During public consultation in respect of the previous application for approval of the Meath-Tyrone 400 kV Interconnection Development, a number of suggestions were received to the effect that parts of that proposed development could be avoided, or at least delayed. These suggestions are considered below.

[17] RPS Planning & Environment for EirGrid plc. (available at http://www.eirgrid.com)

2.5.1 Up-rating of the Existing 275 kV Louth-Tandragee Circuits

It was suggested that if the existing Interconnector was up-rated, then it would only be necessary to construct the Kingscourt (Moyhill) Substation and the 400 kV circuit from Kingscourt to Woodland Substation (i.e., that section in County Meath), thus avoiding the construction of the 80 km Kingscourt to Turleenan 400 kV OHL (i.e., that section in Counties Cavan, Monaghan, Armagh and Tyrone).

The single existing Interconnector between Louth and Tandragee consists of two 275 kV OHL circuits, supported on a single set of towers. This form of construction is known as a double circuit line. Although the existing Interconnector is composed of two separate circuits, there is a risk, because of their close proximity, shared support structures and shared termini, that a single event (for example, a lightning strike or accidental damage to a tower resulting in its collapse) could cause the simultaneous disconnection of both circuits. As there is currently only one high capacity Interconnector, this would result in what is known as a 'system separation' – where the network in Ireland becomes separated from the equivalent network in Northern Ireland.

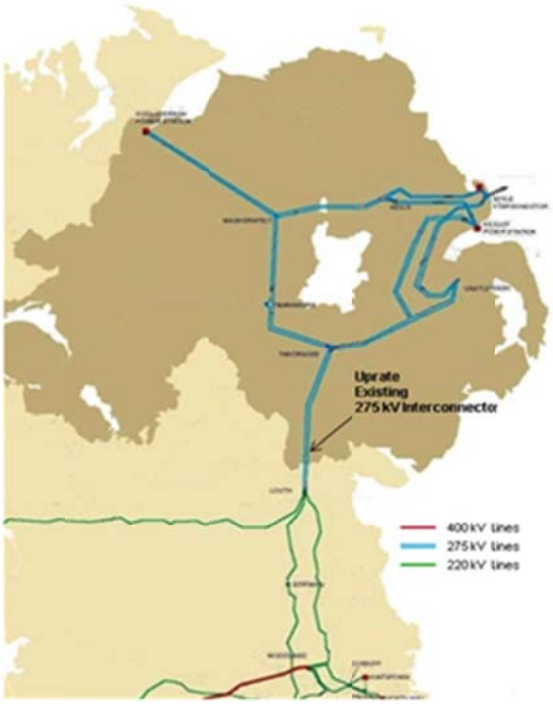

Figure 2.3: Existing High Capacity Transmission Network in the North-East of Ireland

The consequence of such an unplanned and sudden system separation is that the transmission system in one, or both, jurisdictions could become unstable requiring the automatic disconnection of customer load and/or generation in order to prevent a total collapse of the system. The Transmission System Operators (TSOs) north and south of the border have agreed that such a risk is intolerable. As a result, the maximum power transfer across the existing single Interconnector has to be restricted to a level below which, in the event of an unplanned system separation, both systems should be able to cope appropriately with the sudden 'shock' to the system.

The extent of this constraint on 'north to south' and 'south to north' power flows is such that the maximum permitted power transfer across the existing Interconnector is well below the existing power carrying capacity of that interconnector. The capacity of the existing interconnector is not, therefore, the issue. Up-rating the existing Interconnector, even if that was possible, will not eliminate the risk of system separation and will not eliminate the unnecessary and expensive cost incurred by electricity consumers due to the resulting 'bottle neck' on cross-border power flows.

A new and physically separate high capacity cross border interconnector circuit, connecting between appropriately robust[18] parts of the two existing transmission networks is the only option that will achieve the strategic benefits identified in **section 2.2**.

2.5.2 Up-rating of the Existing 220 kV Circuits in the North-East Corridor

It was suggested that, by up-rating the existing 220 kV single circuit OHLs running between Louth Substation and the Greater Dublin Area, it would not then be necessary to construct the proposed 60 km of 400 kV OHL in County Meath and that the required level of interconnection would be achieved simply by constructing a high capacity circuit between Turleenan in County Tyrone and a new substation in the vicinity of Kingscourt, County Cavan.

Figure 2.4: Scenario: New Kingscourt-Turleenan Circuit and Up-rating of Existing 220 kV Circuits

[18] In this context a 'robust' part of the existing network means a new or existing transmission substation which is connected to the wider network by two, or more, existing circuits which have sufficient spare capacity under emergency contingency conditions (N – 1 contingency) to carry the new power flows that will result from the insertion of the proposed new circuit into the existing all-island network.

In this scenario the new substation near Kingscourt would act as the southern terminus of the new North-South Interconnector. The new substation would connect the new interconnector to the existing Flagford-Louth 220 kV OHL and as such would not meet the requirement of being a sufficiently 'robust' part of the transmission network on the southern side of the border. It can be seen from **Figure 2.4** that, in this scenario, the 'power flows' on the new Kingscourt-Turleenan circuit would rely on the capacity, under emergency contingency conditions (N – 1 contingency), of the Flagford-Kingscourt-Louth 220 kV circuits. These circuits do not have the required spare capacity. In addition 'power flows' from the east to Kingscourt, and from Kingscourt to the east, would have to pass through Louth Substation. Louth Substation is already the southern terminus of the existing interconnector. This scenario would not therefore achieve the level of electrical separation required, for security of supply reasons, between the new Interconnector and the existing Interconnector and will not, therefore, achieve the strategic security of supply benefit identified in **section 2.2**.

The section of the Interconnector circuit in County Meath is essential to the proper functioning of the overall planned additional North-South Interconnection Development. It will provide the required capacity for north to south, and south to north, 'power flows' without any reliance on the presence of Louth Substation and will avoid introducing constraints due to the relatively small power carrying capacity of the existing Flagford-Louth 220 kV circuit. Up-rating the two existing 220 kV single circuit OHLs connecting between Louth Substation and the Greater Dublin Area will not alter this fact.

2.6 CONCLUSIONS

Based on all of the above, EirGrid concludes that: -

- There remains a clear and immediate strategic need for a second North-South Interconnector;
- A new and physically separate high capacity cross border interconnector circuit, connecting between appropriately robust parts of the two existing transmission networks north and south of the border, is the only option that will satisfy the identified strategic need;
- The additional North–South tie line is the only project that has the potential to ensure that the security of supply position in Northern Ireland is fully compliant with both the present Northern Ireland and all-island generation adequacy standards for all study years covered in the latest All-Island Generation Capacity statement;
- While the need to reinforce the north-east area for security of supply reasons is not an immediate driving factor for the delivery of the Interconnection Development (as that reinforcement is not expected to be required for at least a decade), the early presence of the interconnector will nevertheless provide reinforcement to the area; and
- Potential alternatives involving the use, or upgrading, of existing transmission infrastructure will not in this instance achieve the identified objectives and benefits of the planned North-South Interconnection Development.

3 TECHNOLOGY OPTIONS

3.1 PROJECT OBJECTIVES/DESIGN CRITERIA

The objectives and/or design criteria for the proposed development are to:-

a) Comply with all relevant safety standards;

b) Comply with all system reliability and security standards;

c) Provide the least cost and an environmentally acceptable solution;

d) Have a power carrying capacity in the region of 1,500MVA, and connect between appropriately robust points on the transmission networks north and south of the border;

e) Facilitate future reinforcement of the local transmission network in the north-east area;

f) Facilitate future grid connections and reinforcements; and

g) Comply with good utility practice.[19]

All of these objectives flow from EirGrid's statutory and licence obligations.

EirGrid's statutory obligations are noted in the recent 'Government Policy Statement on the Strategic Importance of Transmission and Other Energy Infrastructure' of July 2012 where it states that, the "*State network companies are mandated to plan their developments in a safe efficient and economic manner. They are also required to address and mitigate human, environmental and landscape impacts, in delivering the best possible engineering solutions*". The Policy Statement goes on to state that "*the Government does not seek to direct infrastructure developers to particular sites or routes or technologies*" but "*reaffirms that it is Government policy and in the national interest, not least in the current economic circumstances*" that strategically important infrastructure (such as the north – south interconnector) be "*delivered in the most cost efficient and timely way possible, on the basis of the best available knowledge and informed engagement on the impacts and the costs of different engineering solutions*".

The project objectives/design criteria outlined above guide the consideration and assessment of the technology options for the required North-South 400 kV Interconnection Development. It is within this context that the application of "*the best available knowledge and informed engagement on the impacts and the costs of different engineering solutions"* will ensure compliance with the Government Policy Statement.

[19] Note: Compliance with good utility practice does not preclude the use of innovative practices, methods or technologies; however, when such innovative practices, methods or technologies are under consideration, the accompanying risk of failure and consequence of such failure must also be considered.

3.2 REVIEW BY THE INTERNATIONAL EXPERT COMMISSION (AUGUST – NOVEMBER 2011)

In July 2011 the Minister for Communications, Energy and Natural Resources, Mr Pat Rabbitte T.D., appointed an International Expert Commission (IEC) to:-

- Examine the case for, and cost of, undergrounding all or part of the Meath – Tyrone 400 kV line (now known as the North - South 400 kV Interconnection Development);
- Review expert literature already available both in Ireland and internationally in relation to undergrounding high voltage [HV] power lines;
- Consider the route or routes proposed by EirGrid; and
- Consult with EirGrid, the North East Pylon Pressure Committee and the County Monaghan Anti-Pylon Committee, and other bodies/organisations.

The report of the IEC[20] was published in January 2012. The main findings of the report are as follows:-

- Based on an analysis of a number of different high capacity transmission projects in Europe, it is clear "*that there is no single "right" solution. Each project must be judged on its own merits and hybrid solutions, i.e. combining different technologies, have been applied in many cases, for instance partially undergrounding a link. A specific technical solution must be derived accounting for local conditions";*
- There have been advances in transmission technology in recent years, examples being "*the development of VSC HVDC technology and its deployment in transmission projects and the introduction of new tower designs for overhead lines*";
- The IEC did not make any recommendations other than a recommendation "*against fully undergrounding using an a.c. cable solution*";
- If the Interconnector has to be undergrounded for all, or a significant portion, of its length then with today's technology the best solution would be "*a VSC HVDC solution combined with XLPE cables*"; and
- The IEC concluded however that a high voltage AC overhead line "*still offers significantly lower investment costs than any underground alternative and could also be made more attractive by investing slightly more in new tower designs than the classical steel lattice towers now proposed*".

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

3.3 DC TECHNOLOGY AS AN ALTERNATIVE TO AC TECHNOLOGY

The existing electricity transmission system in Ireland is, as in every other country in the world, a high voltage alternating current (HVAC or AC) system. There exists, however, another type of electricity transmission technology known as high voltage direct current (HVDC or DC). Although both technologies are used to transmit electricity, the types of electricity transmitted by each are very different and are not compatible. The result is that a DC circuit does not naturally integrate within an AC network. This is somewhat comparable with the way an electric railway does not naturally integrate with a motorway network; the electric train cannot run on the motorway and motor vehicles cannot run on the electric railway.

In electricity networks the electricity that exits the power stations is AC electricity, and the electricity required by the end consumer is AC electricity. Inserting a DC circuit between the power stations and the end consumer requires that the AC electricity at the supply end of the circuit is converted into DC electricity, carried through the DC cable to the receiving end, where it is converted back from DC to AC electricity, and then transmitted onwards to the end consumer. This is somewhat inefficient, but in the case of some very particular applications it is the only technically feasible option. A good example of this is EirGrid's recently commissioned East West Interconnector. This is a 500 MW HVDC circuit connecting the electricity transmission network on the island of Ireland with that on the island of Great Britain. Clearly it is impossible to build an overhead line across the Irish Sea and the distance is too great for an AC insulated cable laid on the sea bed. The distance however does not present a technical difficulty for a DC insulated cable. In addition the electricity networks of Ireland and Great Britain are not 'in synchronism'. This means they are controlled and operated independently of each other. The only way to transfer electrical power between two such networks is to install a HVDC scheme.[21]

In preparing the Environmental Impact Statement (EIS) associated with the 2009 application for planning approval, EirGrid considered HVDC technology as an alternative to the then AC proposal. This consideration was described in Chapter 4 of that EIS.[22] EirGrid's conclusion at that time was that HVDC is not an acceptable alternative to the then proposed AC solution as:-

- It would not be the least cost technically and environmentally acceptable solution;
- It would not facilitate future grid connections and reinforcements; and
- Its use would not be in compliance with good utility practice.

This conclusion was supported by the findings of the Government sponsored Ecofys Report ('Study on the Comparative Merits of Overhead Electricity Transmission Lines versus Underground Cables

[21] In addition, HVDC schemes are also used to transfer high voltage power over very long distances.
[22] EirGrid plc (2009). 'Meath-Tyrone 400 kV Interconnector Development - Environmental Impact Statement', available from http://www.eirgridprojects.com

(2008)')[23] and by the findings of the PB Power and Transgrid Reports, both of which were commissioned jointly by EirGrid and NIE (see below):-

- PB Power. 'Cavan-Tyrone and Meath-Cavan 400 kV Transmission Circuits Comparison of High Voltage Transmission Options: Alternating Current Overhead and Underground, and Direct Current Underground' (2009);[24] and

- Transgrid Solutions Inc. 'Investigating the Impact of HVDC Schemes in the Irish Transmission Network (2009)'.

During the preparation of the 'Preliminary Re-evaluation Report' of May 2011 EirGrid revisited the issue of DC as an alternative technology for the North-South Interconnection Development. It was found at that time that no information had been received as part of the previous planning application procedure; nor had any new information come to EirGrid's attention subsequently; that altered EirGrid's opinion that HVDC technology is not, based on an assessment of its ability to deliver the identified project objectives and its ability to meet the identified design criteria, acceptable for this particular development.

The publication in January 2012 of the report by the International Expert Commission (IEC) did, however, challenge EirGrid's position on the use of HVDC technology for this development. The IEC reviewed the three reports that EirGrid referenced in support of its conclusion that HVDC would not be an appropriate technology for the north-south interconnector. The IEC concluded that while the reports were robust at their time of publication, there have been advances in HVDC technology in the intervening period which may alter the results if the studies were to be repeated at this point in time. The technology advances referred to by the IEC relate particularly to the VSC version of the HVDC technology.

It is appropriate, therefore, that EirGrid should now review its comparative assessment of the HVDC option based on the findings of the IEC Report, and that such assessment should once again be based on the ability of a VSC HVDC circuit to deliver and meet the previously identified project objectives/design criteria (see **section 3.1**). Before doing so however, it is important to point out that EirGrid is very familiar with the VSC version of HVDC as this is the same technology that is applied on the East-West Interconnector that connects between Ireland and Britain and which is owned and operated by EirGrid. The East-West Interconnector is the largest and most modern VSC HVDC system in operation in the world today (April 2013). A significant difference between the version of VSC HVDC employed on the East-West Interconnector and the next version of VSC HVDC is that the efficiency of the conversion process in the newer version has been improved, thus reducing the electrical losses and the DC voltage has been increased.

[23] Available at http://www.dcenr.gov.ie
[24] Both available at http://www.eirgridprojects.com

The new comparative assessment of a VSC HVDC circuit versus a standard high voltage AC circuit for the implementation of the North-South Interconnection Development against the previously identified project objectives / design criteria is as follows:-

a) Comply with all relevant safety standards;

Both options are equally compliant. In the case of this criterion EirGrid does not see any difference in the two technology options.

b) Comply with all system reliability and security standards;

Both technologies can be considered to be reliable in their own right. However the North–South Interconnector will form the backbone of the 'all-island' transmission network, and is required in order to enable the two networks, north and south, to operate as if they were one network. This is a very different requirement to that of the East-West Interconnector which connects between two independently operated networks and is therefore not part of a meshed network. To the Irish transmission system, the East-West Interconnector will, when it is importing electricity from Britain, appear like a source of electricity, equivalent to a generation station, with the quantity of power imported being controlled by the operator. When the East-West Interconnector is exporting electricity, it will appear to the Irish transmission system like a consumer of electricity, a load that is controlled by a human operator.

In contrast, the North-South Interconnector which will be an integral part of the 'all-island' meshed network, and as such will have to react instantaneously to dynamic system changes such as rises and falls in system demand, and sudden and unplanned changes in system configuration due to unplanned outages of other circuits or generators. If the North-South Interconnector is a standard AC circuit then it will react naturally and instantaneously, without any input from a control system or human operator, to such dynamic changes to the system. A DC circuit on the other hand, as stated previously, does not naturally integrate within an AC network and will not react naturally to such changes. The DC circuit will only react if prompted to do so by a controller. However, a human operator would not be able to react quickly enough, so the control would have to be by means of a computerised control system.

Such a control system would be bespoke and very complex, and would therefore introduce the very real risk of mal-operation. The mal-operation of the computerised system controlling the operation of a HVDC north-south interconnector could result in the collapse of the entire 'all-island' electricity system. Taking such a risk when there is a technically superior and less risky option readily available is unnecessary. Therefore it is EirGrid's opinion that under the heading of 'comply with all system reliability and security standards', a standard AC circuit is preferable to a DC circuit for the specific characteristics of the North-South Interconnection Development.

c) Be the least cost and be an environmentally acceptable solution;

Both the DC option and the AC option can be installed in such a way as to be environmentally acceptable. It is the cost difference therefore which will be the deciding factor in the case of this criterion.

The International Expert Commission (IEC) estimated that the standard AC circuit would cost €167 million whereas the DC alternative would cost €500 million. That is a difference of €333 million. EirGrid believes, based on its own experience in delivering the comparable East-West Interconnector, that implementing the North-South Interconnection Development using HVDC would cost substantially more than the €500 million estimated by the IEC. Nevertheless, even if the cost difference between the two technology options was that as identified by the IEC it would still render the HVDC option unacceptable under this criterion.

The excessive cost of the HVDC technology is, on its own, sufficient reason for EirGrid to discount it as an option for the implementation of the North-South Interconnection Development.

d) Have a power carrying capacity in the region of 1,500MVA, and connect between appropriately robust points[25] on the transmission networks north and south of the border;

Both technology options are equal under this criterion.

e) Facilitate reinforcement of the local transmission network in the north-east area

Both technology options are equal under this criterion. The manner in which this reinforcement is achieved is described in **section 4.2** of this Report.

f) Facilitate future grid connections and reinforcements

All circuits forming a meshed transmission network have the potential to be 'tapped' into at an intermediate point to provide a new grid connection or reinforcement sometime in the future. It is envisaged that the circuit that forms the proposed North-South Interconnection Development will require an intermediate substation in the vicinity of Kingscourt at some future point in time, and others although not planned are possible. The facilitation of future grid connections is therefore an important consideration of the technology choice.

As stated previously, a DC circuit does not naturally integrate within an AC network and a consequence of this is that a DC circuit embedded in an AC network would not facilitate future grid connections and reinforcements. If the North-South Interconnector were to be developed using HVDC technology, then the cost of the planned 'tap in' to the circuit near Kingscourt would, based on the estimates of the IEC, be in excess of €100 million more than the cost of tapping into an equivalent AC circuit. This would make the plan ultimately to reinforce the north-east area by developing a new substation near Kingscourt uneconomic, and that reinforcement would

[25] The meaning of 'appropriately robust points' in the context of this Report is explained in **section 2.5.1**

have to be achieved by some other means, such as the building of new transmission lines into the area.

In addition to the excessive cost of tapping into a DC circuit, a 'multi-terminal' DC circuit (i.e. a DC circuit with more than two terminals) is established when an intermediate terminal is connected to facilitate the tap in. A multi-terminal DC circuit would require an even more complex control system than a two terminal circuit, thus increasing the already unacceptable risk of mal-operation.

The poor facilitation of future grid connections and reinforcements presented by the DC option makes the use of HVDC technology less preferred than a standard AC circuit when compared against this criterion for the implementation of the proposed North - South Interconnection Development.

g) Comply with good utility practice

There are no working examples in the world today of a DC circuit embedded in a small and isolated AC transmission network such as that on the island of Ireland. The examples of planned DC interconnectors in Europe that were identified in the IEC Report (that is the proposed France-Spain Interconnector and the proposed Norway–Sweden Interconnector) are not comparable with the proposed North-South Interconnector

The electricity networks in those four countries are much larger and stronger than those on the island of Ireland and they already have multiple AC interconnections with each other.

Interconnected Countries	Number of existing high capacity interconnectors	Combined Installed Generation Capacity (MW)	Generation Capacity as a ratio of that of the Island of Ireland
Ireland - Northern Ireland	1 Double Circuit	11,262	1
Norway - Sweden	5 Single Circuits	68,227	6
France - Spain	4 Single Circuits	223,366	19.8

Table 3.1: Comparison of Inter-Connected Networks[26]

[26] Figures for Norway-Sweden and France-Spain obtained from https://www.entsoe.eu/publications/general-reports/statistical-yearbooks/

The risk of failure, and the consequence of failure, is an important factor in deciding whether the embedding of a DC circuit in an interconnected network is, or is not, good practice. There is currently only one interconnector between Ireland and Northern Ireland and these two networks are required to merge into each other and to operate as if they were one network. The proposed North-South Interconnection Development, with a power carrying capacity of 1,500 MVA, will become the 'backbone' of this 'all-island' network.

By contrast the proposed France/Spain and Norway/Sweden Interconnectors are upgrades in cross border power transfer capacity between networks that are already highly interconnected. The strategic importance of these interconnectors for France/Spain and Norway/Sweden will not be as critical for overall system security as the North-South Interconnector will be for the 'all-island' network.

These interconnectors therefore do not represent good examples of a DC circuit embedded in a small and isolated AC transmission network such as that on the island of Ireland.

It is on this basis that implementing the proposed North-South Interconnection Development using HVDC technology would not be considered as complying with 'good utility practice' or complying with 'good international practice'.

3.3.1 Overall Conclusion on a DC circuit as an alternative to a standard AC circuit

The IEC concluded in its report that, if the proposed North-South Interconnection Development must be implemented using underground cable, then "*with today's technology the best solution is a VSC HVDC solution combined with XLPE cables*". EirGrid concurs with this conclusion, while at the same time stressing that EirGrid does not believe that the interconnector must be undergrounded. Based on the assessment outlined above, and as summarised in **Table 3.2** below, EirGrid is still of the opinion that a VSC HVDC circuit is not an acceptable option for the proposed North-South Interconnection Development.

Points	Description	AC	DC
	Comply with EirGrid's Statutory and Regulatory Obligations		
a)	Safety		
b)	Reliability and security		
c)	Cost effectiveness		
	Due regard to the environment		
	Meet the Specific Needs of the Project		
d)	1500 MVA Capacity and appropriately strong points of interconnection		
e)	Reinforce the North-East transmission network		
3	Meet the General Objectives for All Projects of this Type		
f)	Facilitate future grid connections and reinforcements		
g)	Good Technical Solution – Be 'best international practice' with proven technology		

**	Preferred, limited impact, acceptable
**	Some impact, some difficulty
*	Least preferred, major impact, unacceptable

Table 3.2: Overview AC versus DC - Strategic Constraints of Potential AC and DC Transmission Alternatives

Implementing the development using VSC HVDC would be vastly more expensive and technically inferior to a standard AC solution. For these reasons, EirGrid is proposing an AC solution.

Having re-considered this issue as part of the re-evaluation process, EirGrid has decided to propose a HVAC circuit. Accordingly, it is necessary to consider whether such a circuit should be entirely implemented using AC overhead line technology, AC underground cable technology or a combination of both.

3.4 UNDERGROUNDING THE ENTIRE INTERCONNECTOR USING AC UGC

In 2009, when preparing the Environmental Impact Statement (EIS) associated with the application for approval, EirGrid considered the option of undergrounding the entire North-South Interconnection Development using AC underground cable. This consideration is described in Chapter 4 of that EIS.[27] EirGrid's conclusion at that time was that the entirely undergrounded AC alternative would not be an acceptable solution as:-

- It would not be the least cost technically and environmentally acceptable solution, and
- Its use would not be in compliance with good utility practice.

Many of the observers who participated in the consultation process associated with that 2009 application for approval disagreed with EirGrid's conclusion, and referenced, either directly or indirectly, the Askon Report in support of their contention. The Askon Report 'Study on the Comparative Merits of Overhead Lines and Underground Cables as 400 kV Transmission Lines for the North-South Interconnector Project' (2008) was commissioned by North East Pylon Pressure (NEPP).

The IEC reviewed the Askon Report as part of its review of the proposed North–South Interconnection Development. The IEC Report was published in January 2012 and stated that, while the author of the Askon Report, Professor Noack *"is well known in the industry for his work on lightning protection and overvoltages"* the "*Commission, is however, not aware of his expertise in grid development, grid operation, economic aspects and undergrounding*". The IEC then went on to state that it had found "*several questionable statements*" in the Askon Report. The more significant of these were:–

- The IEC does not agree with the Askon Report when it states that long 400 kV AC underground cables "*are not really a problem and that experience is there".* The IEC found that there are no 400 kV underground cable circuits in the world that approach the length required for the North-South Interconnector and that this is because of sound technical reasons.
- The analysis by Askon of the reliability of AC underground cable circuits is not valid as it "*is not backed up by actual data".*
- The costs estimates for AC underground cable in the Askon Report are significantly understated as insufficient provision is made for the cost of installation.

Overall, the IEC concluded that the findings of the Askon Report "*are not consistent with industrial practice for other projects in Europe"* that are similar in size and form to the North-South Interconnection Development and which "*have been executed, are under construction or are in planning".* The IEC

[27] EirGrid plc (2009). ' Meath-Tyrone 400 kV Interconnector Development - Environmental Impact Statement', available from http://www.eirgridprojects.com

Report goes on to make only one recommendation and that is that the proposed North-South Interconnection Development should not be implemented using the entirely undergrounded AC cable option.

The position of the IEC regarding the Askon Report is consistent with EirGrid's position on that report. Having reviewed the undergrounding issue as part of the re-evaluation process and, in particular, having considered the IEC Report, EirGrid concurs with the recommendation of the International Expert Commission that the North-South Interconnector Project should not be implemented using the entirely undergrounded AC cable option.

3.5 HIGH VOLTAGE AC XLPE UGC AND EXTENT OF ITS USE

Although EirGrid has considered and then out ruled using the entirely undergrounded AC option for the implementation of the proposed North-South Interconnection Development, the option of using a hybrid AC solution, i.e., a combination of AC underground cable and AC overhead line, remains a viable option. The International Expert Commission found in this regard that the hybrid AC solution is technically feasible but within limitations on the cumulative length of the underground cabled sections. As it is likely that some 400 kV underground cable will be utilised in this project it is appropriate that consideration be given to the current 'state of the art' for such cable.

A number of the written and oral submissions presented during the previous application process made the point that XLPE (cross linked polyethylene) insulated cable is the 'state of the art' for high voltage AC underground cable (UGC) in the world today. EirGrid agrees with this assertion and has been of this opinion for many years. EirGrid adopted the use of high voltage XLPE cable at an early stage in its commercial development. The first 110 kV XLPE cable in Ireland was installed in 1978. The first 220 kV XLPE cable in Ireland was installed in 1984 while the first 400 kV XLPE cable was installed in 2012. The installation of long lengths (greater than 1000 metres) of 400 kV XLPE UGC only became possible in the late 1990s with the development of a suitable cable joint for connecting lengths of such cable together.

In the period 1997 to 2009, eleven significant 380 kV/400 kV XLPE projects[28] (i.e. projects that involved a circuit length in excess of 2 km) were completed in Europe. The longest of these was the 20 km long Elstree - St John's Wood 400 kV cable project in London. This cable is installed in a three metre diameter air conditioned tunnel. The combined circuit length of these eleven European 'projects of significance' amounts to approximately 196 km, with a cumulative single phase cable length of some 640 km. It should be noted that a minimum of three single phase cables is required per circuit.

[28] Refer to the joint paper 'Feasibility and Technical Aspects of Partial Undergrounding of Extra High Voltage Power Transmission Lines' (December 2010) that was submitted to the European Commission in December 2010 by Europacable and ENTSO-E.

If the proposed North-South Interconnection Development was to be implemented in its entirety using 400 kV XLPE cable, it would require approximately 810 km (6 X 135 km) of single phase cable. This means that this single project would require much more 400 kV XLPE cable than has been installed throughout Europe in the past thirteen years. It appears, based on an analysis of reports (Europacable, Cigré [29], T&D World[30]) of major EHV (extra-high voltage - in the range 315 kV to 500 kV) UGC projects carried across the world in the past fifteen years, that if the North-South Interconnector Development was to be implemented using UGC, there would be more EHV XLPE cable installed on the island of Ireland than in all of mainland Europe or in North America.

In contrast to the relatively small quantity of EHV UGC that has been installed in Europe during the period 1997 to 2009, it is interesting to note that in the period 2000 to 2009 over 10,000 km of EHV OHL was installed in mainland Europe (17 member states of UCTE[31]). The reason for this overwhelming preference among UCTE members for OHL can be clearly understood in a letter, dated 14 January 2008, from the Secretary General of the UCTE to APG[32] (the Austrian Power Grid Company) wherein it states:-

> "*For the time being 400kV AC cable systems cannot compete with overhead power lines in the transmission grid. Using cables for lines in interconnected operation (400 kV backbone) presents serious technical, financial and environmental drawbacks.*"
>
> and
>
> "*UCTE therefore recognizes overhead power lines as the most reliable and most secure technical solution for transmitting electricity over long distances. Furthermore based on different studies within UCTE an overhead line is the more efficient and more economic way for the transportation of electricity compared with underground cables at the 400 kV level*".

This overwhelming preference for OHL among European utilities is expected to continue into the future. In this regard, the *Ten Year Network Development Plan 2012* issued by ENTSO-E[33] indicates that in the period covered by the Plan, a further 28,400 km of new EHV (i.e. greater than 330 kV) AC OHL is planned to be installed in Europe while during the same period only some few hundred km, in predominantly short lengths, of 400 kV AC UGC is planned. The reason for the preference for 400 kV OHL is explained in the Plan (at page 81) as follows:-

[29] Cigré is an acronym for The International Council on Large Electric Systems

[30] Transmission and Distribution World magazine, available at http://www.tdworld.com

[31] UCTE is an association of Transmission System Operators from mainland Europe (excluding Scandinavia and the countries of the former USSR). UCTE is now a part of ENTSO-E. The data was obtained from the UCTE Statistical Yearbooks 2000 and 2009

[32] Secretary General of UCTE (2008). Letter from the Secretary General of UCTE to APG (the Austrian Power Grid Company), available at http://http://www.eirgridprojects.com/aboutus/publications/).

[33] ENTSO-E is an acronym for the European Network of Transmission System Operators for Electricity. It has 42 members drawn from 34 countries. The 'Ten Year Network Development Plan 2012' is available at http://www.entsoe.eu

> "*New 400 kV AC OHL projects are in technical, economic, and ecological terms the most efficient solution for long distance electricity transmission. Indeed, such reinforcements integrate straightforwardly into the existing grid since this technology has been the standard for a long time*".

It is clear therefore that the electricity utilities of Europe still consider the use of OHL for 400 kV circuits to be best practice, and that 400 kV UGC is only used in very limited situations and only over relatively short lengths. The installation of 810 km (6 X 135 km) of 400 kV UGC in Ireland in one project, or even in a multiple of different projects, could not be described as complying with good utility practice.

3.6 UPDATE ON RELIABILITY STATISTICS FOR HIGH VOLTAGE AC UGC AND OHL

In April 2009, Cigré published the results of the most comprehensive study of UGC reliability carried out to date.[34] This study was based on the results of a survey of 73 utilities from around the world. Of interest is the information received on the performance of 1,388 km of XLPE cable with a voltage rating in the range 220 kV to 500 kV. Applying the calculated fault rates of this 1,388 km of installed cable, to the length of cable (2 x 140 km) that would be required for the North-South Interconnector project, gives a projected fault rate of 'one fault per annum'.

In addition, the Cigré study found that the average time taken to repair a fault on a 400 kV XLPE cable is 25 days if the cable is direct buried, and 45 days if installed in a tunnel. A direct buried cable is, however, ten times more likely to be damaged due to external factors than a cable installed in a tunnel the study concluded.

Compare this 'fault rate' and 'average time to repair' of UGC with that of an equivalent OHL. EirGrid's latest fault statistics for its OHLs shows that in the case of the 439 km of existing 400 kV OHLs, there has not been a single sustained fault - that is, a fault that required repairs to be carried out before the line could be returned to service after a fault trip - in 25 years of service. This length of 400 kV OHL is, however, probably too small a sample for determining meaningful performance statistics. Meaningful statistics can, however, be obtained by considering the fault statistics of the combined quantity (approximately 2,200 km) of 400 kV, 275 kV and 220 kV OHLs under EirGrid's control. Taking the fault statistics of this 2,200 km of OHL for the five year period 2005 to 2009, gives a projected fault rate for the proposed 400 kV North - South Interconnector OHL of "*one fault every 26 years''*.

The statistics also show that the average duration that an OHL circuit will be out of service for repair after a fault is considerably less than that of a UGC circuit - less than one day in the case of OHLs, and 25 days in the case of a 400 kV UGC. This is summarised in **Table 3.3** below.

[34] Cigré. 'Update of Service Experience of HV Underground and Cable Systems, ISBN 978 -2-85873-066-7' (2009), available from http://www.cigre.org on request

UGC and OHL	Projected Fault Rate for N-S Interconnector	Average Time to Repair
UGC – directly buried cable (based on 1,388 km of XLPE cable with a voltage rating in the range 220 kV to 500 kV) **Source:** Cigre	1 fault per annum	25 days
OHL (2,200 km of 220 kV, 275 kV and 400 kV OHL) **Source:** EirGrid (2005 – 2009)	1 fault every 26 years	Less than 1 day

Table 3.3: Summary of Comparative OHL and UGC Statistics

The findings of the Cigré study are consistent with EirGrid's position, as outlined in the 2009 EIS, that OHLs have a better service availability than UGCs. While the 400 kV UGC alternative was not discounted in the 2009 EIS on the basis of its poorer reliability, in comparison with the equivalent 400 kV OHL, the risk of prolonged unplanned circuit outages must always be a factor when a TSO is considering UGC particularly when the circuit in question is to be a backbone circuit of the transmission network.

3.7 UPDATE ON THE WORLD'S LONGEST HIGH VOLTAGE AC XLPE CABLE CIRCUITS

The longest high voltage AC XLPE cables operating in the world today are submarine cables. The longest is the 105 km interconnector from Great Britain to the Isle of Man. It was commissioned in 2000. It has a power carrying capacity of 40 MW and operates at 90 kV. The second longest is a 100 km submarine cable that was commissioned in Norway in 2010 to supply an offshore floating oil / gas platform. This cable also has a capacity of 40 MW, but operates at the higher voltage of 115 kV. The record for the longest high voltage AC cable in the world is likely to be broken when the proposed 125 km interconnector between the islands of Sicily and Malta is commissioned. The Malta-Sicily interconnector[35] will cost €178 million; have a power carrying capacity of 200 MW and an operating voltage of 220 kV; 100 km of it will be submarine cable with the remaining 25 km UGC located on the island of Sicily.

All of these long cables are radial connections and as such they do not form part of a meshed transmission network, unlike the proposed North-South Interconnector Development. They also have a much lower power carrying capacity than that which is required of the North-South Interconnector. The North-South interconnector is required to have a power carrying capacity in the region of 1,500MW and by implication; therefore, it must also have a voltage rating that is much higher than that of these very

[35] Available at www.nexans.com/eservice/Corporate-en/navigatepub_0_28532/Nexans_wins_contract_for_the_Malta_to_Sicily_power.html

long cables. The environmental impacts of UGC, the technical difficulties of UGC, and the cost of UGC increases rapidly with increase in voltage rating and power carrying capacity. Those long HV undersea cables are therefore in no way comparable with 400 kV UGCs.

The longest 'on-land' AC XLPE cable, with rated voltage of 400 kV or higher, operating in the world today is a 40 km double circuit cable in Tokyo, Japan. These 500 kV, 900MW cables were commissioned in 2000. The longest such cable in Europe is the Elstree - St John's Wood 400 kV 1,600MVA circuit in London, which was commissioned in 2005. Unlike the long undersea cables mentioned above, these cables have power carrying capacities, and voltage ratings, that are comparable with that of the proposed North-South interconnector: There, however, the similarities end, in that:-

- The cables in London and Tokyo are installed under the streets and buildings of two of the largest cities in the world. Both of these cable circuits are installed in air conditioned tunnels. The North-South Interconnector would traverse open farm land in the main;

- The North-South Interconnector will be about 135 km in length. The long cables in London and Tokyo are a fraction of this length. The technical difficulties associated with long lengths of EHV UGC increase rapidly with increase in circuit length; and

- The transmission networks in Great Britain and Japan are orders of magnitude bigger, and therefore electrically stronger, than that of the transmission network on the island of Ireland. The stronger the transmission network the greater its capacity to accommodate EHV UGC.

The longest 'on-land' 220 kV AC XLPE cable in the world is an 87 km cable in the State of Victoria, Australia. It was installed to provide a power supply to a new desalination plant for the city of Melbourne and its surrounds. During the statutory consultation for EirGrid's 2009 application, it was stated by observers that the installation of this long AC UGC in Australia was evidence that 'long' high voltage UGCs are feasible. It is important therefore to consider how such a long high voltage AC cable could be justified by the developer.

The Victorian Desalination Project is being developed by a PPP (public private partnership) between the State of Victoria and a private developer. The private developer is responsible for the design, installation and commissioning of the electricity connection between the existing transmission grid and the new desalination plant. The UGC circuit operates at 220 kV and has a power carrying capacity of 145MW. Due to the high charging current resulting from the capacitance of this length of 220 kV cable, it was necessary to construct two intermediate substations along the route to enable the connection of reactive compensation equipment. One of these substations also provides a power supply for a water pumping station. The UGC circuit consists of three cables, laid in pipe ducts in trefoil formation, in a trench 1.4 m deep by 0.5m wide. It is co-located for 79 km of its 87 km length in the same easement as the water transfer pipeline that connects the desalination plant to the existing water pipeline grid.

From the local electricity supply company's perspective, the 220 kV cable is a service connection supplying a single electricity customer. It does not form part of the meshed transmission network.

When it faults, it will be the responsibility of the owner - the PPP - to find and repair the fault. At these times, only the desalination plant will be without supply, while the wider interconnected transmission network will not be impacted in any way.

The fact that private developers, operating in a non-regulated environment, can sometimes justify using HV UGC to connect their developments (large industrial complexes such as this desalination plant or large wind farms or private power stations) to the transmission system in no way invalidates a responsible TSO's preference for OHL. This is because the decisions of such private developers are based on very different criteria to those that apply to a TSO. It is for this reason that the Ecofys Report found that the risk to the overall system integrity of using long lengths of UGC to connect a single load or generator to the transmission system is low and as a result these developments can often be justified. The same cannot be said however for embedding similarly long lengths of UGC into the meshed transmission network. The Ecofys Report goes on to conclude (p 84) that to suggest "*that UGC is a technically feasible alternative to OHL in meshed transmission networks based on those examples would be inaccurate*". EirGrid agrees with this conclusion, and is of the opinion that this long HV UGC in Australia is not comparable with the circuit required for the proposed North -South Interconnector for the following reasons:-

- The power carrying capacity of the UGC in Australia, at 145 MW, will be around 10% of that required of the North-South Interconnector while the operating voltage will be only 55% of that of the Interconnector. As stated previously, the environmental impacts of UGC, the technical difficulties of UGC, and the cost of UGC, increases rapidly with increase in voltage rating and power carrying capacity; and

- The UGC in Australia will not form part of the meshed transmission network while the North-South Interconnector will be part of the meshed transmission network on the island of Ireland. The Interconnector will, therefore, be expected to comply with much higher operation and reliability standards than that of a service connection to a single customer in Australia.

One of the project objectives/design criteria for the proposed North-South Interconnector circuit, as stated in **section 3.1** above, is that it will have a power carrying capacity in the region of 1,500MVA and connect between appropriately robust points on the transmission networks north and south of the border. To try to achieve this using an entirely UGC option would require the installation of two *circa* 135 km-long UGC circuits. It is clear from the above that no country in the world has ever implemented such a project, or anything comparable. It is also evident from ENTSO-E's 'Ten Year Network Development Plan 2010-2020' that there are no plans to install anything comparable in Europe in the next ten years.

It is concluded therefore that to implement the proposed new North-South Interconnector using long lengths of UGC would not comply with good utility practice.

3.8 UPDATE ON THE COST COMPARISON OF AC UNDERGROUND CABLE AND AC OVERHEAD LINE

3.8.1 Capital Costs

Three separate comparative studies of UGC versus OHL were carried out in Ireland during the period 2008/2009, by Askon ('Study on the Comparative Merits of Overhead Lines and Underground Cables as 400 kV Transmission Lines for the North-South Interconnector Project' *(*2008) commissioned by North East Pylon Pressure (NEPP)) and the previously mentioned Ecofys (commissioned by the DCENR) and PB Power (commissioned by EirGrid/NIE) reports. The studies all found that the capital cost of UGC ranged from three to eight times that of an equivalent OHL[36]. EirGrid considered the three studies, and concluded that the cost multiplier of UGC over OHL would be closer to eight times than to three. This being the case, if UGC was installed for the entire 140 km circuit, and even if this was technically possible and appropriate (which EirGrid, as statutory TSO has concluded it is not), it would cost in the region of €500 million more than that of the equivalent OHL. Even if the cost multiplier of UGC was at the lower end of the range, i.e., three times the cost of OHL, this would still amount to more than €150 million being added to the cost of the project. Having considered the issue during the re-evaluation process, EirGrid has concluded that this level of cost increase, on its own, regardless of the additional technical problems of UGC, effectively discounts using UGC for any significant length in this development.

3.8.2 Life Cycle Costs

In some of the written and oral submissions presented during the previous application process, it was acknowledged that the capital cost of UGC was much greater than that of OHL. It was, however, asserted in these submissions that UGC is more efficient than OHL and that over its life cycle a UGC would incur lower electrical losses and, therefore, lower operating costs than an equivalent OHL. It was further stated that if the cost of the two technologies were compared over a typical life cycle, then UGC might well prove to be the more cost effective option.

Having carefully re-considered these assertions as part of the re-evaluation process, EirGrid has concluded that this statement is incorrect, as it is based on a misunderstanding of transmission networks operation. UGCs and OHLs have different electrical characteristics with the result that a lightly-loaded UGC (typically less than 50% loaded) will have higher electrical losses than an equivalent lightly-loaded OHL, while a heavily-loaded UGC (typically greater than 50% loaded) will have lower losses than a heavily-loaded OHL. Circuits in a meshed transmission network are required, under system normal conditions, to have a contingency capacity. In other words, they are required to have sufficient spare capacity to cater for the sudden loss of another circuit on the network. In practice, this means that transmission circuits, and particularly backbone circuits, typically operate at less than 50%

[36] Note: As these studies were only interested in calculating the cost differential between the options, they did not include in their estimates provision for project costs that are common to all options. Their cost estimates for each option cannot therefore be considered as 'whole of project' cost estimates.

of their power-carrying capacity. Therefore, OHL transmission circuits incur lower electrical losses than equivalent UGC transmission circuits during their lifetime. This is confirmed, in the case of the transmission networks of mainland western Europe, in the letter from the Secretary General of UCTE (as previously referenced), dated 14 January 2008 to the Austrian Power Grid Company (APG), in which it was stated that, "*based on different studies within UCTE an overhead line is the more efficient and more economic way for the transportation of electricity compared with underground cables at the 400 kV level*".

EirGrid can confirm that the average energy transfer on the proposed new North-South Interconnector circuit, over its lifetime, will be significantly less than 50% of its power carrying capacity. It is therefore a fact that using OHL for the new Interconnector will incur lower electrical losses than using equivalent UGC alternative.

3.9 CONSIDERATION OF A HYBRID AC OVERHEAD LINE/AC UNDERGROUND CABLE OPTION

In the 2009 EIS, it is stated that the joint development philosophy of EirGrid and NIE for the proposed transmission line, which will follow an alignment across a rural area, is "*firstly to seek a viable and environmentally acceptable OHL solution; the use of short lengths of UGC will only be considered in the event that an OHL solution cannot be found, and where it can be confirmed that the use of UGC does not exceed the system's capacity to absorb such cables*".

As part of the previous application for approval, EirGrid identified (and sought approval for) a short section of the overall proposed circuit where UGC was deemed to be the most appropriate option. This short section of UGC was fully contained within the confines of Woodland Substation. Having reviewed the content of submissions made as part of the previous planning process and in the context of responding to the Preliminary Re-evaluation Report, EirGrid considers that there are no other sections of its proposed North-South Interconnector Development where the undergrounding of a section of the interconnector circuit would be justified.

When considering the option of a hybrid AC OHL/AC UGC option for a 400 kV project, it is essential to understand the environmental, technical and cost implications of such a development. These issues are assessed in general terms in a joint position paper prepared by Europacable and ENTSO-E that was submitted to the European Commission in December 2010 ('Feasibility and Technical Aspects of Partial Undergrounding of Extra High Voltage Power Transmission Lines' (December 2010).[37] The joint paper "*merges the experience European Transmission System Operators (TSOs) have gained with the inclusion of underground EHV cables into their transmission networks over many years with the technical expertise of the leading XLPE EHV cable systems manufacturers in Europe*". The implications, for the proposed North-South interconnector are considered below.

[37] Available at http://ec.europa.eu/energy

3.9.1 The Hybrid Option - Environmental Issues

The size of the AC UGCs required for the North-South Interconnector would be such that they could not be installed under public roads or under the disused railway line, as these roads and railways are not sufficiently wide. The only practical option would be to install the cables directly across farmland. This would have the following environmental implications:-

- The construction effort associated with the installation of the UGC section would be considerably greater than that of the OHL. The UGC would require a construction swathe, as wide as a 22-metre wide dual carriageway, to be cut through the countryside. This would result in much greater disruption to farming and other activities during the construction phase than would arise from the construction of the OHL;

- The UGC construction swathe will cut through every hedgerow in its path, leaving a permanent gap. The hedgerow will not be allowed to re-establish itself as deep rooted vegetation cannot be permitted to grow in proximity to UGCs. This is unlike the case of the OHL where in many cases the OHL will fly over the hedgerows without unduly interfering with them. Where a mast is positioned straddling a hedgerow, a section of the hedgerow will be removed during construction, but it will be allowed to re-establish itself afterwards, and management of the hedgerow thereafter will be required only to prevent its interference with the overhead line;

- No buildings are permitted within a UGC reserve[38]. Although not desirable, buildings can, and have been, constructed below OHLs; and

- It would be necessary to have a substation at every location where the 400 kV circuit changes from OHL to UGC. Where a substation is required solely for the purpose of accommodating a transition from UGC to OHL, it is known as a 'transition station' or as a 'sealing end compound'. A typical 400 kV transition station has the same appearance as a small 400 kV substation. It would require a land take of about one hectare. It would consist of an inner compound enclosing the live equipment and a small building, with a buffer strip around the compound to accommodate an earth berm, and / or vegetation, for screening.

In the previous application for approval, a short section of 400 kV UGC was proposed in the existing Woodland Substation in order to avoid creating a localised congestion of OHLs. As the proposed UGC was fully contained within the confines of Woodland Substation, transition stations were not required, and as a result the potential for adverse environmental impact, and significant cost of such installations would not have arisen.

[38] Note: This applies where the cables are buried directly into the ground. If the cables are installed in a tunnel, and can be accessed via the tunnel, then buildings and other infrastructure can be constructed above, provided there is sufficient clearance.

Photo 1: Example of a 400 kV Underground Cable to Overhead Line Transition Station

3.9.2 The Hybrid Option - Technical Issues

Inserting a section of UGC into an OHL circuit will have a negative effect on the reliability performance of the overall circuit. The latest fault statistics confirm that, on a kilometre for kilometre basis, 400 kV OHLs have a much better service availability record than 400 kV UGCs.

The risk to transmission system stability associated with the installation of a long length of EHV UGC exists, regardless of whether that long length of cable forms an entire UGC circuit, a single section of a hybrid OHL/UG circuit, or is made up of multiple shorter sections of UGC within a single hybrid OHL/UG circuit. As a result, some utilities have set down the maximum permissible length of EHV UGC that can be installed on their transmission system as a single UGC circuit or as part of a hybrid UGC/OHL circuit and the maximum permissible cumulative length of EHV UGC on the system. In the Netherlands, for example, the maximum permissible length of a single 400kV UGC is 20 km. It is also the case that the longest 400 kV UGC in Europe is a 20 km cable installed in an air conditioned tunnel in London. When considering what should be the maximum permitted length of 400 kV UGC on the island of Ireland, EirGrid, NIE and SONI must take account of the 'accompanying risk of failure and consequence of such failure'. The transmission system on the island of Ireland is much smaller than that on the island of

Great Britain and of course much smaller than that of mainland Europe, to which the system in Netherlands is connected. The transmission system in Ireland is therefore able to accommodate much shorter lengths of 400 kV UGC than is the case in Great Britain or the Netherlands, for example. The TSOs and the Transmission Asset Owners (TAOs) in Ireland are also much smaller and less well-resourced than their counterparts in Great Britain and the Netherlands and must, therefore, carry correspondingly smaller risk.

Accordingly, having carefully considered the issue of partial undergrounding as part of the overall re-evaluation process, it is EirGrid's opinion that the maximum length of 400 kV UGC that can be installed as part of the North-South Interconnector must be considerably less than 20 km, whether installed in one continuous length or in an accumulation of shorter lengths.

3.9.3 The Hybrid Option - Cost Issues

The PB Power Report contains the most detailed site specific cost comparison of UGC and OHL for the proposed new North-South Interconnector carried out to date. The PB Power Report found that a kilometre of 400 kV UGC would cost, on average, €3.6 million more than the equivalent OHL.

Transition stations would add approximately €5 million per installation.

UGC is capacitive in nature. Capacitance produces a form of 'reactive power'. A 400 kV AC UGC typically 'produces' about 10 MVArs[39] (megavolt ampere reactive) of capacitance per km while a comparable 400 kV OHL will only 'produce' 0.5 MVars, a 20 fold difference. Capacitance causes the system voltage to rise. On a 400 kV UGC it has the effect of causing the voltage to rise, as one moves along the length of the cable. If the cable is sufficiently long the voltage will eventually rise above the design rating of the cable. Exceeding the voltage rating of a cable, even by a small margin, will result in an acceleration of the ageing process of the insulation and ultimately premature failure of the cable. The excessive amount of capacitance produced by the UGC can be cancelled out by installing appropriately sized reactors. The process of controlling capacitance by installing reactors is known as 'reactive compensation'.

If the accumulative length of the AC UGC is of sufficient length to require reactive compensation then this would add substantially to the cost and increase the land take at one or more of the transition compounds.

[39] MVAr is the unit of measurement of reactive power.

3.9.4 Conclusion on Hybrid UGC/OHL Option for the Proposed North-South Interconnector

A hybrid UGC/OHL circuit may be feasible, within specified limits, and where the cost of using the short length of UGC can be proven to be an environmentally advantageous and cost-effective way of overcoming an otherwise unavoidable environmental or technical constraint to the preferred OHL.

3.10 ALTERNATIVE OVERHEAD LINE SUPPORT STRUCTURES

A number of studies, that together comprise a comparative evaluation of potentially technically feasible support structures for the proposed 400 kV overhead line, were carried out by ESBI on behalf of EirGrid and NIE during the period 2006 to 2009. A summary of these studies was published in November 2009 in the report 'Meath – Tyrone 400 kV Interconnection Development: Tower Outline Evaluation and Selection Report'.[40]

The studies evaluated a range of designs that included a number of lattice steel structures, wooden structures and steel monopole structures.

The studies concluded that wooden structures would not be technically feasible for 400 kV overhead lines in Ireland due to the heavy loading conditions and electrical clearance requirements. Steel monopole designs were found to be technically feasible with some benefits such as a small footprint requiring a reduced corridor width and relatively short construction duration when compared with traditional lattice steel structures. Due to these benefits a steel monopole design has already been used in Ireland to good effect for a 110 kV overhead line running through an urban area in Cork (refer to **Photo 2** below).

[40] Available at http://www.eirgridprojects.com

Photo 2: 110 kV Monopole Overhead Line in Cork

On balance however the studies found that for a 400 kV overhead line, located in a rural setting in Ireland, a lattice steel structure is preferred. This was on the basis that while monopole designs are sometimes preferred in urban or peri urban areas due to a combination of their reduced visual impact and reduced corridor width; the same advantages would not apply for a 400 kV overhead line in an entirely rural setting. At 400 kV the superstructure of the monopole design would be a large dense visually intrusive steel pole with a diameter of up to six metres at its base. In addition due to the shorter maximum span that can typically be achieved with a monopole design a greater number of structures are required per kilometre than is the case with the lattice steel design.

Having identified lattice steel as the preferred design for the support structures for the proposed 400 kV overhead line, a range of designs was considered in consultation with a designer/manufacturer of lattice steel structures. This resulted in four options being advanced for detailed comparative assessment. These were the classic or standard 401 type structure as used in the mid-1980s for the existing 400 kV overhead lines in Ireland and the modern designs of the IVI type, VVV type and inverted delta type (refer to **Figure 3.1** below).

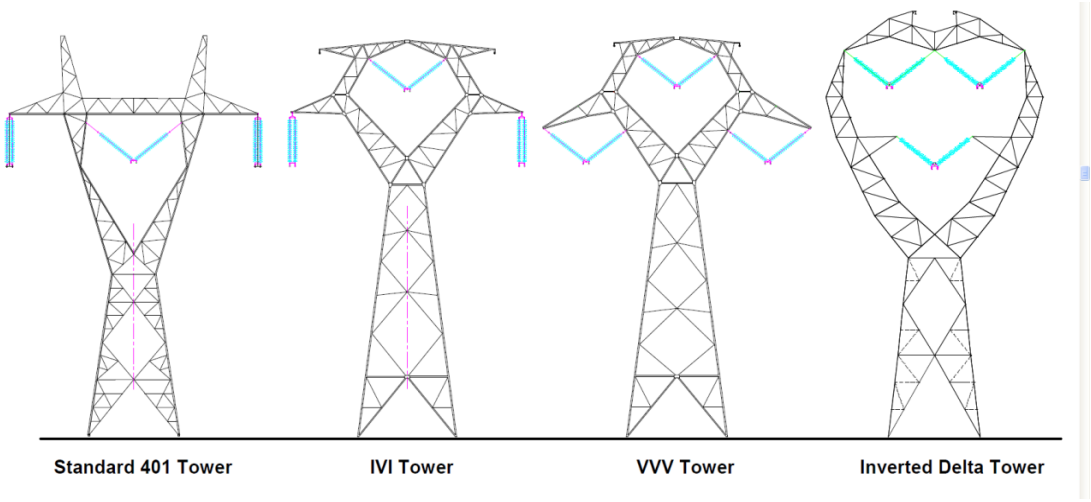

Figure 3.1: Outline Drawings of Lattice Steel Towers (not to scale)

The four options were compared against a range of criteria including visual impact, technical performance, competitive market for procurement and cost. The outcome was that the IVI design was chosen as the preferred option, primarily on the basis of its reduced visual impact. This was the option proposed in the application for planning approval in 2009. The 2009 Report was reviewed during preparation of the 'Preliminary Re-evaluation Report' in 2011, and its conclusions were considered, at that time, to be still appropriate for the proposed Interconnection Development. The IVI tower is therefore the emerging preferred option for progression to the next stage, Confirm Design Stage, of the project.

The report of the International Expert Commission (IEC), published in January 2012, concluded however that while a high voltage AC overhead line "*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, EirGrid will further consider alternative structures before finalising the preferred project solution.

3.11 CONCLUSIONS

Having re-considered all the technology options set out above, EirGrid concludes as follows:-

- The DC option, even one using the latest VSC HVDC technology, is not an acceptable option for the specific nature, extent, and intended function of the proposed North-South Interconnection Development. Implementing the development using VSC HVDC would be significantly more expensive and technically inferior to a standard AC solution. For these reasons, EirGrid is proposing a standard AC solution.

- The International Expert Commission concluded that an entirely undergrounded AC option is not an acceptable solution for this project for technical reasons. This conclusion is shared by EirGrid.

- The use of long 400 kV AC cables on the Irish transmission system is not feasible within the constraints of EirGrid's statutory obligations.

- A 400 kV OHL is the best technical solution for this development and would be significantly less costly than any UGC alternative;

- A hybrid 400 kV UGC / OHL circuit may be feasible, but only if the length of UGC to be installed is relatively short; and where the cost of using the short length of UGC can be proven to be an advantageous and cost effective way of overcoming an environmental or technical constraint to the preferred OHL; and where it can be confirmed that the use of UGC does not exceed the transmission system's capacity to accommodate such cables.

- EirGrid is obliged, within the terms of its licence as TSO, to develop the transmission system using least cost, technically and environmentally acceptable solutions. Based on all of the above and in order to comply with its licence requirement, EirGrid is proposing that the new North-South Interconnector Project is substantially comprised of 400 kV OHL.

- The emerging preferred support structure for use on the proposed 400 kV overhead line development is the lattice steel structure known as the 'IVI' tower. However, EirGrid will further consider alternative structures before finalising the preferred project solution.

- For the North-South Interconnector Project the objective is to firstly seek a viable and environmentally acceptable 400 kV OHL solution; however, the use of short lengths of 400 kV UGC can be considered only where it can be proven to be an environmentally advantageous and cost effective way of overcoming an otherwise unavoidable environmental or technical constraint to the preferred OHL.

4 IDENTIFICATION OF PROJECT STUDY AREA

4.1 INTRODUCTION

The proposed North-South Interconnection Development that was the subject of the previous application for planning approval was originally conceived, prior to 2005, as two separate projects to meet two separate identified needs. These were:

- To provide a secure electricity supply to the north-east area of Ireland; and
- To increase interconnection capacity between Ireland and Northern Ireland.

The two separate projects were formerly known as the Cavan-Tyrone Project and Meath-Cavan Project.

The Cavan-Tyrone project, promoted jointly by EirGrid and Northern Ireland Electricity (NIE), was identified as a way of providing additional cross-border power transfers. North of the border this circuit was identified as most appropriately connecting to the existing Tandragee-Magherafelt/Tamnamore 275 kV double circuit OHL, at a new substation node at Turleenan in County Tyrone. South of the border, it was originally planned to connect into the existing transmission system at a new substation node at some point along the existing Flagford-Louth 220 kV OHL.

The Meath-Cavan circuit, being proposed exclusively by EirGrid (formerly ESB National Grid) was identified as the solution to the requirement for reinforcement of the grid network in the north-east area of Ireland. It was designed to connect the existing transmission system node of Woodland Substation, with a planned new substation node in the vicinity of the point of intersection (at or near Kingscourt, County Cavan) of this new north-south oriented circuit with the existing east-west oriented Flagford-Louth 220 kV OHL.

However, it was recognised at an early stage from system load flow studies that the installation of the planned Cavan-Tyrone circuit, on its own, would not achieve the required increase in cross-border power transfer capacity, and that some associated reinforcement of the transmission system in the north-east area would also be required to facilitate such interconnection. In other words, it is the case that the terminus of the Cavan-Tyrone circuit at the existing Flagford-Louth 220 kV OHL would not constitute a sufficiently robust part of the transmission network to act as the southern terminus of the planned high capacity North-South Interconnector.

As these two projects separately progressed, it became apparent that there was an obvious synergy between them, particularly in view of the fact that they were both planned to connect to a new substation node along the existing Flagford-Louth 220 kV OHL; and that both projects could be facilitated by a shared substation at a common node. As such, the two projects became elements of a single overall project – the North-South Interconnector Development - that addressed the two separate identified needs.

The resulting single project comprised a new 400 kV overhead line (OHL) from the existing Woodland Substation in County Meath to the planned new Turleenan Substation in County Tyrone, with an intermediate substation located close to the point of intersection of the north-south oriented circuit with the existing east-west oriented Flagford-Louth 220 kV OHL circuit. The project had therefore three points of connection to the existing all-island transmission network, including connection to the robust parts of the existing transmission networks in Ireland and Northern Ireland. It was this project that was the subject of the 2009 application for planning approval, following identification, and environmental assessment of a specific route and associated development for the project.

4.2 APPROPRIATE POINTS OF CONNECTION TO THE EXISTING TRANSMISSION NETWORK

In the course of this re-evaluation process, EirGrid has reviewed both the principle and detail of the previously proposed development. EirGrid has reached the following key conclusions regarding the most appropriate points of connection of the North-South Interconnection Development to the existing transmission network (shown below in **bold** font). Connection points are important in the context of determining the study area for any transmission infrastructure project. The conclusions regarding project connectivity form the basis for subsequent identification of a study area within which to route the planned North-South 400 kV Interconnection Development.

- **The existing 400 kV Woodland Substation in County Meath should be the southern terminus for the Interconnection Development.** This derives from the need for the high-capacity Interconnector to connect between appropriately robust points on the transmission networks north and south of the border. This optimises the strategic benefit of establishing a high capacity link between the existing 400 kV network in Ireland with the existing 275 kV double circuit network in Northern Ireland, which is consistent with best practice in transmission infrastructure planning and development.

  Woodland Substation is currently one of the most robust nodes on the meshed all-island transmission network, and is the most northerly located 400 kV substation. Woodland Substation is therefore considered by EirGrid to constitute the most appropriate location for the southern terminus of the North-South 400 kV Interconnection Development.

- **In Northern Ireland, the northern terminus of the Interconnection Development will be at a planned new substation at Turleenan in County Tyrone.** This substation will effectively ensure intersection of the Interconnector circuit and the existing 275 kV OHL circuit between Tandragee and Tamnamore Substations; this will facilitate connection of the interconnector circuit to the existing Tandragee-Magherafelt circuit. NIE has identified Turleenan as a suitable site for the planned substation, having regard to the need for the Interconnection Development to connect with appropriately robust points on the transmission networks north and south of the border. Locating the northern terminus at Turleenan will ensure that the new circuit has sufficient geographic separation from the existing interconnector – as noted in **Chapter 2** of this Report, this separation is required for reasons of system security.

  Both EirGrid and NIE have identified that there is a strategic benefit of establishing a high capacity link between the existing 400 kV network in Ireland and the existing 275 kV double circuit network in Northern Ireland. Such a high capacity circuit will provide the required increase in north-south interconnection capacity without the need for any further points of connection to the existing transmission network.

  A high capacity circuit between Woodland and Turleenan substations will also, on its own, provide an immediate reinforcement of the existing transmission network in the north-east area of Ireland. It will do this by effectively 'bypassing' the existing transmission circuits running between Louth Substation and the Greater Dublin Area. It is via these circuits that electricity normally flows into the north-east area. The new Interconnection Development will provide an alternative high capacity route, from Woodland to Turleenan to Tandragee substations, and via the existing Interconnector into Louth Substation.

  In road traffic terms this is similar to the relief provided by a 'bypass' or relief road of a town with a previously congested main street; however, unlike a road, the meshed nature of the transmission network means that electricity can flow freely between different nodes, and therefore does not have to occur by means of a direct link. In this instance, the "by-pass" can effectively occur via the new interconnector circuit, whereby electricity will be carried from the transmission network in Ireland onto that network within Northern Ireland, and then via a different circuit (the existing interconnector) back into Ireland, rather than using the existing more direct circuits between substations in the Greater Dublin Area and in the north-east of the country (refer to **Figure 4.1** below).

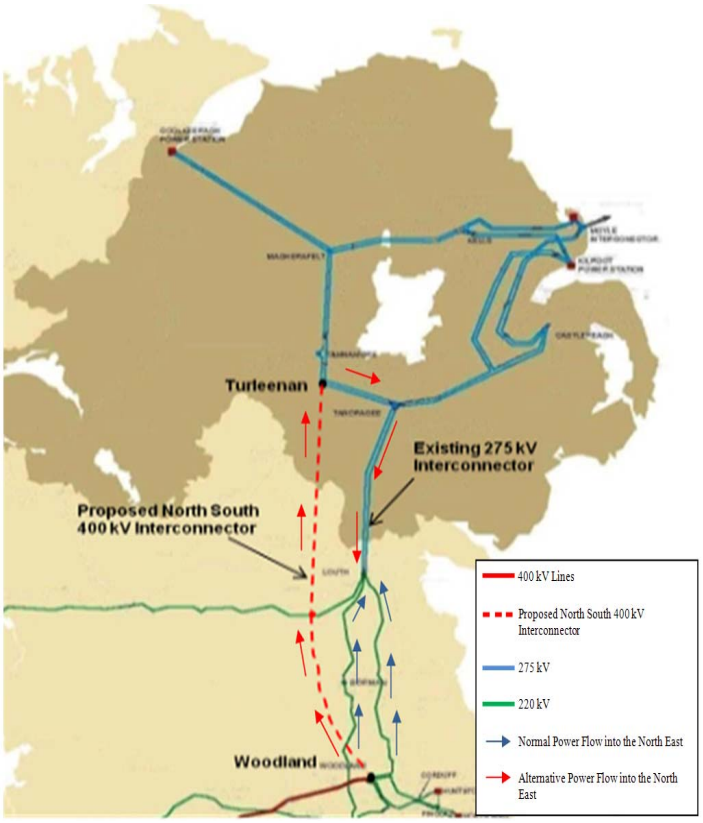

Figure 4.1 Reinforcement of the North-East Via the Proposed Interconnector

Based on the most recent load forecasts as noted in **Chapter 2** of this Report, this 'relief' will provide sufficient reinforcement of the network in the north-east area of the country to cater for the projected load growth in that area for at least the next decade. Thereafter, it is currently anticipated that it will be necessary to carry out further reinforcement of the transmission network in the north-east area. It is envisaged, at this point in time, that such further reinforcement would be best achieved by the construction of an intermediate substation on the proposed Turleenan-Woodland 400 kV OHL that would connect it to the existing Flagford-Louth 220 kV OHL. The need for this intermediate substation may however arise at an earlier date than expected if one of the following scenarios occurs:-

- The load growth in the north-east area exceeds current projections;
- All, or part of, the proposed Interconnection Development which would be located north of the existing Flagford-Louth 220 kV OHL is delayed, while that part to the south of the existing OHL proceeds as planned; and
- All, or part of, the proposed Interconnection Development which would be located south of the existing Flagford-Louth 220 kV OHL is delayed, while that part to the north of the existing OHL proceeds as planned.

The 2009 application for approval proposed an intermediate substation (referred to in that application as Moyhill Substation), which would connect the proposed north-south oriented circuit with the existing east-west oriented Flagford-Louth 220 kV OHL. Having regard to the matters outlined above, EirGrid is now of the view that this intermediate substation is not expected to be required within the next ten years (notwithstanding the caveats above). Consequently it would not be appropriate, in the context of proper planning and sustainable development, to include this element of the overall project in the new application for approval of the proposed North-South 400 kV Interconnection Development.

It is however reasonable, from a strategic planning and environmental assessment perspective, to give some consideration in the re-evaluation of this overall project, to where such a substation should be generally located, in anticipation that it will be required at some future point in time. In this regard, ESBI was commissioned in 2005 by the then ESB National Grid to identify possible locations for a 400/220 kV electricity substation in a search area in the vicinity of the existing Flagford – Louth 220 kV line and in proximity to Kingscourt, (i.e. at the area of interface between the Meath-Cavan study area and the Cavan-Tyrone study in the vicinity of the existing Flagford – Louth 220 kV line). The key criteria used in the report – 'Kingscourt 400 kV Site Selection'[41] – for identifying possible locations generally in the vicinity of Kingscourt included: proximity to the existing Flagford–Louth 220 kV line, future access for 400, 220 and 275 kV overhead lines, general topography, road access and environmental constraints. The report identified a number of potential sites which would meet the criteria. Following re-evaluation of this element of the overall project, the area to the west of Kingscourt, County Cavan continues to constitute the preferred location for the planned intermediate substation.

It is concluded therefore that an appropriate location for an intermediate substation on the proposed Turleenan-Woodland 400 kV circuit (that will ultimately enhance the electricity supply to the north-east area of Ireland) would be in the vicinity of the point of intersection of the future north-south oriented Turleenan-Woodland 400kV OHL and the existing east-west oriented Flagford-Louth 220 kV OHL, near Kingscourt, County Cavan.

For the avoidance of doubt, as the intermediate substation might not be required for more than a decade, it is not proposed to seek planning approval for such a substation as part of the planning application in respect of the North–South Interconnection Development. However, given the possibility of this substation being proposed at some point in the future and the possibility that it may be in the vicinity of Kingscourt (but not necessarily at Moyhill) it is considered reasonable that an environmental impact assessment of the potential impacts arising from the possible future development of the intermediate substation should be included in the EIS as part of the consideration of potential impacts on the environment, including cumulative impacts, for the North-South Interconnector Development.

[41] Available at www.eirgridprojects.com

In summary, notwithstanding the omission of the intermediate substation as a result of the re-evaluation process, the existing 400 kV Woodland Substation in County Meath will be proposed as the southern terminus for the Interconnection Development. In Northern Ireland, the northern terminus will be at a planned new substation at Turleenan, County Tyrone.

A consequence of the deferment of the intermediate substation near Kingscourt is the establishment of a continuous 400 kV overhead line circuit from Woodland to Turleenan and such a circuit will be more than 130 km in length.

The operating performance of such a long high voltage overhead line can sometimes be improved by the insertion of one or more points of transposition along its length. For example when the existing 400 kV overhead line circuit from Moneypoint in County Clare to Dunstown in County Kildare was developed it was found that it would benefit from two points of transposition.

Transposition is the practice of transposing the three phases of a three-phase AC circuit. In other words, it involves the rearranging of the spatial arrangement of the three electricity wires or conductors that make up the three-phase circuit. The transposition takes place over four structures as shown schematically in the **Figure 4.2** below.

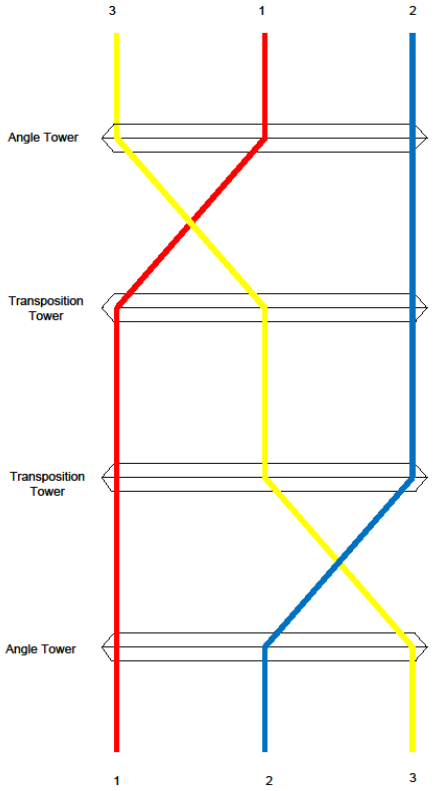

Figure 4.2 Transposition

The three wires enter the transposition point orientated, left to right, 1,2,3 and exit the transposition orientated, left to right, 3,1,2. A photograph of one of the existing transposition alignments on the Dunstown – Moneypoint 400 kV overhead line circuit is shown in **Photo 3**.

A similar transposition alignment will likely be required for this development.

Photo 3: Transposition Alignment on an Existing 400 kV Overhead Line

4.3 IDENTIFICATION OF THE STUDY AREA OF THE PLANNED NORTH-SOUTH 400 KV INTERCONNECTION DEVELOPMENT

The re-evaluation process has included a review of the process for identifying the overall study area within which to concentrate route selection in respect of the planned Interconnection Development. EirGrid and its consultants have revisited the principal assumptions and recommendations of the various studies previously prepared and, in particular, the 'Strategic Issues Review' document of November 2008 (RPS Planning & Environment for EirGrid Plc) and the Environmental Impact Statement (EIS) of December 2009.[42]

There has also been a review of the suite of technical and environmental studies carried out between 2002 and 2008 (which are referenced in the EIS of December 2009). Consideration has also been given to any relevant new information received during the period of the application in 2010. In particular, the re-evaluation of the Study Area for the Interconnection Development has occurred in the context of the parameters outlined at **section 4.1** above regarding re-evaluation of the required connection points for the proposed development.

A number of technical and environmental studies were previously carried out in respect of the Cavan-Tyrone Project. However, the mid-country study area (between Drumkee and Kingscourt) was identified jointly by ESBNG and NIE as the preferred study area within which to route the proposed additional interconnection development having regard to environmental and technical considerations. A key technical consideration influencing the study area relates to concerns around siting a second interconnector circuit along the existing Tandragee-Louth corridor, and the consequent risk of system separation.

A feasibility study was previously carried out in respect of a potential 400 kV line linking Woodland 400 kV Substation to a proposed 400 kV substation in the vicinity of Kingscourt, County Cavan. This is set out in ESBNG: 'Kingscourt – Woodland 400 kV Feasibility Study' (2005).[43] This Report identified a study area which eliminated the area east of Navan, on the basis that any development would have to cross the environmentally sensitive Boyne Valley, and due to the high concentration of existing high voltage transmission infrastructure in this area. This Report concluded that a number of potential route corridors to the west of Navan may be available, but that these would require more detailed site investigation and route evaluation.

At a pre-application consultation meeting with An Bord Pleanála (ABP) in November 2007, in respect of the previous Meath-Tyrone 400 kV Interconnection Development, EirGrid was advised that "*any application should show full consideration and robust examination of possible routes, including options*

[42] Both available at www.eircomprojects.com
[43] Publically available at www.eirgridprojects.com

east of Navan including social and environmental constraints. Further analysis should be carried out from east of Navan to the Coast to support the 2005 study".

As a result, EirGrid's consultants re-considered an expanded study area, using the Irish Sea coast as the boundary. The Consultant's Report in this matter endorsed the originally preferred study area within which to route the southern portion of the planned interconnection development, and to exclude the eastern coastal area (to the east of Navan) on account of significant constraints of proximity to the Brú na Bóinne Complex (a World Heritage Site) and the presence of a number of ecologically designated areas including SPA's and NHA's. This is set out in Socoin/Tobin 'Response to An Bord Pleanála – Kingscourt to Woodland Route Comparison Report' (December 2008).[44]

This reconfirms that the preferred study area for the overall Interconnection Development is between Turleenan, County Tyrone, a future new substation in the vicinity of Kingscourt and the existing 400 kV substation at Woodland, County Meath. As a result, the overall study area goes through counties Monaghan, Cavan and Meath in Ireland.

Having reviewed the study areas previously considered in relation to the proposed North-South Interconnection Development, including the additional study area east of Navan, the additional submissions made and other information available to EirGrid since June 2010, no new significant environmental or other relevant constraints have arisen during the re-evaluation process which would merit consideration of *additional* study areas within which to route the proposed North-South 400 kV Interconnector. This confirms that the preferred study areas for the Interconnection Development goes through counties Monaghan, Cavan and Meath in Ireland.

4.4 DESCRIPTION OF THE STUDY AREA

For the purposes of the re-evaluation process, the proposed application for planning approval, and to prevent confusion with the previous application for approval, the previously termed Cross Border Study Area (CBSA) (i.e. that part of the overall study area north of the existing Flagford-Louth 220 kV OHL, and south of the border with Northern Ireland) is now to be termed the **Cavan-Monaghan Study Area (CMSA)**, having regard to the counties located within this area. Similarly, the previously-termed North East Study Area (NESA) (i.e. that part of the overall study area encompassing Woodland Substation, and north as far as the area south of the existing Flagford-Louth 220 kV OHL) is now to be termed the **Meath Study Area (MSA)**, as it is almost exclusively contained within County Meath. The nominal interface between the two parts of the overall Study Area remains located in the vicinity of the existing Flagford – Louth 220 kV OHL line.

[44] Available from www.eirgridprojects.com

Given the lengthy overall geographical extent of this linear development, after careful review, EirGrid considers that it is appropriate to present the overall project study area sub-divided into these two sectors, in order to 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.

4.4.1 The Cavan – Monaghan Study Area (CMSA)

This area is primarily situated along a north-south axis between the area of the crossings of jurisdictional border with Northern Ireland (currently identified as in the townland of Lemgare, County Monaghan, east of Clontibret) to the north and the area of the existing Flagford-Louth 220 kV OHL (west of Kingscourt) to the south. In addition, consideration was also afforded to the identified study area north of the border as set out by NIE, in respect of its portion of the overall Interconnection Development.

The Cavan-Monaghan Study Area (hereinafter referred to as CMSA), is approximately 30 km in width and 40 km in length. The largest settlements within the CMSA include Kingscourt, Carrickmacross, Castleblaney and Bailieborough, as well as other smaller clusters of dwellings. Rural housing is scattered throughout the CMSA, along with existing transmission lines, and other transmission, transportation and communication infrastructure of varying scales.

The topography comprises a varied landscape of hedge-enclosed fields draped over drumlins and scattered lakes throughout. The land use within the CMSA, outside of the settlements, is predominantly agricultural.

The CMSA is illustrated in **Figure 4.3.**

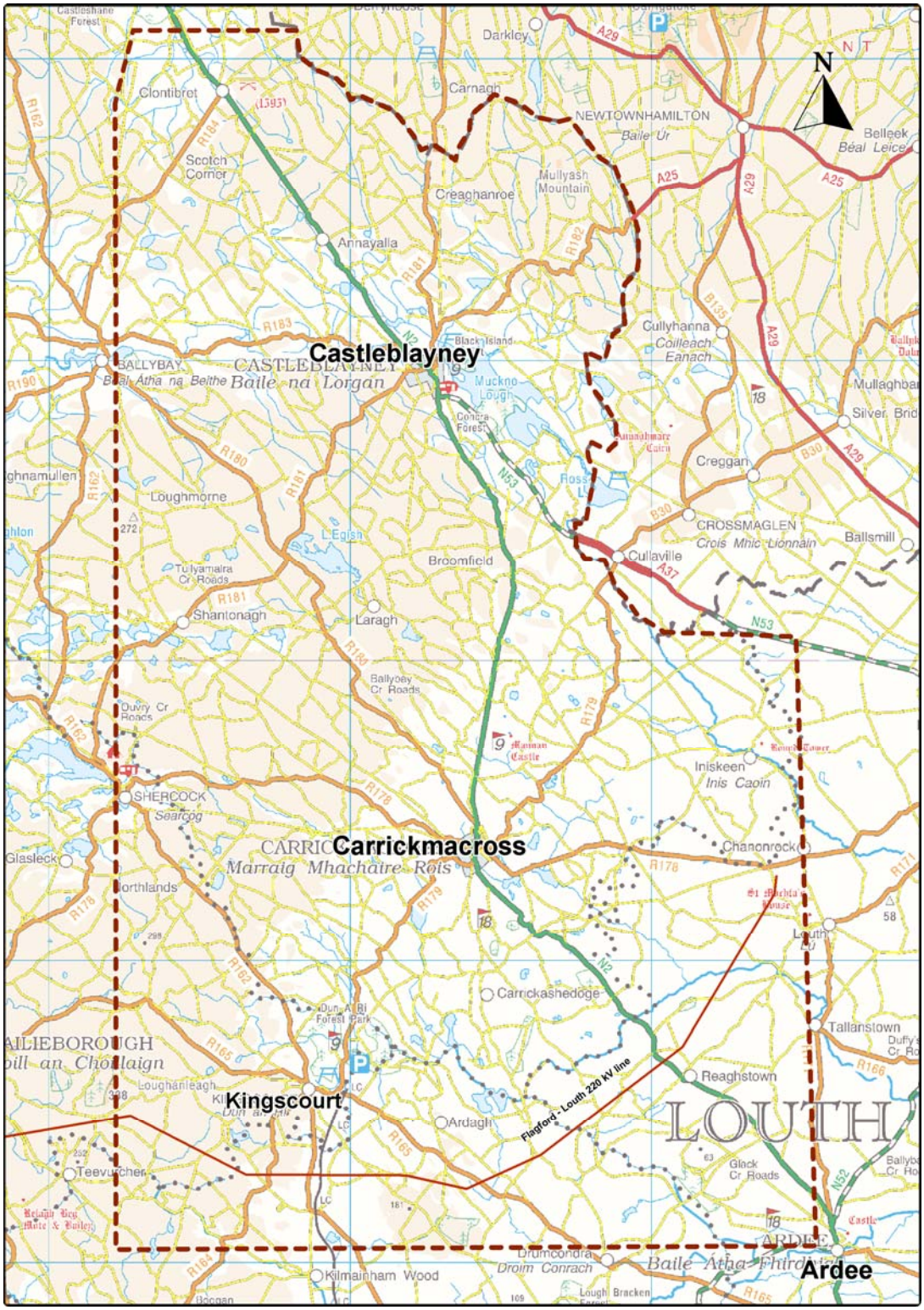

Figure 4.3: The Cavan-Monaghan Study Area (CMSA)

4.4.2 The Meath Study Area (MSA)

The Meath Study Area (hereinafter referred to as the MSA) is situated on a generally north-south axis between the existing Woodland 400 kV Substation in County Meath in the south, and the area of the Flagford-Louth 220 kV OHL (west of Kingscourt) in the north. The area is bounded to the east by the Hill of Tara and the town of Navan, and to the west by the towns of Trim and Athboy. Settlement locations within the MSA include Athboy, Dunshaughlin, Kells, Navan, Nobber, Moynalty and Trim, as well as other smaller clusters of dwellings. Again, rural housing is scattered throughout the MSA, along with existing transmission lines, and other transportation and communication infrastructure of varying scales. The study area contains two major rivers, the River Boyne and the River Blackwater. The land use within the study area, outside of the settlements, is predominantly agricultural. The MSA is illustrated in **Figure 4.4.**

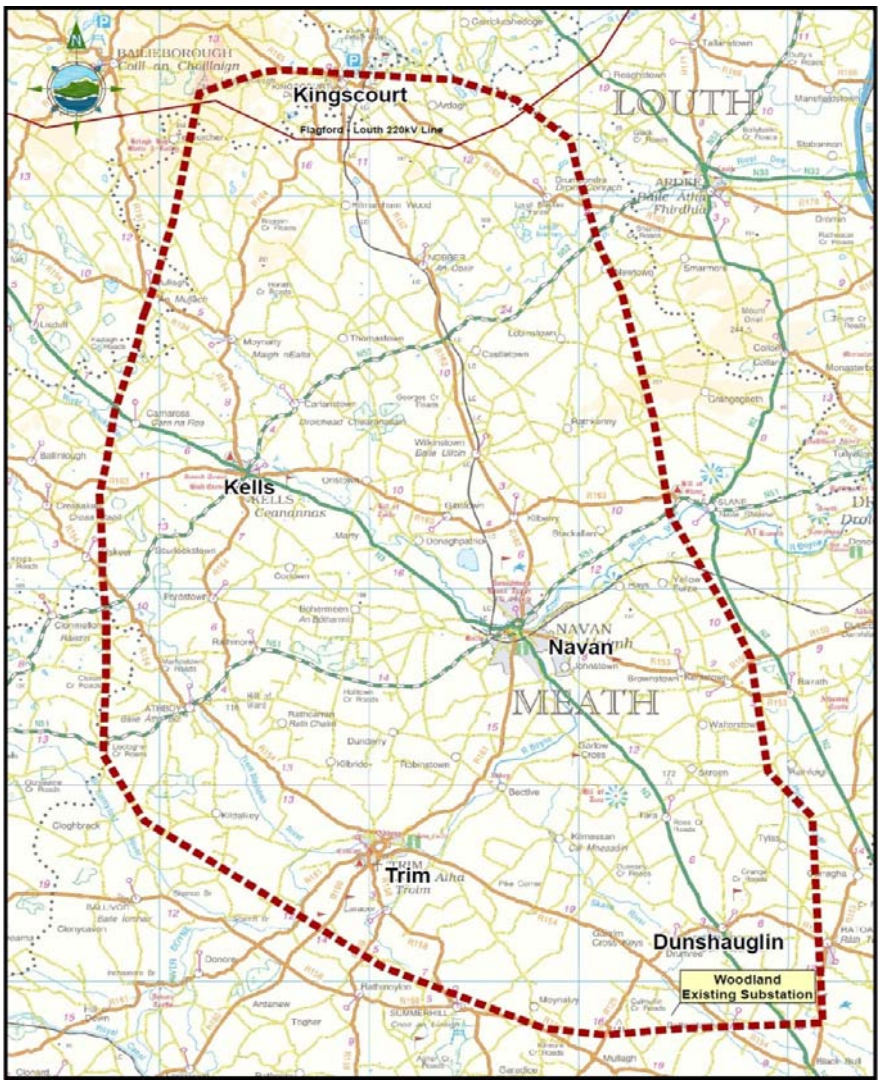

Figure 4.4: The Meath Study Area (MSA)

4.5 CONCLUSIONS

In summary, having reviewed the study areas previously considered in relation to the proposed North-South Interconnection Development, including the additional study area east of Navan, the additional submissions and other information available to EirGrid since June 2010, no new significant environmental or other relevant constraints, have arisen during the re-evaluation process which would merit consideration of additional study areas within which to route the proposed North-South 400 kV Interconnection Development. The parameters for the identification of the study area and circuit located therein remain as follows:-

- The existing Oldstreet-Woodland 400 kV OHL enters Woodland Substation from the west. For the final 2.8 km run into Woodland Substation, it is carried on double circuit structures, which are designed to carry two independent circuits (each circuit consisting of a set of three wires, with one set of three suspended from one side of the structure and the other set on the opposite side of the structure). The existing Oldstreet-Woodland OHL is installed on the southern side of these structures leaving the northern side currently unused. The unused side of the double circuit structures is therefore available for use, and this should be considered in the route constraint study for the project, as it may present an opportunity for minimising the environmental impact of the proposed development in the vicinity of Woodland Substation.

- Continuing in a northerly direction, and staying to the west of Navan Town in order to avoid the sensitive heritage and ecological landscape to the east thereof, the circuit will inevitably intersect with the existing east-west orientated Flagford-Louth 220 kV OHL.

- The route of the new circuit will be required to ensure that it has sufficient geographic separation from the existing Louth-Tandragee 275 kV Interconnector for reasons of system security, while at the same time minimising the length of the new circuit. This is considered to be in accordance with best practice for routing strategic electricity transmission development;

- From the point of intersection with the existing Flagford-Louth 220 kV OHL, the circuit will proceed in a generally northerly direction, until it intersects with the existing 275 kV OHL between Tandragee and Tamnamore Substations in Northern Ireland. A new substation shall be constructed at this point of intersection, proposed to occur at Turleenan in County Tyrone (identified by NIE), and this shall form the northern terminus of the second North-South 400 kV Interconnection Development.

- EirGrid is now of the view that the intermediate substation in the vicinity of Kingscourt is not expected to be required within the next ten years. Consequently it would not be appropriate, in the context of proper planning and sustainable development, to include this station in the new application for approval of the proposed North-South 400 kV Interconnection Development.

5 IDENTIFICATION OF ENVIRONMENTAL AND OTHER CONSTRAINTS WITHIN THE PROJECT STUDY AREA

An initial step in any route selection process is to identify the nature, extent and location of main environmental and other constraints within the defined study area. In this context, 'constraints' mean any physical, environmental, topographical, socio-economic or other feature or condition that may affect the location, development and other aspect of a proposal. The constraints are considered further in **section 5.2**.

5.1 BACKGROUND TO THE IDENTIFICATION OF CONSTRAINTS

As set out previously, the re-evaluation process has had regard to the considerable body of work previously undertaken in respect of the previously proposed Meath–Tyrone 400 kV Interconnection Development. Specifically, in the early phases of development of the original proposal, the main environmental constraints and potential route corridors were identified and evaluated within the study area. It has been confirmed in **Chapter 4** of this Report that, having reviewed the issue, EirGrid has concluded that the previously identified Study Area remains the most appropriate for the purposes of considering the routing of the planned North–South Interconnection Development.

ESBI and AOS Planning undertook the previous constraints analysis in respect of that part of the overall study area previously referred to as the Cross-Border Study Area (CBSA), now referred to as the Cavan-Monaghan Study Area (CMSA). Socoin and TOBIN Consulting Engineers undertook this analysis in respect of that part of the overall study area previously referred to as the North-East Study Area (NESA), now referred to as the Meath Study Area (MSA). These Constraints Reports were prepared to identify key environmental issues within the overall study area. This work included baseline studies of key environmental criteria within the receiving environment of the overall study area. The scope, methodology and output for this work was detailed in the following publications:-[45]

- ESBI and AOS Planning, 'Route Constraints Report' (September 2007); ESBI and AOS Planning, 'Route Constraints Report' *(*September 2007) Addendum Report (May 2008);

- Socoin and TOBIN Consulting Engineers, 'Kingscourt to Woodland Constraints Report Volume ' (July 2007) and

- Socoin and TOBIN Consulting Engineers, *'*Kingscourt to Woodland Constraints Report Volume 1' (July 2007) Addendum Report (May 2008).

[45] Available at www.eirgridprojects.com

The 2007 Constraints Reports were based upon strategic analysis, including desktop studies, vantage point and driving surveys as well as consultation with interested parties and other stakeholders. Constraints were assessed under the following headings in terms of potential environmental impact:-

- Socio-Economic;
- Land Use;
- Landscape;
- Flora and Fauna;
- Water;
- Soils; and
- Cultural Heritage

5.1.1 Re-evaluation Parameters and Considerations

The re-evaluation process has included a detailed review of the scope and content of those previous Constraints Reports, as well as new information and/or changes in relation to environmental and other constraints considered subsequent to that previous evaluation process. This has included taking into consideration:-

- New environmental designations e.g., proposed Natural Heritage Areas (pNHAs) for geological criteria and sites proposed for County Geological Sites (CGS);

- Updated wintering birds survey results (Winter Survey Periods 2007 – 2012);

- Updated designations and visual constraints listed in the relevant statutory development plans and other relevant reports, including the Draft Tara Skyrne Landscape Conservation Area (May 2010), Draft Monaghan County Development Plan 2013-2019 and Meath County Development Plan 2013 – 2019;

- Candidate World Heritage Sites announced in April 2010;

- Updated information on new residential and other developments;

- Information obtained from written and oral submissions made to An Bord Pleanála by prescribed bodies, landowners and members of the public during the previous application process in respect of the previously proposed Meath-Tyrone 400 kV Interconnection Development (refer to **Appendix A** to this Report);

- Information arising from the public consultation process undertaken in respect of the Preliminary Re-evaluation Report, in May-June 2011 (refer to **Appendix B** to this Report); and

- Information arising from EirGrid's on-going technical and environmental analysis of the proposed North-South 400 kV Interconnection Development.

In this regard, it should be noted that the original Route Constraints Reports from 2007 were intended to constitute strategic studies of route corridor options, based on the best available scientific and other information at that time. The purpose of those Route Constraints Reports was to facilitate identification of an emerging preferred overhead line route corridor, which would then be subject to more detailed environmental and other assessments.

As part of the current re-evaluation process, EirGrid's consultants revisited and updated the baseline information of all key environmental criteria as outlined in the original Route Constraints Reports, having regard to current best available scientific and other information.

As part of this process, each route corridor option was revisited by the route designers and specialists; this entailed a desktop review of mapping and aerial photography, as well as updated windscreen surveys (from public roads) for all route corridor options. The purpose of these surveys was to confirm that, within the 1 km route corridor, there remained a potentially feasible line route, and to examine in greater detail particular locations where conflicting constraints may influence the route corridor options or a potentially feasible line route within those corridors.

5.1.2 Constraints Mapping

EirGrid, through its consultants, has updated the individual constraints layers and the background data of the GIS Database for the Interconnector project with reference to, *inter alia*, items identified in **section 5.5.1** above. The main output from the Database is a series of maps which spatially represent constraints within the study area. GIS permits multiple layers of environmental data to be built up to compile composite maps which facilitate the identification of feasible route corridors. The GIS data is sourced from a variety of sources. The majority of the data sets are publically available (e.g. National Parks and Wildlife Service (NPWS), Environmental Protection Agency (EPA), County Councils, etc.). Where additional data has been collected from other sources (e.g. wintering bird studies) this has been added to the GIS mapping.

EirGrid's consultants are also availing of the opportunity of the re-evaluation process to streamline and simplify the presentation, mapping and evaluation of constraints, including:-

- The nominal interface between the CMSA and MSA, which occurs in the area of the Flagford–Louth 220 kV OHL, west of Kingscourt;

- The constraints headings and their respective qualification and quantification have been streamlined; and

- The base mapping and presentation of constraints have been streamlined.

It is important to note that, while the actual presentation of material may have altered in this report, the findings are consistent with those contained in the original Route Constraints Reports. Overall, whilst there are some minor variations between the current and previous findings as a result of the re-evaluation process and subsequent public consultation process no new constraints information has arisen which would have material implications for, or would otherwise prevent, the identification of potential route corridors within which to site the new Interconnection Development project within the overall identified (mid-country) study area.

In summary, having reviewed the baseline constraints information in relation to the North-South Interconnection Development, including additional submissions and other information made available to EirGrid since June 2010, no new constraints information has arisen which would have material implications for, or would otherwise prevent, the identification of potential route corridors within which to site the new Interconnection Development project within the overall identified (mid-country) study area.

5.2 IDENTIFICATION OF CONSTRAINTS

The re-evaluation process has enabled EirGrid and its consultants to review the presentation of constraints material. In this regard, consideration has been afforded to the approach to constraints analysis adopted by the National Roads Authority (NRA) in its '2010 Project Management Guidelines'.[46] Accordingly, for the purpose of this Re-evaluation Report, the key environmental constraints are summarised under the following headings:-

- **Natural Constraints (naturally occurring landscapes and features)**

- Ecology
- Landscape
- Geology
- Water

[46] Available at www.nra.ie

- **Artificial Constraints (forming part of the built environment)**

- Settlements
- Cultural Heritage
- Infrastructure/Utilities

Within the above headings, constraints can be further divided into primary (i.e. the most important) and secondary (i.e. a lower level of importance) constraints.

Primary constraints generally relate to protections afforded to sites/features at a World or European level (i.e. World Heritage Sites, SACs and SPAs), but these can also include landscape designations and protections as set out in the relevant County Development Plan. It is an objective to seek to avoid these primary constraints in corridor identification where possible.

Secondary constraints generally relate to protections afforded to sites/features at a National or County level (i.e. NHAs, geological, rivers/lakes, woodlands/hedgerows, national monuments and protected structures). Whilst the process of corridor identification will also seek to avoid these constraints, it is generally easier to mitigate potential impacts on these constraints, than would be the case with the identified primary constraints, at the detailed line design stage of the project.

The constraints are briefly summarised below and are detailed in accompanying Maps contained in **Appendix C** and **D**. It should be noted that **Map 1 (CMSA),** contained in **Appendix C** and **Map 1 (MSA)**, contained in **Appendix D**, highlight all environmental and other constraints that are detailed in this chapter on one composite map for each study area. Each individual set of constraints is then separately illustrated on Maps 2 - 9 for both the CMSA and MSA, where they can be seen in the context of the identified route corridors.

As referred to above, it is important to note that **while the actual presentation of material may have altered, the baseline information outlined in this report is consistent with that contained in the original 2007 Route Constraints Reports, except where otherwise indicated.**

The following sections identify and describe the natural and artificial constraints within both the CMSA and MSA.

5.2.1 Natural Constraints (Naturally Occurring Landscapes and Features)

5.2.1.1 Ecology

Ecological constraints have been divided up into designated sites for nature conservation (including those in Northern Ireland), proposed designated sites, wintering bird sites, important fisheries, wetlands and mature deciduous woodlands. In the CMSA, there are no new designated sites since the publication of the previous Constraints Reports.[47] In the MSA, in October 2011, the River Boyne and Blackwater River Corridors were designated as a Special Protection Areas (SPAs) specifically for the breeding Kingfisher. Information in relation to Whooper Swans in both areas has been updated to include wintering bird surveys which have been completed over the last five Wintering Periods (i.e. 2007 - 2012).

CMSA:

- ***Designated / Proposed Designated Sites*** - In summary within the CMSA, there are no sites designated as candidate or Special Areas of Conservation (cSACs or SACs) or Special Protection Areas (SPA). There are a number of proposed Natural Heritage Areas (pNHAs). There are two sites located within 5 km of the study area, in Northern Ireland, which are designated as Areas of Special Scientific Interest (ASSI) [this is the equivalent of a NHA], namely Drumcarn Fen and Drumlougher Lough. There are seventeen proposed Natural Heritage Area's (pNHAs), located within the study area and a further four pNHAs within 5 km of the study area. These habitats largely comprise lakes and associated wetland fringe habitats. **Table 5.1** provides a list of these sites and they are mapped on **Map 1 (CMSA)** included in **Appendix C**.

Within the CMSA	Within 5 km of the CMSA
Breakey Lough pNHA	Mentrim Lough pNHA
Tassan Lough pNHA	Dromore Lakes pNHA
Lough Smiley pNHA	Gibson's Lough pNHA
Cordoo Lough pNHA	Black and Derrygoony Loughs pNHA
Muckno Lough pNHA	Drumcarn Fen (Northern Ireland ASSI)
Lough Egish pNHA	
Loughbawn House Loughs pNHA	
Ballyhoe Lough pNHA	
Corstown Loughs pNHA	

[47] For further information on designated sites, refer to the following websites http://www.npws.ie/en/ProtectedSites/ (Republic of Ireland) and http://www.doeni.gov.uk/niea/protected_areas_home/area_interest.htm (Northern Ireland)

Within the CMSA	Within 5 km of the CMSA
Creevy Lough pNHA	
Nafarty Fen pNHA	
Lough Fea Demesne pNHA	
Spring and Corcin Loughs pNHA	
Lough Naglack pNHA	
Moynalty Lough pNHA	
Lough Ross pNHA	
Drumakill Lough pNHA	

Table 5.1: Designated Sites (CMSA)

In addition, the recent wetland surveys (2008 to 2012) carried out on behalf of Monaghan County Council have highlighted a range of sites in the study area some of which are considered to be of National Importance. These Nationally important sites include Corlea and Cashel Bog. These sites are suitable for designation as National Heritage Areas (NHAs), though they remain undesignated and are not listed as proposed designated sites. These sites are however fully considered in this report and treated as nationally important.

- ***Fisheries*** - The study area lies mainly within the catchments of the Rivers Glyde and Fane, which drain a significant area of Cavan, Monaghan and adjacent counties but also lies within the catchments of the Rivers Erne, Blackwater and Boyne. Coarse fisheries are associated with the many lakes in the region while game fisheries (brown trout) are limited and include stretches of the Rivers Glyde, Fane and associated tributaries. The study area is in an area that is sensitive to water pollution (historically through agricultural fertiliser run-off).

- ***Wintering Birds*** – Wintering bird surveys have been undertaken over the last five Winter Survey Periods (2007 – 2012) within the study area. These have included extensive checks for significant flightlines throughout the study area and counts of sites based on standard WeBS Wetland Counts (Gilbert *et al.,* 1993).[48] From these surveys, 50 sites within the study area have been identified as being specifically used by Whooper Swans (refer to **Table 5.2** which lists these sites and provides an indication of their importance/status). Whooper Swans are widely dispersed within this study area, however, the key risk areas (based on the studies to date) are detailed herein. The survey results including survey dates (where relevant) are indicated on **Map 1 (CMSA)** in **Appendix C**. These sites include predominantly lake areas and adjoining fields although some sites consist of fields only. Whooper Swan family groups are relatively sedentary during the winter although movements do occur between sites.

[48] Gilbert G, Gibbons D and Evans J (1993). Bird Monitoring Methods. RSPB.

Other wildfowl/waders (e.g. Mute Swan, Wigeon, Snipe, Curlew, Tufted Duck, Golden Plover, Teal, Goldeneye, Little Grebe and Lapwing) are also considered in the importance assessment (see **Table 5.2**). It should be noted that other lake/pond sites in the study area not utilised by Whooper Swans (not detailed in **Table 5.2**) are considered locally important sites.

Whooper Swan Site	**Importance/ Status** [49]
Annaghierin Lough	Locally Important site (WS)
Ballintra	Locally Important Site (WS)
Barnagrow Lough	Locally Important site (WS)
Bawn Lakes	Locally Important site (WS)
Bellatrain Lough	County Important site (WS and wildfowl)
Blaney Castle Lake or Muckno Lough	Locally Important site (WS)
Ballyhoe Lough / Wetlands	County Important site (WS)
Comertagh Lough	County Important site (WS)
Corliss Lough	Locally Important site (WS)
Corraghy Lough	Locally Important site (WS)
Creeve Lake	County Important site (WS and Wildfowl)
Creevekeeran	Locally Important site (WS)
Creevy Lough	County Important site (WS)
Crossduff Lough	Locally Important site (WS)
Derrygoony Lough	County Important site (WS)
Derrynaloobinagh	Nationally Important site (WS, Wildfowl and Waders)
Dromore Wetlands	Nationally Important site (WS, Wildfowl and Waders)
Drumillard Lough	Locally Important site (WS and wildfowl)
Druminnick Lough	County Important site (WS)
Drumlougher	Locally Important site (WS)
East Laragh Lough 2	Locally Important site (WS)
Fane River	Locally Important site (WS)
Kiltybane Lough	Locally Important site (WS)
Lackagh	Locally Important site (WS)
Lantaur	Locally Important site (WS)
Laragh Lough	County Important site (WS)
Lismagurshin or Cremartin Lough	County Important site (WS)
Lisnakillewbane Lough	County Important site (WS)
Lough Alina	County Important site (WS)

[49] National Roads Authority, 'Guidelines for Assessment of Ecological Impacts of National Road Schemes' (2009), available at www.nra.ie

Whooper Swan Site	Importance/ Status [49]
Lough Egish	County Important site (WS)
Lough Major	Locally Important site (HS, Wildfowl)
Lough Morne	Locally Important site (WS)
Lough Nagarnaman	County Important site (WS)
Lough Nahinch / Tassan/ White	Locally Important site (WS)
Lough Namachree	County Important site (WS)
Lough Patrick	County Important site (WS)
Lough Ross	County Important site (WS)
Lough Sillan	Locally Important site (WS)
Lough Smiley (I north)	Locally Important site (WS)
Lurgacham (Lough + fields)	County Important site (WS)
Mill Lough	Locally Important site (WS)
Milltown Lough	County Important site (WS)
Muckno Mill Lough	County Important site (WS)
Muckno Mill Lough (Tributary)	Locally Important site (WS)
Raferagh (pond)	County Important site (WS)
Shantonagh Lough	County Important site (WS)
Tievaleny Lough	County Important site (WS)
Tonyscallan Lough	County Important site (WS)
Toome or Crinkell Lough	County Important site (WS)
Tullyvaragh Upper / Moylan Lough	County Important site (WS, Waders and Wildfowl)

Table 5.2: Wintering Bird Sites (CMSA) (2012 Update)

Note: WS = Whooper Swans; HS = Historical site Whooper Swans

The most important areas identified as relevant to the CMSA is the Dromore Wetlands. The Dromore Wetlands are considered a nationally important site for Whooper Swans, Waders (Curlew, Snipe and Lapwing predominantly) and other wildfowl (e.g. Mute Swan, Great Crested Grebe, Wigeon, Teal and Mallard). A small part of the wetland complex is within the main study area and is identified due to its significance. Derryloobinagh included in **Table 5.2** forms the eastern end of this wetland system which occurs west of Ballybay town.

Tullyvaragh Lough is also a very important site and is regularly utilised throughout the winter by a moderate sized flock of Whooper Swans. Other wildfowl numbers are also high relative to other sites in the study area.

Other important clusters of lake sites determined to date are detailed below, including an assessment of their importance (based on NRA. 'Guidelines for Ecological Assessment of Road Schemes' (2009):[50]

- Lough Tonyscallon, Ballintra and Toome or Crinkill. These areas are regularly utilised by a number of Whooper Swan family groups (though less so in Winter 2011/2012) and overall are considered to be of county importance;

- Lough Namachree, Lough Shantonagh and lakes to the west. These areas are regularly utilised by several Whooper Swan family groups and are considered to be of county importance;

- Lough Egish, Lurgacham (fields) and Lough Morne and lakes located immediately to the west of these lakes. Lough Egish is irregularly utilised by low numbers of Whooper Swans and they potentially may occasionally fly to Lough Morne. Loughs Egish and Morne are important for Mute Swans and small numbers of wader (Lapwing and Golden Plover – specifically during migration periods) and Great Crested Grebe. These lakes are considered to be of county importance;

- Comertagh, Mill and Raferagh Lough. These wetlands are regularly utilised by several family groups of Whooper Swans with irregular movement occurring between these lakes. These lakes are considered to be of county importance; and

- Lough Patrick and Lough Alina (lakes within 2 km to east). These lakes in Northern Ireland are regularly utilised by significant numbers of Whooper Swans and are considered to be of county importance.

- ***Other Birds*** - Noteworthy breeding birds in the survey area include Great Crested Grebe, Mute Swan, Lapwing, Woodcock and Snipe. These species are generally associated with wetlands and are considered in the site importance assessment detailed in **Table 5.2**.

- ***Wetlands (Habitats)* –** The study area is primarily improved farmland with hedgerow boundaries. However, lakes and fringing wetlands are key local ecological features which are widely dispersed in drumlin hollows. Many of these wetlands provide remnants of semi natural habitat which are of local (higher value)/county conservation importance. Key sites are highlighted in **Table 5.2** and also include Cashel Bog and Corlea Bog. Lakes are important local habitats for breeding waterfowl in particular Great Crested Grebe and Mute Swan.

[50] Available at www.nra.ie

- ***Mature Deciduous Woodlands*** – Isolated patches of woodland exist in the study area particularly wet woodland (alder and birch dominated) associated with lakes and cutover bog areas.

Map 1 (CMSA) included in **Appendix C** identifies all Ecological Constraints (and other constraints) within the CMSA.

MSA:

- ***Designated* / Proposed *Designated Sites* -** There are four sites designated for nature conservation that lie within the study area: one candidate Special Area of Conservation (cSAC) namely the River Boyne and River Blackwater cSAC, one Special Protection Area for Birds namely River Boyne and River Blackwater SPA and two NHAs namely Girley Bog NHA and Jamestown Bog NHA. There is one other designated area within 5 km of the study area namely Killyconny Bog cSAC. These are set out in **Table 5.3**.

  There are fourteen proposed National Heritage Areas (pNHAs) within the study area itself, and within a 5 km radius of the study area.

Within the MSA	Within 5 km of the MSA
River Boyne and River Blackwater cSAC;	Killyconny Bog cSAC
River Boyne and River Blackwater SPA	Thomastown Bog pNHA
Girley Bog NHA	Rossnaree Riverbank pNHA
Jamestown Bog NHA	Slane Riverbank pNHA
Trim Wetland pNHA	Crewbane Marsh pNHA
Boyne Woods pNHA	Mentrim Lough pNHA
Breakey Lough pNHA	Rathmoylan Esker pNHA
Balrath Woods pNHA	Lough Shesk pNHA
Ballyhoe Lough pNHA	
Corstown Lough pNHA	

Table 5.3: Designated Sites (MSA)

- ***Mature Deciduous Woodlands*** - There are a number of old demesne estates with mature woodland and associated mature linear woodland in the study area.

- ***Wetlands* –** Wetlands are relatively insignificant in the study area outside the identified designated bog sites. Several non-designated cutover bog sites have been identified and are detailed.

- ***Fisheries*** – Included within the study area are the very important salmonid fisheries of the Rivers Boyne and Blackwater. Also included in the study area are a number of lakes including Whitewood and Newcastle Loughs which are recognised coarse fisheries by Inland Fisheries Ireland.

- ***Wintering Birds*** - Whooper Swan is the main bird species requiring consideration. This species is widely dispersed within the study area; however the areas (based on the studies to date) which require consideration are detailed herein. Wintering bird surveys have been undertaken over the last five Winter Survey Periods (2007 – 2012). Through the consultation process and field surveys undertaken, 42 sites have been identified as being used specifically by Whooper Swans within the study area (refer to **Table 5.4** - which lists these and provides an evaluation of their importance). Identified roost sites (which are key sites) include Tara Mines Tailings Ponds, Headford Estate, Balrath Demesne and Cruicetown. Most of the other sites are foraging areas only, and hence their usage is very much influenced by type/availability of suitable foodstuff, which influences their overall evaluation importance. The survey results including survey years (where relevant) are indicated on **Map 1 (MSA)** in **Appendix C**. Wintering Golden Plover numbers are occasionally nationally significant, particularly in Tara Mines Tailings Pond. **Table 5.4** considers Golden Plover (and other waders), wildfowl and other bird species of conservation significance.

Whooper Swans Site	Importance
Balgeeth	County Important (WS)
Balrath	Locally Important (WS)
Balrath Demense	County / Nationally Important (WS). Locally Important (Wildfowl)
Barfordstown	Historical Site - Locally Important (WS)
Batterstown	Locally Important (WS)
Black Lough	Historical Site - Locally Important (WS)
Bloomsbury	County Important (WS)
Breakey Lough	County Important (WS)
Breakey Lough Little	Locally Important (WS)
Calliaghstown	Locally Important (WS)
Cannonstown	Locally Important (WS)
Carlanstown	Historical Site Locally Important (WS)
Carnaross	County Important (WS)
Clooney Lough	Locally Important (WS)
Clooney Lough 2 (fields)	Locally Important (WS)
Cookstown Great	Locally Important (WS)
Coolaliss	Locally Important (WS)
Cruicetown	Nationally Important (WS). Locally Important (Wildfowl)
Cruicetown 2	Locally Important (WS)

Whooper Swans Site	Importance
Emlagh	Historical Site Locally Important (WS)
Every Lough	Locally Important (WS)
Fordstown	Historical Site
Fyanstown (area)	County/ Nationally Important (WS)
Grange	Locally Important (WS)
Headford	Nationally Important (WS)
Liscartan	Historical Site
Mullagh	Locally Important (WS and wildfowl)
Mullagheven Cross Rds	Locally Important (WS)
Newcastle Lough	Locally Important (WS and wildfowl)
Newtown	Locally Important (WS)
Nr Tara Mines	Historical Site
Pepperstown	Locally Important (WS)
Rahendrick	Locally Important (WS)
Randelstown	Historical Site
Sedenrath (area)	County Important (WS)
Southeast of Trim	Locally Important (WS)
Tankardstown	Historical Site
Tara Mines Tailings Pond	Nationally / Internationally Important (WS and Golden Plover). Locally Important (Wildfowl)
Teltown	Local Important (WS)
Whitewood Lough	County Important (WS). Locally Important (Wildfowl)
Yellow River	County/ Nationally Important (WS)
Yellow River 2	County/ Nationally Important (WS)

Table 5.4: Wintering Bird Sites (MSA) (Update 2012)

Note 1: WS = Whooper Swans

Note 2: Historical sites were highlighted in desk studies/consultation though no wintering birds were noted during this study

- ***Other Birds*** – A number of breeding bird species of conservation significance have been recorded in the study area. These include Yellowhammer, Lapwing, Barn Owl and Kingfisher. Other bird species not of significant conservation importance, but considered as potentially sensitive, include Grey Heron, Cormorant and Mute Swan.

Map 1 (MSA) included in **Appendix D** identifies all Ecological Constraints (together with all other constraints) within the MSA.

5.2.1.2 Landscape

The 2007 Route Constraints Reports referred to relevant policies of the Meath, Monaghan and Cavan County Development Plans which were in place at the time the reports were prepared. The re-evaluation process also includes landscape constraints in the recently adopted plans (i.e. the Meath County Development Plan 2013 – 2019), published Draft Development Plans, where relevant, as well as any subsequent variations to adopted Development Plans.

CMSA:

The Monaghan County Development Plan (MCDP) 2007-2013 and the Cavan County Development Plan (CCDP) 2008-2014,[51] have identified a number of landscape designations within the CMSA. The Draft Monaghan County Development Plan 2008-2019 was published in May 2012, and has been assessed for any additional landscape constraints. The Landscape Character Areas and Landscape Character Types as described in the Monaghan and Cavan Landscape Character Assessments are illustrated on **Map 1 (CMSA)**, included in **Appendix C**.

- ***Monaghan County Development Plan 2007 - 2013***

  The MCDP designates ***areas of primary and secondary amenity value***. There are also a number of ***views from scenic routes*** identified, the majority of these views are associated with views of lakes or are views from upland areas. These are indicated on Map 4.5 of the MCDP. The Landscape Character Areas in Monaghan are shown on Map 3.3 in **Appendix C**.

Areas of Primary Amenity	Areas of Secondary Amenity
PA2 - Lough Muckno and Environs	SA8 - Billy Fox Memorial Park and Environs SA11 – Dromore River and lake system including White Lake and Bairds Shore SA12 - Lough Major and Environs SA14 – Lisanisk Lake SA15 – Lough Naglack SA16 – Rahans Lake

Table 5.5: Areas of Primary and Secondary Amenity (CMSA)
Source: Monaghan County Development Plan 2007 – 2013

[51] **Available at www.monaghan.ie and www.cavancoco.ie, respectively**

Views from Scenic Routes	
SV12, SV13 and SV14	Scenic drive and views of open countryside from Mullyash
SV15, SV16 and SV17	Scenic drive along Lough Muckno
SV18 and SV19	Distant views of Lough Muckno and Slieve Gullion
SV20	Views of Slieve Gullion at Taplagh, Broomfield
SV21	Scenic views of Lough Egish
SV22	Scenic drive at Beagh, Shantonagh and Corlat

Table 5.6: Views from Scenic Routes (CMSA)
Source: Monaghan County Development Plan 2007 - 2013

The MCDP also includes a Landscape Character Assessment (LCA) for the County (which was adopted as a variation to the Development Plan in June 2008). Whilst the LCA provides supplementary guidance to the MCDP and a description of the landscapes in County Monaghan, it does not designate additional amenity areas or views to those already identified on Map 4.5 of the MCDP. The LCA was fully considered both in the context of the previous planning application and the re-evaluation process.

There is one long distance ***waymarked path*** traversing the study area. This is the Monaghan Way which is a waymarked walking route (approx. 64km) that runs from Monaghan Town in the north-east of the county to Inniskeen in the south-east. It is not designated as an amenity area in the MCDP, and passes through many different landscapes. It is of local and regional amenity value.

- ***Draft Monaghan County Development Plan 2013 - 2018***

  The Views from Scenic Routes and Areas of Primary and Secondary Amenity, as listed above, continue to be listed in the Draft County Development Plan 2013-2018. It is a policy that any new developments should have regard to the Landscape Character Assessment of 2008, and that decisions about landscape should follow the spirit of the European Landscape Convention ratified in 2002.

- ***Cavan County Development Plan 2008-2014***

  The area around Lough an Lea Mountain, west of Kingscourt contains a number of different designations as set out in the CCDP, many of which are based around its landscape value:

  - *HL3 – Lough an Lea Mountain*. This identifies the mountain as a High Landscape Area with an associated high landscape value;

- *SV8 – Lough an Lea Gap*. This identifies the scenic viewing point associated with Lough an Lea Mountain. Panoramic views from this upland area are available from this viewpoint; and
- *Walking Route 2* – This identifies walking routes around the area of Lough an Lea.

The area around Dun a Rí Forest Park, east of Kingscourt, contains a number of different designations, many of which are based around its landscape value:

- *SL1 – Kingscourt/Dun a Rí.* This identifies the Dun a Rí Forest Park as an Area of Special Landscape Interest;
- *Walking Route 5* – This identifies walking routes within the Dun a Rí Forest park.

The landscape designations in the Monaghan and Cavan CDPs are similar to those contained in the previous CDPs referred to in the 2007 Route Constraints Reports and are indicated on **Map 1 (CMSA)**, included in **Appendix C**.

In summary, having reviewed the landscape constraints information including information available to EirGrid since June 2010, no new significant information has been identified which would impact upon a consideration of route corridor selection in the CMSA in respect of the proposed Interconnection Development.

MSA:

A number of designations relating to landscape and visual constraints are listed in the Meath County Development Plan 2013-2019 (MCDP),[52] and the Cavan County Development Plan 2008-2014 (CCDP). The Meath Landscape Character Assessment (MLCA) provides supplementary guidance to the MCDP, and a description of the landscapes in County Meath.

The Meath County Development Plan 2013-2019 came into effect on 22nd January 2013 and has been assessed for any additional landscape constraints. The most significant change in the 2013-2019 Meath CDP is the addition of a new set of "Protected Views and Prospects" to replace the previous "Scenic Viewpoints" identified within the CDP. The Protected Views and Prospects relevant to the study area are listed below.

- ***Meath County Development Plan – 2013-2019***

  A survey was carried out by Meath County Council in 2012 to update the recognised views of significance within the county. These new designated scenic views are shown in Appendix 12 of the CDP and are shown on Map 1 (MSA) contained in **Appendix D** of this report. There are 94

[52] Available at www.meath.ie

Protected Views and Prospects listed in the Meath CDP 2013 - 2019, 37 of these are located within the study area.

Protected Views and Prospects are classified into four levels of significance: International, National, Regional and Local. There are no views of international significance within the Study Area, while there are three views of national significance, twelve views of regional significance and thirty views of local significance.

The Protected Views and Prospects relevant to the Study Area are indicated on Map 3.1 (MSA) in **Appendix D** and include:-

- A cluster of views in the Hill of Tara area (views 41, 42, 43, 44, 45, 46, 47, 48 and 49);
- A number of views located between Moynaltya and Nobber and north of Kilmainhamwood (views 15, 16, 17, 18, 19, 20 and 21);
- A number of views around Kells and the Blackwater Valley (views 12, 13, 14, 80, 81, 82 and 85);
- A cluster of views around Rathkenny (views 24, 25, 26, 27, 28 and 76);
- The view from the Hill of Ward (view 52);
- Views towards Trim (views 50 and 51);
- A cluster of views east of Oldcastle (views 2, 3, 4, 5, 6, 7 and 94);
- A cluster of views at Crosakeel (views 9, 10 and 11);
- Views in the south-western corner of the county (views 53, 54, 55. 56, 57, 78, 79, 83 and 84);
- Views from Bective Bridge (86); and
- A view west of Dunshaughlin (77).

The Meath CDP also supports the delivery of cycle and pedestrian routes such as the Trim-Navan-Slane-Drogheda cycle/greenway along the river Boyne and the Navan-Kingscourt cycle/greenway.

The Meath CDP includes an objective requiring proposals in designated landscapes and demesnes to include an appraisal of the landscape, designated views and vistas and an assessment of significant trees, or groups of trees as appropriate.

The Meath CPD 2013 includes an undertaking to present a draft Green Infrastructure Strategy to Meath County Council within one year.

The Draft Tara Skryne Landscape Conservation Area Explanatory Document was published by Meath County Council in May 2010. The MCDP states that it is an objective to progress the designation, in a timely fashion, of *a* Landscape Conservation Area pursuant to Section 204 of the Planning and Development Act, 2000 – 2012 for the Tara Skryne Landscape. The proposed boundary of the Tara Skryne Landscape Conservation Area is detailed in **Map 1 (MSA)** contained in **Appendix D** of this Report. The Meath CDP also states an objective to explore the designation of a Landscape Conservation Area for Loughcrew and Slieve na Callaigh Hills.

- ***Meath Landscape Character Assessment***

  The Meath Landscape Character Assessment forms Appendix 7 of the Meath CDP 2013-2019. The MLCA separately contains a listing of, Landmarks, Driving Routes and Way-Marked Paths and Cycleways.

  The **Key Viewpoints** are shown on **Map 1 (MSA)** contained in **Appendix D** of this report and include;

  A number of **Landmarks** are indicated within the study area on the Landmarks Map of the MLCA. These include the Hill of Tara, Skryne Church, the People's Park Lighthouse (Tower of Lloyd), Trim Castle, Bective Abbey and a number of other castles, copses and other features. Other landmarks which are of importance but are located outside the study area include Slane Castle, the Hill of Slane, Newgrange, Loughcrew Hill and Oldcastle Church.

  There are two **existing Driving Routes** within the study area. One route follows the N3 from the county boundary in the south-east, travelling northwards before turning west at the Hill of Tara and continuing towards Trim, Athboy and Kells. The second route traverses the study area from east to west, generally along the N51, from Drogheda, through Navan to Kells and further west.

  A Boyne Driving Route is being promoted by Fáilte Ireland and is similar to the existing Driving Routes. It differs in that the route from Trim to Tara travels via a road travelling south of the Boyne through Trubley rather than along the R131. This new driving route and a number of mapped "Boyne Sites" along its route, is indicated on Map 1 (MSA).

  A number of **Way-Marked Paths and Cycle Routes** traverse the study area. The marked routes run from Drogheda to Navan, further south from there to the Hill of Tara and westwards towards Trim. The routes continue northwards to Athboy and Kells and further north-east from there towards Ardee in County Louth. Navan and Kells are linked by a route that continues west. A third route passes north and west of Athboy. All routes are indicated in **Map 1 (MSA)**

contained in **Appendix D** of this Report. One potential route for a **Footpath and Cycle Route** is indicated within the study area. This potential route follows the river Blackwater, leaving Navan in a north-western direction towards Kells and continuing further north-west.

The description of the Landscape Value of the Tara-Skryne Hills Landscape Character Area has changed from "National" to "International" as a result of an amendment to the previous MCDP. This does not affect the overall conclusions of the 2007 Constraints Report as the Hill of Tara area was acknowledged as one of the more sensitive parts of the Study Area.

As previously detailed in **section 5.2** landscape constraints are treated as primary constraints.

In summary, having reviewed the landscape constraints information including information available to EirGrid since June 2010, no new significant information has been identified which would impact upon a consideration of route corridor selection in the MSA in respect of the proposed Interconnection Development.

5.2.1.3 Geology

The 2007 Route Constraints Reports described the geology in the overall study area. The Geological Survey of Ireland (GSI) has since compiled a list of sites proposed for designation as National Heritage Areas (pNHAs) and this Report incorporates the most up-to-date information (i.e., as at 2012) The GSI has also determined a secondary list of County Geological Sites (CGS) which may be considered for protection at local authority level (possibly within future CDPs). There are a number of pNHAs and CGSs located within the overall study area. Therefore, for the purposes of the re-evaluation process, these are also considered. These geological heritage areas are generally designated as a result of a specific geological interest (e.g. rare fossils or bedrock exposures within active quarries).

CMSA:

There are a number of sites of geological interest sites, including pNHAs and CGSs lying within the CMSA. These are listed in **Table 5.7**. **In summary, having reviewed the geological constraints information including information available to EirGrid since June 2010, no new significant information has been identified which would impact upon a consideration of route corridor selection in the CMSA in respect of the proposed Interconnection Development.**

Site	Description	Type of Site
Kingscourt	A high sulphate well	Proposed under IGH 16 - Hydrogeology Theme (including warm springs) as a NHA site (pNHA)
Carrickleck Quarry	Quarry comprising of disaggregated sandstone. The rock may be the source of stone for High crosses at Kells, Monasterboice etc	Proposed under IGH 9 - Upper Carboniferous and Permian Theme as a CGS site (pNHA)
Poulmore Scarp	The Poulmore Scarp has an exceptional conodont yield but also it exposes the contact of the Lower Carboniferous (Brigantian) limestones and the Upper Carboniferous sandstones	Proposed under IGH 3 - Carboniferous to Pliocene Palaeontology as a CGS site (pNHA)
Cregg	The build-ups at Cregg some 8km south of Ardagh are dominated by cyanophytes and calcareous algae and an exceptional cephalopod fauna	Proposed under IGH 3 - Carboniferous to Pliocene Palaeontology as a CGS site (pNHA)
Barley Hill Quarry (Ardagh Quarry)	A massive late Asbian build-up complex is dominated by cyanophytes and calcareous algae, developed on a shallow water carbonate platform. (Also an exhumed pre-Namurian topography of semi-karst type, partially overlaid by the Namurian shales. Two important stream sections also occur in the area under IGH 9)	Proposed under IGH 16 - Lower Carboniferous as a NHA site (pNHA)
Mullaghmore	Comprising of a thrust block moraine, with deformed sands and gravels	Proposed under IGH 7 - Quaternary as a NHA site (pNHA)
Carrickatee Hill	Comprising of excellent and most extensive exposures of andesitic agglomerate of the Carrickatee Formation. The best exposed example of mid/late Ordovician volcanism within the Moffat Shale Group south of the Orlock Bridge Fault in Ireland	Proposed under IGH 4 - Cambrian-Silurian as a NHA site (pNHA)
Lemgare	Pits and an adit. Disseminated ankerite/siderite in arenite or in veins, also quartz, galena, sphalerite and baryte; the adit could be made accessible. Potentially the most easily accessible representative of the lead mines in this region, though it was never very productive pyromorphite, wulfenite, one of few locations for this mineralogy; not as good as Luganure	Proposed under IGH 6 - Mineralogy as a NHA site (pNHA)
Clontibret Stream	Mineralisation interest exposed in a stream section. Stibnite, arsenopyrite. Only locality in Ireland with well crystallised stibnite (Sb2S3). Unusual mineralogy	Proposed under IGH 6 - Mineralogy as a NHA site (pNHA)

Site	Description	Type of Site
Knocknacran Mine	Comprising of Permo-Triassic gypsum	Proposed under IGH 12 - Mesozoic and Cenozoic as a NHA site (pNHA)
Mokeeran Quarry	This quarry is the largest continuously exposed section of late Asbian platform limestones	Proposed under IGH 3 - Carboniferous to Pliocene Palaeontology as a NHA site (pNHA)

Table 5.7: Sites of Geological Interest (CMSA)

MSA:

There are a number of geological interest sites including pNHAs and CGSs lying within the MSA. These are listed in **Table 5.8**.

In summary, having reviewed the geological constraints information including information available to EirGrid since June 2010, no new significant information has been identified which would impact upon a consideration of route corridor selection in the MSA in respect of the proposed Interconnection Development.

Site	Description	Type of Site
Barley Hill Quarry	Comprising Lower to Upper Carboniferous limestone with rare fossils within a quarry.	Proposed under the IGH 3, 8, 9; Carboniferous to Pliocene Palaeontology, Lower Carboniferous, Upper Carboniferous themes for designation as a pNHA site
Poulmore Scarp	Comprising a swallow hole and cliff section, which may also be a disused quarry.	Proposed under the IGH 3 & 8; Carboniferous to Pliocene Palaeontology and Lower Carboniferous themes for designation as a pNHA site
Mullaghmore	Comprising Quaternary glacial deposits showing a thrust block moraine, with deformed sands and gravels.	Proposed under the IGH 7 Quaternary theme for designation as a pNHA site
St Keeran's Well	Comprising surface karst features and spring	Proposed under the IGH1 Karst Theme for designation as a CGS site
Gibstown Castle	Comprising a natural rock outcrop of Lower Carboniferous limestone of Ballysteen Formation and spring	Proposed under the IGH1 Karst Theme for designation as a CGS site
Cregg	Comprising natural rock outcrops of Lower Carboniferous (Viséan) fossiliferous limestone of the Milverton Group.	Proposed under the IGH 3 Carboniferous to Pliocene Palaeontology theme for designation as a CGS site

Site	Description	Type of Site
Rathkenny	Comprising ice contact sub-aerial fan and glacial outwash deposits.	Proposed under the IGH 7 Quaternary theme for designation as a CGS site
Boyne Valley	Comprising Quaternary deposits, channels and terraces of a relict glaciofluvial system.	Proposed under the IGH 7 Quaternary theme for designation as a CGS site
Kilbride Quarry	Comprising a disused quarry exposure of Lower Carboniferous (Courceyan) limestone of the Cruicetown Group.	Proposed under the IGH 8 Lower Carboniferous theme for designation as a CGS site
Nobber	Comprising natural rock outcrops along the banks of the River Dee over a distance of 360m.	Proposed under the IGH 8 Lower Carboniferous theme for designation as a CGS site
Painestown Quarry	Comprising a disused quarry exposure of Lower Carboniferous (Viséan) thin to medium bedded limestone and shale of the Loughshinny Formation.	Proposed under the IGH 8 Lower Carboniferous theme for designation as a CGS site
Bray Hill	Large working quarry, with Lower Carboniferous limestone and Tertiary sill	Proposed under the IGH8 Lower Carboniferous Theme for designation as a CGS site
Summerhill	Comprising of partially wooded moraine ridge made of Quaternary deposits predominantly of clay, sand and gravel.	Recommended under the IGH7 Quaternary Theme for designation as a CGS site
Boyne River	A section of the Boyne River comprising one of the few examples of anastomosing (distributary) channel in Meath	Proposed under the IGH14 Fluvial / Lacustrine Geomorphology Theme for designation as a CGS site
Galtrim Moraine	Comprising an example of an esker crossing a moraine	Proposed under the IGH7 Quaternary Theme for designation as a CGS site
Trim Esker	Comprising of a km long section of a predominantly wooded esker ridge, made of Quaternary sand & gravel deposits	Proposed under the IGH7 Quaternary Theme for designation as a CGS site
Altmush Stream	Comprising a continuous section of natural rock outcrops of Lower Carboniferous to Upper Carboniferous limestone and shale of the Fingal group and Ardagh Shale formation	Proposed under the IGH8 Lower Carboniferous Theme for designation as a CGS site
Carrickleck Quarry	Comprising a working quarry exposure of Upper Carboniferous (Namurian) disaggregated sandstone of the Carrickleck Sandstone Member.	Proposed under the IGH 9 Upper Carboniferous theme for designation as a CGS site
Dunshaughlin	Comprising a basin shaped body of silica derived from decalcified limestone, undated but possibly formed from Tertiary weathering.	Proposed under the IGH 12 Mesozoic and Cenozoic theme for designation as a CGS site
Blackwater	Comprising a Valley and outwash plain with	Proposed under the IGH7 Quaternary

Site	Description	Type of Site
Valley	Quaternary deposits in the form of a pitted sandur. Most of this site lies within an existing NHA & SAC.	Theme for designation as a CGS site

Table 5.8: Sites of Geological Interest (MSA)

Map 1 (CMSA) contained in **Appendix C** identifies Geology Constraints (and other constraints) within the CMSA. **Map 1 (MSA)** contained in **Appendix D** identifies Geology Constraints (and other constraints) within the MSA.

5.2.1.4 Water

CMSA:

The surface water environment of the study area consists of five river catchments – Erne, Blackwater, Fane, Glyde and Boyne. The majority of the study area is located within the Fane and Glyde catchments with the other river catchments (Erne, Blackwater and Boyne) located in its western and southern sections. Numerous water bodies such as rivers and an extensive number of lakes are located within each catchment.

The River Glyde catchment is located in the southern section of the study area and includes Carrickmacross, County Monaghan and the surrounding area. The River Glyde rises as two separate rivers namely the River Lagan and the Kilanny River. The two rivers meet at Tully, County Louth and flow approximately 35 km towards the sea, entering tidal water between Murlough Upper and the Haven, County Louth. The catchment also includes the River Dee, south of Kingscourt, County Cavan, Longfield River, Proules River and the Lagan River. The major lakes located in this catchment include Monalty Lough, Fea Lough and Boraghy Lake.

The River Fane catchment is located in the eastern section of the study area and enters tidal water between Murlough Upper and the Haven, County Louth. The River Fane flows southwards through Inniskeen, County Monaghan. The catchment also consists of the Ballykelly River and the County (Water) River, which is located to the north of Castleblayney, County Monaghan and drains into Lough Muckno. The major lakes located in this catchment include Lough Muckno, Ross Lough, Lough Nahinch and Tassan Lough, along with a number of other lakes.

The River Blackwater catchment is located in the north western section of the study area at Clontibret County Monaghan, and consists of the Blackwater (Cor) River and the Clontibret Stream. The Blackwater River catchment is subsequently drained by the River Bann, and by all streams entering

tidal water between the Barmouth and Ballyaghran Point, County Derry. The Six Mile Lake in the Derryarrilly townland and the Black and White Loughs in the Cashel townland are located within the River Blackwater catchment.

The Erne catchment is the surface catchment drained by the River Erne and all streams entering tidal water between Aughrus Point and Kildoney Point, County Donegal. The towns of Ballybay and Shantonagh, County Monaghan and Shercock, County Cavan are located within the catchment. The catchment consists of the Annalee River and its tributaries, the Dromore River and the Knappagh River. The rivers flow west to receiving waters at Lough Oughter, County Cavan. The major lakes located in this catchment include Lough Egish, Crinkell (Toome) Lough, Sillan Lough and Lagan Lough.

A small section of the south western part of the study area, between Kingscourt and Bailieborough, County Cavan, is located within the River Boyne catchment.

In summary, having reviewed the baseline water constraints information including information available to EirGrid since June 2010, no new significant information has been identified which would impact upon a consideration of route corridor selection in the CMSA in respect of the Interconnection Development project.

The main surface water features (and other constraints) within the study area listed in **Table 5.9** and are identified on **Map 1 (CMSA)** contained in **Appendix C**.

Watercourse	Catchment	Receiving Waters	Location within Study Area
Blackwater River	Blackwater	River Bann	Clontibret, Co. Monaghan
Clontibert Stream		Blackwater River	Clontibret, Co. Monaghan
Annalee	Erne	Lough Oughter (Erne)	Shercock, Co. Cavan
Knappagh		Annalee River	Shantonagh, Co. Monaghan
Dromore		Annalee River	Ballybay, Co. Monaghan
Lough Egish		-	1.0 km North of Laragh, Co. Monaghan
Crinkell (Toome) Lough		-	6.0 km east of Ballybay, Co. Monaghan
Lough Sillan		-	0.5 km North-West of Shercock, Co. Cavan
Glyde	Glyde	Irish Sea	8 km North-West of Ardee, Co. Louth
Lagan		Glyde	south of Carrickmacross, Co. Monaghan
Dee		Glyde	south of Kingscourt, Co. Cavan

Watercourse	Catchment	Receiving Waters	Location within Study Area
Longfield		Glyde	south of Carrickmacross, Co. Monaghan
Proules		Glyde	10 km north-west of Ardee, Co. Louth
Monalty Lough		-	2 km south-east of Carrickmacross, Co. Monaghan
Fea Lough		-	2 km south-west of Carrickmacross, Co. Monaghan
Fane	Fane	Irish Sea	5 km east of Carrickmacross, Co. Monaghan
Ballykelly		Fane	5 km east of Carrickmacross, Co. Monaghan
County (Water)		Lough Muckno	1 km east of Castleblayney , Co. Monaghan
Lough Muckno		-	1 km east of Castleblayney , Co. Monaghan

Table 5.9: Major Rivers and Lakes (CMSA)

MSA:

The surface water environment of the MSA consists of three river catchments – the Dee/Glyde, Nanny and Boyne. The majority of the study area is located within the Boyne catchment with the other catchments located in its eastern and northern sections. Numerous water bodies such as rivers and lakes are located within each catchment.

The River Boyne catchment in the south and central sections of the study area, dominates the natural surface water environment. The River Boyne flows in a south-west to north-east direction through the towns of Trim and Navan and has five main tributaries; River Blackwater, Tremblestown/Athboy River, Knightsbridge River, Boycetown River and the Clady River. The River Blackwater flows in a north-west to south-east direction from Kells before entering the Boyne at Navan. The Moynalty River, a major tributary, enters the Blackwater River midway between Kells and Navan and a smaller tributary, Yellow River, joins the Blackwater River 4 km north west of Navan. A high density of small streams comprising of Dangan River, Clonymeath/Moynalvy River, Boycetown River and Skane River are located in the south of the study area. Clooney Lough is located to the north of the Boyne/Blackwater catchment with the man-made Tara Mines Tailings Pond located at Randalstown, near Navan.

The River Dee/River Glyde catchment is located in the northern section of the study area and includes Nobber, County Meath and the surrounding area. The catchment includes a number of tributaries

namely the River Lagan, Kilmainham River and the Killary River. The river flows through Nobber and Ardee towards the sea to at Annagassan, County Louth. The major lakes located in this catchment include Whitewood Lough, Newcastle Lough, Ervey Lough, Brackan Lough, Ballyhoe Lough and Breakey Lough.

The River Nanny catchment is located in the eastern section of the study area around Rathfeigh and Kentstown, County Meath. The River Nanny flows eastwards and enters tidal water at Laytown, County Meath. The catchment also consists of the Hurley River, a tributary of the River Nanny which is located to the east of the Skreen Hills, County Meath.

In general, there is a high drainage density throughout the centre and south of the study area. North of Nobber in County Meath, the drainage density decreases as the relief and the number of lakes increase. The main surface water features (and other constraints) within the study area are listed in **Table 5.10**, and are identified on **Map 1 (MSA)** contained in **Appendix D**.

In summary, having reviewed the baseline water constraints information including information available to EirGrid since June 2010, no new significant information has been identified which would impact upon a consideration of route corridor selection in the MSA in respect of the Interconnection Development project.

Watercourse	Catchment	Receiving Waters	Location in Study Area
Blackwater River	Boyne	Boyne River	Kells to Navan
Boyne River		Irish Sea	Trim to Slane
Clady River		Boyne River	north-east of Navan
Tara Mines Tailings Pond		Boyne River	north-west of Navan
Clooney Lough		-	north-west of Wilkinstown
Knightsbrook River		Boyne River	3 km east of Trim
Moynalty River and tributaries		Blackwater River	north-west of Kells
Nanny River		Irish Sea	south-east of Navan
Tremblestown River/Athboy River		Boyne River	Athboy to Trim
Moynalvy/Cloneymeath River		Boyne River	1 km east of Summerhill
Dangan River		Boyne River	1.5 km north of Summerhill
Yellow River		Blackwater River	5 km north-west of Navan
Boycetown River		Boyne River	south of Trim
Killary River	Dee/Glyde	River Dee	6 km north of Nobber

Watercourse	Catchment	Receiving Waters	Location in Study Area
Kilmainham River		River Dee	east of Kilmainhamwood
Whitewood Lough		River Dee	north-west of Nobber
Newcastle Lough		River Dee	north-west of Nobber
Ervey Lough		River Dee	south-east of Kingscourt
Brackan Lough		River Dee	south-east of Drumcondra
Ballyhoe Lough		River Lagan	east of Kingscourt
Breakey Lough		River Dee	south-west of Kingscourt
Nanny River	Nanny	-	Kentstown
Hurley River		Nanny River	south-east of Navan

Table 5.10: Major Rivers & Lakes (MSA)

Map 1 (CMSA) contained in **Appendix C** identifies Main Water Constraints (and other constraints) within the CMSA. **Map 1 (MSA)** contained in **Appendix D** identifies Main Water Constraints (and other constraints) within the MSA.

5.2.2 Artificial Constraints (Forming Part of the Built Environment)

5.2.2.1 Settlements

CMSA:

Settlements within the study area include Carrickmacross, Castleblayney, Annyalla, Doohamlet, Oram, Lough Egish, Broomfield, Laragh, Lisdoonan, Corduff, Donaghmoyne, Magheracloone, Shercock and Kingscourt.

MSA:

Settlements within the study area include Athboy, Dunshaughlin, Kells, Navan, Nobber, Moynalty, Kilmainhamwood, Kingscourt, Kilmessan and Trim.

In addition to these settlements, there is a significant extent of lower hierarchy settlement nodes (e.g. clusters at crossroads), one-off housing and ribbon development in the overall study area. While there has been a certain increase in the number of one-off dwellings in the overall study area in recent years, there have been no new significant settlement areas or existing or planned expansion of existing settlements which would impact upon the route corridor identification and selection process in respect of the Interconnection Development Project.

Therefore, having reviewed the baseline settlements constraints information including information available to EirGrid since June 2010, no new significant information has been identified which would impact upon a consideration of route corridor selection in the CMSA or MSA in respect of the Interconnection Development project.

Population densities vary amongst electoral districts (ED) within the overall study area; higher population densities occur around the main urban settlements, with lower densities outside of these urban settlements.

Map 1 (CMSA) contained in **Appendix C**, illustrates Settlement Constraints (and other constraints) within the CMSA. **Map 1 (MSA)** contained in **Appendix D** illustrates Settlements Constraints (and other constraints) within the MSA.

5.2.2.2 Cultural Heritage

Within the overall study area there is a great variety of archaeological and architectural heritage, including structures/buildings of architectural heritage significance and distinctive character that are deemed worthy of protection.

CMSA:

A number of cultural heritage features have been identified within this part of the overall study area. Such features include areas of archaeological significance, National Monuments, scheduled monuments, archaeological sites, protected structures, architecturally significant buildings and historic gardens and demesnes. By far the most numerous features are archaeological monuments which are indicated on the Records of Monuments and Places (1,128) in Ireland and on the Sites and Monuments Records (50) in Northern Ireland. There are no World Heritage sites in this part of the study area. There are over a thousand known archaeological and architectural sites as summarised in **Table 5.11**.

In summary, having reviewed the baseline archaeological and architectural heritage constraints information including information available to EirGrid since June 2010, no new significant information has been identified which would impact upon a consideration of route corridor selection in the CMSA in respect of the Interconnection Development project.

Cultural Heritage Sites	Number
Archaeological Sites	
World Heritage Sites (ROI/NI) (within 10 km)	0
World Heritage Sites – Tentative List (ROI/NI)	0
Areas of Significant Archaeological Interest (NI) (within 7km)	1
National Monuments in the Ownership or Guardianship of the State (ROI) (within 5 km)	4
Scheduled Monuments (NI) (within 5 km)	15
Sites Under Preservation Orders (ROI) (within 2 km)	2
Potential National Monuments in the Ownership of a Local Authority (ROI) (within 2 km)	24
Record of Monuments and Places (ROI) and Sites and Monuments Record (NI) (within 2 km)	1,178
Architectural Sites	
Architectural Conservation Areas (ROI) / Conservation Areas (NI) (within 2 km)	1
Register of Historic Parks & Gardens (NI) (within 2 km)	0
Demesne Gardens & Historic Landscapes (ROI) (NIAH) (within 2 km)	36
Record of Protected Structures (ROI) / Listed Buildings (NI) / Industrial Heritage (NI) / Defence Heritage (NI) (within 2 km)	118
National Inventory of Architectural Heritage (NIAH) (ROI) (within 2 km)	1

Table 5.11: Summary of Known Archaeological and Architectural Sites (CMSA)

MSA:

To the east of this part of the overall study area is the Hill of Slane. Slane itself is an historic town where Slane Castle is situated. To the east of Slane is Brú na Bóinne, one of only three World Heritage Sites located in Ireland. To the west of the study area is Lough Crew, Ireland's largest complex of megalithic passage graves. A large number of architectural sites are located within this part of the overall study area, including Castles such as Trim, Demesnes, such as Headfort and Ardbraccan, many of which contain country houses and landscaped parks and gardens and bridges and vernacular cottages.

The archaeological resource is likewise extensive, with numerous enclosures, raths and ringforts as well as some of the country's pre-eminent archaeological sites, such as Tara and Kells, both recently nominated for World Heritage status (announced by the Minister for Environment, Heritage & Local Government in April 2010). There are thousands of known archaeological and architectural sites located within the study area, as summarised in **Table 5.12**.

It is noted that the majority of RPSs and NIAHs are located within or adjacent to the major settlements, particularly in the towns of Navan, Trim and Kells.

Two Candidate World Heritage Sites have been nominated for designation since the publication of the previous Constraints Report - the Tara Complex and Kells. These sites have not yet been designated. The sites are located at a significant remove from the previously identified route corridor options. Meath County Council has also published a Draft Landscape Conservation Plan relating to the designation of a Landscape Conservation Area based around the Tara Complex. The proposed route corridors lie outside the proposed draft Landscape Conservation Area.

In summary, having reviewed the baseline archaeological and architectural heritage constraints information including information available to EirGrid since June 2010, no new significant information has been identified which would impact upon a consideration of route corridor selection in the MSA in respect of the Interconnection Development project.

Cultural Heritage Sites	**Number**
Archaeological Sites	
World Heritage Sites	0
Candidate World Heritage Sites	2
National Monuments in the Ownership or Guardianship of the State	26
Sites Under Preservation Orders	37
Potential National Monuments in the Ownership of a Local Authority	116
Record of Monuments & Places (RMP)	1402
Architectural Sites	
Record of Protected Structures (RPS)	860
National Inventory of Architectural Heritage (NIAH)	1160
Demesne Gardens & Historic Landscapes	>100
Architectural Conservation Areas	8

Table 5.12: Summary of Known Archaeological and Architectural Sites (MSA)

Map 1 (CMSA) contained in **Appendix C** identifies the locations of the Cultural Heritage Constraints (and other constraints) within the CMSA. **Map 1 (MSA)** contained in **Appendix D** identifies the locations of Cultural Heritage Constraints (and other constraints) within the MSA.

As previously detailed in **section 5.2**, archaeological sites afforded protection at a World level are categorised as primary constraints.

5.2.2.3 Utilities and Infrastructure

Infrastructure and utilities constraints include electricity lines, gas pipelines, roads, windfarms, airfields and railways.

CMSA:

- ***Gas Pipeline*** – There is one gas pipeline which lies just outside the defined study area, running between Drogheda and Bailieborough. A new pipeline off this line serving Kingscourt, Carrickmacross and Lough Egish is proposed, but not yet in existence.

- ***Roads*** – The most significant road in the study area is the N2 Dublin – Monaghan National Primary route. This runs in generally a north/south direction and includes bypasses of Carrickmacross and Castleblayney. There are a number of regional roads linking the major towns, while a large number of local roads serve what is, in general, a rural area.

- ***Windfarms*** – There is one operational wind farm within the study area, namely Mullananalt in County Monaghan.

- ***Airfields*** – There are no airfields in the study area.

- ***Railways*** – The Kingscourt to Navan railway line alignment lies to the south of the study area, this is currently disused. Whilst it could be reopened in the future there are currently no plans to reopen it.

- ***Electricity Lines*** – The most significant electricity line in the Study Area is the Flagford-Louth 220 kV OHL which runs in an east-west direction to the south of Kingscourt. There are three 110 kV electricity lines (Arva – Shankill – Lisdrum, Lisdrum – Louth and Shankill – Louth). An additional 110 kV line (Arva – Shankill) is due to be completed by the end of 2012. Overall, in the CMSA there are approximately 217 km of existing high voltage lines (91 km of 38 kV, 83 km of 110 kV and 43 km of 220 kV). In addition, there are also thousands of kilometres of medium voltage, low voltage and telephone overhead lines.

In summary, having reviewed the baseline information in relation to infrastructure / utilities including information available to EirGrid since June 2010, no new significant infrastructure / utilities information has been identified which would impact upon a consideration of route corridor selection in the CMSA in respect of the Interconnection Development project.

MSA:

- ***Gas Pipelines*** - There are a number of gas pipelines in the study area particularly around the main settlements of Navan, Trim, Dunshauglin, Kells and Kingscourt. There are also a network of gas pipelines which connect these settlements, including the following:-

    - From Ratoath to Dunshaughlin;
    - Dunshaughlin passing approximately 1 km to the north of the village of Summerhill; towards the village of Rathmoylan;
    - Trim to Navan; and
    - Ardee towards Kingscourt, Lisnagrow and Mullagh.

- ***Roads*** - In terms of transport infrastructure there is a dense network of national and regional roads within the study area. The M3 runs in a north westerly direction, bypassing the town of Dunshauglin, it then runs to the west of Navan and Kells. There are a number of regional roads linking the major towns, while a large number of local roads serve what is in general a rural area.

- ***Wind Farms*** – There are five proposed wind farms in the study area, which may in the future be connected to the national electricity grid. Three of the five proposed wind farms are located approximately 4.5 km southwest of the village of Kilmainhamwood. The other two wind farms are located approximately 1 km east of Gibbstown and approximately 3 km west of Slane. At present there are no operational wind farms within the study area.

- ***Airfields -*** There are two Airfields in the study area; Trim Airfield located north-east of Trim, and Summerhill Airfield located north of Summerhill.

- ***Railways -*** The Navan–Pace railway line corridor lies to the south of the study area. This is currently disused, but consideration is being given to rehabilitating and opening this line as an extension to the existing Dublin-Clonsilla-Dunboyne-Pace line. There is also a Navan to Kingscourt freight rail line located within the study area.

- ***Electricity Lines -*** There are a number of existing electricity lines located throughout the study area, which include both transmission and distribution lines. The most significant electricity lines in the study area are the Oldstreet to Woodland 400 kV line, which is located to the south of the study area and the Flagford-Louth 220 kV OHL which runs in an east-west direction to the south of Kingscourt. There are a number of other existing 220 kV lines in the study area namely Chanonrock to Celbridge and Chanonrock to Gorman. There are two proposed 110 kV lines which will cross the study area north of Navan, namely Gorman to Meath Hill and Gorman to Navan, which have recently been constructed. Overall in the MSA there are approximately 329 km of existing electricity lines (161 km of 38 kV, 101 km of 110 kV, 93 km of 220 kV and 4 km of

400 kV). There are also thousands of kilometres of medium voltage, low voltage and telephone overhead lines.

In summary, having reviewed the baseline information in relation to infrastructure / utilities including information available to EirGrid since June 2010, no new significant infrastructure / utilities information has been identified which would impact upon a consideration of route corridor selection in the MSA respect of the Interconnection Development project.

Map 1 (CMSA) contained in **Appendix C** identifies the existing Utilities and Infrastructure Constraints (and other constraints) in the CMSA. **Map 1 (MSA)** contained in **Appendix D** identifies the existing Utilities Infrastructure Constraints (and other constraints) in the MSA.

5.3 CONCLUSIONS

The re-evaluation process has facilitated a review of all environmental and other constraints that were pertinent to the decision making and evaluation process previously undertaken in respect of the Meath – Tyrone 400 kV Interconnection Development, and which continue to be pertinent in the context of the planned new Interconnection Development project.

In summary, there are a wide variety of ***natural constraints*** (naturally occurring landscapes and features) which were previously identified, and which will continue to influence the location of any route corridor within the overall study area. The main way in which potential impacts on natural constraints can be mitigated is through avoidance and this will comprise the core strategy in route corridor identification, and ultimately, the route selection process. If avoidance is not possible, specific mitigation measures can be designed into the project to reduce potential impacts.

The most significant ***artificial constraints*** (forming part of the built environment) in the overall study area are the major settlements and features of cultural heritage. The larger settlements will continue to be avoided. However, the distribution of one-off and clustered rural housing throughout the overall study area remains a significant factor in determining any route corridor and as a design consideration.

In summary, key environmental and other constraints (previously identified and updated) in the overall study area will continue to be avoided where possible, particularly those categorised as Primary constraints, and have been given full consideration in the route corridor identification process.

Overall, having reviewed all baseline constraints information in relation to the proposed North-South Interconnection Development, including additional submissions made and other information available to EirGrid since June 2010, no new significant environmental or other constraints has been identified which would impact upon a consideration of route corridor selection in the CMSA and MSA respect of the Interconnection Development project.

6 IDENTIFICATION OF FEASIBLE ROUTE CORRIDOR OPTIONS

As noted earlier in this Report, the re-evaluation process relied on the considerable body of work previously undertaken, including work undertaken during the previous route selection process of the Meath–Tyrone 400 kV Interconnection Development, when feasible route corridors were identified and evaluated within the identified study area.

Once key environmental and other constraints were identified, documented, mapped and overlaid onto Discovery Series Mapping, the next step in the route selection process was to identify technically feasible route corridor options, avoiding those identified constraints, to the greatest extent possible, with particular emphasis on seeking to avoid Primary constraints. The feasible route corridors were mapped and assessed. This process involved a high level evaluation of the likely impacts of each of the route corridor options on the identified Primary and Secondary constraints.

The identified route corridor options are of a nominal indicative width of 1km. Such width has no technical or, scientific basis, rather a 1km wide corridor is intended to ensure that an adequate area is identified in which a potential line route, including all associated structures, can best be sited, while making provision for as great a buffer distance as possible to identified sensitive receptors (i.e. any element of the environment which has the potential to be significantly impacted) within the environment in which the line will be located.

Corridor options need to be of comparable width, to facilitate a robust comparative evaluation. However, that is not to say that the preferred line route cannot extend outside the indicative corridor boundaries, if this is deemed appropriate to ensure the optimum solution.

6.1 BACKGROUND TO THE IDENTIFICATION OF FEASIBLE ROUTE CORRIDOR OPTIONS

The re-evaluation process relied on the considerable body of work previously undertaken as detailed in the following publications:

- ESBI and AOS Planning, ‘Route Constraints Report’ (September 2007); and
- Socoin and TOBIN Consulting Engineers, ‘Kingscourt to Woodland Constraints Report Volume 1’ (July 2007).[53]

[53] Both available at www.eirgridprojects.com

Subsequently, in May 2008, ESBI and AOS Planning, and Socoin and TOBIN Consulting Engineers, prepared Addendum Reports which complemented the earlier Route Constraints Reports, by assessing the relative merits of each identified corridor on the basis of further more detailed analysis undertaken, and having regard to a number of issues raised during the public stakeholder and other consultation processes. This work is detailed in the following publications:

- ESBI and AOS Planning, 'Route Constraints Report September 2007 Addendum' (May 2008); and

- Socoin and TOBIN Consulting Engineers, 'Kingscourt to Woodland Powerline Addendum Report 1' (May 2008).[54]

The process of identifying potential route corridor options included the identification of a potential indicative line route within each corridor. It was considered essential to ensure, at an early stage, that a potentially feasible line route existed within each identified corridor.

Given that there has not been substantial or profound alterations to the receiving environment of the Study Area over the last 5 years, other than a modest amount of new built development which is regularly monitored by EirGrid's consultants, it is considered appropriate and prudent to have regard to these studies in the re-evaluation process.

6.2 POTENTIAL CORRIDORS IN THE STUDY AREA

The 2007 Route Constraints Reports identified potential route corridors within the previously identified CBSA and NESA (now referred to as the CMSA and MSA). These are described in summary below.

CMSA:

Three potential route corridor options were identified for the CMSA avoiding where possible the most significant identified constraints. These were:

- **Route Corridor Option A** (Red) runs within the western part of the study area, west of the N2, Castleblayney and Carrickmacross. It turns in a north-easterly direction approximately 1 km north of Annyalla to cross the N2 and then turns in north-westerly direction at Lemgare to the border crossing locations;

[54] Available at www.eirgridprojects.com

- **Route Corridor Option B** (Blue) runs within the central part of the study area, west of the N2, Castleblayney and Carrickmacross but closer to Castleblayney and Lough Muckno than the western route. It is straighter and slightly shorter than Route A; and

- **Route Corridor Option C** (Black) follows Route Option B to a point approximately 4km north-west of Carrickmacross before turning east to run to the east of the N2 and east of Lough Muckno. It is the longest of the routes.

All three corridors share the first 10km in a northerly direction, from the intersection point with the MSA to a point approximately 5km west of Carrickmacross, where they diverge then into different corridors. The final 2km of each corridor close to the intersection point with the NIE line route is also shared with each corridor.

The route corridor options are illustrated on **Figure 6.1**.

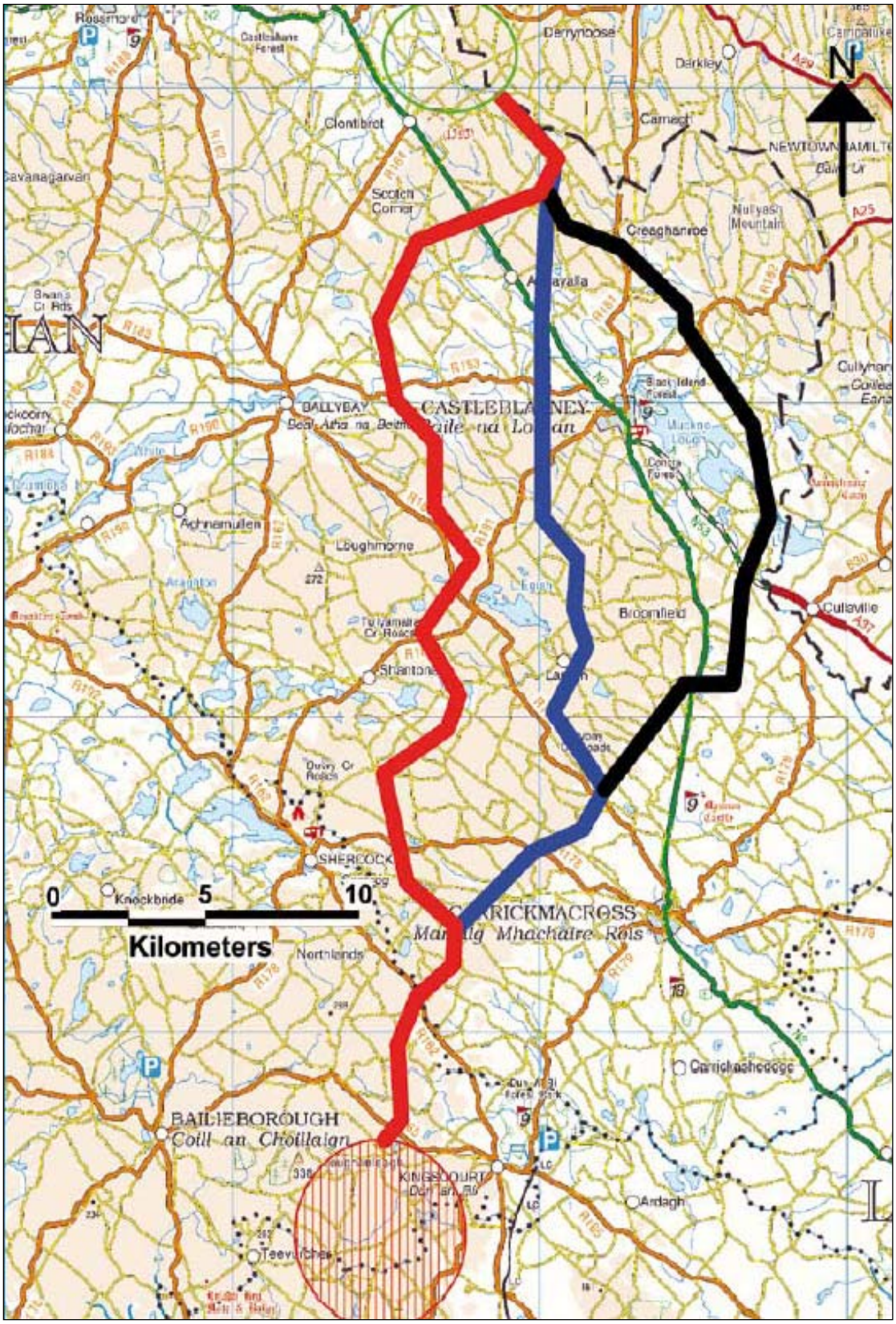

Figure 6.1: Route Corridor Options (CMSA) taken from the 2007 Route Constraints Report

MSA:

Three potential route corridor options (with one sub-option) were identified for the MSA, also taking cognisance of identified constraints. These were:-

- **Route Corridor Option 1** (Blue) runs within the western part of the study area, to the west of Trim, Athboy and Kells and approximately 4km north of Ballivor and east of Mullagh;

- **Route Corridor Option 2** (Red) runs between the central and western section of the study area, staying to the east of Trim and Athboy, west of Kells and then runs parallel to Route Option 1, running approximately 1.5 km to the east of Mullagh;

- **Route Corridor Option 3A** (Light Green) follows Route Corridor Option 2 initially before running in a due north direction, running to the west of Navan and to the east of the town of Kells. Approximately 5 km north of the M3, this route corridor option splits into two sub-options 3A and 3B. 3A runs to the west of Castletown and Nobber before joining together west of Whitewood Lough; and

- **Route Corridor Option 3B** (Green) follows Route Corridor Option 2 initially before running in a due north direction, running to the west of Navan and to the east of the town of Kells is similar to Route Corridor Option 3A, this route corridor option splits into two options 3A and 3B. Route Corridor Option 3B runs to the west of Carlanstown before joining together west of Whitewood Lough.

The route corridor options are illustrated on **Figure 6.2.** In this regard, all route corridor options extend out from Woodland Substation in a westerly direction along the alignment of the existing Oldstreet–Woodland 400 kV transmission line. From an environmental perspective, it was considered that using the unused side of these existing double circuit towers has a much lower potential impact compared with using new route corridors into/out of Woodland Substation.

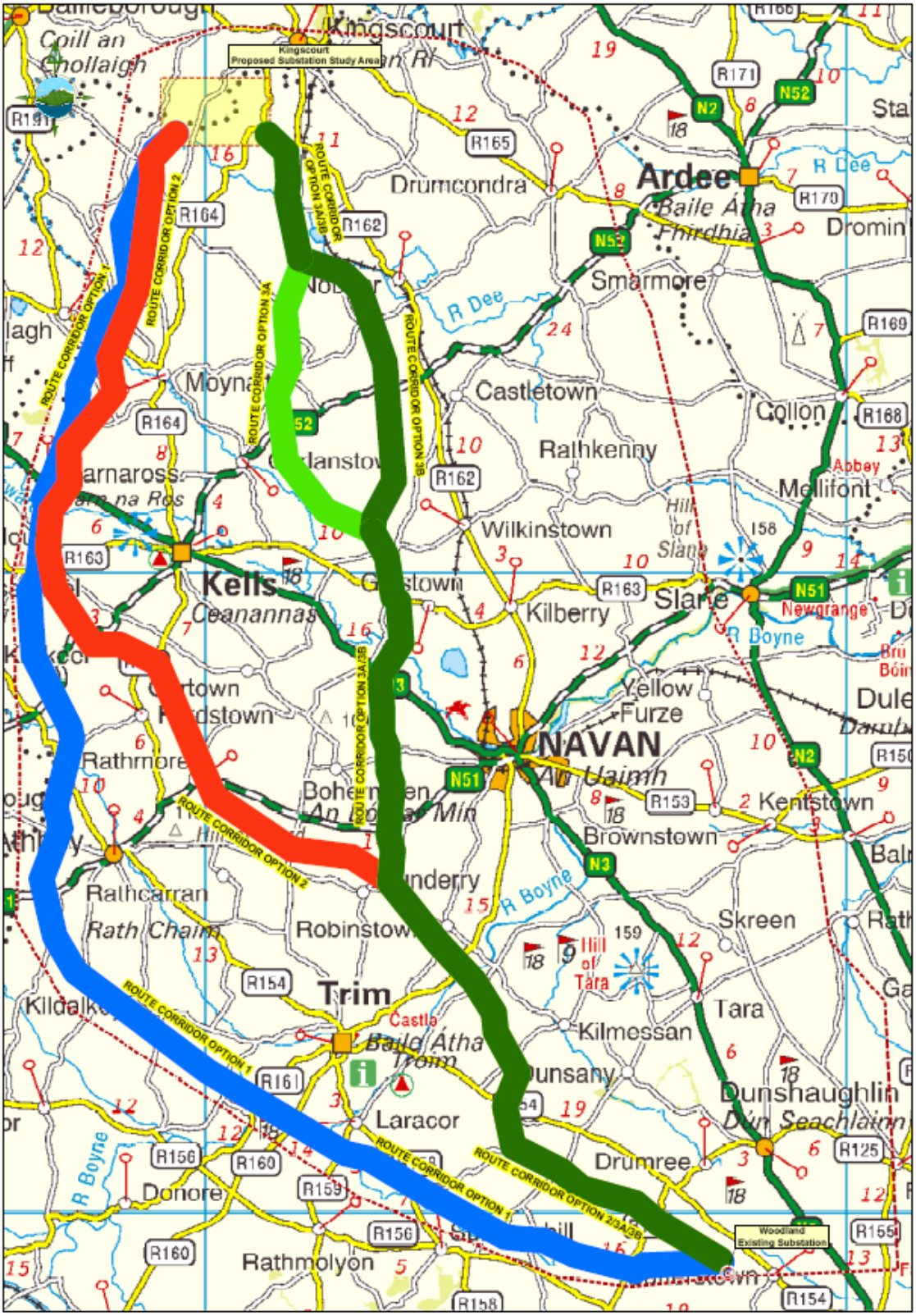

Figure 6.2: Route Corridor Options (MSA) taken from the 2007 Route Constraints Report

6.3 RE-EVALUATION PARAMETERS AND CONSIDERATIONS

The principal purpose of the re-evaluation process is to confirm the applicability, or otherwise, of these identified corridors, in the context of updated constraints and other information gathered since the original identification of these potential corridors in 2007.

In the previous chapter it was confirmed that having reviewed all baseline environmental constraints information in relation to the proposed North-South Interconnection Development (including additional submissions made and other information available to EirGrid since June 2010), no new constraints have been identified which would impact upon a consideration of route corridor selection in the CMSA and MSA in respect of the Interconnection Development project. The process of identification of constraints is the fundamental precursor to corridor identification.

In this context, and also having regard to all technical information and analysis, and related public, stakeholder and other inputs arising since the withdrawal of the previous application for approval of the Meath-Tyrone 400 kV Interconnection Development, **no new significant issues or information have arisen which would result in either any fundamental change to the previously identified route corridor options, or any requirement to seek to identify other route corridor options within the study area; although it is noted that some minor localised changes have occurred.** For example, as set out in **Chapter 4**, in circumstances where it is not intended to proceed with a substation as part of this planned Interconnection Development, local amendments have been made to these identified route corridor options in the general vicinity of the previously proposed substation location.

As noted above, it is now proposed that the nominal boundary between the CMSA and MSA sections of the overall study area should lie in the vicinity of the existing Flagford – Louth 220 kV OHL, rather than the boundary of the previously identified 5 km study area, within which it was intended to site the previously proposed substation west of Kingscourt. Previously, the identified corridors terminated at the boundary of the substation study area. For the purpose of the re-evaluation process, the same route corridor options have now been extended into this 5 km area resulting in a continuous corridor within the CMSA and MSA. The implications of this are set out below and illustrated on **Figure 6.3** and **Figure 6.4**:-

- CMSA: southerly extension and associated amendments of the previously identified 400kV Route Corridor Option A so that it meets the MSA corridor;
- MSA: northerly extension and amendments of the previously identified 400kV Route Corridor Option 3A so that it meets the CMSA corridor; and
- Omission of the associated 220kV circuits forming the previously proposed loop-in of the Flagford-Louth 220 kV line into the previously proposed substation near Kingscourt.

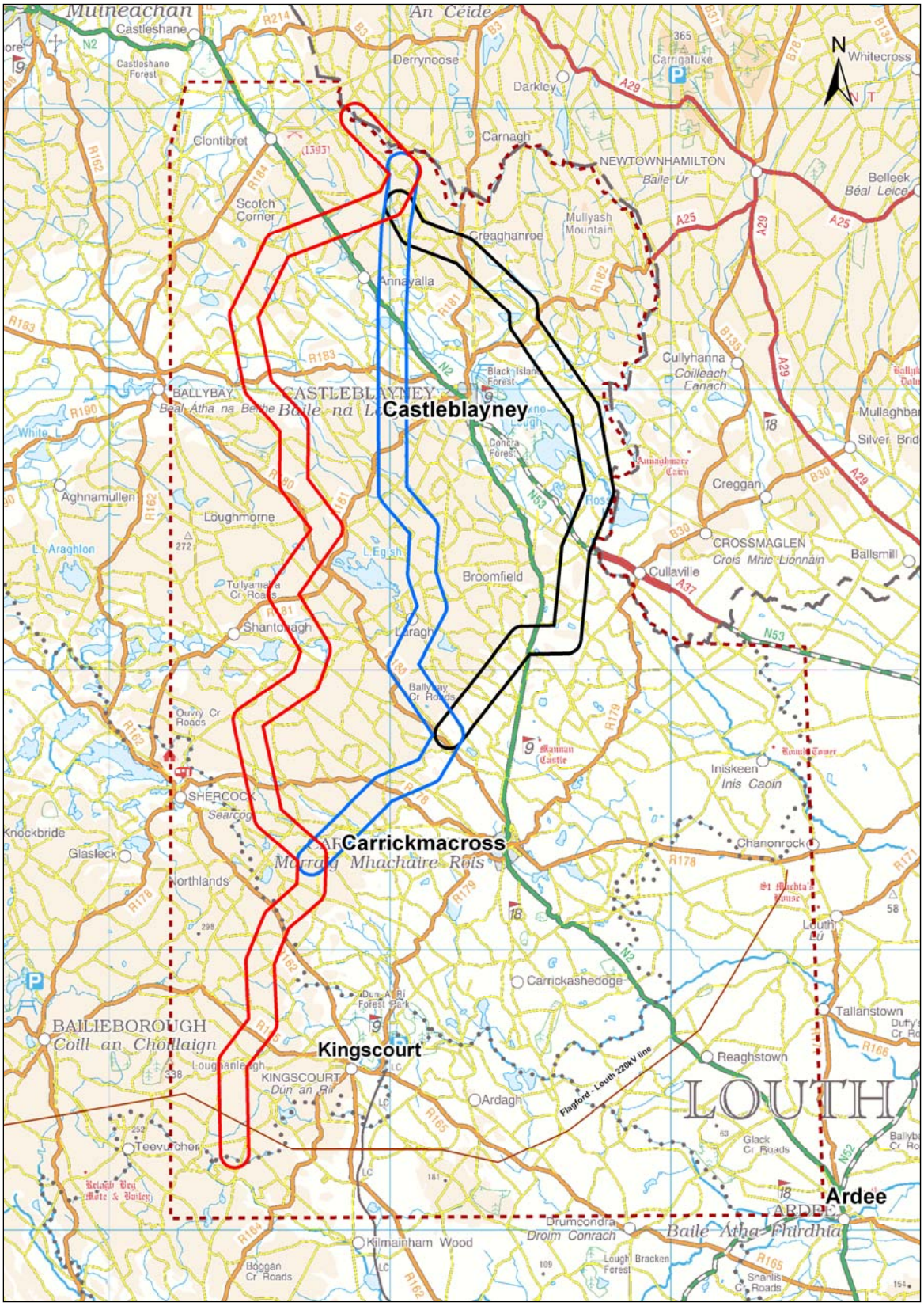

Figure 6.3: Route Corridor Options for the CMSA (Amended)

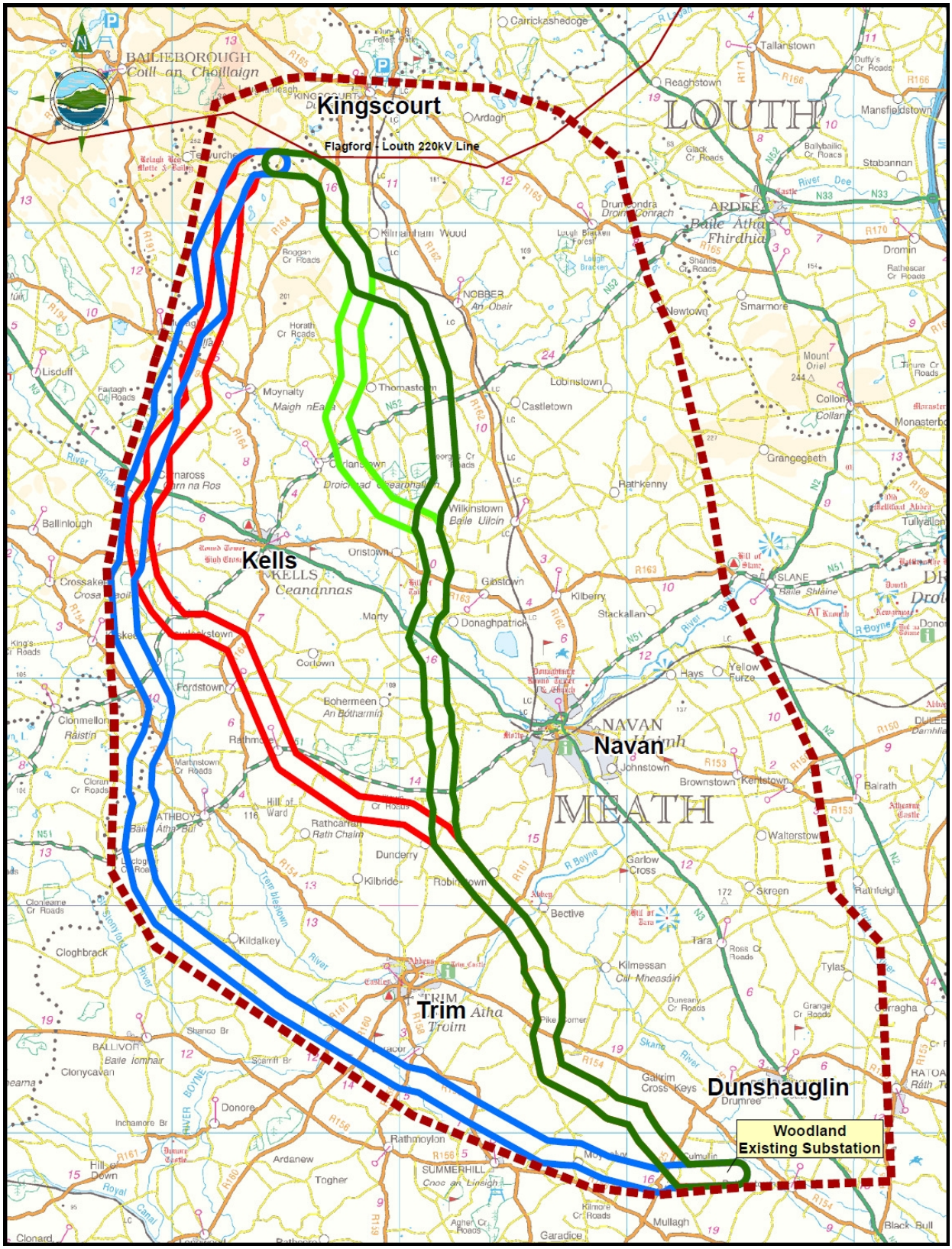

Figure 6.4: Route Corridor Options for the MSA (Amended)

6.4 ENVIRONMENTAL OVERVIEW OF POTENTIAL CORRIDORS

This section of the Re-evaluation Report provides an overview of the Primary and Secondary constraints associated with these identified route corridor options, having regard to updated environmental and other constraints information. As noted above, while the actual presentation of material may have altered, the baseline information outlined in this report is generally consistent with that contained in the original 2007 Route Constraints Reports, except where otherwise indicated.

6.4.1 Ecology

The significance of ecology constraints must be considered in the context of the following facts:-

- While the final design traverses a very lengthy stretch of the country, the actual impacts are at a very localised and small scale. Impacts are not comparable with road schemes or similar significant linear developments, and are at a much lower scale;
- There is flexibility in design considerations i.e. final tower location. Thus the majority of identified constraints can be avoided, or potential impacts can be much reduced by appropriate mitigation at line design stage.

With this fact in mind, ecology constraints can be broadly summarised into two categories:-

- **Constraints A: All ecology constraints (except birds).** International, national and county value ecological receptors which have been identified can, for the most part, be effectively avoided at line design stage. In the case of wooded habitats (e.g. hedgerows and woodlands), which are generally of local conservation interest, the shortest route will generally minimise impacts.
- **Constraints B: Wintering Birds – Whooper Swans.** These are identified separately as a constraint, as it is not possible to fully avoid risk from a new transmission line development; this risk is localised, and is discussed in more detail herein. Also considered in this category are all other potential collision-prone birds identified in the study area e.g. Mute Swans.

Whooper Swans which are listed on Annex 1 of the Birds Directive utilise the CMSA and MSA. Numbers of Whooper Swans regularly reach populations which are considered of international significance (+> 1% International population) throughout the study area, at certain times of the winter period (November – early April inclusive).

Whooper Swans in the MSA are clustered into large flocks which typically undergo extensive daily migrations from roost to forage areas and back again. This fact is an important consideration for informing potential collision and displacement risk from a transmission line development. A key constraint for Whooper Swan distribution in the MSA is availability of roost sites. Key sites are Tara

Mines Tailings Ponds, Headford Estate (lakes), Balrath Demense and the townland of Cruicetown. Other small lakes including Whitewood Lough are also used irregularly, typically by low numbers of Whooper Swans (County significance). Foraging areas are widespread in MSA and change year to year based on agricultural management (food availability). Key sites are large arable fields in the Blackwater River Valley and large arable fields west of Kells; however, Whooper Swans can be present at a widespread number of locations, especially where potatoes are available.

Whooper Swan distribution and their habitat in the CMSA is different to the MSA. Whooper Swans in the CMSA are much more widespread in scattered small flocks. They are relatively sedentary and stay on small lakes for long periods. In this case regular flight lines are not significant (except at a few key areas).

In relation to Whooper Swans (and other wildfowl), regardless of which route corridor option is eventually selected, it is the case that suitable mitigation measures at specific areas can and will be developed in consultation with National Parks and Wildlife Service (NPWS) as part of the final line design and considered in the EIS to be submitted with the application for planning approval.

Key facts for informing sensitivity (i.e., the potential of any element of the environment which is subject to impacts to be significantly changed) and hence risk to Whooper Swans (and other birds) from the proposed overhead line (OHL) development include:-

- The presence of large numbers of Whooper Swans in the context of an existing wirescape across the study area. This wirescape consists of approximately 546 km of existing high voltage electricity lines (252 km of 38 kV, 184 km of 110 kV, 135 km of 220 kV and 4 km of 400 kV), as well as the thousands of kilometres of medium voltage, low voltage and telephone overhead lines that occur across the study area;

- The fact that Whooper Swans regularly roost, fly over and forage in the vicinity of existing electricity line infrastructure;

- The avoidance of corridors of significantly more important Whooper Swan sites (e.g. Dromore River Wetlands, located west of the CMSA) and key roost sites in the MSA such as Tara Mines Tailings Ponds; and

- The stable/increasing national population of Whooper Swans in the context of the above points.

CMSA:

Map 2 (CMSA) contained in **Appendix C** identifies the route corridor options for the CMSA in the context of identified ecological constraints in the area.

- ***Designated / Proposed Designated Sites –*** The CMSA largely consists of improved farmland with scattered lakes and ponds with associated wetlands in drumlin hollows. Route Corridor Option A crosses Tassan Lough pNHA. Route Corridor Option B does not traverse any site. Route Corridor Option C runs along the edge of Muckno Lough pNHA. All these sites can be effectively avoided at line design stage. The location of designated sites relative to all route corridors is detailed in **Map 2 (CMSA)** contained in **Appendix C**.

  One change has occurred since the previous constraints report: the Monaghan Fen survey (2008) has highlighted Corlea and Cashal Bog (within Route Corridor A) as being suitable for designation as NHA, though they remain undesignated, and are not yet proposed for designation as pNHAs. However, for the purposes of this re-evaluation process, those sites are being treated as pNHAs and can be avoided. Designated sites/ proposed designated sites do not rule out any of the corridor options from further consideration.

- ***Other Habitats -*** All route corridor options include relatively small areas of significant habitat generally of relatively small and well-defined extent, including inter-drumlin wetlands (many with associated lakes/ponds), cutaway bogs, distinct riparian areas and semi natural deciduous woodlands. The locations of these habitats relative to the study area are detailed in **Map 2 (CMSA)** contained in **Appendix C** and summarised below in **Table 6.1**.

Habitat	Route Corridor Option A	Route Corridor Option B	Route Corridor Option C
Lake/ Wetlands	5	5	8
Woodlands/ Scrub	2	2	
Riparian Habitat	-	1	3
Cutover Bog	4	2	1

Table 6.1: Summary of Noteworthy Habitats Crossed by each Route Corridor Option (CMSA)

Most of these habitats, including hedgerow networks, can be appropriately avoided at the more detailed line design stage. As such, no habitat has been identified which would eliminate any of these route corridor options from further consideration. Generally, the shortest route would be likely to have the least impact on hedgerows/field boundaries as fewer structures and less tree cutting under the line would be required. However, other habitats do not rule out any of the corridor options from further consideration.

- ***Fisheries*** - The route corridors lie mainly within the catchments of the Rivers Glyde and Fane, which drain a significant area of Cavan, Monaghan and adjacent counties. These rivers and lakes (as previously outlined in **section 5.2.1.1**) are notable coarse fisheries. Game fisheries (brown trout predominantly) are localised and associated with the Rivers Glyde and Fane, and their tributaries. The route corridor options passes through an area that is sensitive to water pollution (historically through agricultural fertiliser run-off). The key issues of concern relate to dedicated siting and design, which can be most appropriately addressed in an EIS in respect of the proposed development. As such, no issue with fisheries has been identified which would eliminate any of these route corridor options from further consideration.

- **Whooper Swans** – Whooper Swans are considered a key wintering bird species requiring consideration in the CMSA. Surveys for wintering birds have been undertaken over five wintering periods (2007-2012) within all route corridors and observed sites up to 10km from route corridors, as swans can cover significant local migrations. Based on this survey it has been established that Whooper Swans are a key ecological receptor requiring consideration (listed on Annex 1 of EU Birds Directive) as they are potentially prone to collision/displacement from a transmission line development.

  The key significant findings from studies to date regarding Whooper Swans relevant to each of the route corridor options are summarised as follows:-

  - ***Route Corridor Option A*** – No international or nationally important flightlines are relevant to this corridor. Identified flightlines relate to county significant numbers of Whooper Swans. These include a regular flight line confirmed across this route corridor option immediately east of Loughs Tonyscallon and Toome or Crinkell. An irregular but identified significant flightline also occurs across this route corridor option in the vicinity of Comertagh Lough and surrounding lakes including Raferagh Pond. Outside these areas Whooper Swan flights are very irregular and considered insignificant relative to the route corridor.

  - ***Route Corridor Option B*** – No international or nationally important flightlines are relevant to this corridor. Identified flightlines relate to county significant numbers of Whooper Swans. These include irregular confirmed flightlines across this route in the Laragh Lough area. No other significant flights were noted or are likely relative to this route corridor. Outside this area, Whooper Swan flights are highly irregular and considered insignificant relative to the route corridor.

  - ***Route Corridor Option C*** – No international or nationally important flightlines are relevant to this corridor. Identified flightlines relate to county significant numbers of Whooper Swans. No significant flightlines were noted relative to this route corridor though an irregular flightline probably exists between Lough Nagarnaman, Creevy and Lough

Tullvaragh, based on observational changes in Whooper Swans over the winter period at these sites.

The wintering bird surveys undertaken over the past five years point to a degree of inter-year difference in site-usage among some of the sites utilised by Whooper Swans, while other sites are regularly used. This factor is considered in this assessment. It should also be noted that sites utilised by Whooper Swans (and also the assessment area) could change in the future, hence ongoing future monitoring is recommended.

- ***Other Birds -*** Mute Swans potentially fly across Route Corridor Option A between Loughs Egish and Morne as numbers of non-breeding individuals build up on these lakes in some years during Autumn/Winter and Spring. Other species, e.g. Great Crested Grebe, are relatively sedentary and not considered to be at significant risk on any of the route corridor options.

No issue has been identified with respect to all birds (including Whooper Swans) which would eliminate any of these route corridor options from further consideration. However at key areas described, appropriate mitigation can be implemented to reduce potential risk on sensitive bird species.

MSA:

Map 2 (MSA) contained in **Appendix D** identifies the route corridor options for the MSA with the Ecological Constraints.

- ***Designated / Proposed Designated Sites -*** Route Corridor Option 1 crosses the River Boyne and Blackwater cSAC/SPA three times. Route Corridor Options 2 and 3 cross the River Boyne and Blackwater cSAC/SPA twice. Mitigation by avoidance (direct impacts) and mitigation by reduction (indirect impacts) can be designed for all route corridor options which avoid significant impacts to qualifying interests and other sensitive ecological receptors in this site. All proposed designated sites and Natural Heritage Areas are avoided.

- ***Other Habitats*** – County Meath is characterised by large agriculturally-managed fields. Distinct wetland and woodland habitats are rare in the study area though a key local ecological feature of note is the presence of patches of mature deciduous (demesne) woodland and robust mature linear woodland at field boundaries. All route corridor options include these relatively small and well-defined areas of locally significant habitat. Identified noteworthy larger extent habitats are summarised below in **Table 6.2.**

Habitat	Route Corridor Option 1	Route Corridor Option 2	Route Corridor Option 3A	Route Corridor Option 3B
Wetlands	1		1	-
Woodlands	3	2	3	5
Cutover Bog	2	-	-	-

Table 6.2: Summary of Noteworthy Habitats Crossed by each Route Corridor Option (MSA)

Most of these habitats can be effectively avoided at detailed line design stage. A large network of hedges and linear woodland occur throughout the MSA and within each of the identified corridor options. Generally the shortest route would be likely to have the least impact on hedgerows as fewer structures and less tree cutting under the line would be required. In summary, no habitat has been identified which would eliminate any of the route corridor options from further consideration.

- ***Fisheries*** – All route corridor options lie mainly within the catchments of the Rivers Dee, Nanny and Boyne (Blackwater), though the majority of the route corridors are located within the Boyne Catchment. These rivers are all important game fisheries. They are also important for Lamprey species. This fact has been recognised in the designation of the River Boyne and Blackwater as cSAC sites. However, no issue regarding fisheries has been identified which would eliminate any of the route corridor options from further consideration.

- ***Whooper Swans*** – Whooper Swans are considered a key wintering bird species requiring consideration in the MSA. Surveys for all wintering birds have been undertaken over five winter periods (2007-2012) within all route corridors and up to 10 km outside corridors, as Whooper Swans in particular can cover significant diurnal migrations. Whooper Swans have been recorded at 42 sites (including historical data) in the study area.

  The key significant findings from studies to date regarding Whooper Swans relevant to each of the route corridor options are summarised as follows:-

  - ***Route Corridor Option 1*** – No international or nationally important flightlines are relevant to this corridor. Identified flightlines relate to county significant numbers of Whooper Swans. These include a relatively regular flight line across this corridor in the Carnaross area as birds forage in the vicinity of the River Blackwater. Also of note is the (at least occasional) presence of Whooper Swans close to the River Boyne, in the vicinity of Rathmoylan Village. Movements of Whooper Swans in this area could potentially cross this route corridor option, though this has not been confirmed to date.

- ***Route Corridor Option 2*** - No international important flightlines are relevant to this corridor. A flight line which is very close to national significance was confirmed across this route corridor in the Balrath/ Balgeeth area during Winter Survey Period 2, (2008/2009) and last winter (2011/2012) as birds forage in open farmland and roost on a pond at Balrath Demesne.

  The Carnaross corridor described for Route Option 1 is also relevant to this corridor.

- ***Route Corridor Option 3/3A*** – A regular nationally significant flightline crosses this corridor between Tara Mines Tailings Ponds and a number of sites in the Blackwater River Valley (Route 3). The roost site is > 2.5km from the corridor meaning Whooper Swans will be in active flight pattern when they cross the corridor, a stage when they are likely to be least sensitive to collision.

  In addition a county significant flightline has been confirmed close to this route corridor near Cruicetown and areas to the south-west, including the eastern edge of Route Corridor Option 3A. Numbers in the Cruicetown area reach National importance and it is feasible to suggest that, at least on occasion, a nationally significant flightline could cross this corridor though this has never been recorded.

  The Yellow River Area (east of Route 3) was regularly utilised in 2011/2012 and is a known foraging site by numbers which can reach National Significance. The nearest Whooper Swans observed were < 0.5km, though none crossed the route corridor and flight directions observed were always away from Route 3/3A/3B-, i.e., to/from Tara Mines Tailings Ponds.

  A locally important site used by foraging Whooper Swans at Teltown will be crossed by this Route Corridor. Hence, there is a risk that they will be displaced from using this area.

  Route Corridor Option 3/3B – A nationally significant flightline crosses this corridor between Tara Mines Tailings Ponds and a number of sites in the Blackwater River Valley (Route 3). The roost site is > 2.5km from the corridor meaning Whooper Swans will be in active flight when they cross the corridor, a stage when they are likely to be least sensitive to collision.

  In addition, a County significant flightline has been confirmed across this route corridor near Cruicetown towards Whitewood Lough and probably Newcastle Lough and more significant wetlands to the north-east of this location. Numbers in the Cruicetown area reach National importance and it is feasible to suggest that at least on occasion a nationally significant flightline could cross this corridor, though this has never been recorded.

The Yellow River Area (east of Route 3) was regularly utilised in 2011/2012 and is a known foraging site by numbers which can reach National Significance. The nearest Whooper Swans observed were < 0.5km, though none crossed the route corridor and flight directions observed were always away from Route 3/3A/3B, i.e., to/from Tara Mines Tailings Ponds.

An occasional flightline also occurs in the vicinity of Cloony Lough based on third party observations though none have been recorded to date.

A locally important site used by foraging Whooper Swans at Teltown will be crossed by this Route Corridor. Hence a risk exists that they will be displaced from using this area.

- ***Other Birds –*** Nationally significant numbers of Golden Plover (listed Annex 1 Birds Directive) roost at Tara Mines Tailings Ponds in some years and forage in the Blackwater Valley (relevant to 3A and 3B). This species is not considered sensitive to the development as they are a skilled flier and frequently forage close to existing overhead lines. Other significant species including Cormorant, Grey Heron and Mute Swan utilise the River Boyne and Blackwater and unrecorded flight lines will cross all route corridors at River Crossings. Other species are not considered at risk. For example, Kingfisher is not considered to be at risk as riparian areas are avoided and this species is not considered sensitive to overhead lines.

No issue has been identified with respect to birds (including Whooper Swans) which would eliminate any of these route corridor options from further consideration. However at key areas described, appropriate mitigation can be implemented to reduce potential risk of collision by birds.

6.4.2 Landscape

An overhead transmission line will generally be most visible within the landscape at distances up to 500 metres. Beyond this distance, and particularly within a landscape that contains a strong hedgerow network and undulating topography, visibility greatly decreases with distance, primarily due to intervening screening and topography. The mapping of constraints within the study area resulted in identified sensitive landscapes being avoided at corridor identification stage. The remaining potential landscape and visual impacts of each corridor are outlined in this section.

CMSA:

The study area generally consists of a uniform drumlin landscape overlain on a very gradual north-south ridge. There are scenic views and landscapes at a number of locations within the study area, the majority of which are associated with lakes, with the most significant views being in and around the Lough Muckno Primary Amenity Area, and views of Lough Egish from an upland area to the north-east.

Additionally, there are views from upland areas including Lough an Lea Mountain, Mullyash Mountain and Kilkitt. **Map 3.1 (CMSA)** included in **Appendix C** identifies the route corridor options for the CMSA in the context of the Landscape Constraints in the area.

In summary:-

- ***Route Corridor Option A*** – has the least potential to be visible as it runs through relatively lower underlying topography compared to Options B and C. Therefore, of the three Route Corridor Options, Option A has the least potential for visibility from sensitive receptors. It passes close to two scenic routes near Lough Egish and Shantonagh Lough and crosses through a drumlin landscape with scattered housing and a dense road network. The corridor avoids Areas of Primary and Secondary Amenity Value, Lakeside Amenity Areas, Forest Parks and Areas of Special Landscape Interest;

- ***Route Corridor Option B*** – is located along the most elevated underlying topography of the three routes in relation to key views in the surrounding landscape. It will therefore cause the most widespread visibility especially from portions of the N2, though it is the shortest route. It crosses through a drumlin landscape with scattered housing and a dense road network and passes close to scenic routes and views northeast of Lough Egish. The corridor avoids Areas of Primary and Secondary Amenity Value, Lakeside Amenity Areas, Forest Parks and Areas of Special Landscape Interest; and

- ***Route Corridor Option C*** – is the longest route and passes closest to the most significant landscape resources, i.e., Lough Muckno (which is an Area of Primary Amenity Value) and the outskirts of Castleblayney. It crosses through a drumlin landscape with scattered housing and a dense road network and close to a number of scenic views and routes south and east of Lough Muckno. It crosses the Monaghan Way route twice. The corridor avoids Areas of Secondary Amenity Value, Lakeside Amenity Areas, Forest Parks and Areas of Special Landscape Interest.

Overall, no landscape designation or feature has been identified which would eliminate any of the route corridor options from further consideration.

MSA:

The landscape in the study area is predominantly low-lying with a strong network of hedgerows and mature trees which prevent long distance views in many areas. There are some scattered areas of higher ground which afford views over the landscape, and the drumlin type landscape tends to dominate as one moves north. Some of these panoramic views are identified as scenic in the County Development Plan (CDP), including those from the Hill of Tara and The People's Park Lighthouse, Kells. These views are also listed in the CDP 2013-2019, along with panoramic views from the Hill of

Ward and from the tops of some drumlins. The long use by man of the landscape of County Meath results in a high incidence of heritage features, some identified in the CDP as Landmarks, as well as a complex pattern of roads and field boundaries.

While settlement is concentrated in the towns and villages, rural housing is widespread throughout the area as indicated in the set of Protected Views and Prospects listed in the CDP 2013-2019 and there are a number of historic designed landscapes. A number of existing transmission lines traverse the landscape, along with national roads and the M3 motorway. This complex and long inhabited landscape is recognised in the CDP set of Protected Views and Prospects, which describes the content of significant views within the county. **Map 3.1** (MSA) contained in **Appendix D** identifies the route corridor options for the MSA with the Landscape Constraints in the area.

All route corridor options pass through the area of higher ground west of the existing Woodland Substation, and through parts of the drumlin landscape in the north of the study area. All route corridor options cross identified tourist driving routes and proposed/existing paths and cycle routes. All route corridor options cross the Rivers Boyne and Blackwater.

In summary:

- ***Route Corridor Option 1*** - mostly passes through gently undulating or flat agricultural land with scattered rural housing and a network of hedgerows containing mature trees. It however traverses more areas of higher topography and very flat topography than Route Corridor Options 3A and 3B which would result in a transmission line within the corridor being potentially visible over a wider area. It passes near a cluster of protected and protected viewpoints between Kells and Crossakeel. This route corridor option also crosses more roads (which provide more opportunities for viewing the proposed development at close proximity) than Route Corridor Options 3A and 3B. The corridor avoids the Hill of Tara, and avoids proximity to protected viewpoints and landmarks;

- ***Route Corridor Option 2*** - mostly passes through gently undulating or flat agricultural land with scattered rural housing and a network of hedgerows containing mature trees. However, it traverses more areas of higher ground than Options 3A and 3B, which would result in a transmission line within the corridor being potentially more visible over a wider area. It passes near a cluster of protected viewpoints between Kells and Crossakeel and between Tara and Trim. This route corridor option also crosses more roads (which provide more opportunities for viewing the proposed development at close proximity) than Route Corridor Options 3A and 3B. The corridor avoids the Hill of Tara, and avoids proximity to protected viewpoints and landmarks;

- ***Route Corridor Option 3A*** - mostly passes through gently undulating or flat agricultural land with scattered rural housing and a network of hedgerows containing mature trees. It passes near a cluster of protected viewpoints between Tara and Trim and west of Nobber. This route corridor option crosses less roads (which provide more opportunities for viewing the proposed development at close proximity) than Route Corridor Option 1 and 2. The corridor avoids the Hill of Tara, and avoids proximity to protected viewpoints and landmarks; and

- ***Route Corridor Option 3B*** - mostly passes through gently undulating or flat agricultural land with scattered rural housing and a network of hedgerows containing mature trees. It passes near a cluster of protected and protected viewpoints between Tara and Trim and west of Nobber. It also passes over a protected viewpoint at Kilbeg. This route corridor option crosses the lowest number of roads of all four options, as well as having the lowest number of major river crossings. The corridor avoids the Hill of Tara, and avoids proximity to protected viewpoints and landmarks.

Overall, no landscape designation or feature has been identified which would eliminate any of these route corridor options from further consideration.

6.4.3 Geology

CMSA:

Map 4 (CMSA) contained in **Appendix C** identifies the route corridor options for the CMSA in the context of the geological constraints in the area.

In terms of geological heritage, one geological pNHA is relevant: Lemgare (Grid Ref. 280400, 328100) located approximately 250m northeast of Route Corridor Option A. There are ten other sites of geological interest located within the study area however these are not crossed by any of the route corridor options.

Overall, no geological designation or feature has been identified which would eliminate any of these route corridor options from further consideration.

MSA:

Map 4 (MSA) contained in **Appendix D** identifies the route corridor options for the MSA in the context of the geological constraints in the area.

In terms of geological heritage no geological pNHAs are located along any route corridor options. Seven County Geological Sites (CGSs) are located along the four route corridor options:

- ***Route Corridor Option 1*** – three CGSs are located along this Option namely Blackwater Valley, St Keeran's Well and Summerhill;

- ***Route Corridor Option 2*** - three CGSs are located along this Option namely St Keeran's Well, Galtrim Moraine, Boyne River and Blackwater Valley; and

- ***Route Corridor Options 3A and 3B*** - three CGSs are located along this Option namely Galtrim Moraine, Boyne River and Altmush Stream.

There are thirteen other sites of geological interest located within the study area; however these are not crossed by any of the route corridor options.

Overall, no geological designation or feature has been identified which would eliminate any of these route corridor options from further consideration.

6.4.4 Water

CMSA:

Based on the desk study of the various route options, the total number of river and stream crossings varies between each of the route corridor options. These are identified on **Map 5** (CMSA) contained in **Appendix C**. In summary:

- ***Route Corridor Option A*** - crosses 14 rivers;

- ***Route Corridor Option B*** - crosses 11 rivers; and

- ***Route Corridor Option C*** - crosses 9 rivers.

A number of lakes are located in the vicinity of each route corridor option, some of these are pNHAs. The route corridor options are located at varying distances from the lakes.

No water feature has been identified which would eliminate any of these Route Corridor Options from further consideration.

MSA:

The number of river crossing is similar between the various route corridor options. These are identified on **Map 5** (MSA) contained in **Appendix D**. In summary:

- ***Route Corridor Option 1*** - crosses 9 rivers;
- ***Route Corridor Option 2*** - crosses 7 rivers;
- ***Route Corridor Option 3A*** - crosses 7 rivers; and
- ***Route Corridor Option 3B*** - crosses 6 rivers.

Route Corridor Option 1 crosses the River Boyne and River Blackwater cSAC at three separate locations, whereas Route Corridor Option 2, 3A and 3B cross the River Boyne and River Blackwater cSAC at two separate locations.

No water feature has been identified which would eliminate any of these route corridor options from further consideration.

6.4.5 Settlements

CMSA and MSA:

The purpose of the information in this section is to provide a comparative estimated indication of the population number and densities, based on published information, in the vicinity of potential route corridors and potential line routes within such corridors. Published information has been supplemented with additional information sourced from surveys and aerial photography where possible.

All route corridor options avoid the main identified settlements; however the predominance of dispersed rural settlement within the overall study area will affect the specific routing and positioning of the overhead line within any route corridor option. **Map 6 (CMSA)** contained in **Appendix C** and **Map 6 (MSA)** contained in **Appendix D** identifies the route corridor options for the CMSA and MSA illustrating both Settlement Constraints and Population Densities of the area.

An estimate[55] of the number of dwellings generally within the 1 km route corridors based on a distance of 500 metres and 100 metres on each side of an indicative line route[56] is given in **Table 6.3** and **6.4**. In order to provide some indication of the population, the average household size based on the CSO

[55] This information is based on GeoDirectory data, which is a database of buildings in Ireland. It identifies the address and location of every residential and commercial property.

[56] As noted in **section 6.1** the process of identifying potential route corridor options included the identification of a potential indicative line route within each corridor. It was considered essential to ensure at an early stage that a potentially feasible line route existed within each identified corridor. For the purpose of this analysis distances are measured from the centre of a potential line route within each corridor.

statistics is used. The most recent CSO statistics are for 2011, which state that average size for private households is 2.73.

Population densities were sourced from the Census, 2011, published by the CSO. **Map 6 (CMSA)** contained in **Appendix C** and **Map 6 (MSA)** contained in **Appendix D** identifies the route corridor options for the CMSA and MSA with Population Densities. Whilst population densities vary amongst electoral districts (ED), the density of rural settlement is broadly similar within all route corridors.

Route Corridor Option	Length of Corridor /Line Route	Residential Dwellings within 100m either side of indicative line route	Estimated Indicative Population within 100m either side of indicative line route	Residential Dwellings within 500m either side of indicative line route	Estimated Indicative Population within 500m either side of indicative line route
Route Corridor Option A	46 km	41	112	383	1,018
Route Corridor Option B	43 km	52	142	449	1,225
Route Corridor Option C	48 km	55	150	509	1,389

Table 6.3: Estimated Indicative Population (CMSA)

It is apparent from **Table 6.3** that Option A, whilst it is not the shortest option, has the least number of dwellings along its length.

Route Corridor Option	Length of Corridor /Line Route	Residential Dwellings within 100m either side of indicative line route	Estimated Indicative Population within 100m either side of indicative line route	Residential Dwellings within 500m either side of indicative line route	Estimated Indicative Population within 500m either side of indicative line route
Route Corridor Option 1	65 km	32	87	559	1,526
Route Corridor Option 2	62 km	31	85	517	1,411
Route Corridor Option 3A	58 km	21	57	604	1,648
Route Corridor Option 3B	57 km	17	46	575	1,570

Table 6.4: Estimated Indicative Population (MSA)

It is apparent from **Table 6.4** that Option 3B, which is the shortest option, has the least number of dwellings in close proximity to the indicative line route.

Overall, no issue has been identified in respect of population and settlement which would eliminate any of these route corridor options from further consideration.

6.4.6 Cultural Heritage

For the purposes of this re-evaluation process, all archaeological and architectural sites within the study area have been summarised in the tables. The distances used in the analysis are greater for sites with a higher level of legislative protection or importance, such as National Monuments and Candidate World Heritage Sites. It should be noted that such distances have no legal basis, but are simply identified as appropriate distances based on the expertise and experience of EirGrid's cultural heritage consultants. For the purpose of this particular analysis, distances are measured from the centre of a potential line route within each corridor [57].

The purpose of **Tables 6.5** and **6.7** is to identify archaeological and architectural features where there is potential for direct impacts. The purpose of **Table 6.6** and **6.8** is to identify archaeological and architectural features where there is potential for indirect impacts (i.e. visual).

CMSA:

- **Potential for Direct Impacts:** All known archaeological and architectural sites within a distance of 500 m of a potential line route within each corridor are summarised in **Table 6.5**. These are sites where, given their proximity to the proposed route corridor options, there is potential that they could be impacted upon directly during the construction phase of the proposed development. The tables include relevant features and their equivalents in both Ireland (ROI) and Northern Ireland (NI). **Map 7 (CMSA)** contained in **Appendix C** identifies the route corridor options for the CMSA in the context of the Cultural Heritage Constraints in the area.

[57] As noted in **section 6.1** the process of identifying potential route corridor options included the identification of a potential indicative line route within each corridor. It was considered essential to ensure at an early stage that a potentially feasible line route existed within each identified corridor. For the purpose of this analysis distances are measured from the centre of a potential line route within each corridor.

Archaeological Sites	**Route Corridor Option A**	**Route Corridor Option B**	**Route Corridor Option C**
World Heritage Sites (ROI/NI)	0	0	0
World Heritage Sites – Tentative List (ROI/NI)	0	0	0
Areas of Significant Archaeological Interest (NI)	0	0	0
National Monuments in the Ownership or Guardianship of the State (ROI)	0	0	0
Scheduled Monuments (NI)	0	0	0
Sites Under Preservation Orders (ROI)	0	0	0
Potential National Monuments in the Ownership of a Local Authority (ROI)	0	0	0
Records of Monuments and Places (ROI) and Sites and Monuments Record (NI)	46	55	58
Architectural Sites	**Route Corridor Option A**	**Route Corridor Option B**	**Route Corridor Option C**
Architectural Conservation Areas (ROI) / Conservation Areas (NI)	0	0	0
Register of Historic Parks & Gardens (NI)	0	0	0
Demesne Gardens & Historic Landscapes (ROI) (NIAH)	2	0	0
Record of Protected Structures (ROI) / Listed Buildings (NI) / Industrial Heritage (NI) / Defence Heritage (NI)	3	2	2
National Inventory of Architectural Heritage (NIAH) (ROI)	0	0	0

Table 6.5: Potential for Direct Impacts on Cultural Heritage Sites (CMSA)

- **Potential for Indirect Impacts:** All known archaeological and architectural sites within a representative distance of between 2 and 10 km from the indicative line route (centreline) within the route corridor option are identified in **Table 6.6**. At these distances there is a potential that they could be impacted upon indirectly (i.e. the setting of these may be altered) as a result of the proposed development.

Archaeological Sites	**Route Corridor Option A**	**Route Corridor Option B**	**Route Corridor Option C**
World Heritage Sites (ROI/NI) (within 10 km)	0	0	0
World Heritage Sites – Tentative List (ROI/NI)	0	0	0
Areas of Significant Archaeological Interest (NI) (within 7 km)	0	0	1
National Monuments in the Ownership or Guardianship of the State (ROI) / Scheduled Monuments in the Ownership or Guardianship of the State (NI) (within 5 km)	0	2	4
Scheduled Monuments (NI) (within 2 km)	0	0	3
Sites Under Preservation Orders (ROI) (within 2 km)	3	0	0
Potential National Monuments in the Ownership of a Local Authority (ROI) (within 2 km)	3	0	2
Sites and Monuments Record (ROI / NI) (within 2 km)	228	234	268
Architectural Sites	**Route Corridor Option A**	**Route Corridor Option B**	**Route Corridor Option C**
Architectural Conservation Areas (ROI) / Conservation Areas (NI) (within 2 km)	0	0	0
Register of Historic Parks & Gardens (NI) (within 2 km)	0	0	0
Demesne Gardens & Historic Landscapes (ROI) (within 2 km)	7	4	4
Record of Protected Structures (ROI) / Listed Buildings (NI) / Industrial Heritage (NI) / Defence Heritage (NI) (within 2 km)	17	9	15
National Inventory of Architectural Heritage (NIAH) (ROI) (within 2 km)	1	1	1

Table 6.6: Potential for Indirect Impacts on Cultural Heritage (CMSA)

As can be seen from **Table 6.6**, there is the highest potential for indirectly impacting on features of cultural interest along Route Corridor Option C. There is a marginal numerical difference between Route Corridor Options A and B, with B being slightly preferable. However, the table is based purely on distance from the potential line route within the route corridor option to the feature, and takes no account of existing and proposed mitigation measures (such as screening) that may be considered.

Overall, no cultural heritage designation or feature has been identified which would eliminate any of these route corridor options from further consideration.

MSA:

- **Potential for Direct Impacts:** All known archaeological and architectural sites within a representative distance of 500 m from the centre of a potential line route within each corridor are summarised in **Table 6.7**. These are sites at which, given their proximity to the proposed route corridor options, there is a potential for direct impact during the construction phase of the proposed development. **Figure 7 (MSA)** contained in **Appendix B** identifies the route corridor options for the MSA in the context of the Cultural Heritage Constraints in the area.

  Analysis of known archaeological sites indicates that there are more archaeological sites of National Monument or Potential National Monument status (archaeological sites in the ownership of the local authority) within the vicinity of Route Corridor Options 2 and 3A. National Monuments are archaeological sites that are afforded the highest level of protection in Irish legislation. It is noted that a National Monument in the Ownership or Guardianship of the State is located approximately 700 metres from Route Corridor Option 1 and that the closest National Monument to Route Corridor Option 3B is approximately 1 km away. There is a site under a Preservation Order in the vicinity of Route Corridor Option 3B, which is also afforded National Monument protection. Otherwise there are a similar number of archaeological sites listed in the Record of Monuments & Places (RMP) within the vicinity of each Route Corridor Option.

  Analysis of known architectural sites indicates that there are fewer sites listed in the Record of Protected Structures (RPS) and National Inventory of Architectural Heritage (NIAH) located in the vicinity of Route Corridor Options 3A and 3B; with approximately half the number that is located in the vicinity of Route Corridor Options 1 and 2. There is little variance in the number of Demesne Landscapes and Historic Gardens indicated on the Ordnance Survey Ireland First Edition Maps in the vicinity of the different Route Corridor Options and there are no Architectural Conservation Areas (ACA) within 500 metres; although there is an ACA at Ardbraccan approximately 600 m to the east of Route Corridor Options 3A and 3B.

	Route Corridor Option 1	Route Corridor Option 2	Route Corridor Option 3A	Route Corridor Option 3B
Archaeological Heritage				
World Heritage Sites	0	0	0	0
Candidate World Heritage Sites	0	0	0	0
National Monuments in the Ownership or Guardianship of the State	0	2	2	0
Sites Under Preservation Orders	0	0	0	1
Potential National Monuments in the Ownership of the Local Authority	0	5	5	3
Record of Monuments & Places	50	54	49	55
Architectural Heritage				
Architectural Conservation Areas	0	0	0	0
Demesne Gardens & Historic Landscapes	15	13	13	15
Record or Protected Structures	14	13	7	8
National Inventory of Architectural Heritage	17	14	1	1

Table 6.7: Potential for Direct Impacts on Cultural Heritage Sites (MSA)

- **Potential for Indirect Impacts:** For the purposes of this study, sites located in the vicinity of the proposed route corridor options that may experience indirect impacts or impacts upon their setting have been summarised in **Table 6.8**. A representative distance of between 2 and 10 km from the indicative line route (centreline) within the route corridor is identified. The distances used in the analysis are greater for sites with a higher level of legislative protection or importance, such as National Monuments and World Heritage Sites or Candidate World Heritage Sites

  There are no World Heritage Sites within the study area. The nearest World Heritage Site, Brú na Bóinne, is located approximately 16.5 km to the east of Route Corridor Options 3A and 3B. Two Candidate World Heritage Sites, as announced by the Minister for Environment, Heritage & Local Government in April 2010, are located within the study area: Tara Complex and Kells. The Tara Complex is located approximately 6 km to the east of all route corridor options. Kells is located, at its closest point, approximately 4.5 km from all route corridor options.

  Meath County Council published a Draft Tara Skryne Landscape Conservation Area Report in July 2010 which recommends a conservation area boundary. Routes Corridor Options 2, 3A and 3B all lie approximately 1 km to the west of the area demarcated.

There are fewer National Monuments in the Ownership or Guardianship of the State within 2 km of Route Corridor Options 1 and 3B. The highest number of these sites (four) is found in the vicinity of Route Corridor Option 3A with three in the vicinity of Route Corridor Option 2. Looking further afield (up to 5 km from the proposed Route Options), there are eleven National Monuments in the Ownership or Guardianship of the State around Route Corridor Options 2, 3A and 3B and eight around Route Corridor Option 1.

There are approximately 25% more archaeological sites from the RMP within 2 km of Route Corridor Option 3B than the other route corridor options.

More architectural sites from the RPS and NIAH are found in the vicinity of Route Corridor Option 3B. Although as noted previously, there are fewer of these sites in close proximity (500 m). An ACA at Ardbraccan is located approximately 600 metres to the east of Route Corridor Options 3A and 3B

The fewest number of architectural sites are found in the vicinity of Route Corridor Option 2. There are more Demesne Landscapes and Historic Gardens indicated on the Ordnance Survey Ireland First Edition Maps within the vicinity of Route Corridor Option 1 than the other route corridor options.

	Route Corridor Option 1	**Route Corridor Option 2**	**Route Corridor Option 3A**	**Route Corridor Option 3B**
Archaeological Heritage				
World Heritage Sites (within 10 km)	0	0	0	0
Candidate World Heritage Sites (within 7km)	1	2	2	1
National Monuments in the Ownership or Guardianship of the State (within 5 km)	8	11	11	11
National Monuments in the Ownership or Guardianship of the State (within 2 km)	1	3	4	2
Sites Under Preservation Orders (within 2 km)	1	0	0	3
Potential National Monuments in the Ownership of the Local Authority (within 2 km)	11	18	21	23
Record of Monuments & Places (within 2 km)	238	230	243	301
Architectural Heritage				
Architectural Conservation Areas (within 2 km)	0	0	1	1
Demesne Gardens & Historic Landscapes (within 2 km)	57	46	42	44
Record or Protected Structures (within 2 km)	70	51	77	96
National Inventory of Architectural Heritage (within 2 km)	80	37	77	83

Table 6.8: Potential for Indirect Impacts on Cultural Heritage Sites (MSA)

Overall, no cultural heritage designation or feature has been identified which would eliminate any of these route corridor options from further consideration.

6.4.7 Utilities and Infrastructure

CMSA:

Map 8 (CMSA) contained in **Appendix C** identifies the Route Corridor Options for the CMSA with regard to Utilities and Infrastructure Constraints in the area. In summary:

- There are no crossings of gas pipelines;
- There are a number of existing electricity lines which include both transmission and distribution lines that cross each route corridor option; and
- Each of the route corridor options crosses the N2 once.

MSA:

Map 8 (MSA) contained in **Appendix C** identifies the route corridor options for the MSA with regard to Utilities and Infrastructure Constraints in the area. In this regard:

- Gas pipelines traverse each route corridor option at least twice;
- There are a number of existing electricity lines which include both transmission and distribution lines that cross each route corridor option;
- Each of the route corridor options crosses the M3 Motorway once; and
- Trim Airfield is located close to all route corridor options. Summerhill Airfield is located in close proximity to Route Corridor Option 1.

Overall, no utilities or transport feature has been identified which would eliminate any of these Route route corridor options from further consideration.

6.5 CONCLUSIONS

The re-evaluation process has facilitated a review of the process for identifying feasible route corridor options in the overall study area, as previously identified in the 2007 Route Constraints and Addendum Reports.

The updated constraints information, including those identified during the period of the previous application for the proposed Interconnection Development, and subsequently during this re-evaluation process, do not have material implications for the nature, extent and location of the previously identified route corridor options. It is acknowledged that a number of identified potential constraints within the route corridors are site- or area-specific, rather than being general to the overall corridor, and potential impacts can therefore be minimised through appropriate route selection and design. This is addressed in **Chapter 8** in respect of identification of an indicative route, and will be further addressed during the more detailed route identification process. Such constraints do not materially concern the high-level process of corridor identification.

In summary, the updated constraints do not have material implications for the locations of the previously identified route corridor options. In addition, no additional and/or previously unidentified route corridor emerges from the re-evaluation process that is of equal or greater merit to those identified route corridors that were considered in respect of the previous Meath-Tyrone 400 kV Interconnection Development.

Of particular note, given the distribution and constantly changing movement patterns of wintering birds, it is likely that any route corridor will lie within areas where such wintering birds have the potential to be found.

It remains clear that each of the identified route corridor options contains environmental constraints. However, as noted throughout this chapter, no constraint has been identified within any of the route corridor options which would render it infeasible, impossible or impracticable to identify and develop a line route. In this regard, the route identification process can ensure the avoidance of the most significant of the identified constraints to the maximum practical extent, with a particular emphasis on primary constraints**.** As such, all identified route corridor options can progress to more detailed evaluation.

The report up to this point outlines constraints in respect of each specific environmental topic purely on a factual basis. **Chapter 7** provides an evaluation of each route corridor against the identified constraints (referred to as a multi-criteria evaluation), so that a recommendation can be made as to which corridor is emerging as the preferred corridor. It is important to understand that the term “emerging preferred” is a generally accepted industry term for infrastructure route selection (for example road or rail corridors), by which is meant the least constrained or “best-fit” option.

7 COMPARATIVE EVALUATION OF FEASIBLE ROUTE CORRIDORS

The selection of a preferred ("best-fit") route corridor for the Meath-Tyrone 400 kV Interconnection Development for the previous application for planning approval involved a comparative evaluation of the identified route corridor options. The objective of that evaluation was to evaluate and compare route corridor options taking account of a wide range of technical, environmental, community and other criteria.

7.1 Background to the Identification of Assessment Criteria

The selection of evaluation criteria in this chapter has had regard to the previous 'Tyrone-Cavan Interconnector & Meath Cavan Transmission Circuit – Corridor Evaluation Document'.[58] The Evaluation Document referenced a number of other reports including:-

- ESBI and AOS Planning, 'Route Constraints Report' (September 2007);
- ESBI and AOS Planning, 'Route Constraints Report (September 2007) Addendum Report' (May 2008);
- Socoin and TOBIN Consulting Engineers, 'Constraints Report Volume 1' (July 2007); and
- Socoin and TOBIN Consulting Engineers, 'Constraints Report Volume 1' (July 2007) Addendum Report (May 2008).

EirGrid and its project consultants originally identified a diverse range of issues which could potentially comprise evaluation criteria. These issues derived from the professional expertise of the EirGrid project team and its consultants, from the strategic technical and environmental constraint assessments carried out in respect of the identified corridors by the project consultants, and from information elicited from informal and formal stakeholder and public consultation. These are summarised in **Table 7.1**.

[58] RPS Planning & Environment March 2009 publically available from www.eirgridprojects.com

Technical Criteria	
1. Safety • Operational Safety Risk: • Construction Safety Risk: • Risk of Disturbance by Third Parties	**2. Construction/Operation** • Road Infrastructure • Availability of Construction Materials • Maintenance During Operation • Ground Condition/Stability • Extent of Civil Works • Road Closures
3. Design • Need for Temporary and Permanent Compounds • Watercourse Crossings • Road Crossings • Length of Route	**4. Other Technical Considerations** • Security of Supply • Reliability • Potential for Future Linkage • Assurance of Adequate MVA Capacity
Environmental Criteria	
5. Human Beings • Health Impacts • Noise • Potential for Negative Economic Impact	**6. Electrical & Magnetic Fields** • Impact of Electrical Fields • Impacts of Magnetic Fields
7. Flora & Fauna • Potential Impact on Livestock • Potential Impact on Bloodstock • Potential Impact on Other Fauna/Flora Including Specific Species/Birds • Potential Impact on Protected and Designated Habitats	**8. Visual Amenity & Landscape** • Potential Impact on Protected Views and Prospects • Potential Impact on Areas of High Scenic Value • Potential Impact on Non-Designated but Scenic Landscapes
9. Archaeology, Culture & Local Heritage • Potential Impact on Protected Structures and Their Settings • Potential Impact on Recorded Monuments (RMPs) & Places and Their Settings • Potential for Cultural Heritage Constraints	**10. Water** • Disruption to Groundwater • Risk of Pollution of Ground and/or Surface Water
11. Air Quality • Disturbance and or creation of Particle Matters (PM10s)	
Community Criteria	
12. Planning and Land Use • Impact on Rural Development and Land Use • Impact on Urban Development and Land Use	**13. Community Severance**
14. Number of Dwellings within the 1 km wide Corridor	**15. Number of Dwellings and Other Occupied Buildings within 100 metres of Indicative Routes**
16. Landowner Consent	**17. Potential Impact on Public Amenities** • Distance to Nearest School (within approx. 500m) • Playing Pitches (within approx. 200m) • Recreational Areas • Other Public Buildings/Institutions • Tourism Facilities • Airfield:

Other Criteria
18. Compliance with Current Planning & Development Policy & Guidelines
19. Project Programme and Deliverability
20. Economic Feasibility
21. Compliance with Best International Practice
22. Adaptability for Future Development

Table 7.1: Evaluation Criteria (extracted from the RPS Route Constraints Corridor Evaluation Report (March 2009)

7.1.1 Re-evaluation Parameters and Considerations

The evaluation criteria set out in the 2009 'Tyrone-Cavan Interconnector & Meath Cavan Transmission Circuit – Corridor Evaluation Document' have been reviewed and updated having regard *inter alia* to issues and concerns articulated or arising during the public consultation process including during the Oral Hearing process in respect of the previous application, and to submissions and feedback arising from consultation in respect of the 'Preliminary Re-evaluation Report'.

A number of these criteria previously yielded results that were generally 'Neutral' for the purpose of the comparative evaluation of route corridor options, in that the results are broadly the same for every route corridor option in the overall study area. These issues include those for which it is reasonably assumed that mitigation measures can and will be implemented and which will therefore be the same or similar for each identified corridor (e.g. safety and construction/operational issues) and those issues more appropriately addressed during subsequent detailed route design, preparation of EIS and planning stages. These issues relate to the following categories:-

- Safety;
- Construction/Operation;
- Other Technical Considerations;
- Human Beings;
- Electrical and Magnetic Fields;
- Air Quality;
- Planning and Land Use;
- Landowner Consent;
- Community Severance; and
- Other Criteria.

EirGrid's consultants remain satisfied, following consideration of public and stakeholder feedback, as well as from its own studies and analysis, that such criteria detailed above remain broadly neutral for all identified potential route corridor options. That is not to reduce the importance of such criteria, but rather that comparative evaluation of these criteria will not distinguish a preference between identified route corridor options.

For the purpose of the re-evaluation process therefore, the 'Neutral' criteria have been omitted, in order to focus on those other criteria which may differentiate the route corridor options, and specifically on whether a particular route corridor option is 'More Preferred' or 'Less Preferred' in respect of that particular criterion, as defined in **Chapter 1** above (again this reference to "Preferred" should be taken to mean "least constrained" or "best-fit" to meet the parameters of the project). These criteria are identified below.

In this re-evaluation process, the consultants have streamlined and simplified the presentation of evaluation criteria. This includes:-

- Using the updated constraints headings as set out in **Chapter 5** and **6**; and

- Including modified criteria to reflect issues including those identified during the period of the previous application / Oral Hearing.

Natural Constraints	Artificial Constraints	Other Parameters
Ecology • Potential Impact on Wintering Bird Sites • Potential Impact on Designated Sites • Potential Impact on Fisheries • Potential Impact on Mature Deciduous Woodlands • Potential Impact on Wetlands • Potential Impact on Hedgerows	**Settlements** • Potential Impact on Urban and Rural Settlements	**Length of Route** • The approximate length of an indicative route of transmission infrastructure within the identified corridor
Landscape • Potential Impact on Landscape Character including landscape values and sensitivity • Potential Impact on Protected Views and Prospects • Potential Impact on Areas of High Scenic/Amenity Value • Potential Impact on Non-Designated but Scenic Landscapes	**Cultural Heritage** • Potential Impact on Archaeological Sites • Potential Impact on Architectural Sites	
Geology • Potential Impact on Proposed Geological National Heritage Areas (NHAs) • Potential Impact on County Geological Sites (CGSs)	**Infrastructure/Utilities** • Potential Impact on Road crossings • Potential Impact on Existing electricity lines • Potential Impact on Airfields	
Water • Potential Impact on River Crossings • Potential Impact on River Catchments • Potential Impact on Lakes		

Table 7.2: Re-evaluation Criteria

7.2 Comparative Corridor Evaluation

This section sets out the criteria-by-criteria re-evaluation of the identified route corridor options against the updated criteria, and all current information gathered in respect of planned interconnection project. As with the previous comparative evaluation process, no quantitative or weighting system has been applied to the criteria in order to re-evaluate corridors. Rather, a strategic qualitative evaluation system, based on professional experience and expertise, is applied to each corridor against the identified criteria.

Qualitative evaluation is a long-established and accepted process of decision-making. This qualitative approach records whether, in respect of a particular criterion, a corridor is 'More Preferred' or 'Less Preferred', based on information and knowledge obtained to date, without implying whether one criterion is of greater or lesser importance than another. Essential to such an evaluation approach is the need for a clear explanation and rationale for each conclusion reached.

As previously detailed in **Chapters 5** and **6**, when evaluating corridors relative to each other, particular emphasis is placed on those constraints categorised as Primary Constraints (i.e. ecological and archaeological sites/features afforded protection at a World or European level and landscape constraints).

When comparing one criterion against another, emphasis is also placed on the significance of the likely impact, and whether or not, in general terms, potential impacts can be mitigated. It is reasonable that when comparing route corridors, if there are likely to be long term adverse significant residual impacts which cannot be mitigated which are associated with a particular criterion, then these are deemed to be more sensitive than a potential impact which can be mitigated.

Finally, the length of line route has implications in terms of overall environmental impact. It is generally considered that the shortest line route will have the least environmental impacts; however this is not necessarily always the case, and as such, the criterion needs also to be considered when comparing route corridor options relative to environmental and other issues.

CMSA	MSA
Route Option A – 46 km	Route Option 1 – 65 km
Route Option B – 43 km	Route Option 2 – 62 km
Route Option C – 48 km	Route Option 3A - 58 km
	Route Option 3B – 57 km

Table 7.3: Approximate Length of Route (CMSA and MSA)

Of the natural and artificial environmental and other constraints identified in **Chapters 5** and **6**, and notwithstanding **section 7.1.1** above, it is considered that the Primary Constraints associated with landscape, ecology and archaeological heritage are the key constraints which influence a preference for one route corridor over another. Whilst other constraints related to geology, water, settlements and utilities/infrastructure, are important, they do not impact on route selection to the same degree as the previously mentioned constraints.

As noted in **section 7.1**, when comparing each corridor against the identified criteria, professional experience and judgement is used to determine the sensitivity of the criteria, the significance of the likely impact, and whether or not, in general terms, potential impacts can be mitigated. This qualitative approach records whether, in respect of a particular criterion, a corridor is 'More Preferred' or 'Less Preferred', based on information and knowledge obtained to date, without implying whether one criterion is of greater or lesser importance than another.

Of the constraints identified in **Chapters 5** and **6**, ecological, landscape and cultural heritage constraints are considered to be the most significant constraints in influencing a route corridor for an OHL from the different route corridor options identified.

Having regard to the previously identified primary constraints, **section 7.3** considers landscape, ecology and cultural heritage under the heading "key constraints", while **section 7.4** considers other topics under the heading "other constraints".

7.3 KEY CONSTRAINTS

7.3.1 Landscape

The landscape criteria include potential impacts of the different route corridor options on a range of considerations including:-

- Protected Views and Prospects;
- Designated Areas of High Scenic/Amenity Value;
- Non-Designated but Scenic Landscapes; and
- Potential for general visibility in the landscape and landscape character.

Overhead electricity transmission lines, while necessary, and generally of strategic importance, are large linear elements in the landscape. They therefore have the potential to affect, to varying degrees, the visual and other environmental aspects of the area through which they are routed. The most

effective way of mitigating these effects is by careful routing and the avoidance of the most sensitive environmental and visual receptors. Other than appropriate route selection, in order to avoid or minimise visual impact, it is generally difficult to apply other mitigation measures; for example while local screening may be possible, this cannot normally be applied across a wider area of landscape.

As such, appropriate routing remains the only realistic mitigation measure and this is the reason it is considered to be a Primary Constraint. The importance of routing in relation to visual impact is acknowledged in industry related guidance documents (e.g., High Voltage Overhead Lines – Environmental Concerns, Procedures, Impacts and Mitigations (Cigré 1999) and National Grid's Holford Rules).

A proposed OHL development must always be considered in the context of the receiving environment, which includes the existing wirescape network and other development across the study area.

7.3.1.1 CMSA

In summary EirGrid's re-evaluation has resulted in the following conclusions being reached:-

- ***Route Corridor Option A*** - Is the second longest route corridor. However, it will have least visibility in relation to the main viewing opportunities, as it is located on less elevated underlying topography than Route Corridor Option B. The main residual impacts would likely occur in the general landscape when towers are located on higher topography, where there is little intermittent vegetation between viewpoints and the route, and at road crossings. The route corridor also passes close to a scenic viewpoint southwest of Lough Egish, with potential impact on this landscape feature. This corridor crosses the least amount of roads;

- ***Route Corridor Option B*** - Is the shortest route corridor. However, it will be the most potentially conspicuous in the wider landscape as it is located along the most elevated underlying topography, in relation to the main viewing opportunities. The main residual impacts would likely occur in the general landscape when towers are located on higher topography, where there is little intermittent vegetation between viewpoints and the route, and at road crossings. The route corridor also passes close to scenic viewpoints northeast of Lough Egish with potential impact on this landscape feature. This corridor route crosses more roads than route A but less than C;

- ***Route Corridor Option C*** - Is the longest route and also has the greatest potential to affect sensitive landscapes and regionally significant landscape resources due to its proximity to Lough Muckno. The main residual impacts would likely occur in the general landscape when towers are located on higher topography, where there is little intermittent vegetation between viewpoints and the route, and at road crossings. The route corridor also passes close to scenic viewpoints around and south of Lough Muckno and an area of Primary Amenity Value at Lough Muckno with potential impacts on these landscape features. This corridor route crosses more roads with more potential for visibility of the transmission line at close proximity.

Having regard to landscape criteria including: Protected Views and Prospects, Designated Areas of High Scenic/Amenity Value, Non-Designated but Scenic Landscapes and potential for general visibility in the landscape and landscape character, Route Corridor Option A is the 'More Preferred' followed by Route Corridor Option B, with Route Corridor Option C being the 'Less Preferred'.

7.3.1.2 MSA

In summary this re-evaluation finds:-

- ***Route Corridor Option 1*** - along with Option 2, is the longest route corridor. The main residual impacts would likely occur in the general landscape when towers are located on higher topography, where there is little intermittent vegetation between viewpoints and the route, and at road and river crossings. This route corridor crosses a slightly larger area of higher ground compared with Options 3A and 3B resulting in potentially higher visibility of a transmission line over a wider area. It also crosses a large flat area west of Trim. It passes close to a cluster of scenic viewpoints and protected views between Kells and Crosakeel and crosses the Blackwater and the Boyne. Option 1 also crosses a higher number of roads with more potential for visibility of the transmission line at close proximity.

- ***Route Corridor Option 2*** - along with Option 1, is the longest route corridor. The main residual impacts would be likely to occur in the general landscape when towers are located on higher topography, where there is little intermittent vegetation between viewpoints and the route, and at road and river crossings. This route corridor crosses a slightly larger area of higher ground compared with Options 3A and 3B resulting in potentially higher visibility of a transmission line over a wider area. It passes close to a cluster of scenic viewpoints and protected views between Kells and Crosakeel and between Tara and Trim. It also crosses the Blackwater and the Boyne. Option 2 also crosses a higher number of roads with more potential for visibility of the transmission line at close proximity.

- ***Route Corridor Option 3A*** – Options 3A and 3B are the shortest route corridor options and cross the least amount of higher ground. Option 3A is very similar to 3B but passes over a scenic viewpoint at Kilbeg, as listed in the 2013-2018 CDP. The main residual impacts would be likely to occur in the general landscape when towers are located on higher topography, where there is little intermittent vegetation between viewpoints and the route, and at road and river crossings. This option crosses the Blackwater and the Boyne.

- ***Route Corridor Option 3B*** – As stated above, Options 3A and 3B are the shortest route corridor options and cross the least amount of higher ground. Option 3B has the least number of road crossings as well as having the least number of major river crossings (although like all the other options, it crosses the Boyne and the Blackwater). The main residual impacts would be likely to occur in the general landscape when towers are located on higher topography, where there is little intermittent vegetation between viewpoints and the route, and at road and river crossings.

Having regard to landscape criteria including: Protected Views and Prospects, Designated Areas of High Scenic/Amenity Value, Non-Designated but Scenic Landscapes, potential for general visibility in the landscape and landscape character, Route Corridor Options 3A and 3B are the 'More Preferred' followed by Route Corridor Option 1, and Route Corridor Option 2 being the 'Less Preferred'.

7.3.2 Ecology

As identified in the previous chapters, ecology includes a range of considerations which have the potential to impact upon the different route corridor options. The primary considerations are the potential for impacts on sites, habitats and species which are protected at a European level. These are followed by secondary considerations where sites, habitats and species are protected at a National or local level.

The National Parks and Wildlife Service (NPWS) also expressed views in relation to the previous application for planning approval about the potential impacts of locating structures on hedgerows. Whilst NPWS acknowledged that many of these hedgerows are not necessarily protected, they advised that hedgerows function as part of the wider ecological network supporting designated ecological sites, habitats and species, and need to be considered in that context. In that regard, the detailed line design will consider the exact location of structures in relation to such hedgerows and will seek to minimise potential impacts. For the purposes of this report, potential impacts on hedgerows are considered to be greater on longer route corridors as more cutting of trees under the line is required. With regard to the views expressed by NPWS, the same mitigation measures will be applied irrespective of the selected corridor.

7.3.2.1 CMSA

As set out in **section 6.4.1**, two summary constraint categories were defined for ecology based on potential sensitivity and other criteria detailed. These are discussed below and a summary assessment of each category is detailed.

Constraints A – All Ecological Constraints (except birds):

No significant impacts are likely to arise to designated sites including Natura 2000 sites (protected at a European level) from any route corridor option, as these have been identified at the outset as Primary Constraints to be avoided. Where a potential localised impact may occur to a significant non-designated habitat, it will be addressed during the line design stage, and the associated environmental assessment.

Having regard to the above, the re-evaluation finds:-

- ***Route Corridor Option A*** - Potentially crosses more cutover bog sites (High Local/County significance) compared with other route corridor options including Tasson Lough pNHA. The most sensitive specific habitats including wetlands and hedgerows are of a small scale and can be avoided during the subsequent line design stage;

- ***Route Corridor Option B*** - Includes a similar number of wetland habitats to Route Corridor Option A and less than Route Corridor Option C. The number of other habitats, e.g. woodland, is generally lower than the other Route Corridor Options. This is the shortest option and would therefore require the least number of structures and least tree cutting;

- ***Route Corridor Option C*** – This route passes the edge of Lough Muckno pNHA, which is the largest ecological site in the study area (designated as a pNHA). It includes more wetland and riparian / aquatic (fishery) areas and therefore in terms of habitats and fisheries, it has higher potential impacts compared to Route Corridor Options A and B. Wetland habitats and riparian/aquatic areas are considered to be more sensitive to potential impacts compared with other described habitats. This is also the longest route hence has the most tree cutting potential.

No significant difference exists between any of the options regarding designated sites including Natura 2000 sites from any route corridor option as there are no Natura 2000 sites in the study area. All nationally designated sites in Northern Ireland (ASSI) are also avoided.

In terms of undesignated habitats and fisheries, Route Corridor Option B is 'more preferred' due to it being the shortest route and thereby having less potential impacts to sensitive habitats particularly bog sites and less tree cutting is required. This is followed by Route Corridor Option A, while Route Corridor Option C is potentially the 'Less Preferred' option.

With regard to all three Route Corridor Options, potential impacts are likely to be capable of being mitigated by means of appropriate siting of structures during the detailed line design process. As such, the differences between the route corridor options in respect of this category are considered to be low.

Constraints B – Whooper Swans (and wildfowl):

Whooper Swans (and wildfowl): In respect of Whooper Swans (and other wildfowl), the re-evaluation finds that Whooper Swans in the CMSA are highly localised and sedentary in terms of distribution, and flightlines are very infrequent. This means that collision risks are likely to be relatively low for all route corridor options. It is also important to highlight that the most significant wetland sites in Counties Monaghan and Cavan (e.g. Dromore lakes) are located to the west of all corridor options. Therefore risks, to waterfowl including Whooper Swans are effectively minimised at route corridor option selection stage through avoidance of more important areas.

It is also essential to understand that appropriate mitigation measures can be designed at the line design stage at risk areas in whichever route corridor option is selected. Such local mitigation measures, which are common features on overhead transmission infrastructure across the country (and internationally), would be developed in consultation with the National Parks and Wildlife Service (NPWS).

In addition, the proposed OHL development risk to wintering birds (in particular Whooper Swans) must always be considered in the context of:

- The extent of the existing wirescape across the study area which consists of approximately 217 km of existing high voltage electricity lines (91 km of 38 kV, 183 km of 110 kV, 43 km of 220 kV), as well as the thousands of kilometres of medium voltage, low voltage and telephone overhead lines that occur across the study area;
- The fact that Whooper Swans regularly roost, fly over and forage in the vicinity of existing overhead line electricity infrastructure; and
- The stable / increasing population of Whooper Swan in the context of the above points.

Having regard to the above, the re-evaluation finds:

- ***Route Corridor Option A -*** This route corridor option has potentially the highest risk, although this risk is localised within the overall route corridor length at two specific areas (i.e., Ballintra and Comertagh Lough areas). A number of other potential risk sites were monitored, although no significant flight line activity has been noted to date. The localised nature of such flightlines means that risks are less than if regular flightlines occur.

- ***Route Corridor Option B -*** Is likely to have the lowest potential risk, as most of the sites in the local and wider vicinity of the route corridor option are irregularly utilised, or the focus of flying Whooper Swans and foraging areas are away from this route option. The exception is a local area around Laragh Lough and areas to the east where flightlines occur. The area of flight activity around Comertagh Lough at the extreme south of this route corridor is generally avoided. Lough Nagarnamam was regularly utilised in the last two winters (i.e. 2010/2011 and 2011/2012), although no flights in the vicinity of this corridor were observed and the Whooper Swans roosted on the Lough. Again, the localised and irregular nature of such flightlines means that risks are less than if regular flightlines occur.

- ***Route Corridor Option C*** - Has potentially the second lowest risk. Fifteen Whooper Swan sites were noted close to this route corridor, several of which (including Loughs Patrick, Alina and Tullyvaragh) were regularly utilised by larger flocks of Whooper Swan. The Muckno Mill Lough area is located within this route corridor. In addition, Lough Patrick and Lough Tullyvaragh were assessed to have a comparatively high potential for flightlines to cross the route corridor option (at least occasionally). During the most recent Wintering Bird Survey (i.e., 2011/2012) an irregular flightline was noted towards this route between Lough Nagarnaman and Tullyvaragh Lough.

Within the defined study area, and based on the Wintering Bird Surveys to date (2007 to 2012), Route Corridor Option B is the 'More Preferred' option; followed by Route Corridor Option C; followed by Route Corridor Option A. This assessment is based on recorded distribution and number of sites (roost/foraging sites) and clusters of sites in the local and wider vicinities of the identified Route Corridor Options, as well as the importance of sites (regularity of usage/ numbers of Whooper Swan) and recorded flight lines, and hence the potential for the new transmission line to impact upon Whooper Swan activity.

In conclusion, the key ecological constraints for CMSA are summarised into two broad categories. For Constraints A, it is considered that careful line design to avoid key receptors on the preferred route corridor and appropriate mitigation will minimise ecological impacts here. For Constraints B, studies have been implemented which have

determined key risk areas. It is considered that all corridor options have sections which would present a localised risk to defined bird species. In this case, at key areas appropriate mitigation will be implemented for the final line route which will reduce risk.

7.3.2.2 MSA

Constraints A – All Ecological Constraints (except birds):

Designated and Undesignated Sites, Significant Habitats and fisheries: In relation to ecological sites and significant habitats the re-evaluation finds:

- ***Route Corridor Option 1*** - Crosses more woodland than other route corridor options. It also crosses close to one area of cutover bog (with associated woodland) and a relatively more sensitive section of the River Boyne and Blackwater cSAC/SPA, which includes a lake and surrounding mixed woodland. It also crosses the Boyne and Blackwater cSAC / SPA and associated sensitive fisheries and riparian habitats three times compared to twice for the other route corridor options. This is also the longest route corridor option and, therefore, potential impact on hedgerows/linear woodland in the form of tree-cutting could be more significant compared to the other three route corridor options.

- ***Route Corridor Option 2*** - Crosses two small areas of woodland (which it is likely can be avoided by any specific line route). This route corridor option crosses the River Boyne and Blackwater cSAC/SPA at two points where impacts to riparian and aquatic (fisheries) habitats can be avoided. This is the second longest option and, therefore, potential impacts on hedgerows (field boundaries) could be more significant than Route Corridor Options 3A and 3B but less than Route Corridor Option 1

- ***Route Corridor Option 3A*** - Crosses three small areas of woodland and a wetland (which it is likely can all be avoided by any specific line route). This route corridor option crosses the River Boyne and Blackwater cSAC/SPA at two points where impacts to riparian and aquatic (fisheries) habitats can be avoided. Routes 3A and 3B are similar in length and shorter than Route Corridor Options 1 and 2, therefore potential impacts to hedgerows/linear woodland could be expected to be less than on 3A (and 3B);

- ***Route Corridor Option 3B*** - Crosses four small areas of woodland and a wetland. In general these areas can all be avoided. This route corridor option crosses the River Boyne and Blackwater cSAC/SPA at two points where impacts to riparian and aquatic (fisheries) habitats can be avoided. Routes 3A and 3B are similar in length and shorter than Route Corridor

Options 1 and 2 therefore impacts to hedgerows/linear woodland could be expected to be less on Route Corridor Options 3A and 3B.

In terms of designated sites, habitat and fisheries, it is considered that Route Corridor Option 3A and/or 3B are the 'More Preferred' options followed by Route Corridor Option 2, with Route Corridor Option 1 the 'Less Preferred'. With regard to all route corridor options, potential impacts can be reduced through mitigation including appropriate location of structures during the detailed line design process.

As such, the differences between the route corridor options in respect of this category are considered to be low.

Constraints B - Whooper Swan (including wildfowl):

Whooper Swans: In respect of Whooper Swans, the re-evaluation finds that Whooper Swans are mobile in nature, and key areas (roost sites) have been defined at Cruicetown, Tara Mines Tailings Ponds, Balrath Demesne, Headford Estate, from which Whooper Swan make extensive daily flights to foraging areas which would cross route corridors at areas defined. It is considered that the localised nature of such flight lines means that appropriate and established mitigation measures can be used in the subsequent route design, irrespective of which route corridor option is selected. Such local mitigation measures would be developed in consultation with the National Parks and Wildlife Service (NPWS) and considered in the EIS which will accompany the application for planning approval to be submitted to An Bord Pleanála.

Similarly, the proposed overhead line development and associated potential impacts to birds must always be considered in the context of:

- The extent of the existing wirescape across the study area which consists of approximately 329 km of existing high voltage electricity lines (161 km of 38 kV, 101 km of 110 kV, 93 km of 220 kV and 4 km of 400 kV), as well as the thousands of kilometres of medium voltage, low voltage and telephone overhead lines that occur across the study area;

- The fact that Whooper Swans regularly roost, fly over and forage in the vicinity of existing electricity line infrastructure;

- The fact that Whooper Swan distribution will constantly change based on available food resources in Co. Meath which are subject to farmer crop selection;

- The stable / increasing population of Whooper Swan in the context of the above points; and

- The fact that risks have been minimised by avoidance of key roost sites including Cruicetown, Balrath and key foraging areas in the Blackwater River Valley.

Having regard to the above, the re-evaluation finds:

- ***Route Corridor Option 1*** - Is likely to have the lowest potential impact, as most of the sites noted are irregularly utilised or no significant flightline has been determined (with the exception of Carnaross. There is a flightline between Carnaross and Lough Ramor (at least irregular) which would cross this route corridor option. Other Whooper Swans sites, e.g., Breaky Lough were recorded away from this route corridor option. Significant displacement risks are likely to be low on this route.

- ***Route Corridor Option 2*** - Includes one regular site (Carnaross) as per Route Corridor Option 1 above. In addition, the Balrath Demesne area is regularly used and includes sites which include the edge of this corridor. Flightlines by large numbers (close to National Significance) were confirmed in 2008/2009 and 2011/2012 crossing this route. Significant displacement risks are likely to be low on this route.

- ***Route Corridor Option 3A –*** Is likely to have the second lowest potential for impacts. This option includes one significant flightline between Tara Mines Tailing Ponds (as does 3B) and a number of sites in the Blackwater valley and environs. No other regular flightline was noted on this route, although potential occasional foraging areas exist close to Cruicetown and the Yellow River site is close to this corridor (<0.5km away). Significant displacement risks are likely to be low on this route corridor option.

- ***Route Corridor Option 3B*** - To date, this route corridor option has the largest numbers of Whooper Swans in its local and wider vicinity and the highest number of locations where a potential for flights to cross the route. Key sites in the vicinity include regular roost sites at Tara Mines Tailings Pond and Cruicetown, with much less significant sites at Newcastle Lough and Whitewood Lough. Confirmed flight lines occur across this route corridor at two extensive locations, including between Cruicetown and various sites such as Whitewood/ Newcastle Loughs/Clooney Lough and between Tara Mines Tailing ponds and a large range of sites in the Blackwater valley and environs. Observations during 2011/2012 indicated that the Balrath area flightline (Route 2) may be becoming more significant and the Tara Mines Blackwater Valley flightline comparably less significant, as little activity was recorded here in 2011/2012. However, further monitoring is required to confirm this, and based on the overall 5 years of survey data, the comparative ranking below applies. Significant displacement risks are likely to be low on this route given tolerance of this species to OHL developments.

Within the study area defined and based on wintering bird surveys carried out over five winter survey periods to date (2007 to 2012), Route Corridor Option 1 is the 'More Preferred' Option, followed by Route Corridor Option 2, followed by Route Corridor Option 3A, with Route Corridor Option 3B being "Less Preferred".

In conclusion, the key ecological constraints for MSA are summarised into two broad categories. For Constraints A, it is considered that careful line design to avoid key receptors on the preferred route corridor and appropriate mitigation will minimise ecological impacts. For Constraints B, studies have been implemented which have determined key risk areas. It is considered that all corridor options have sections which would present a localised risk to defined bird species. In this case, at key areas, appropriate mitigation will be implemented for the final line route which will reduce risk.

7.3.3 Cultural Heritage

The cultural heritage criteria considered in the re-evaluation of the proposed North-South Interconnector Project include the potential impact of the different route corridors on archaeological and architectural sites and features. Potential impacts can arise directly (i.e. the feature itself can be altered) or indirectly (i.e. the visual context or setting of the feature can be altered but not the feature itself). As set out previously in **section 5.2.2.2,** there are sites and features which, given their location within the corridor route options, have the potential to be directly impacted upon as a result of constructing towers. These sites could also experience indirect impacts or impacts upon their setting and, given the upstanding linear form of the development, it also has the potential to impact on the setting of sites further away.

It is possible to adjust the design of any overhead line within any route corridor option so as to avoid known archaeological and architectural sites/features and, therefore, avoid many of the potential direct impacts. In the majority of instances, it is possible to route the line across these sites/features and design the tower in a location where there will be no physical impact on sites/features. Using avoidance as the principal mitigation measure will ensure that direct impacts across all identified route corridor options will be minimal, thereby ensuring that there are no significant differences between any of the route corridor options. It may not be possible to avoid indirect impacts on all features due to the visual appearance of an OHL and, consequently, there may be residual indirect impacts on sites/features of Cultural Heritage.

As the vast majority of direct impacts can be mitigated through routing and siting of the line, this re-evaluation focuses on considering the potential for indirect impacts.

7.3.3.1 CMSA

There are no World Heritage Sites and no Areas of Significant Archaeological Interest within close proximity to any of the identified route corridor options. There are numerous Records of Monuments and Places (RMP) and Sites and Monuments Records (SMR) within the representative distance of 2 km from the centre of each of the route corridor options. In summary this re-evaluation finds the following:

- ***Route Corridor Option A*** –There are no National Monuments and two Scheduled Monuments within a representative distance of 5 km from the centre of this route corridor option;

- ***Route Corridor Option B*** – There is one National Monument and two Scheduled Monuments within a representative distance of 5 km from the centre of this route corridor option; and

- ***Route Corridor Option C*** - There are two National Monuments and eight Scheduled Monuments within a representative distance of 5 km from the centre of this route corridor option. This also has a higher number of architectural sites within the representative distance of 2 km zone than other route corridor options.

In terms of potential indirect impacts, Route Corridor Options A and B are largely similar and are 'More Preferred' as there are fewer sites where there is potential for significant impacts upon setting, with Route Corridor Option C being the 'Less Preferred'.

There are no significant differences between Route Corridor Option A and B which are 'more preferred', with the 'Less Preferred' option being Route Corridor Option C.

7.3.3.2 MSA

In summary this re-evaluation finds the following:

- ***Route Corridor Option 1*** has no National Monuments in the Ownership or Guardianship of the State in close proximity (<500 m) and only one within 2 km. One Candidate World Heritage Site (Kells) occurs within 7 km of the proposed route option. The number of RMP and RPS sites in the vicinity of the route option is similar to Route Corridor Options 2 and 3A and there are four sites (Drewstown House, Tower of Lloyds, St Ciaran's Well, Castlekeeran Church & Crosses,) identified during the windscreen survey where there is a potential for significant impacts upon setting;

- ***Route Option 2*** has two National Monuments in the Ownership or Guardianship of the State in close proximity (<500 m) and eight within 3 km. The route corridor option also has two Candidate World Heritage Sites located within 7 km (Tara & Kells). The number of RMP and RPS sites in the vicinity of the route corridor option is similar to Route Corridor Options 1 and 3A but there are eight sites (Bective Abbey, Hill of Ward, Rathmore Church & Cross, Castle at Rathmore, Tower of Lloyds, St Ciaran's Well, Castlekeeran Church & Crosses, Carnacross Church & Parochial House) where there is a potential for significant impacts upon setting;

- ***Route Corridor Option 3A*** has two National Monuments in the Ownership or Guardianship of the State in close proximity (<500m) and four within 2 km. The route corridor option also has two Candidate World Heritage Sites located with 7km (Tara & Kells). The number of RMP and RPS sites in the vicinity of the route corridor option is similar to Route Corridor Options 1 and 2, and there are three (Bective Abbey, Kilbeg Graveyard, Cruicestown Church & Cross) where there is a potential for significant impacts upon setting; and

- ***Route Corridor Option 3B*** has no National Monuments in the Ownership or Guardianship of the State in close proximity (<500 m), and only two located within 5 km. One Candidate World Heritage Site (Tara) occurs within 7 km of the route corridor option. Although there are a greater number of RMP and RPS sites within 2 km of the Route Corridor Option 3B compared with the other route corridor options, only one site was noted, namely Bective Abbey, where there is a potential for significant impacts upon setting. It is noted that the route corridor includes Brittas Estate. In this regard, there are a number of constraints in close proximity, including the town of Nobber to the east, which has a number of archaeological constraints including Moynagh Crannog. To the west of the route corridor is Cruicestown Lough, which is a National Monument, a designated landmark in the Meath Landscape Character Assessment (MLCA) and a foraging area for Whooper Swans.

In overall terms, Route Corridor Option 3B is 'More Preferred', with the 'Less Preferred' option being Route Corridor Option 2 because it has two National Monuments in the Ownership or Guardianship of the State in close proximity and eight sites where there is a potential for significant impacts upon their setting. Option 2 is 5km longer than Route Corridor Option 3B.

7.4 OTHER CONSTRAINTS

It should be re-iterated that whilst all constraints are important, the constraints included in this section are considered as Secondary Constraints, as these constraints are broadly similar across all route corridors for both CMSA and MSA and it is generally possible to mitigate impacts on these constraints at the detailed line design stage of the project.

7.4.1 Geology

The geology criteria include potential impact of the different route corridor options on geological pNHAs and CGSs.

7.4.1.1 CMSA

Based on the geological heritage areas, there are no significant differences between any route corridor options. A section of route corridor passes in close proximity to a pNHA at Lemgare, however this section is common to all three route corridor options. It does not directly impact on the geological characteristics of the feature and appropriate mitigation measures can be incorporated into the detailed line design of any route within the identified route corridor options to ensure any potential impacts can be avoided or minimised. In this context there is no significant difference between each route corridor option.

7.4.1.2 MSA

Based on the geological heritage areas, there are no significant differences between any route corridor options. A section of Route Corridor Option 1 crosses 1.3 km of the Blackwater Valley CGS. It could potentially impact on the geological characteristics of the feature, however appropriate mitigation measures can be incorporated into the detailed line design of any identified route to ensure that any potential impacts can be avoided or minimised. In this context there is no significant difference between each route corridor option.

Based on the geological heritage areas, there are no significant differences between any route corridor options in terms of geology for both the CMSA and MSA.

7.4.2 Water

The water criteria include potential impact of the different route corridor options on the number of navigable/non-navigable, streams, lakes etc. to be crossed by the OHL. Each of the various identified route corridor options includes a number of watercourse crossings. Appropriate mitigation measures, primarily relating to construction methodologies, can be incorporated into the detailed line design of any identified route within any of the identified route corridor options to ensure that any potential impacts on water bodies can be avoided or minimised. Mitigation measures are typically designed around the site specific tower location. For example, once the tower base is appropriately located, and in consideration of the fact that a tower is required only approximately at 350–400 metre intervals, the potential adverse impact of an overhead line (OHL) crossing of a river or lake is low.

7.4.2.1 CMSA

As mitigation measures can be incorporated into the detailed line design of a specific route (as noted above), there are no significant differences between any of the route corridor options.

7.4.2.2 MSA

As mitigation measures can be incorporated into the detailed line design of a specific route (as noted above), there are no significant differences between any of the route corridor options.

There are no significant differences between any route corridor options for both the CMSA and MSA in terms of water.

7.4.3 Settlements

The settlement criteria considered as part of EirGrid's re-evaluation process include potential impacts of the different route corridor options on settlements including both urban settlements and rural dwellings. One of the most significant constraints for corridor identification arose as a result of dispersed settlement patterns and areas of higher population density. The relevant considerations for this evaluation stage generally relate to the number of dwellings within any route corridor, and the resulting potential for any subsequent line route to occur in proximity to those dwellings. In this regard:

- While it might be assumed that a longer route corridor will typically contain more dwellings, this is not necessarily the case e.g, Route Corridor 1 and Route Corridor 3A in the MSA (refer to **Table 6.4** in **section 6.4.5**). and

- The potential impact relates to the proximity of dwellings to the specific line route, rather than simply the number of dwellings within the identified route corridors, which are each 1 km wide.

All route corridor options avoid the main identified settlements. The predominance of dispersed rural settlement within the overall study area will affect the subsequent detailed positioning of the line route within any route corridor, and appropriate mitigation measures can and will need to be incorporated into the detailed design to avoid and minimise potential impacts. In this regard, therefore, it is considered that there are no significant differences between any of the route corridor options in terms of settlement.

There are no significant differences between any of the route corridor options for the CMSA and MSA in terms of settlement.

7.4.4 Utilities and Infrastructure

There are no significant differences between any of the route corridor options for the CMSA.

There are no significant differences between any of the route corridor options for the MSA.

7.5 CONCLUSIONS

The preferred ('best-fit') route corridor for the North-South Interconnection Development presents what is considered to constitute the most appropriate balance between the various technical, environmental and community evaluation criteria, as re-evaluated above. While the re-evaluation process concentrates on the primary and secondary environmental constraints, as set out in **Chapters 5, 6 and 7**, it is reiterated that technical and other criteria previously identified in the 2009 Corridor Evaluation Report have not been ignored, rather the issues are considered neutral for the purpose of the route corridor comparative re-evaluation process.

On the basis of updated information and survey data, the re-evaluation process may have resulted in changes to whether a particular route corridor is 'more preferred' or 'less preferred' relevant to a particular criterion, when compared to the 2007 Route Constraints Reports and/or the 2009 Route Corridor Evaluation Document. However, the overall conclusions of the re-evaluation process are generally consistent with the conclusions of these documents.

As is noted in the evaluation, the majority of potential impacts can be mitigated as part of the detailed design. As a result of this, an identified potential impact in respect of a particular environmental topic may not actually distinguish a preference between the identified route corridor options. Equally, where a preference is identified, and when mitigation is assumed, there may be a reduced distinction between a "more preferred" and "less preferred" options. However, having regard to the nature of an OHL project, there will be some potentially significant impacts which cannot be mitigated – these primarily relate to visual impacts, as previously detailed.

The proposed OHL development must always be considered in the context of the extent of the existing wirescape across the study area, which consists of approximately 546 km of existing high voltage electricity lines (252 km of 38 kV, 155 km of 110 kV, 135 km of 220 kV and 4 km of 400 kV), as well as the thousands of kilometres of medium voltage, low voltage and telephone overhead lines that occur across the study area. Overhead electricity transmission lines, while necessary, and generally of strategic importance, are large linear elements in the landscape. They therefore have the potential to affect, to varying degrees, the visual and other environmental aspects of the area through which they are routed. The most effective way of mitigating these effects is by careful routing and the avoidance of the most sensitive environmental and visual receptors.

These have been the key considerations in the selection of **Route Corridor Option A (CMSA) and 3B (MSA)as the overall preferred ('best-fit') route corridor** within which to route the planned North-South 400 kV Interconnection Development.

Ecological constraints for both study areas include sites, species and habitats, in particular wintering birds, which are protected by European Union legislation. However, ongoing studies have found that any potential impact on wintering birds is likely to be localised along the linear alignments of any of the identified Route Corridor Options. Appropriate mitigation measures, based on the results of wintering bird surveys which have been carried out over a number of years, will be developed in consultation with NPWS as part of the final line design in order to further mitigate impacts along the route which will be submitted for planning approval.

A summary of the findings of the re-evaluation process is set out in **Tables 7.4 and 7.5.** The tables initially categorise the significance of impacts (minor, moderate or major) with reference to each environmental criterion for the project in an overall context. The tables then indicate the degree to which potential impacts can be mitigated (no practicable mitigation possible, reduce scale of impact or avoid impact). Finally, the tables indicate the preference for one route corridor over another with reference to more preferred or less preferred. Where all corridors are considered equal having regard to the criteria, it should not be inferred that these criteria are unimportant but rather no preference is expressed in relation to a particular corridor having regard to these criteria.

In summary, in the CMSA, **Route Corridor Option A** is the 'most preferred' option, by virtue of the fact that it has the lowest potential for creating long-term adverse significant residual impacts which cannot be mitigated. These potential impacts arise primarily in terms of landscape and visual impacts. All other potential significant environmental impacts, including potential impact on whooper swans, are localised, and can be mitigated.

Similarly, in the MSA, **Route Corridor Option 3B** is the 'most preferred' option, as it is considered to create the lowest potential visual impact on the landscape, with all other potential significant environmental impacts being localised, and capable of being mitigated**.**

Accordingly, following the comparative evaluation process, which incorporates consideration of public and stakeholder feedback arising both in respect of the previous proposed 400 kV Interconnection Development, and in respect of the subsequent Preliminary Re-evaluation Report, as well as updated studies carried out by or on behalf of EirGrid, it is the recommendation of the consultants that Route Corridor Option A and 3B emerges as the preferred route corridor for the North-South 400 kV Interconnection Development.

Less Preferred → More Preferred

CAVAN - MONAGHAN STUDY AREA

	Significance of Impact	Ease of Mitigation		Corridor Option A	Corridor Option B	Corridor Option C
Ecology	--	--	Potential Impact on Wintering Bird Sites			
	--	--	Potential Impact on Designated Sites Potential Impact on Fisheries Potential Impact on Mature Deciduous Woodlands Potential Impact on Wetlands Potential Impact on Hedgerows			
Landscape	---	-	Potential Impact on Protected Views and Prospects Potential Impact on Areas of High Scenic Value Potential for impacts on non designated but scenic landscapes Potential Impact on Landscape Character including landscape values and sensitivity.			
Cultural Heritage	--	--	Potential Impact on Archaeological Sites Potential Impact on Architectural Sites			
Techincal	N/A	N/A	Length of Line Route			
Water	-	---	Potential Impact on River Crossings Potential Impact on River Catchments Impact on Lakes			
Geology	-	---	Potential Impact on Proposed Geological National Heritage Areas (NHA's) Potential Impact on County Geological Sites (CGS's)			
Settlements	--	--	Potential Impact on Urban & Rural Settlements			
Infrastructure / Utilities	-	---	Potential Impact on Road Crossings Potential Impact on Railways Potential Impact on Existing Electricity Lines Potential Impact on Airfields			

Table 7.4: Route Corridor Evaluation CMSA

Less Preferred ⟷ More Preferred

MEATH STUDY AREA

	Significance of Impact	Ease of Mitigation		Corridor Option 1	Corridor Option 2	Corridor Option 3A	Corridor Option 3B
Ecology	--	--	Potential Impact on Wintering Bird Sites				
	--	--	Potential Impact on Designated Sites Potential Impact on Fisheries Potential Impact on Mature Deciduous Woodlands Potential Impact on Wetlands Potential Impact on Hedgerows				
Landscape	---	-	Potential Impact on Protected Views and Prospects Potential Impact on Areas of High Scenic Value Potential for impacts on non designated but scenic landscapes Potential Impact on Landscape Character including landscape values and sensitivity.				
Cultural Heritage	--	--	Potential Impact on Archaeological Sites Potential Impact on Architectural Sites				
Techincal	N/A	N/A	Length of Line Route				
Water	-	---	Potential Impact on River Crossings Potential Impact on River Catchments Impact on Lakes				
Geology	-	---	Potential Impact on Proposed Geological National Heritage Areas (NHA's) Potential Impact on County Geological Sites (CGS's)				
Settlements	--	--	Potential Impact on Urban & Rural Settlements				
Infrastructure / Utilities	-	---	Potential Impact on Road Crossings Potential Impact on Railways Potential Impact on Existing Electricity Lines Potential Impact on Airfields				

Table 7.5: Route Corridor Evaluation MSA

Significance:

******* Major: a fundamental change to a sensitive environment
****** Moderate: a material but non-fundamental change to the environment
***** Minor: a detectable but non-material change to the environment
N/A Not applicable

Mitigation

* No practicable mitigation possible
** Mitigation likely to **reduce** adverse scale of impact
*** Mitigation likely to **avoid** adverse discernible impact
N/A Not applicable

8 INDICATIVE LINE ROUTE

8.1 Background to the Identification of an Indicative Line Route

As previously noted, the original route identification process carried out in respect of the previous Meath-Tyrone 400 kV Interconnection Development included the identification of an indicative feasible route within each route corridor option, as it was considered essential to ensure that a potentially feasible line route existed within each identified corridor option. The process progressed towards the confirmation of a line route which formed the basis for the application which was submitted to An Bord Pleanála for approval in December 2009.

EirGrid and its consultants have had regard to the considerable body of work previously undertaken in respect of that previous decision-making process, which includes technical, environmental, planning and other reports (as described previously in this Report), the Environmental Impact Statement (and associated reports) and mapping prepared in respect of the previous proposal (which in itself was based upon, and made considerable reference to, other reports, documents and mapping). EirGrid has also carefully considered the volume of written and oral submissions which were presented by or on behalf of prescribed bodies, other stakeholders, and the general public, during the previous application. Subsequently, EirGrid and its consultants have considered the feedback arising in respect of the consultation process following publication of the Preliminary Re-evaluation Report – this is contained in **Appendix B** to this Report. In summary, the principal recommendation of EirGrid and its consultants arising from the re-evaluation process, is that the identified Route Corridor Options A and 3B remain the least constrained (and thereby "preferred" or "best fit") options, from a technical, environmental and other perspective, for the North-South 400 kV Interconnection Development. In addition, having considered all the submissions made during the consultation process, it is the view that the general alignment of the indicative line route within Route Corridor Options A and 3B (as identified in the Preliminary Re-evaluation Report), and as set out in this chapter, remains valid.

There have, however, been a number of localised modifications to the indicative alignment arising from, *inter alia*, the process of landowner engagement in respect of the Preliminary Re-evaluation Report. It needs to be understood, however, that the indicative alignment is suggestive of the final alignment and has been identified for the purposes of ongoing technical and environmental analysis, as well as public and landowner consultation and engagement.

This re-evaluation process therefore has facilitated the review of issues and information raised since December 2009, which are considered relevant for identification of an indicative line route within the identified preferred route corridor. The indicative line route identified in this Re-evaluation Report, located within the "most preferred" Route Corridor Options A and 3B, is broadly similar to the previously proposed line route but incorporates localised modifications as follows:

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

- Modification 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 Interconnection Development; and

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

These modifications are accounted for as part of the indicative line route presented on **Map 9 (CMSA**) and **Map 9 (MSA).**

Next steps in the development of the North-South 400 kV Interconnection Development project include the presentation of a more detailed preferred route alignment, following further technical and environmental analysis, and the consideration of all feedback arising during the public consultation process in respect of the Preliminary and Final Re-evaluation Report. This will be presented in a Preferred Project Solution Report, which will be published in due course, and will be the subject of a separate round of public consultation and engagement, in particular including landowner engagement. **At the conclusion of the re-evaluation process, EirGrid and its consultants have 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 OHL exists within the identified preferred Route Corridors A and 3B. There are no significant material implications which would require the use of underground cable (UGC) along any part of the indicative line route, other than on an identified section at the approach to Woodland Substation.**

By definition, the indicative line route does not include any significant detail regarding its specific location and siting of transmission infrastructure, including tower positions.

The progression of the indicative line route to a more detailed preferred line design will be presented in a separate Preferred Project Solution Report to be published in due course. The more detailed line design, as presented in this Report, will form the focus for ongoing landowner engagement, as well as for further detailed design and survey work, and consultation with An Bord Pleanála, Prescribed Bodies, the public and other stakeholders.

8.2 Summary of Indicative Line Route

A summary description of the indicative line route is set out below:

Cavan-Monaghan Study Area (CMSA):

In the CMSA the indicative line route is broadly similar to the original line route (i.e., within identified Route Corridor Option A), as outlined below:

- The line route commences at the NIE line route at the border crossing points of Lemgare/Mullyard north-east of Clontibret;

- The line route continues in a southerly direction circumventing Drumgristin and Coogan Lough and bypassing the village of Cremartin, before turning in a south-westerly direction to traverse across the new Castleblayney bypass and the old N2, approximately 1.2 km north west of Annyalla;

- The line route then crosses the R180 north-west of Lough Egish, and proceeds in a southerly direction before crossing the R183, 3.5 km east of Ballybay and 1.5 km west of Doohamlet;

- The line route then traverses to the east of Northlands to circumvent the punctuation of lakes at Northlands and crosses the R178 approximately 3 km east of Shercock. The line route continues in a south-easterly direction and then in a south-westerly direction bypassing on its way Shantonagh Lough before crossing the R181, some 2 km south-west of Lough Egish;

- The line route runs in a southerly direction crossing on its way the existing Flagford – Louth 220kV OHL. It then turns south-west to cross the R165, some 3.5 kilometres west of Kingscourt. It then continues in a southerly direction and crosses the county boundary into Co. Cavan along the R162, approximately 5.5 km north-west of Kingscourt Co. Cavan;

- The route then connects the CMSA with the MSA identified line route in the vicinity of the townland of Clonturkan Co. Cavan;

This is illustrated on **Figure 8.1** and **Map 9 (CMSA)** in **Appendix C**.

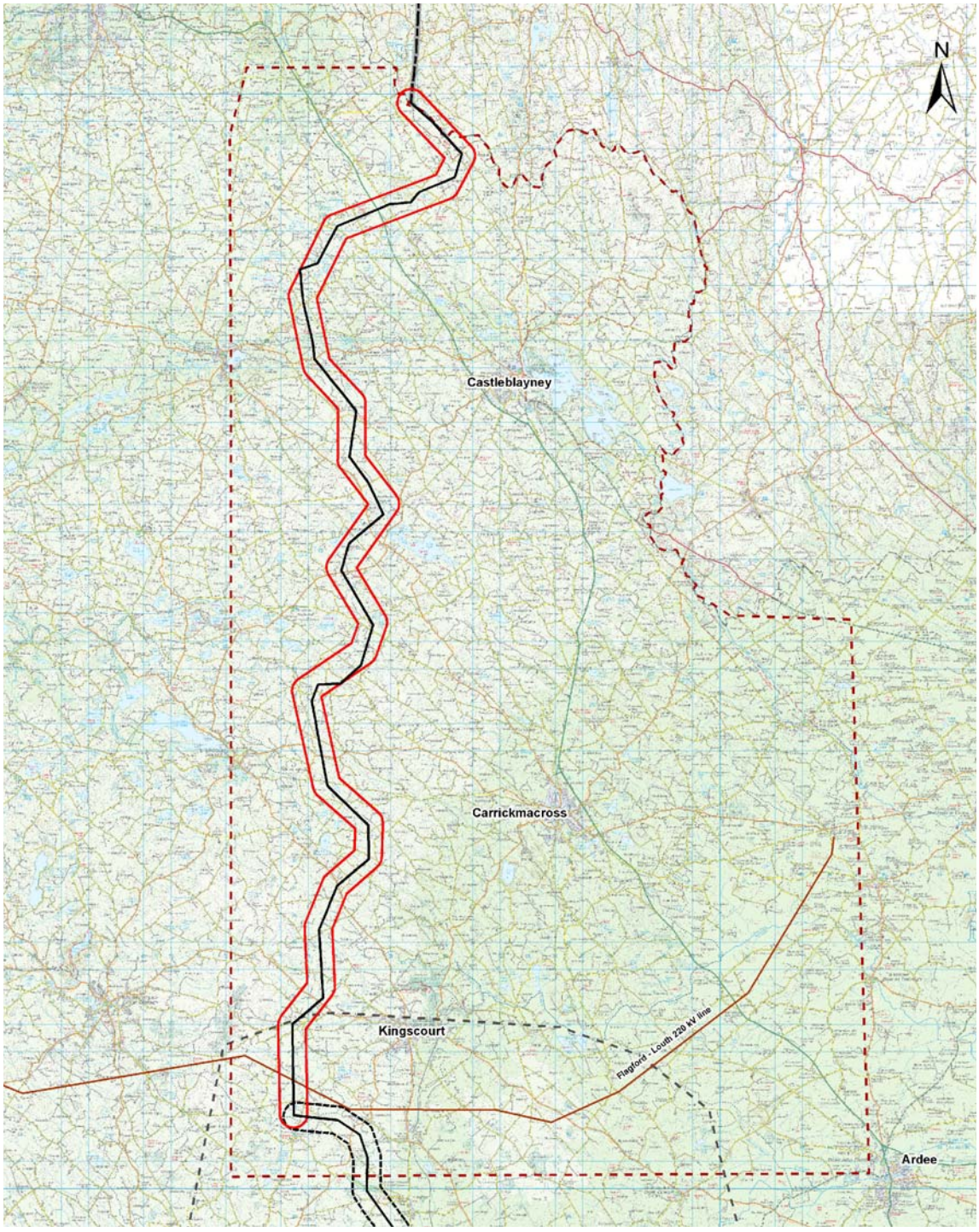

Figure 8.1: Indicative Line Route (CMSA)

Meath Study Area (MSA):

In the MSA the indicative line route (i.e., within identified Route Corridor Option 3B) is similar to the original line route with a number of localised alterations, as outlined below:

- The route connects with the CMSA proposal in the townland of Clonturkan;
- It crosses the R164 in the townland of Lislea;
- It continues in a south-easterly direction to the west of Kilmainhamwood Village;
- It continues in a south-easterly direction, passing to the west of Whitewood Lough to the west of Whitewood House;
- It continues in a south-easterly direction in the townland of Cruicetown;
- In the townland of Brittas to the west of Nobber, it crosses Brittas Estate;
- It continues in a southerly direction crossing the N52 in the townland of Clooney;
- It continues in a south-westerly direction through the townland of Mountainstown;
- It continues in a southerly direction through the townland of Clongill;
- It continues in a southerly direction crossing the River Boyne and River Blackwater cSAC and Teltown Zone of Archaeological Amenity, west of the village of Donaghpatrick, at this point it also crosses the N3;
- It crosses the M3 in the townland of Grange, north west of the village of Ardbraccan;
- It crosses the N51 in the west of the town of Navan, and continues in a southerly direction towards the village of Dunderry which is located to the west of the route corridor option;
- It continues in a south-easterly direction crossing the townland of Philpotstown. Robinstown village is located to the north east of the route option;
- It continues in south-easterly direction to the east of the town of Trim. There has been a minor modification to the line route near Trim Airfield to ensure that towers will now be located outside the approach surface, which will lead to an additional clearance margin between the top of the towers and the obstacle limitation surface;

- It continues in south-easterly direction, crossing the River Boyne and River Blackwater cSAC. Bective Abbey is located to the east of the route option;

- The route has been modified in the townland of Marshalltown in order to take into account the construction of new houses occurring in this area since the preparation and submission of the previous application for approval of the Meath-Tyrone 400 kV Interconnection Development in December 2009;

- It continues in a southerly direction, crossing the R154;

- The line route crosses in close proximity to Galtrim Moraine County Geological Site (CGS);

- The line route joins up with the existing Oldstret-Woodland 400 kV double circuit OHL near the townland boundaries of Bogganstown and Curraghstown; and

- The line route travels in an easterly direction along the free side of the existing double-circuit line to the existing Woodland Substation.

This is illustrated on **Figure 8.2** and **Map 9 (MSA)** in **Appendix D**.

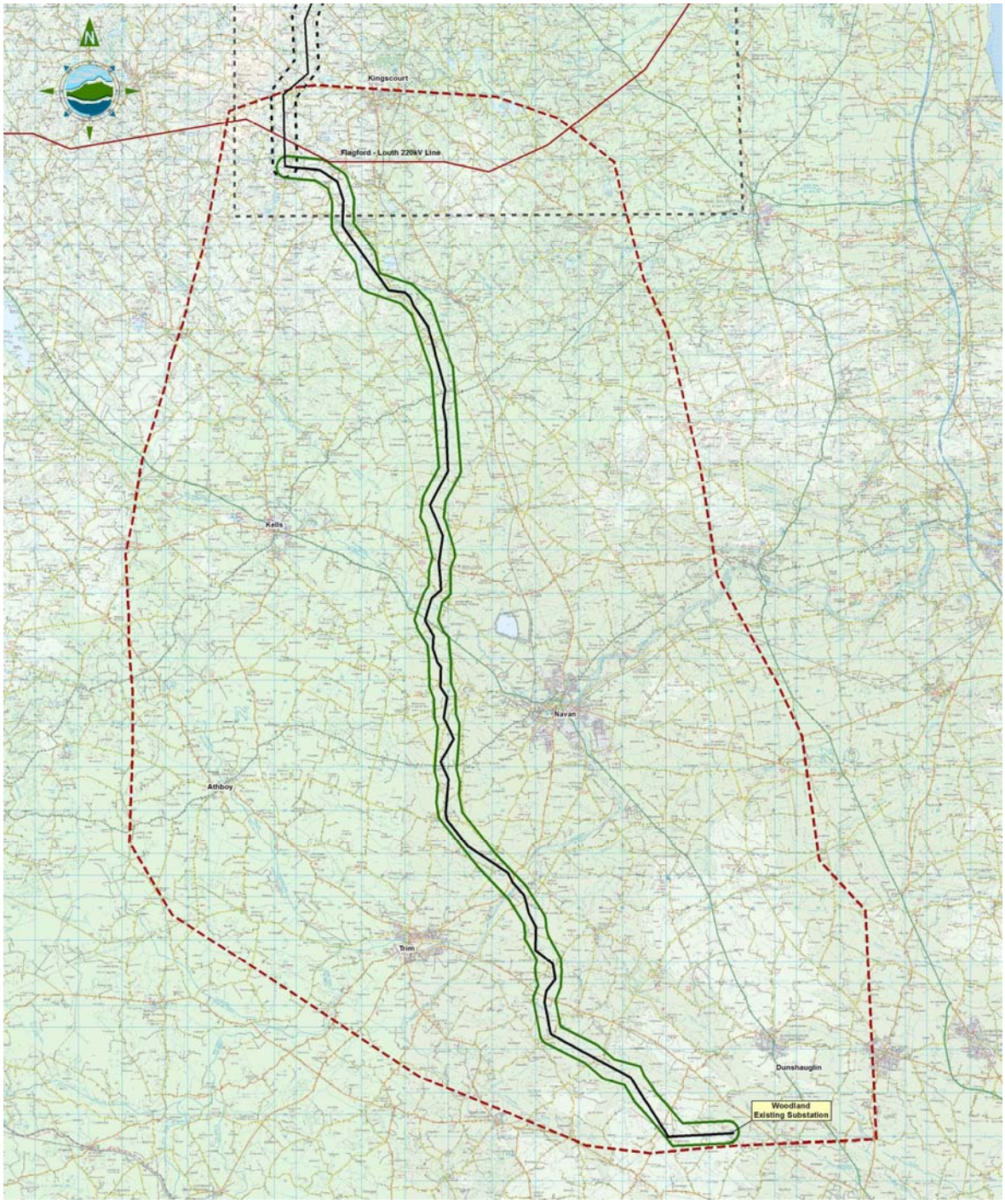

Figure 8.2: Indicative Line Route (MSA)

9 OVERALL CONCLUSIONS OF THIS RE-EVALUATION REPORT

- There is a clear and immediate strategic need for the development of an additional high-capacity North-South interconnector.

- It is envisaged that the new Interconnector circuit shall generally take the form of a single circuit 400 kV AC (alternating current) overhead line (OHL).

- The existing 400 kV Woodland Substation in County Meath shall be the southern terminus for the new high-capacity North-South Interconnector circuit.

- A new 400 kV substation located at Turleenan in County Tyrone shall form the northern terminus of the new Interconnector circuit.

- It is envisaged, at this point in time, that future reinforcement of the North East would include the construction of an intermediate substation on the proposed Turleenan-Woodland 400kV OHL that would connect it to the existing Flagford-Louth 220 kV OHL. The need for the intermediate substation near Kingscourt is not now expected to arise for at least another ten years. In accordance with the principles of proper strategic planning and sustainable development, it has been decided that any such future substation shall not be specifically proposed in the new application for Statutory Approval of the Turleenan-Woodland 400 kV Interconnection Development, but rather will be the subject of a separate future application for approval and environmental impact assessment.

- In Ireland, the North-South Interconnector shall be routed within a mid-country study area, generally along the shortest alignment that is both technically and environmentally appropriate, from Woodland Substation northwards through County Meath, staying to the west of Navan, and northwards through Cavan and Monaghan, crossing the border to link up with that element of the overall planned Interconnector development being proposed by NIE.

- All decisions and process relating to environmental and other constraints have been reviewed, updated, reported, and re-evaluated. Route corridor options have also been reviewed and qualitatively re-evaluated. On the basis of this re-evaluation, the overall preferred ('best-fit') route corridor within which to route the planned North-South Interconnection Development is identified Route Corridor Option A and 3B (as summarised in section 8.2).

- An indicative line route has been identified within this preferred corridor, which EirGrid's consultants are recommending should be brought forward to the next phase of route confirmation, detailed design, preparation of EIS and planning application, comprising Stage 3 of EirGrid's Project

Development and Consultation Roadmap. The indicative line route is broadly similar to that previously proposed line route, but incorporating localised modifications as follows:

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

- Modification 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 Interconnection Development; and

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

These modifications are accounted for as part of the indicative line route presented on **Map 9 (CMSA**) and **Map 9 (MSA).**

EirGrid and its consultants have 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 OHL exists within the identified preferred Route Corridor Options, and 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 report is the culmination of a detailed re-evaluation of all aspects of the North-South Interconnector Project. The conclusion of the report, i.e., the identification of an indicative line route for the transmission line within an identified preferred route corridor, will be the focus for further detailed design and survey work.

This re-evaluation process has identified a study area, constraints within that study area, route corridor options which seek to avoid identified constraints, and an indicative line route within an identified preferred route corridor option. This has been subject to public consultation, primarily in the context of the Preliminary Re-evaluation Report, but also including direct engagement with some landowners, members of the public, and with prescribed bodies. It is therefore considered to be consistent with Stages 1 and 2 of EirGrid's Project Development and Consultation Roadmap, notwithstanding its somewhat unique planning circumstances. This Roadmap (referred to in **Figure 1.3**) is a framework by which EirGrid undertakes the planning and development of its major transmission infrastructure development projects.

Next steps in the development of the North-South 400 kV Interconnection Development project include the presentation of a more detailed preferred route alignment, following further technical and environmental analysis, and the consideration of all feedback arising during the public consultation process in respect of the Preliminary and Final Re-evaluation Report. This preferred line design, including identification of feasible

tower locations along the alignment, will be presented in a Preferred Project Solution Report, which will be published in due course, and will be the subject of a separate round of public consultation and engagement, in particular including landowner engagement.

The preferred line design will also form the basis of environmental assessment in accordance with Stage 3 of EirGrid's Project Development and Consultation Roadmap. The output of this consultation and assessment process, along with further technical and environmental studies, will feed into the final project proposal that EirGrid will publish as part of the planning application for approval to An Bord Pleanála.

Once the application for approval is submitted to An Bord Pleanála, the project will then move to the statutory consent phase (Stage 4 of EirGrid's Project Development and Consultation Roadmap). During this phase, An Bord Pleanála will afford defined periods within which parties may make submissions or observations in respect of any proposed development. Indeed, An Bord Pleanála also has discretion to hold an oral hearing in respect of any application for proposed development.

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