North South 400 kV Interconnection Development

Preliminary Re-evaluation Report

Part Funded by the

EU TEN-E Initiative

May 2011

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EXECUTIVE SUMMARY

EirGrid plc (formerly ESB National Grid) is engaging in a comprehensive re-evaluation of its previous application to An Bord Pleanála for approval of the Meath-Tyrone 400 kV Interconnection Development, being that portion of the overall North-South Interconnector Project occurring within the Republic of Ireland. This review includes (but is not restricted to) the specific subject matter of that application for approval, the Environmental Impact Statement (and supporting studies) accompanying the application, alternatives considered, and third party and other submissions made to An Bord Pleanála. This also includes information provided to, or obtained by EirGrid, subsequent to the withdrawal of that previous application. This is in order to ascertain whether the scope, content, conclusions, and proposal of that previous application remain applicable for the purposes of informing and shaping the new application for approval of the North-South Interconnection Development.

The scope of this re-evaluation process involves the preparation and publication of this Preliminary Re-evaluation Report; thereafter, EirGrid shall engage in a programme of landowner, public and stakeholder consultation, in order to obtain feedback, primarily on any new issues arising, or new insights on aspects of the project previously published. The feedback, and EirGrid's response to same, will be documented in a Final Re-evaluation Report; this separate report will conclude with identification of EirGrid's preferred project solution for the new North-South Interconnection Development, which, it is envisaged, will form the basis of an application to be submitted to An Bord Pleanála for development consent.

The preliminary findings of this re-evaluation process, as set out in this Report are as follows:

EirGrid is satisfied that the development of an additional high-capacity electricity interconnector between the electricity networks of the Republic of Ireland and Northern Ireland is required in order to comply with current National energy policy and governing European Directives. In this governing strategic policy context, EirGrid has identified that such an additional north-south interconnector provides multiple technical and other benefits. These include:

- Improving competition by reducing the constraints that are currently restricting the efficient performance of the all-island Single Electricity Market;
- Improving security of supply by providing a reliable high capacity link between the two parts of the all-island transmission system; and
- Supporting the development of renewable power generation by enhancing the flexible exchange of power flows over a large area of the island.

EirGrid has also re-examined the case for the reinforcement of the transmission system in the north-east area of the Republic of Ireland and has concluded that such reinforcement will be required sometime between 2015 and 2020. This finding is based on consideration of the latest data including electricity growth projections for the north-east area that take account of the continuing economic downturn.

EirGrid is satisfied that a new high capacity cross border interconnector circuit, physically separate from the existing high capacity cross border interconnector, and connecting between appropriately robust [1]parts of the two existing transmission networks north and south of the border, is the only option that will satisfy the identified strategic need and thus provide the strategic primary benefits outlined above. A secondary benefit of such an interconnector is that it will provide the required reinforcement of the north-east area at no additional environmental or financial cost. The timeline for the delivery of the new Interconnector anticipates that it will be delivered in late 2015, at the earliest. It is further concluded therefore that the need to progress with this project to reinforce the north-east area is immediate, in the context of the time it will take to deliver this project.

EirGrid is obliged, within the terms of its licence as Transmission System Operator (TSO), to develop the transmission system using least cost, technically and environmentally acceptable solutions. In order to comply with this requirement, and following the preliminary re-evaluation process EirGrid has concluded that the most appropriate nature and form for the new North-South Interconnector Development is one that it substantially comprised of 400 kV overhead line (OHL), on the basis that;

- High voltage direct current (HVDC) technology and high voltage alternating current (HVAC) undersea cable do not comply with the project objectives/design criteria for the proposed North-South Interconnector;

- There have not been any developments in 2010 in either underground cable (UGC) technology, or power system control and protection systems, which would alter EirGrid's opinion that the use of long HVAC cables on the Irish transmission system is not feasible within the constraints with which EirGrid must comply;

- No new information has come to EirGrid's attention in 2010 which would alter its opinion that a 400 kV OHL is the best technical solution for this development, and that it would be significantly less costly than the 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, 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 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.

[1] 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.

EirGrid has also reviewed the effectiveness of the previously proposed development in meeting the identified requirements of the project. Based on this re-evaluation, EirGrid has reached the following key conclusions:

- The route of the Interconnection Development shall be the shortest route that is technically and environmentally appropriate;

- The existing 400 kV Woodland Substation in County Meath should be the southern terminus for the Interconnection Development;

- In Northern Ireland, the northern terminus of the Interconnection Development will be at a planned new substation at Turleenan in County Tyrone;

- The previous proposal included an intermediate substation on the proposed Turleenan-Woodland 400 kV OHL connecting into the existing Flagford-Louth 220 kV OHL. A high capacity transmission circuit, connecting between Woodland and Turleenan Substations will provide the required increase in north-south interconnection capacity without the need for such an intermediate substation. It will also provide an immediate reinforcement of the transmission network in the north-east area without the need for an intermediate substation. Based on the latest load forecast a Turleenan-Woodland 400 kV OHL would provide sufficient reinforcement of the network in the north-east to cater for the projected load growth in that area for at least the next decade. Thereafter 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 connecting to the existing Flagford-Louth 220 kV OHL.

- As this intermediate substation is not now expected to be required within the next ten years it is EirGrid's view that it would not be appropriate in the context of proper planning and sustainable development to include it in the new application for approval for the proposed North-South Interconnection Development; and

- From a strategic planning perspective, in anticipation that it will be required at some future point in time it is reasonable to give some consideration now to where such a substation should be generally located. It is concluded that an appropriate location for an intermediate substation on the proposed Turleenan-Woodland 400 kV circuit (required to enhance the electricity supply to the north-east area) would be in the vicinity of the point of intersection of the future Turleenan-Woodland 400kV OHL and the existing Flagford-Louth 220 kV OHL.

The technical basis and considerations for the Interconnection Development, as re-evaluated by EirGrid (and summarised above) informed the planning and environmental issues covered by its consultants in this Preliminary Re-Evaluation Report. This included the instruction to seek a viable

and environmentally acceptable 400 kV OHL solution, and to only consider the use of short lengths of 400 kV UGC in the event that an appropriate and acceptable entirely OHL solution cannot be found.

The preliminary findings of this part of the re-evaluation process, as set out in this Report are as follows:

EirGrid and its consultants have revisited the principal assumptions and recommendations of the various studies previously prepared, and are satisfied that no new environmental consideration or other relevant material has arisen in respect of the original evaluation process which identified the overall **Study Area** within which to route the planned Interconnection Development project. The only significant technical issue which has arisen is the decision not to proceed at this juncture with the intermediate substation in the vicinity of the point of intersection with the existing Flagford-Louth 220 kV OHL. EirGrid and its consultants remain satisfied that the planned Interconnection Development between the existing Woodland Substation Co. Meath, and the planned Turleenan Substation Co. Tyrone, should best occur within a general mid-country study area comprising the Counties of Tyrone, Armagh, Monaghan, Cavan and Meath.

For the purposes of this re-evaluation, and the subsequent envisaged application for planning approval and environmental assessment, and to prevent confusion during necessary comparison with the previous application for approval of the Meath-Tyrone 400 kV Interconnection Development, 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 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). The nominal interface between the two parts of the overall study area occurs in the vicinity of the existing Flagford – Louth 220 kV OHL.

EirGrid and its consultants have also revisited and reviewed all **key environmental and other constraints** in the overall study area (i.e., in the CMSA and MSA) and are satisfied that no new environmental or other constraints have been identified which would prevent the identification of potentially feasible route corridors, within which to route and site the planned Interconnection Development. Furthermore, EirGrid and its consultants are satisfied that the updated environmental and other constraints within the identified study area do not have material implications for the locations of the previously identified **route corridor options** (as set out in the 2007 Route Constraints and Addendum Reports). While each of the identified route corridor options contains environmental constraints, the route identification process ensures the avoidance of the most significant of these to the maximum practical extent. Other identified potential constraints within the route corridors are site or area specific, and it is considered that potential impacts on these can be mitigated through appropriate route selection. In addition, EirGrid and its consultants are satisfied that no additional and/or previously unidentified route corridor emerges from this 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.

EirGrid and its consultants confirm on the basis of the re-evaluation process that the **emerging preferred route corridor option** for the Interconnection Development within the identified mid-country study area is considered to constitute the most appropriate balance between the various technical, environmental and other evaluation criteria. In the CMSA, **Route Corridor Option A** is the preliminary 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 can be mitigated. Similarly, in the MSA, **Route Corridor Option 3B** is the preliminary preferred option, as it is considered to create the lowest potential visual impact on the landscape, with all other potential significant environmental impacts capable of being mitigated. These preliminary preferred route corridor options, along with the proposed route identified by NIE for that portion of the proposed development located within Northern Ireland, are set out in a linear contiguous arrangement in Figure E1. The current re-evaluation process has facilitated the consultants in undertaking a process to address issues/information raised since December 2009, which are considered relevant for this phase i.e., the preliminary identification of an indicative line route within the identified preferred route corridor. Perhaps unsurprisingly, given the extent of detailed study and assessment that informed the previous application for statutory approval of the Meath-Tyrone 400 kV Interconnection Development, the **preliminary indicative line route** identified in this Preliminary Re-evaluation Report is broadly similar to that previously proposed line route, but incorporating localised modifications as follows:

- A modification to the line route in order to take account of the construction of new houses occurring since the preparation and submission of the previous application in December 2009; and

- Modification arising as a result of the decision not to proceed with the intermediate substation as part of the new application for approval of the Interconnection Development.

The preliminary indicative line route incorporating localised modifications is set out in Figure E2 and E3. Other potential localised modifications are matters that are best dealt with in consultation with the competent authorities, and in reference to the conclusions of ongoing studies. The actual necessity or appropriateness of such potential modifications will therefore be confirmed at a later stage in the overall progression towards an application for the North-South Interconnection Development.

At this stage in the re-evaluation process, EirGrid and its consultants are of the consideration that on the basis of the re-evaluation of updated environmental constraints and other information, a viable and environmentally acceptable preliminary indicative line route for a 400 kV OHL exists and there are no material implications which would warrant the use of UGC along any part of the preliminary indicative line route other than on the identified section within Woodland Substation.

Overall, it should be noted that the current line route remains indicative for the purposes of this Preliminary Re-evaluation Report. The preferred project solution will emerge from the re-evaluation process and will follow further detailed design and survey work, in consultation with An Bord Pleanála, Prescribed Bodies, other stakeholders, landowners and the general public.

Figure E1: EirGrid's Preliminary Preferred Route Corridor Options (CMSA and MSA) and NIE's Proposed Route in Northern Ireland

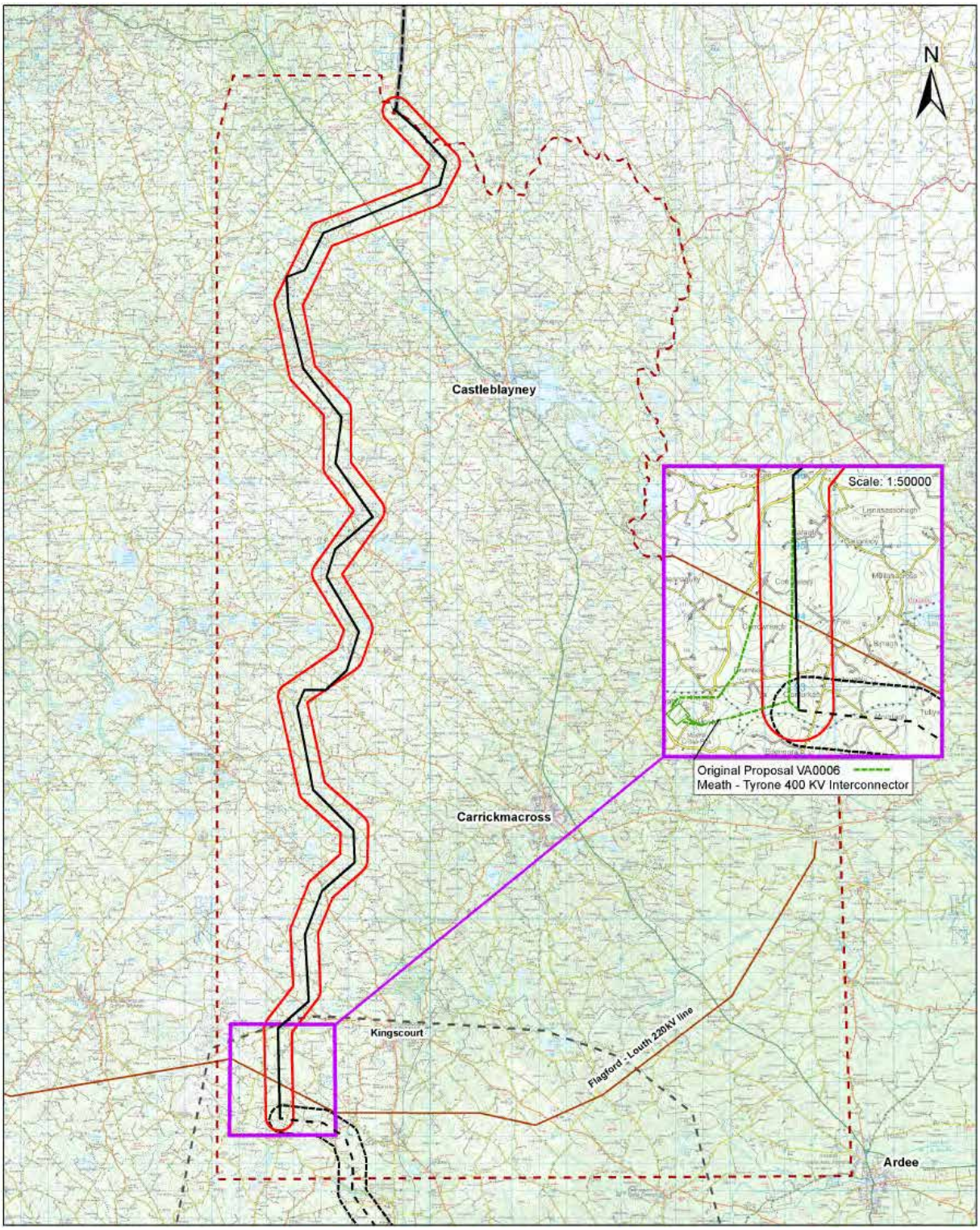


Figure E2: Preliminary Indicative Line Route (CMSA)

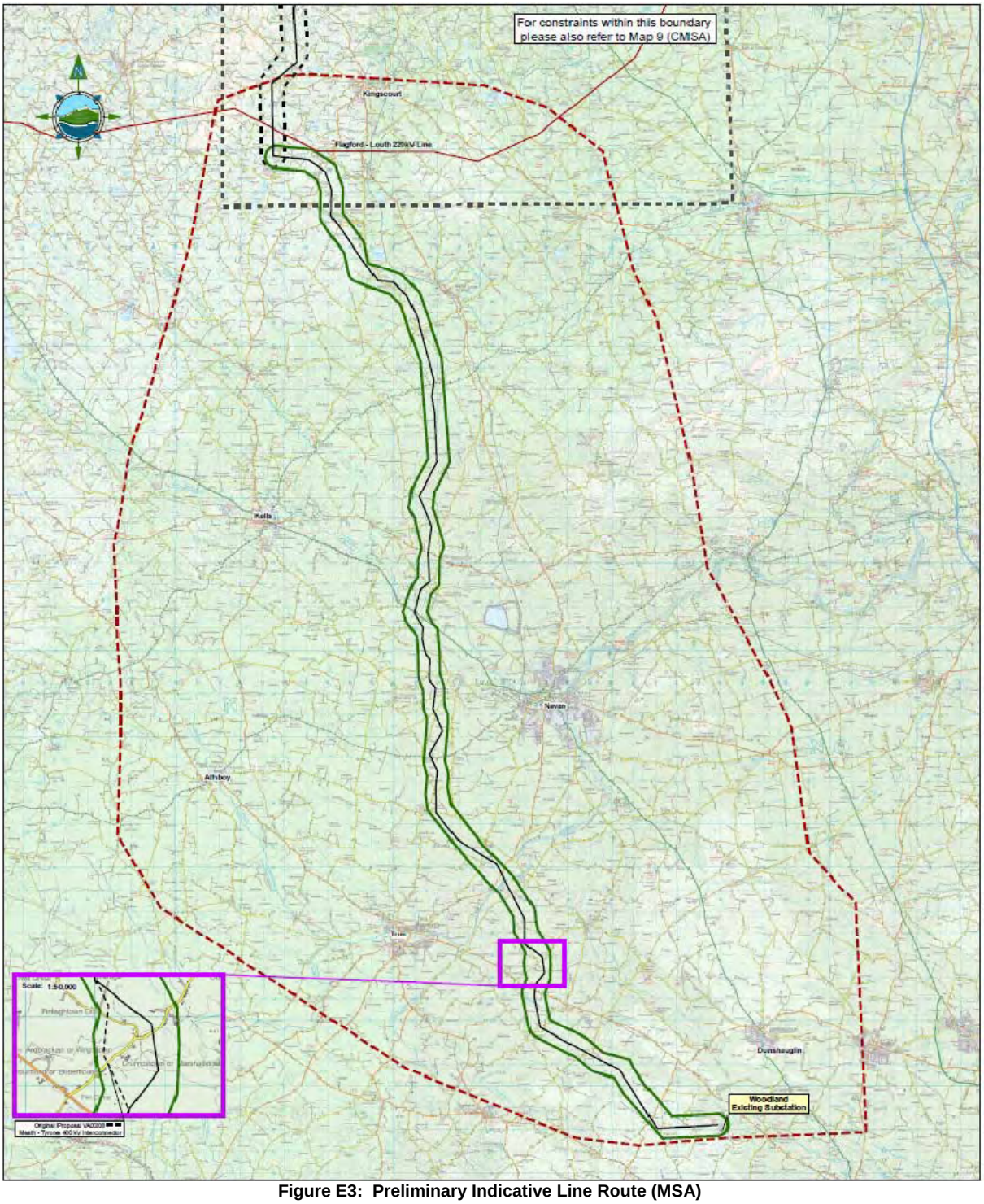


Figure E3: Preliminary Indicative Line Route (MSA)

1.0 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 the Republic of Ireland. This will comprise the second high-capacity electricity interconnector between the two networks – the existing high-capacity interconnector, a 275kV double circuit overhead line (OHL), connects between Tandragee and Louth Substations. Over the last number of years, a joint project has been developed, primarily comprising a high-voltage transmission circuit between a new substation at Turleenan, County Tyrone, and the existing Woodland 400 kV Substation, near Batterstown, County Meath.

The new line, and associated infrastructure, is planned to be located in the Counties of Tyrone, Armagh, Monaghan, Cavan and Meath, as indicated on Figure 1.

Figure 1: Proposed North-South Interconnection Development (in bold red).

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 33.9 km across lands in Counties Tyrone and Armagh, from the new substation at Turleenan to the locations where the circuit crosses the jurisdictional border - in the townland of Mullyard, Co. Armagh in Northern Ireland, and the townland of Lemgare, Co. Monaghan in the Republic of Ireland.

In August 2010 the Northern Ireland Environment Minster referred the NIE application to the Planning Appeals Commission (PAC) for a public inquiry. There is currently no confirmed date for this inquiry. In October 2010 further information was requested in respect of this application. An addendum to the application was submitted in January 2011.

Also in December 2009, EirGrid Plc submitted an application to An Bord Pleanála for approval of that portion of the proposed cross-border transmission infrastructure development located within the Republic of Ireland (An Bord Pleanála Reference VA0006). This application, known as the Meath-Tyrone 400 kV Interconnection Development, was accompanied by an Environmental Impact Statement (EIS). The project scope 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, Co. Monaghan to the existing 400 kV substation at Woodland, Co. Meath, extending across lands in Counties Monaghan, Cavan and Meath;
- A new 400 kV substation in the townland of Moyhill, Co. Meath, in the vicinity of where the proposed new north-south oriented transmission circuit was proposed to intersect with the existing east-west oriented 220 kV OHL between Flagford and Louth Substations;
- The 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, the application was on public display, and An Bord Pleanála invited written submissions from identified Prescribed Bodies, other stakeholders, the general 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 notice. As such, the application for approval was not determined by An Bord Pleanála.

EirGrid now intends to submit a new application for approval of that portion of the overall Interconnection Development Project within the Republic of Ireland that will ultimately link with the existing and planned high-voltage electricity transmission network in Northern Ireland. For the avoidance of doubt, this re-evaluation process relates to the scope and content of that portion of the overall North-South Interconnector Project which occurs within the Republic of 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 approval of the Meath-Tyrone 400 kV Interconnection Development, it is the case that the considerable body of work undertaken in respect of that previous application remains relevant. In particular, the considerable data contained in the EIS (and associated studies) prepared in respect of the previous proposal remains relevant to the process of identifying and assessing the main effects which any new proposal is likely to have on the environment. The EIS and associated technical, environmental, planning and other documents, were all publicly available during the period of the previous application for approval, and they remain available for public review and reference.

In addition, a considerable volume of written and oral submissions were presented by Prescribed Bodies, other stakeholders, landowners and the general public, during the period of the previous application. These submissions contain information which is useful to EirGrid in undertaking its own review of the nature and location of the new development.

The purpose of the current re-evaluation process is to carry out a comprehensive review of the previous application for approval of the Meath-Tyrone 400 kV Interconnection Development, including (but not restricted to):

- The subject matter of that application for approval;
- The EIS (and supporting studies) accompanying the application;
- Alternatives considered; and
- Third party and other submissions made to An Bord Pleanála.

This review also includes information provided to, or obtained by, EirGrid, subsequent to the withdrawal of that previous application. This is in order to ascertain whether the scope, content, conclusions, and proposal of that previous application remain relevant for the purposes of informing and shaping the new application for approval of the North-South Interconnection Development.

In summary, the scope of this re-evaluation process involves the preparation and publication of this Preliminary Re-evaluation Report; thereafter, EirGrid shall engage in a programme of landowner, public and stakeholder consultation, in order to obtain feedback, primarily on any new issues arising (including modification to the proposal notified herein), or new insights on aspects of the project previously published. The feedback, and EirGrid's response to same, will be documented in a Final Re-evaluation Report; this separate report will conclude with identification of EirGrid's preferred project solution for the new North-South Interconnection Development, which, it is envisaged, will form the basis of an application to be submitted to An Bord Pleanála for development consent.

In more detail, the first element of the re-evaluation process involves the preparation of this Preliminary Re-evaluation Report, which documents the review of the Interconnection Development as previously proposed. Of particular note, EirGrid has reviewed all written and oral submissions presented during the previous application process by Prescribed Bodies, other stakeholders, landowners and the general public, as well as information sought by An Bord Pleanála during the Oral Hearing in respect of that previous application. The conclusions of this Preliminary Re-evaluation Report set out what is considered by EirGrid and its consultants, following this review, to comprise, at this stage, the optimum nature and location of development.

Whilst this constitutes a Preliminary Re-evaluation Report - wherein EirGrid brings forward its **indicative project solution** - it must be recognised that the Interconnection Development Project has somewhat unusual planning circumstances: it has a history of almost four years; a significant number of submissions have been made directly to EirGrid over this time, while almost 1,000 written submissions, and a considerable amount of oral statements were made to An Bord Pleanála in the context of the previous application for approval of the Meath-Tyrone 400 kV Interconnection Development. In short, the context in which the indicative project solution is being brought forward by EirGrid is different to that of other projects. EirGrid is therefore in a position to bring forward an indicative project solution that has the significant benefit of the planning process that has preceded it.

EirGrid is putting the Preliminary Re-evaluation Report, and the indicative project solution, before stakeholders, including the public in order to obtain feedback primarily on any new issues arising, or new insights on aspects of the project previously published. As such, the second element of this overall re-evaluation process includes a programme of non-statutory landowner, public and stakeholder consultation.

In particular, this stage of the re-evaluation process includes initial landowner engagement – based upon the identified indicative line route (and other conclusions of this Preliminary Re-evaluation Report). This is in order to obtain feedback from landowners regarding the conclusions of the Preliminary Re-evaluation Report, as well as to commence more detailed surveys and studies to confirm that the indicative project solution is feasible, taking into account often competing environmental, technical and land-use issues.

EirGrid shall review the Preliminary Re-evaluation Report in reference to the feedback received through the consultation programme, the on-the-ground work, as well as its own ongoing re-evaluation of issues. EirGrid proposes that this subsequent review, and the conclusions thereof, including any modifications to the preliminary project solution, shall be documented in a separate Final Re-evaluation Report. The Final Re-evaluation Report will conclude with identification of EirGrid's emerging **preferred project solution** for the new North South Interconnection Development. For the purposes of this Preliminary Re-evaluation Report (and the overall re-evaluation process in general), the term "preferred" is taken to mean a "best-fit" to meet the parameters of the project.

It is envisaged that EirGrid's preferred project solution will form the basis for further public, stakeholder and landowner engagement, and environmental assessment. This 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.

Notwithstanding the fact that EirGrid can reasonably attach a high degree of confidence in the indicative project solution, it acknowledges that something may arise during the consultation process in respect of the Preliminary Re-evaluation Report which requires EirGrid to significantly modify its preliminary conclusions. In such a scenario, it may be necessary or appropriate for EirGrid to publish for further consultation and feedback, an interim Report, which reflects any such significant modifications (and the resulting amendments to the indicative project solution.

The overall re-evaluation process, and progression towards submitting an application to the Board for development consent, is summarised in Figure 2.

This Preliminary Re-evaluation Report has been jointly carried out by EirGrid, and its consultants (RPS Group, Socoin/Tobin Consulting, ESBI, and AOS Planning). EirGrid has undertaken the re-evaluation of high level issues such as project need, 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 the route corridor of the originally proposed Meath-Tyrone 400 kV Interconnection Development.

In this regard, clearly, the technical basis and considerations for the Interconnection Development, as re-evaluated by EirGrid, inform the planning and environmental issues covered by its consultants in this report. For expediency however, EirGrid issued an early working instruction to its consultants to commence their elements of the re-evaluation process on the basis of two key assumptions: (a) the southern terminus of the interconnector would comprise Woodland Substation, Co Meath; and (b) the northern terminus of the interconnector would comprise the separately proposed new substation at Turleenan, Co. Tyrone. This initial working instruction was fundamentally based upon the considerable work and studies undertaken in respect of the previously proposed Meath-Tyrone 400 kV Interconnection Development, the considerable expertise and experience of EirGrid, and the statutory responsibility of EirGrid, as exclusive developers of the transmission network.

In addition to this, it is reasonable to have regard to the current planning application by NIE in respect of that portion of the overall Interconnection Development occurring within Northern Ireland. In particular, the southern end of that current proposal occurs in the area of the jurisdictional border. That separate proposal therefore offers a further reference for re-evaluation as part of this overall process.

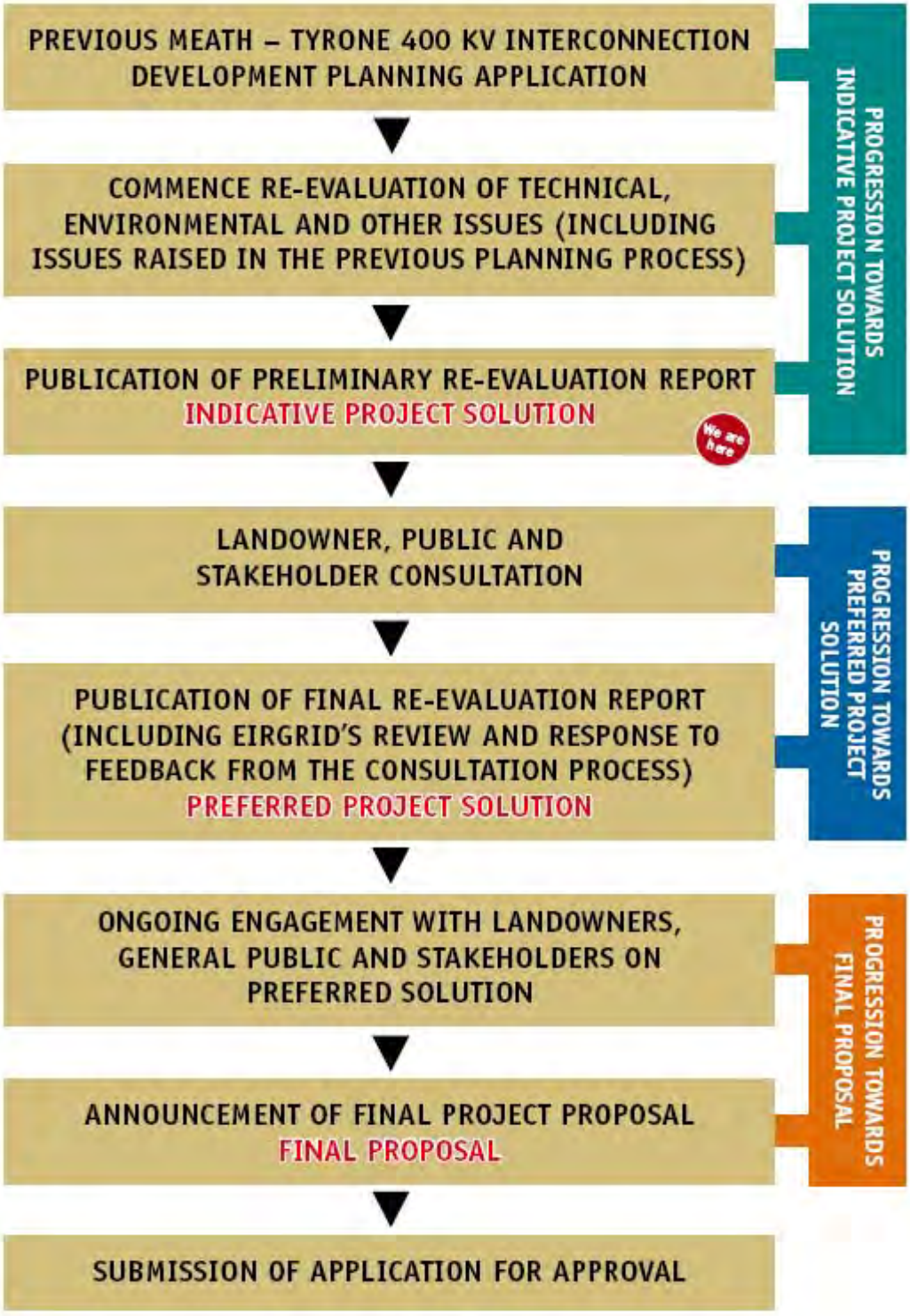


Figure 2: Re-evaluation Process and Progression towards an Application for Approval

1.3 Scope and Methodology of this Preliminary Re-evaluation Report

This Preliminary 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 these reports. This information includes new or updated environmental designations, updates on wintering bird surveys, and new statutory development plans. It also includes additional desktop study, and visits to the identified study area. The **first step** of the Report is to confirm the strategic need, rationale and justification for the Interconnection Development. This includes a review of governing European, National and other policies for strategic electricity interconnection and transmission development. There is also a review of the specific objectives of the Interconnection Development project, and its appropriateness to meet such strategic need.

The **second step** is to confirm the technological nature of the Interconnection Development project. This 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 all 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.

The **third step** 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 – the general area of 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 studies (e.g. wintering bird surveys). These key environmental constraints are documented, mapped and overlaid onto Discovery Series Mapping. These maps are contained in Appendix A and B of this report.

The **fifth step** is to identify 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 route corridor. This occurs by identifying key criteria, and evaluating those criteria which would differentiate between the route corridor options - that is whether a particular route corridor option is “more preferred” or “less preferred” in respect of a particular criterion than another route corridor option.

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 and other criteria.

The **seventh step** identifies the indicative project solution which includes an indicative line route within the identified preferred route corridor. This primarily occurs by taking into account all previous studies completed on the previously preferred line routes, consultation with statutory bodies, engagement with landowners, review of updated aerial photography, and the considerable amount of written and oral submissions which were presented by prescribed bodies, other stakeholders and the general public during the period of the previous application, including the Oral Hearing.

The relevant stages in the scope and methodology for the compilation of this Re-evaluation Report are summarised in Figure 3.

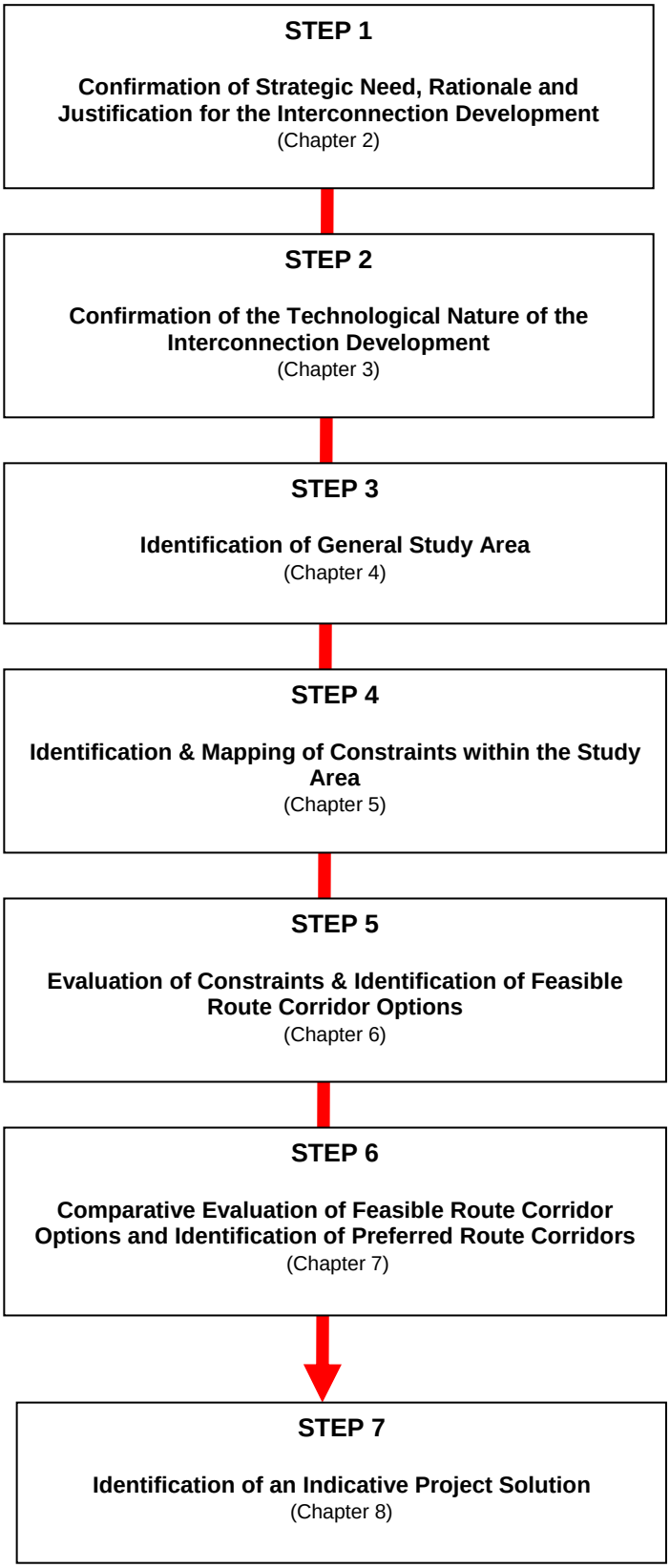


Figure 3: Relevant Stages in the Scope and Methodology of the Preliminary Re-evaluation Report

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

2.1 Strategic Need and Benefits of an Additional Interconnector

It remains National policy that an additional high capacity electricity interconnector be established between the Republic of Ireland and Northern Ireland. This policy objective is specifically referenced in a number of policy documents such as:

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

In addition it is noted in the NIE Environmental Statement at Section 2 that the Interconnector is consistent with the UK Government's 2007 Energy White Paper *Meeting the Energy Challenge* (NIE. Tyrone – Cavan Interconnector Environmental Statement (2009)).

The National policy objective for the establishment of a second north-south electricity interconnector is supported and guided by a number of European Directives such as:

- EU. Single Electricity Market Directive (2003/54/EC). Publically available from http://europa.eu/legislation ;
- EU. Safeguarding Security of Electricity Supply Directive (2005/89/EC).Publically available from http://www.energy.eu/directives ;
- EU. Renewables Directive (2001/77/EC). Publically available from http://eur-lex.europa.eu and
- EU. National Renewable Energy Action Plans Directive (2009/28/EC). Publically available from http://www.energy.eu/directives.

In addition to these Directives, the clearest statement of European Union support for greater cross border electricity interconnection is set out in Decision 1364/2006/EC of the European Parliament and Council dated September 2006 (publically available from http://eur lex.europa.eu).

EirGrid is satisfied that the development of an additional high-capacity electricity interconnector between the electricity networks of the Republic and Northern Ireland is required in order to comply with current National energy policy and governing European Directives.

In this governing strategic policy context, EirGrid has identified that such an additional north-south interconnector provides multiple technical and other benefits. These include:

- Improving competition by reducing the constraints that are restricting the efficient performance of the all-island Single Electricity Market;
- Improving security of supply by providing a reliable high capacity link between the two parts of the all-island transmission system; and
- Supporting the development of renewable power generation by enhancing the flexible exchange of power flows over a large area of the island.

Therefore there remains a clear and immediate strategic need for a second north-south interconnector.

2.2 Need for Reinforcement of the North-East Area

In the Strategic Issues Review document of November 2008 (RPS Planning & Environment for EirGrid Plc. (November 2008) publically available from http://www.eirgrid.com), 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 the Republic of Ireland. It was noted that the peak electrical load on the existing 220 kV circuits that connected 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 planning standards a need for the reinforcement of the transmission network in the north-east area was clearly established.

As part of this preliminary re-evaluation, EirGrid has re-examined the case for reinforcement of the north-east based on the best and latest information available relating to the wide range of factors that could influence the decision. This focused in particular on changes in:

- Demand growth projections;
- Network topology;
- Generation portfolios;
- Market conditions;
- Network flows based on generation patterns throughout the system; and
- The TSO's licence condition that requires planning on an all-island basis.

It is concluded that there remains a need to reinforce the north-east area and that this is required sometime between 2015 and 2020.

A secondary benefit of a new high capacity north-south interconnector is that it will reinforce the north-east. The timeline for the delivery of the new Interconnector anticipates that it will be delivered in late 2015, at the earliest. It is further concluded therefore that the need to progress with this project to reinforce the north-east area is immediate, i.e., there remains a need to reinforce the north-east area and that this is required sometime between 2015 and 2020.

2.3 Implications of the Continuing 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 questioned in light of the decline in electricity consumption as a result of the economic downturn. The current 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 EirGrid, in July 2009, issued an update to its Generation Adequacy Report 2009 – 2015 (publically available on www.eirgrid.com). 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.

The previous application for approval was submitted in December 2009. The revision 'downwards' in the five year growth projections for electricity consumption was known and was considered during the preparation of that application.

The strategic need for an additional high capacity north-south interconnector is outlined in Section 2.1 above. The 'need' for the project is driven by EU and National policies that call for greater competition in the energy market, greater penetration of renewable power generation and improved security of supply rather than growth in electricity consumption. The continuing economic recession therefore does not change the 'need' for the interconnector, or make a case for delaying its development.

The need for reinforcement of the north-east area is however impacted by the fall in electricity consumption in that area. The result is that the security of supply to the north-east area is not now as precarious as had been predicted prior to the commencement of the recession in 2008. The latest growth projections for electricity consumption can be found in The All-Island Generation Capacity Statement 2011 - 2020, a joint report prepared by EirGrid and SONI[2] (publically available on www.eirgrid.com). The report is forecasting that electricity demand in the Republic of Ireland will only return to 2007 levels sometime around 2013. These latest demand growth projections were applied in

[2] SONI is the System Operator Northern Ireland

the re-evaluation of the need for the reinforcement of the north-east area, outlined in Section 2.2 above. They contributed to the conclusion that there remains a need to reinforce the north-east area and that this is required sometime between 2015 and 2020.

2.4 Consideration of Suggestions for Delay of the new 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.

2.4.1 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 (that section of the OHL in County Meath), thus avoiding the construction of the 80 km Kingscourt to Turleenan 400 kV OHL (that section of the OHL 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 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 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'.

The consequence of 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 (TSO) north and south of the border have agreed that such a risk is intolerable. As a result, the maximum power transfer across the interconnector is 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[3] parts of the two existing transmission networks is the only option that will achieve the strategic benefits identified in Section 2.1.

2.4.2 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.

In this scenario the substation near Kingscourt would act as the southern terminus of the new North-South Interconnector. It would connect the new interconnector to the existing Flagford-Louth 220 kV OHL. That part of the existing network however would not meet the requirement of being a sufficiently 'robust' part of the transmission network on the southern side of the border and will not therefore achieve the strategic benefits identified in Section 2.1.

The section of the Interconnector circuit in County Meath is essential to the proper functioning of the overall planned additional North-South Interconnection Development. Up-rating the two existing 220 kV single circuit OHLs connecting between Louth Substation and the Greater Dublin Area will not alter this fact. The proposal is therefore eliminated from further consideration.

2.5 Conclusions

Based on all of the above, EirGrid concludes that -

- There remains a clear and immediate strategic need for a second north-south interconnector;
- There remains an immediate need to reinforce the transmission network in the north-east area of the Republic of Ireland;
- 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; and
- Such a high capacity north-south interconnector will have the secondary benefit of providing the required reinforcement of the north-east area.

[3] 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.

3 TECHNOLOGY OPTIONS

3.1 Project Objectives/Design Criteria

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

a) Comply with all relevant safety standards;

b) Comply with all system reliability and security standards;

c) Be the least cost, technically and 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 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[4].

All of the these Objectives flow from EirGrid's statutory and licence obligation, under its licence as Transmission System Operator (TSO), and as set out in Statutory Instrument Number 445 of 2000 (publically available from http://www.irishstatutebook.ie). They guide the consideration and assessment of the technology options for the required North-South Interconnection Development.

3.2 HVDC as an Alternative to HVAC

The existing electricity transmission system in Ireland is, as in every other country in the world, a high voltage alternating current (HVAC) system. There exists, however, another type of electricity transmission technology known as high voltage direct current (HVDC).

EirGrid considered HVDC technology as an alternative to the HVAC proposal, which was the subject of its application for approval in 2009, and this consideration is described in Chapter 4 of the associated EIS (EirGrid Plc, Meath-Tyrone 400 kV Interconnector Development - Environmental

[4] 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.

Impact Statement, (2009) publically available from www.eirgrid.com). In that 2009 EIS, EirGrid concluded that HVDC is not an acceptable alternative to the proposed HVAC 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 is consistent with the findings of the Government sponsored Ecofys Report (Ecofys. Study on the Comparative Merits of Overhead Electricity Transmission Lines versus Underground Cables (2008) publically available from http://www.dcenr.gov.ie) 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). Publically available from www.eirgrid.com; and
- Transgrid Solutions Inc. Investigating the Impact of HVDC Schemes in the Irish Transmission Network (2009). Publically available from www.eirgrid.com.

No information was received via the written and oral submissions presented during the previous application process, nor has any new information subsequently come to EirGrid's attention, that would alter its opinion on HVDC technology as being inappropriate for this particular development.

3.3 Preliminary Re-evaluation of Routing the New North-South Interconnector under the Sea rather than Over Land

The existing transmission system is located on land. It is a requirement of this development that the new interconnector 'connect between appropriately robust points on the transmission networks north and south of the border' and that it be physically remote from the existing north-south interconnector. To connect from the coast to an appropriate point on the existing transmission system would require long lengths of overland transmission circuit, with a cumulative length in excess of 40 km. This means that an entirely undersea option is impossible, while the long length of circuit required on land renders the undersea option impractical. In addition a long undersea cable would have a much poorer level of availability for service than that of an equivalent cable routed overland.

The part overland and part undersea option is therefore eliminated from further consideration on the basis that:

- 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.

3.4 Update on the Current 'State-of-the-Art' for HVAC XLPE Underground Cable and Extent of its Use by Utilities in Europe

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 HVAC 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. 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[5] (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 the eleven European 'projects of significance' amounts to about 196 km, with a cumulative single phase cable length of some 640 km. (NOTE: a minimum of three single phase cables is required per circuit).

NOTE: If the proposed North-South Interconnection Development was to be implemented 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 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, Cigre[6], T&D World[7]) 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 Interconnection 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[8]). The reason for this overwhelming preference among UCTE members for OHL can be clearly understood in a letter, dated

[5] 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.
[6] Cigre is an acronym for The International Council on Large Electric Systems
[7] Transmission and Distribution World magazine, www.tdworld.com
[8] 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

14 January 2008, from the Secretary General of the UCTE to APG (the Austrian Power Grid Company). The letter (available from http://www.eirgrid.com/aboutus/publications/) 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. The Ten Year Network Development Plan 2010-2020 issued by ENTSO-E[9] (publically available from www.entsoe.eu) indicates that in the period covered by the Plan a further 23,200 km of new 400 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 as follows:

> "*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 and neither EirGrid nor NIE could make a justification for such a proposal to their respective Energy Regulators.

3.5 Update on the Latest Reliability Statistics for HVAC UGC and OHL

In April 2009 Cigre published the results of the most comprehensive study of UGC reliability carried out to date (Cigré. Update of Service Experience of HV Underground and Cable Systems, ISBN 978 -

[9] ENTSO-E is an acronym for the European Network of Transmission System Operators for Electricity. It has 42 members drawn from 34 countries.

2-85873-066-7 (2009), publically available from Cigré (http://www.cigre.org) on request). 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 Cigre 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.

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 their almost 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 2200 km) of 400 kV, 275 kV and 220 kV OHLs under EirGrid's control. Taking the fault statistics of this 2200 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.

The findings of the Cigre 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 that 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.

3.6 Update on the World's Longest HVAC XLPE Cable Circuits

The longest HVAC 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 HVAC cable in the world is likely to be broken when the proposed 125 km interconnector between the islands of Sicily and Malta is commissioned in 2013. The Malta-Sicily

interconnector[10] 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 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. 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 1,500 MW and by implication therefore it must also have a voltage rating that is much higher than that of these very 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' HVAC XLPE cable operating in the world today is a 40 km double circuit cable in Tokyo, Japan. These 500 kV, 900 MW cables were commissioned in 2000. The longest HVAC XLPE cable in Europe is the Elstree - St John's Wood 400 kV 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. It is there however that the similarities end.

- 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;
- The North-South Interconnector would 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 record for the longest 'on-land' HVAC XLPE cable in the world is expected to be broken in the near future, as an 87 km cable is currently being installed in the State of Victoria, Australia. It is being installed to provide a power supply to a new desalination plant which is required to enhance the water supply to the city of Melbourne and its surrounds. During public consultation for the 2009 application, it was stated by third parties that the installation of this long HVAC UGC in Australia was evidence that 'long' UGCs are feasible. It is important therefore to consider how such a long HVAC cable could be justified by the developer.

[10] www.nexans.com/eservice/Corporate-en/navigatepub_0_-28532/Nexans_wins_contract_for_the_Malta_to_Sicily_power.html

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 will operate at 220 kV and will have a power carrying capacity of 145 MW. Due to the high charging current resulting from the capacitance of this length of 220kV cable, it will be necessary to construct two intermediate substations along the route to enable the connection of reactive compensation equipment. One of these substations will also provide a power supply for a water pumping station. The UGC circuit will consist of three cables, laid in pipe ducts in trefoil formation, in a trench 1.4 m deep by 0.5m wide. It will be co-located for 79 km of its 87 km length in the same easement as the water transfer pipeline that will connect the desalination plant to the existing water pipeline grid.

From the local electricity supply company's perspective, the 220 kV cable will be a service connection supplying a single electricity customer. It will 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 TSOs 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 less than 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 have a power carrying capacity in the region of 1,500 MVA and connect between appropriately robust points on the transmission networks north and south of the border. To try to achieve this using UGC 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.

3.7 Update on the Cost Comparison of Underground Cable and Overhead Line

3.7.1 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 and PB Power reports. The studies all found that the capital cost of UGC ranged from three to eight times that of an equivalent OHL. 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, that is three times the cost of OHL, this would still amount to more than €150 million being added to the cost of the project. This level of cost increase, on its own, and regardless of the additional technical problems of UGC, and in the absence of any overriding environmental constraint to OHL, effectively discounts using UGC for any significant length in this development.

3.7.2 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 stated 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.

This assertion is incorrect as it is based on a misunderstanding of how transmission networks operate. 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% of their power carrying capacity. It is therefore the case that 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 APG (the Austrian Power Grid Company) 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.

3.8 Consideration of a Hybrid Overhead Line / 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*".

The outcome of the consideration was that EirGrid identified 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 and was included in the proposal that formed the 2009 application for approval. Both EirGrid and NIE remain satisfied that there are no other sections of that proposed development where the undergrounding of a section of the interconnector circuit could be justified.

When considering the hybrid OHL/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) publically available from http://ec.europa.eu/energy). 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.

3.8.1 Environmental Issues

The size of the UGC 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 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 activity and disruption to the wider community 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 sail right 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;
- No buildings are permitted within a UGC reserve. 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.

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

3.8.2 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, forms 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 say Great Britain or the Netherlands. The TSOs and the Transmission Asset Owners (TAOs) in Ireland are also much smaller and less resourced than their counterparts in Great Britain and the Netherlands and must therefore carry correspondingly smaller risk. Based on this it is EirGrid's opinion that the maximum length of 400 kV UGC that can be installed as part of the North-South Interconnector circuit must be considerably less than 20 km, installed in one continuous length or in an accumulation of shorter lengths.

3.8.3 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 circuit carried out to date. The Report found that a km of 400 kV UGC would cost on average €3.6 million more than the equivalent OHL.

Transition stations would add an additional approximately €5 million per installation.

UGC is capacitive in nature. Capacitance produces a form of 'reactive power'. A 400 kV UGC typically 'produces' 10 MVArs[11] (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 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.

3.8.4 Conclusion on hybrid UGC/OHL option for the new 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 profound environmental or technical constraint to the preferred OHL.

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

3.9 Conclusions

In conclusion:

- HVDC technology and HVAC undersea cable do not comply with the project objectives/design criteria for the proposed North-South Interconnector;

- There have not been any developments in 2010 in either UGC technology, or power system control and protection systems, which would alter EirGrid's opinion that the use of long HVAC cables on the Irish transmission system is not feasible within the constraints with which EirGrid must comply;

- No new information has come to EirGrid's attention in 2010 which would alter its opinion that a 400 kV OHL is the best technical solution for this development, and that it would be significantly less costly than the 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 environmentally 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 it is clear that in order to comply with this requirement, EirGrid must propose for the new North-South Interconnector Project a development that is substantially comprised of 400 kV OHL; and

- EirGrid's instructions to its consultants for the North-South Interconnector Project is to firstly seek a viable and environmentally acceptable 400 kV OHL solution; the use of short lengths of 400 kV UGC will only be considered in the event that an appropriate and acceptable entirely OHL solution cannot be found.

4 IDENTIFICATION OF PROJECT STUDY AREA

4.1 Project Connectivity: Re-evaluation of the Points of Connection of the New North-South Interconnector to the Existing Transmission System

The proposed development that was the subject of the previous application for approval was originally conceived, in the period prior to 2005, as two separate projects to meet two identified needs. These were:

- To provide a secure electricity supply to the north-east area; and
- To increase north-south interconnection capacity.

The two separate projects were generally known as the Meath-Cavan Project and the Cavan-Tyrone Project. The Meath-Cavan circuit was identified as the solution to the stated reinforcement requirement of the north-east area. It was to connect into the existing transmission system at the existing Woodland Substation, and at a planned new substation at the point of intersection of this new circuit with the existing Flagford-Louth 220 kV OHL.

The Cavan-Tyrone circuit was identified as a way of providing additional cross-border power transfers. North of the border this circuit was to connect to the existing Tandragee-Magherafelt/Tamnamore 275 kV double circuit overhead line (OHL) at a new substation in County Tyrone. South of the border, it was to connect into the existing transmission system at a new substation along the existing Flagford-Louth 220 kV OHL. However, it was recognised at an early stage from the system load flow studies that the installation of the Cavan-Tyrone circuit, on its own, would not achieve the required increase in the cross-border power transfer capacity, and that some reinforcement of the transmission system in the north-east area would also be required. In other words it is the case that a substation connecting to the existing Flagford-Louth 220 kV OHL would not, by itself, be a sufficiently robust part of the transmission network to act as the southern terminus of a new high capacity north-south interconnector.

As these two projects progressed it became apparent that there was an obvious synergy between them, and that they should connect to the existing Flagford-Louth 220 kV OHL at a common point - a shared substation. As such, the two projects became parts of a single scheme that addressed the two identified needs. This single scheme, comprised a 400 kV OHL from the existing Woodland Substation to the planned new Turleenan Substation, with an intermediate substation located close to the point of intersection with the existing Flagford-Louth 220 kV OHL. The scheme had therefore three points of connection to the existing all-island transmission network and it is this that was the subject of the 2009 application for approval.

In the course of the current re-evaluation process, EirGrid has reviewed the effectiveness of the previously proposed development in meeting the identified requirements of the project (as described above). Based on this re-evaluation, EirGrid has now reached the following key conclusions regarding the most appropriate points of connection of a new north-south interconnector to the existing transmission network (shown below in **bold** font).

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 Interconnector to connect between appropriately robust points on the transmission networks north and south of the border, as well as the strategic benefit of establishing a high capacity link between the existing 400 kV network in the Republic with the existing 275 kV double circuit network in Northern Ireland. Woodland Substation is already one of the strongest nodes on the meshed all-island transmission network, and is the most northerly located 400 kV substation. Woodland Substation is therefore clearly the most appropriate location for the southern terminus of this North-South 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 be located close to the point of intersection of the Interconnector circuit and the existing 275 kV double circuit OHL between Tandragee and Tamnamore Substations, and will connect the interconnector circuit to the existing Tandragee-Magherafelt circuit. NIE has identified Turleenan as a suitable site for this substation. The above decisions also derive from the need for the Interconnection Development to connect between appropriately robust points on the transmission networks north and south of the border, as well as the strategic benefit of establishing a high capacity link between the existing 400 kV network in the Republic with the existing 275 kV double circuit network in Northern Ireland. Locating the northern terminus at Turleenan will ensure that the new interconnector circuit has sufficient geographic separation from the existing interconnector - this separation is required for reasons of system security.

Such a high capacity circuit, connecting between Woodland Substation in County Meath and a new substation at Turleenan in County Tyrone 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 will also, on its own, provide an immediate reinforcement of the transmission network in the north-east area. 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 Interconnector will provide an alternative high capacity route, from Woodland to Turleenan to Tandragee and down through 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.

Based on the most recent load forecast this 'relief' will provide sufficient reinforcement of the network in the north-east to cater for the projected load growth in that area for at least the next decade. Thereafter 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 400kV 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 exceeds current projections;
- All, or part of, the proposed Interconnection Development located north of the existing Flagford-Louth 220 kV OHL is delayed while that part to the south of the OHL proceeds as planned; and
- All, or part of, the proposed Interconnection Development located south of the existing Flagford-Louth 220 kV OHL is delayed while that part to the north of the OHL proceeds as planned.

The 2009 application for approval proposed that an intermediate substation (referred to in that application as Moyhill Substation) be constructed which would connect the interconnector circuit to the existing Flagford-Louth 220 kV OHL. **Having regard to the matters outlined above EirGrid is now of the view that this intermediate substation is not now expected to be required within the next ten years (notwithstanding the previously outlined caveat). Consequently it would not be appropriate in the context of proper planning and sustainable development to include it in the new application for approval for the proposed North-South Interconnection Development.**

It is however reasonable, from a strategic planning perspective, to give some consideration now to where such a substation should be generally located, in anticipation that it will be required at some future point in time. A suitable location from an environmental impact perspective is to locate the substation somewhere in the vicinity of the point of intersection of the future Turleenan-Woodland 400kV OHL and the existing Flagford-Louth 220 kV OHL as this will minimise the additional lengths of 400 kV and/or 220 kV circuits that have to be constructed in the future in order to connect in the new substation.

It is concluded therefore that an appropriate location for an intermediate substation on the proposed Turleenan-Woodland 400 kV circuit (that is required to enhance the electricity supply to the north-east area) would be in the vicinity of the point of intersection of the future Turleenan-Woodland 400kV OHL and the existing Flagford-Louth 220 kV OHL.

The conclusions regarding project connectivity form the basis for the identification of a study area within which to route the planned North-South Interconnection Development.

4.2 Background to the Identification of the Defined Study Area

As part of its re-evaluation of the Interconnector project, EirGrid has reviewed the Strategic Issues Review document of November 2008 (RPS Planning & Environment for EirGrid Plc. Strategic Issues Review (November 2008) publically available from http://www.eirgrid.com), and the EIS of December 2009, which accompanied the withdrawn application for approval of the Meath-Tyrone 400 kV Interconnection Development (Meath-Tyrone 400 kV Interconnection Development Environmental Impact Statement (2009) publically available from http://www.eirgrid.com.). There has also been a review of the suite of 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 Interconnection Development Study Area has occurred in the context of the parameters outlined at Section 4.1 above.

It is normal practice in routing linear transmission infrastructure to seek the shortest environmentally and technically acceptable route between identified connection points. Two connection points to the existing transmission network have been identified from an electricity transmission planning perspective for this Development. These are the existing substation at Woodland in County Meath and a new substation at Turleenan in County Tyrone. In addition a probable future third connection point will be a new transformer substation in the vicinity of the point of intersection of the existing Flagford-Louth 220 kV OHL and the proposed Interconnector circuit that will connect these two circuits together.

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. This is set out in ESBNG: Kingscourt – Woodland 400 kV Feasibility Study (2005) publically available from www.eirgrid.com. This Report defined 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 because of the high concentration of existing high voltage transmission lines. This Report concluded that a number of potential route corridors to the west of Navan may be available, but 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 east of Navan including social and environmental constraints. Further analysis should be carried out from east of Navan to the Coast to support the 2002 study*".

As a result, EirGrid's consultants re-considered an expanded eastern study area using the Irish Sea coast as the boundary. The Consultants Report in this matter, endorsed the selection of the western study area within which to route the southern portion of the planned interconnection development, to exclude the eastern coastal area (to the east of Navan) on account of significant constraints of proximity to the Brú na Bóinne Complex (an Annex 1 World Heritage Site) and the presence of a number of 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) publically available from www.eirgrid.com.

The current re-evaluation process has facilitated a review of the process for identifying the overall defined 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 are satisfied that no new environmental consideration or other relevant material has arisen in respect of the original evaluation process which identified the overall study area within which to route the planned Interconnection Development project. The only significant technical issue which has arisen is the decision not to proceed at this juncture with the intermediate substation in the vicinity of the point of intersection with the existing Flagford-Louth 220 kV OHL.

Based on all of the above, EirGrid has concluded the following in respect of the Study Area within which to route the proposed Interconnection Development:

- The route of the Interconnection Development shall be the shortest route that is technically and environmentally appropriate;

- The existing 400 kV Woodland Substation in County Meath shall be the southern terminus for the Interconnector; and

- The Interconnector circuit shall exit Woodland Substation and shall proceed generally in a northerly direction.

  NOTE: 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. These structures 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 this Development 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 the Interconnector circuit will inevitably intersect with the existing east-west orientated Flagford-Louth 220 kV OHL. The routing of the new circuit will be such as to ensure that it has sufficient geographic separation from the existing Interconnector for reasons of system security, while at the same time minimising the length of the new interconnector circuit. This is considered reasonable, and in accordance with best practice for routeing strategic electricity transmission development; and

- From the point of intersection with the existing Flagford-Louth 220 kV OHL the interconnector circuit will proceed in a generally northerly direction, until it intersects with the existing 275 kV double circuit OHL between Tandragee and Tamnamore Substations in Northern Ireland. A new substation shall be constructed at this point of intersection, which shall be located at Turleenan in County Tyrone, and this shall form the northern terminus of the second North-South Interconnection Development. This location (identified by NIE) will ensure that the new Interconnector has sufficient geographic separation from the existing Interconnector for reasons of system security, while at the same time minimising the length of the new Interconnector circuit. This is considered reasonable, and in accordance with best practice for routeing strategic electricity transmission development.

For the purposes of this re-evaluation, and the subsequent envisaged application for planning approval and environmental assessment, and to prevent confusion during necessary comparison with the previous application for approval of the Meath-Tyrone 400 kV Interconnection Development, 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). 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 occurs in the vicinity of the existing Flagford – Louth 220 kV OHL line.

4.3 DESCRIPTION OF THE STUDY AREA

4.3.1 The Cavan – Monaghan Study Area (CMSA)

This area is primarily situated along a north-south axis between the area of the proposed border crossing point in the townland of Lemgare, County Monaghan to the north, to the area of the Flagford-Louth 220 kV OHL to the south. In addition, regard was given to the wider area north of the border that comprised a part of the area studied by NIE in respect of its portion of the overall development. The study area is approximately 30 km by 40 km in length. The largest settlements within the study area include Kingscourt, Carrickmacross, Castleblaney and Bailieborough.

The topography comprises a highly varied landscape of hedge-enclosed fields draped over drumlins and scattered lakes throughout. It is an occupied, man-altered landscape that contains many small and medium sized farm holdings and associated roads, agricultural buildings, telephone wires, powerlines, and other structures, such as communication masts, wind turbines etc.

The Cavan – Monaghan Study Area (CMSA) is illustrated in Figure 4.

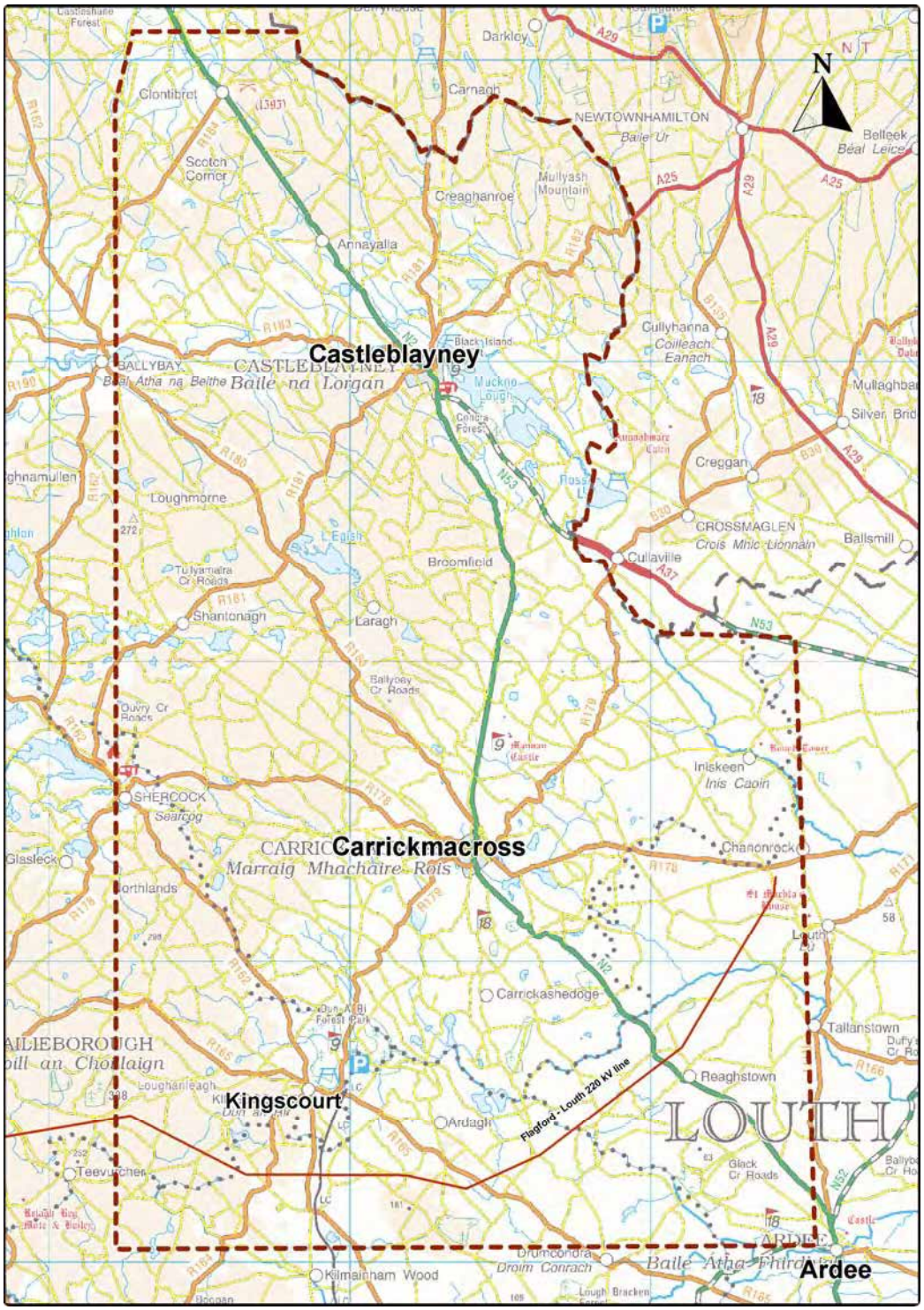


Figure 4: The Cavan-Monaghan Study Area (CMSA)

4.3.2 The Meath Study Area (MSA)

This part of the study area 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 in the north, at a location near Kingscourt, County Cavan. The area is bound 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 study area include Athboy, Dunshauglin, Kells, Navan, Nobber, Moynalty and Trim as well as other smaller clustered nodes. Rural housing is scattered throughout the study area, 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 Meath Study Area (MSA) is illustrated in Figure 5.

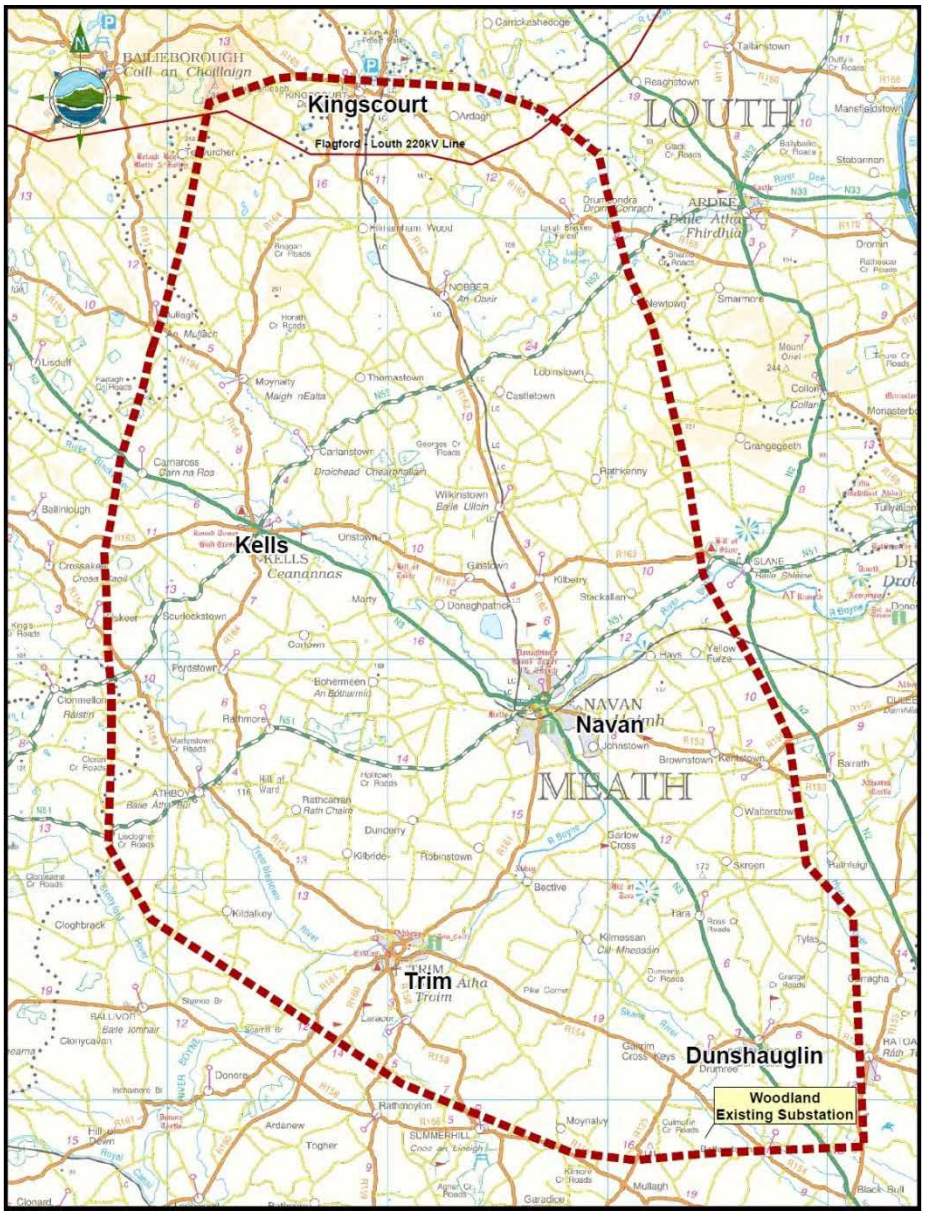


Figure 5: The Meath Study Area (MSA)

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 and extent of key environmental and other constraints within the defined study area.

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 this project, key 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 the Consultants are satisfied that the previously identified study area remains the most appropriate for the purposes of routing the planned Interconnector 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 for clarity 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 for clarity referred to as the Meath Study Area (MSA). These Constraints Reports were prepared to identify key environmental issues within the overall study area, in which any potential corridor options may have an environmental impact. 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:

- ESBI and AOS Planning. Route Constraints Report (September 2007). Publically available at www.eirgrid.com;
- ESBI and AOS Planning. Route Constraints Report (September 2007) Addendum Report (May 2008). Publically available at www.eirgrid.com;
- Socoin and TOBIN Consulting Engineers. Kingscourt to Woodland Constraints Report Volume 1 (July 2007). Publically available at www.eirgrid.com; and
- Socoin and TOBIN Consulting Engineers. Kingscourt to Woodland Constraints Report Volume 1 (July 2007) Addendum Report (May 2008). Publically available at www.eirgrid.com.

The 2007 Constraints Reports were based upon initial high-level 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 Preliminary Re-evaluation Parameters and Considerations

The current re-evaluation process has facilitated a 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 subsequent to the previous decision making and evaluation process, which ultimately resulted in the identification of potentially feasible route corridors. This has included *inter alia* taking into consideration:

- New environmental designations e.g., proposed Natural Heritage Area's (pNHA's) for geological criteria and sites proposed for County Geological Sites (CGS);

- Updated wintering birds survey results (Wintering Survey Periods (2007 – 2011));

- 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);

- Candidate World Heritage Sites announced in April 2010;

- Updated information on new residential and other developments; and

- Information obtained from written and oral submissions made to An Bord Pleanála by Prescribed Bodies, landowners and the general public during the previous applications process in respect of the Meath-Tyrone 400 kV Interconnection Development

In this regard, it should be noted that the original Route Constraints Reports were intended to constitute higher level 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 routing solution, which would then be subject to more detailed environmental and other scrutiny.

As part of the current re-evaluation process, the consultants have 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 where updated and available.

The consultants are also availing of the opportunity of this re-evaluation process to streamline and simplify the presentation, mapping and evaluation of constraints. This includes:

- The nominal interface between the CMSA and MSA occurs in the area to the south of the Flagford–Louth 220 kV OHL;

- The constraints headings and their respective qualification and quantification have been streamlined between the different consultants of the CMSA and MSA, having regard to established methodologies; and

- The base mapping and presentation of constraints have been streamlined between the different consultants of the CMSA and MSA.

It is important to note that, while the actual presentation of material may have altered in this report, the findings are consistent with that contained in the original Route Constraints Reports. Overall, whilst there are some minor variations between the current and previous findings as a result of this re-evaluation process, EirGrid and its consultants are satisfied that 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

This preliminary re-evaluation process has enabled EirGrid and its consultants to review the presentation of constraints material. In this regard, they have had regard to the approach to constraints analysis adopted by the National Roads Authority (NRA) in its 2010 Project Management Guidelines, publically available at www.nra.ie. Accordingly, for the purpose of this Preliminary Re-evaluation Report, the key environmental constraints are summarised under the following headings:

- **Natural Constraints (naturally occurring landscapes and features)**
    - Ecology
    - Landscape
    - Geology
    - Water

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

  - Settlements
  - Cultural Heritage
  - Infrastructure / Utilities

The constraints are briefly summarised below and are detailed in accompanying Maps contained in Appendix A and B. It should be noted that Map 1 (CMSA), contained in Appendix A and Map 1 (MSA), contained in Appendix B, highlight all environmental and other constraints that are detailed in this chapter on one composite map. Each individual constraint 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.

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 both the CMSA and MSA, there are no new designated sites since the publication of the previous Constraints Reports[12]. Information in relation to Whooper Swans in both areas has been updated to include wintering bird surveys which have been completed over the last four Wintering Periods (2007 - 2011).

Cavan-Monaghan Study Area (CMSA):

- ***Designated Sites / Proposed Designated Sites*** - In summary, there are no designated sites in the study area located in the Republic of Ireland. There is one designated area located within 5 km of the study area, in Northern Ireland, which is an Area of Special Scientific Interest (ASSI), namely Drumcarn Fen.

[12] For further information on designates 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)

- The recent Monaghan Fen Survey (2008) has highlighted Corlea and Cashal Bog as being suitable for designation as National Heritage Areas (NHAs), though they remain undesignated. There are seventeen proposed Natural Heritage Area's (pNHA's), located within the study area and a further four pNHA's within 5 km of the study area. These habitats largely comprise lakes and associated wetland fringe habitats. Table 1 provides a list of these sites and they are mapped on Map 1 (CMSA) included in Appendix A.

Within the CMSA Study Area	Within 5 km of the CMSA Study Area
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	
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 1: Designated Sites (CMSA)

- ***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. Significant 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 four Wintering Survey Periods (2007 – 2011) within the study area. From these surveys 50 sites have been identified as being used by Whooper Swan specifically within the study area (refer to Table 2 which lists these sites and provides an indication of their importance/status). Whooper Swans are widely dispersed within this study area; however the considered 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 A. These sites include predominantly lake land areas and adjoining fields although some sites consist of fields only. Whooper Swan family groups are relatively sedentary during the winter though movements occur between

sites. A number of more obvious clusters (of sites) can be determined where irregular inter site movement occurs, and these clusters are highlighted.

Other wildfowl/waders (e.g. Mute Swan, Wigeon, Tufted Duck, Golden Plover, Teal, Goldeneye, Little Grebe and Lapwing) are also considered in the importance assessment (see Table 2). Note: other lake/ pond sites (not detailed in Table 2) in the study area not utilised by Whooper Swan are considered locally important sites.

Whooper Swan Site	Importance/ Status [13]
Annaghierin Lough	Locally Important site (WS)
Bawn Lakes	Locally Important Site (WS)
Comertagh Lough	County Important site (WS)
Raferagh (Pond)	County Important site (WS)
Creeve Lake	County Important site (WS and wildfowl)
Creevy Lough	County Important site (WS)
Derrynaloobinagh	County Important site (WS)
Drumillard Lough	Locally Important site (WS and wildfowl)
Laragh Lough	County Important site (WS)
East Laragh Lough 2	Locally Important site (WS)
Lisnakillewbane Lough	County Important site (WS)
Lough Egish	Locally Important site (WS and wildfowl/ waders)
Lough Morne	Locally Important site (wildfowl)
Lough Major	Locally Important site (Wildfowl)
Lough Nagarnaman	County Important site (WS and wildfowl)
Lough Namachree	County Important site (WS)
Shantonagh Lough	County Important site (WS and wildfowl)
Lough Ross	Locally Important site (WS and wildfowl)
Lough Sillan	Locally Important site (WS)
Lough Smiley (Lake to north of here)	Locally Important site (WS)
Tonyscallan Lough	County Important (WS)
Ballintra	County Important (WS)
Drumlougher Lough	Locally Important site (WS)
Barnagrow Lough	Locally Important site (WS)
Teergeely (grassland)	Locally Important site (WS)
Tievaleny Lough	County Important site (WS)
Muckno Mill Lough (River)	Locally Important site (WS and Wildfowl)
Mill Lough	Locally Important site (WS)
Lurgacham (fields)	Locally Important site (WS)
Lough Alina	County Important site (WS)
Kiltybane Lough	Locally Important site (WS)
Fane River	Locally Important site (WS)
Derrygoony Lough	County Important site (WS)
Corliss Lough	Locally Important site (WS)
Cordoo Lough	Locally Important site (WS)
Muckno Lough	Locally Important site (WS)

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

Whooper Swan Site	Importance/ Status [13]
Bellatrain Lough	County Important site (WS)
Drumlougher Lough	Locally Important site (WS)
Toome or Crinkill Lough	County Important roost site (WS)
Milltown Lough	Locally Important site (WS)
Muckno Mill Lough (Milltown)	County Important site (WS)
Lough Patrick	County Important site (WS)
Tullyvaragh Upper	County Important site (WS, Wildfowl and Waders)
Lough Nahinch	Locally Important site (WS)
Tasson Lough	Locally Important site (WS)
Lackagh (fields)	Locally Important site (WS)
Druminnick Lough	County Important site (WS)
Crossduff Lough	Locally Important site (WS)
Lismagurshin or Cremartin Lough	Locally Important site (WS)
Loughs Rahans, Ballyhoe	County Important site (WS)

Table 2: Wintering Bird Sites (CMSA)
Note: WS = Whooper Swan

Various clusters of sites utilised by Whooper Swans are detailed below, including an assessment of their importance (based on NRA. Guidelines for Ecological Assessment of Road Schemes (2009) publically available at www.nra.ie):

- *Lough Tonyscallon, Ballintra and Toome/Crinkill.* These areas are regularly utilised by a number of Whooper Swan family groups and overall are considered to be of county importance. They are at the eastern end of a linear cluster of wetlands extending east of Ballybay which in summation are probably Nationally significant;

- *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 Swan and potentially Whooper Swan may fly to Lough Morne though none have been recorded to date. Loughs Egish and Morne are important for Mute Swan and small numbers of wader (Lapwing and Golden Plover) and Great Crested Grebe. These lakes are overall considered to be of county importance;

- *Comertagh Lough and smaller lakes within 1.5 km.* These areas are regularly utilised by significant numbers of Whooper Swan and are considered to be of County importance; and

- *Lough Patrick and Alina (lakes within 2 km to east)*. These lakes in Northern Ireland are regularly utilised by significant numbers of Whooper Swan 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 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. Lakes are important local habitats for breeding waterfowl in particular Great Crested Grebe and Mute Swan.

- ***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.

Meath Study Area (MSA):

- ***Designated Sites* / Proposed *Designated Sites* -** There are three 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 and two NHA's namely Girley Bog NHA and Jamestown Bog NHA. There is one designated area within 5 km of the study area namely Killyconny Bog cSAC which is also a pNHA.

  Both within the study area itself, and within a 5 km radius of the study area there are fourteen pNHA's.

Within the MSA Study Area	Within 5 km of the MSA Study Area
River Boyne and River Blackwater cSAC;	Killyconny Bog pNHA (this site is also designated as a cSAC)
Girley Bog NHA	Thomastown Bog pNHA
Jamestown Bog NHA	Rossnaree Riverbank pNHA
Trim Wetland pNHA	Slane Riverbank pNHA
Boyne Woods pNHA	Crewbane Marsh pNHA
Breakey Lough pNHA	Mentrim Lough pNHA
Balrath Woods pNHA	Rathmoylan Esker pNHA
Ballyhoe Lough pNHA	Lough Shesk pNHA
Corstown Lough pNHA	

Table 3: Designated and Proposed Designated Sites within the Study Area and 5 km of the Study Area (MSA)

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

- ***Wetlands* –** Wetlands are relatively insignificant in the study area outside designated bog sites described. A number of potential sites are described further in this section of the Report.

- ***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 in Eastern Regional Fisheries Board jurisdiction.

Wintering Birds - Whooper Swan is the main bird species requiring consideration. This species is widely dispersed within the study area; however the considered key risk areas (based on the studies to date) are detailed herein. Wintering bird surveys have been undertaken over the last four Wintering Survey Periods (2007 – 2011) within the study area. From these surveys 31 sites have been established as being used by Whooper Swans specifically within the study area (refer to Table 4) which lists these sites and provides an indication of their importance / status. The survey results including survey dates (where relevant) are indicated on Map 1 (MSA) in Appendix B. Wintering Golden Plover numbers are occasionally significant (Nationally) particularly in Tara Mines Tailings Pond (roost site). Also considered in Table 4 are waders and other species of wildfowl.

Whooper Swan Site	Importance / Status[14]
Carnaross	County Important (WS)
Grange	County Important (WS)
Emlagh	Historical Site
Sedenrath (area)	County Important (WS)
Headford	Nationally Important (WS)
Fyanstown (area)	Nationally Important (WS)
Bloomsbury	County Important (WS)
Carlanstown	Historical Site (WS)
Barfordstown	Historical Site (WS)
Fordstown	Historical Site (WS)
Balrath (area)	Locally important (WS)
Black Lough	Historical Site
Balgeeth	Locally important (WS)
Tara Mines Tailings Pond	Nationally/ Internationally Important (WS and Golden Plover). Locally important (Wildfowl).
Randelstown	Historical Site
Yellow River	Locally important (WS)
Liscartan	Historical Site
Nr Tara Mines	Historical Site
Teltown	Locally Important (WS)
Tankardstown	Historical Site
Cruicetown	Nationally/ Internationally Important (WS). Locally important (Wildfowl)
Clooney Lough (area)	Locally important (WS)
Whitewood Lough	County Important (WS). Locally important (Wildfowl)
Newcastle Lough	County Important (WS).
Breakey Lough (area)	County Important (WS)
Batterstown	Locally important (WS)
Mullagh Lough	Locally important (WS and Wildfowl)
Area south-east Trim	Locally important (WS)
Newrath	Locally important (WS)
Newtown	Locally important (WS)
Mullagheven	Locally important (WS)

Table 4: Wintering Bird Sites (MSA)

Note 1: WS = Whooper Swan

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

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

- ***Other Birds*** – A number of breeding bird species of conservation significance have been recorded in the study area. These include Yellowhammer and Kingfisher. Other bird species considered as potentially sensitive include Grey Heron, Cormorant and Mute Swan.

Map 1 (CMSA) included in Appendix A identifies all Ecological Constraints (and other constraints) within the CMSA. Map 1 (MSA) included in Appendix B identifies all Ecological Constraints (and 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. For the purpose of updating landscape constraints, the re-evaluation process sets out relevant policies of the more recent statutory development plans, where relevant.

Cavan-Monaghan Study Area (CMSA):

The Monaghan County Development Plan (MCDP) 2007-2013 (publically available at www.monaghan.ie) and the Cavan County Development Plan (CCDP) 2008-2014 (publically available at www.cavancoco.ie) have identified a number of landscape designations within the CMSA.

- ***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.

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

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 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 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.

There is one ***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 however of local and regional amenity value.

- ***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 A. No new constraints information has been identified which would impact upon a consideration of route corridor selection in respect of the proposed Interconnection Development.

Meath Study Area (MSA):

A number of designations relating to landscape and visual constraints are listed in the Meath County Development Plan 2007-2013 (MCDP) (publically available at www.meath.ie) 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. It is noted that policies relating to landscape features generally overlap with the CMSA (particularly in relation to Cavan area) as outlined above. The following are a list of the key landscape features located within the MSA and referenced in both CDPs.

- ***Meath County Development Plan 2007 - 2013***

  A number of Scenic Viewpoints are listed in the Meath County Development Plan 2007-2013 (MCDP), and shown on Map 1 (MSA) contained in Appendix B of this report; these include the view from the Hill of Tara, a view of Bective, Athlumney, Headfort Demense as well as a number of views from high points in the landscape, short distance views or views of particular features.

  The MLCA contains a listing of Key Viewpoints, Landmarks, Driving Routes and Way-Marked Paths and Cycleways

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

  - Panoramic views from the Hill of Tara;
  - Panoramic views from the People's Park in Kells;
  - Views of and from Skryne Church;
  - Views of Slane;
  - Views of the County Cavan hills; and
  - A number of localised short distance views.

  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, from Drogheda, through Navan to Kells and further west.

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 B 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 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 '*designate the historic Tara Skryne Area as a Landscape Conservation Area'* under Section 204 of the Planning and Development Act, 2000 (HER POL 59/HER POL 65 and Section 8.4.4. Heritage Landscapes refers). The proposed boundary of the Tara Skryne Landscape Conservation Area is detailed in Map 1 (MSA) contained in Appendix B of this Report. The original Constraints Report of 2007 (Socoin and TOBIN Consulting Engineers. Kingscourt to Woodland Constraints Report Volume 1 (July 2007)) included the "Key Viewpoints" as described in the MLCA but did not contain the "Scenic Viewpoints" indicated on Map 3 MSA "Route Corridor Options for the MSA with the Landscape Constraints of the area" (of this Re-evaluation Report) as these were not mapped in Meath County Council documents. These are now indicated on Map 1 (MSA) contained in Appendix B. The locations of these "Scenic viewpoints" do not alter the conclusions of the original Constraints Report. 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 MCDP. This does not affect the overall conclusions of the 2007 Constraints Report.

Apart from the above, and the proposal for a Tara Skryne Landscape Conservation Area, no changes have arisen since the original Constraints Report prepared in July 2007 which would impact upon a consideration of route corridor selection in respect of the proposed Interconnection Development.

Map 1 (CMSA) contained in Appendix A identifies Landscape / Visual Constraints (and other constraints) within the CMSA. Map 1 (MSA) contained in Appendix B identifies Landscape / Visual Constraints (and other constraints) within the MSA.

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 (pNHA's). The GSI has also determined a secondary list of County Geological Sites (CGS) which may be considered for protection at local authority functional control 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 now considered. These geological heritage areas are designated for reason of a specific geological interest (e.g. rare fossils or bedrock exposures within active quarries).

Cavan-Monaghan Study Area (CMSA):

There are a number of sites of geological interest sites, including pNHAs and CGSs lying within the CMSA. These are listed in Table 7. Notwithstanding the above references to pNHAs and CGSs no new information has been identified which would impact upon a consideration of route corridor selection 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)

Site	Description	Type of Site
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)
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 7: Sites of Geological Interest (CMSA)

Meath Study Area (MSA):

There are a number of geological interest sites including pNHAs and CGSs lying within the MSA. These are listed in Table 8. Notwithstanding the above references to pNHAs and CGSs no new information has been identified which would impact upon a consideration of route corridor selection 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

Site	Description	Type of 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
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 Valley	Comprising a Valley and outwash plain with Quaternary deposits in the form of a pitted sandur. Most of this site lies within an existing NHA & SAC.	Proposed under the IGH7 Quaternary Theme for designation as a CGS site

Table 8: Sites of Geological Interest (MSA)

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

5.2.1.4 Water

Cavan-Monaghan Study Area (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. There also exist a number of other lakes.

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, while there also exist 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 while there also exist a number of other lakes.

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

No new constraints information has been identified which would impact upon a consideration of route corridor selection in respect of the new Interconnection Development project.

The main surface water features (and other constraints) within the study area listed in Table 9 and are identified on Map 1 (CMSA) contained in Appendix A.

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
Knapppagh		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
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 9: Major Rivers and Lakes (CMSA)

Meath Study Area (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 portions. Numerous water bodies such as rivers and lakes are located within each catchment.

The River Boyne catchment in the south and central portions 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 while there also exists a number of other lakes.

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 10, and are identified on Map 1 (MSA) contained in Appendix B.

No new constraints information has been identified which would impact upon a consideration of route corridor selection in respect of the new 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
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 10: Major Rivers & Lakes (MSA)

Map 1 (CMSA) contained in Appendix A identifies Main Water Constraints (and other constraints) within the CMSA. Map 1 (MSA) contained in Appendix B 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

Cavan-Monaghan Study Area (CMSA):

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

Meath Study Area (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 an increase in the number of one-off dwellings in the overall study area, there have been no new significant settlement areas or existing or planned expansion of existing settlements therein since 2008 which would impact upon the route corridor identification and selection process in respect of the new 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 A, illustrates Settlement Constraints (and other constraints) within the CMSA. Map 1 (MSA) contained in Appendix B 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; this includes structures/buildings of architectural heritage significance and distinctive character that are deemed worthy of protection.

Cavan-Monaghan Study Area:

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 the Republic of Ireland and on the Sites and Monuments Records (50) in Northern Ireland. Whilst there are no World Heritage sites in this part of the study area, there over a thousand of known archaeological and architectural sites as summarised in Table 11.

No new constraints information has been identified which would impact upon a consideration of route corridor selection in respect of the planned Interconnection Development.

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)	1178
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 11: Summary of Known Archaeological and Architectural Sites (CMSA) [15]

Meath Study Area (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 wealth of architectural sites are located within this part of the overall study area, including Castles such as Trim, Demesnes, such as Headfort and Arbraccan, containing 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

[15] The terminology for cultural heritage sites in the Republic of Ireland (ROI) and Northern Ireland (NI) differ slightly however they have been grouped with their equivalent in the Cultural Heritage tables relating to the CMSA.

Government in April 2010). There are thousands of known archaeological and architectural sites located within the study area, as summarised in Table 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 production of the previous Constraints Report - the Tara Complex and Kells. These are located at a significant remove from the previously identified route corridor options. Meath County Council has also released a Draft Landscape Conservation Plan relating to the designation of a Landscape Conservation Area relating to the Tara Complex. The proposed route corridors lie outside the proposed draft Landscape Conservation Area. No other new constraints information has been identified which would impact upon a consideration of route corridor selection in respect of the new 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 12: Summary of Known Archaeological and Architectural Sites (MSA)

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

5.2.2.3 Utilities and Infrastructure

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

Cavan-Monaghan Study Area (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 Co. 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, but consideration is being given to some future re-opening of the line.

- ***Electricity Lines*** – The most significant electricity line in the Sudy 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 commence construction in the near future. In addition to higher voltage lines there are numerous lower voltage distribution lines within the study area. In the CMSA study area 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). There are also thousands of kilometres of medium voltage, low voltage and telephone overhead lines.

No new significant infrastructure / utilities information has been identified which would impact upon a consideration of route corridor selection in respect of the new Interconnection Development project.

Meath Study Area (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 be connected to the grid post Gate 3. 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 alignment 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 are permitted but not constructed. There is an extensive network of lower voltage lines located within the study area. In the MSA study area there are approximately 329 km of existing electricity lines (161 km of 38 kV, 72 km of 110 kV, 92 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.

No new significant infrastructure / utilities information has been identified which would impact upon a consideration of route corridor selection in respect of the new Interconnection Development project.

Map 1 (CMSA) contained in Appendix A identifies the existing Utilities and Infrastructure Constraints (and other constraints) in the CMSA. Map 1 (MSA) contained in Appendix B identifies the existing Utilities Infrastructure Constraints (and other constraints) in the MSA.

5.3 Conclusions

This 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 and have been given full consideration in the route corridor identification process. Overall, EirGrid and its consultants are satisfied that no new environmental or other relevant constraints have been identified within the overall study area which would prevent the identification of potentially feasible route corridors therein, within which to route and site the planned Interconnection Development project.

6 IDENTIFICATION OF FEASIBLE ROUTE CORRIDOR OPTIONS

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 feasible route corridor options, avoiding those identified constraints, to the greatest extent possible. 1 km wide feasible route corridors were mapped and assessed. This process included a high level evaluation of the likely impacts of each of the route corridor options on the key constraints, with some indication as to which, if any, of these are likely to be significant.

6.1 Background to the Identification of Feasible Route Corridor Options

As noted earlier in this Report, the current re-evaluation process relies 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. This work is detailed in the following publications:

- ESBI and AOS Planning. Route Constraints Report (September 2007). Publically available at www.eirgrid.com; and

- Socoin and TOBIN Consulting Engineers. Kingscourt to Woodland Constraints Report Volume 1 (July 2007). Publically available at www.eirgrid.com.

Subsequently, 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 1 km wide corridor, on the basis of further 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). Publically available at www.eirgrid.com; and

- Socoin and TOBIN Consulting Engineers. Kingscourt to Woodland Powerline Addendum Report 1 (May 2008). Publically available at www.eirgrid.com.

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.

6.1.1 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.

Cavan-Monaghan Study Area (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 location;

- **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.

The route corridor options are illustrated on Figure 6.

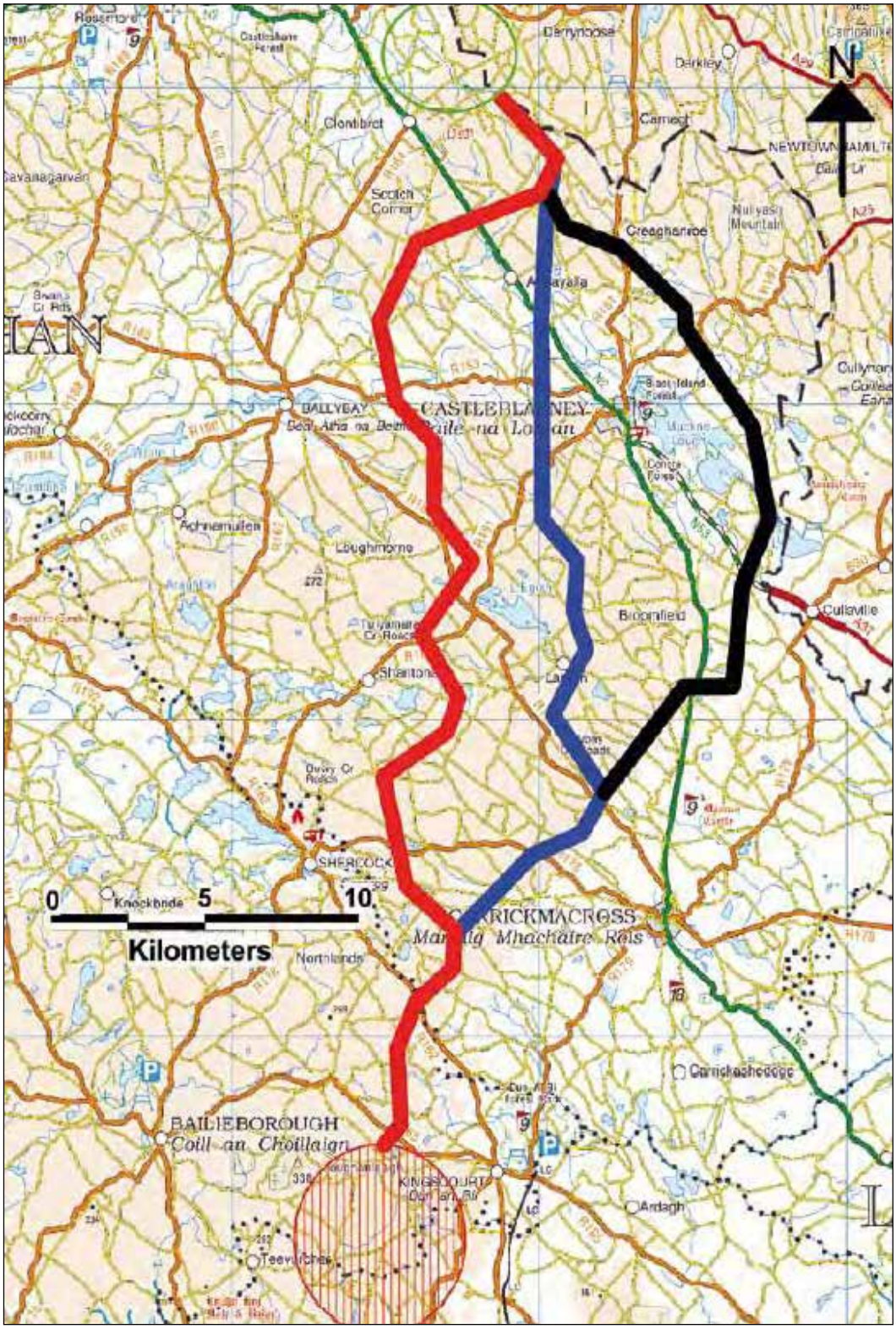


Figure 6: Route Corridor Options (CMSA) (taken from the 2007 Route Constraints Report)

Meath Study Area (MSA):

Three potential route corridor options (with a sub-option of one of the options) were identified for the MSA 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; and

- **Route Corridor Option 3A** (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;

- **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. 3B runs to the west of Carlanstown before joining together west of Whitewood Lough.

The route corridor options are illustrated on Figure 7**.** 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.

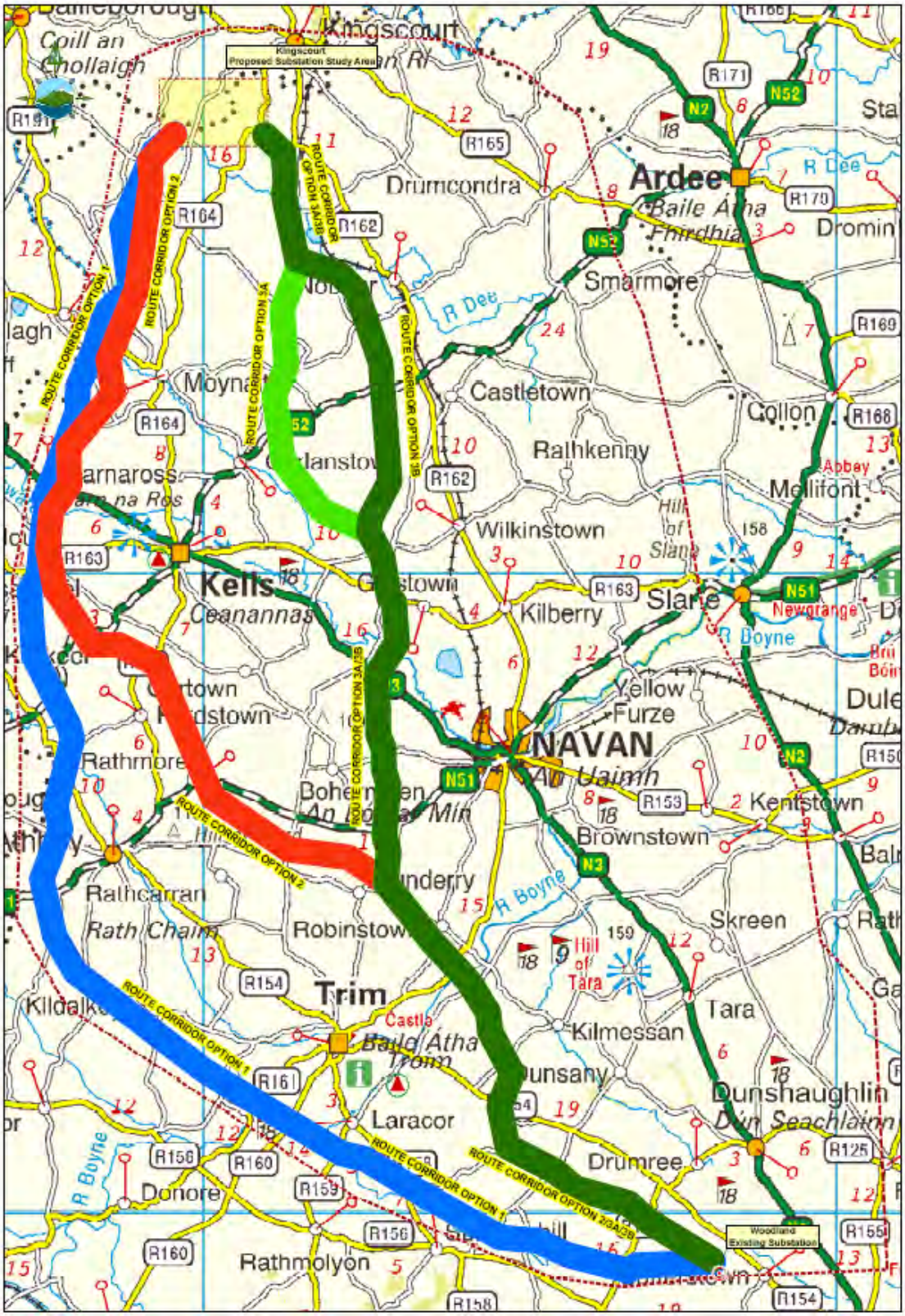


Figure 7: Route Corridor Options (MSA) taken from the 2007 Route Constraints Report

6.1.2 Preliminary Re-evaluation Parameters and Considerations

The purpose of this re-evaluation 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 no new significant environmental or other constraints have arisen which would result in any change to the previously identified route corridor options. However, as a result of the technical advice from EirGrid, as set out in Chapter 4 that it is not intended to proceed with a substation as part of this current Interconnection Development, amendments have been made to the route corridor options in the general vicinity of the previously proposed substation location.

Having regard to the decision in relation to the substation, it is now proposed that the nominal boundary between the CMSA and MSA sections of the overall study area lies to the south 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 (as described in Section 6.1.1). For the purpose of this 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 8 and Figure 9:

- CMSA: Extension and amendments of the 400kV route corridor so that it meets the MSA corridor;
- MSA: Extension and amendments of the 400kV route corridor so that it meets the CMSA corridor; and
- Omission of the previously required 220kV circuits linking to the substation site.

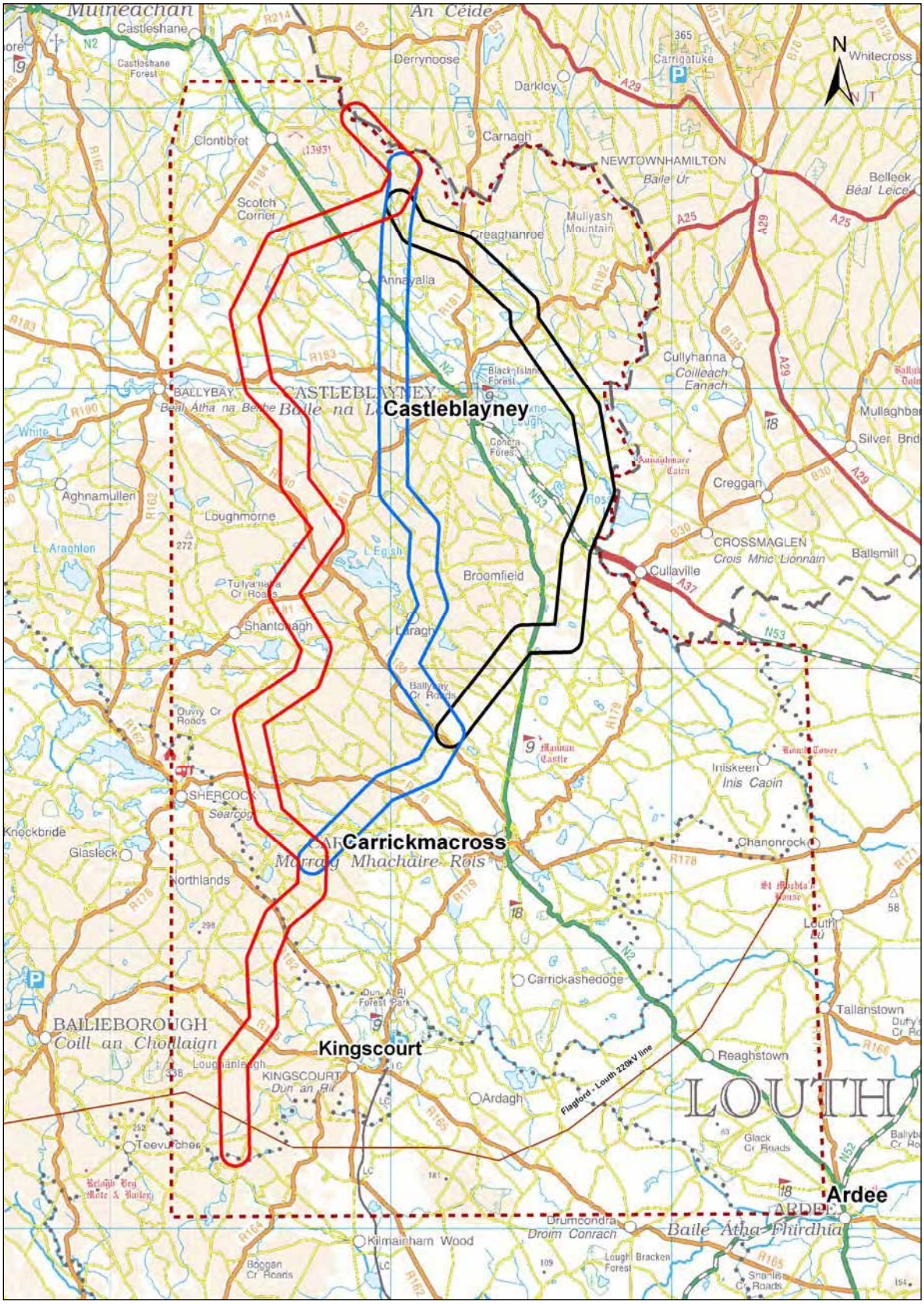


Figure 8: Route Corridor Options for the CMSA (Amended)

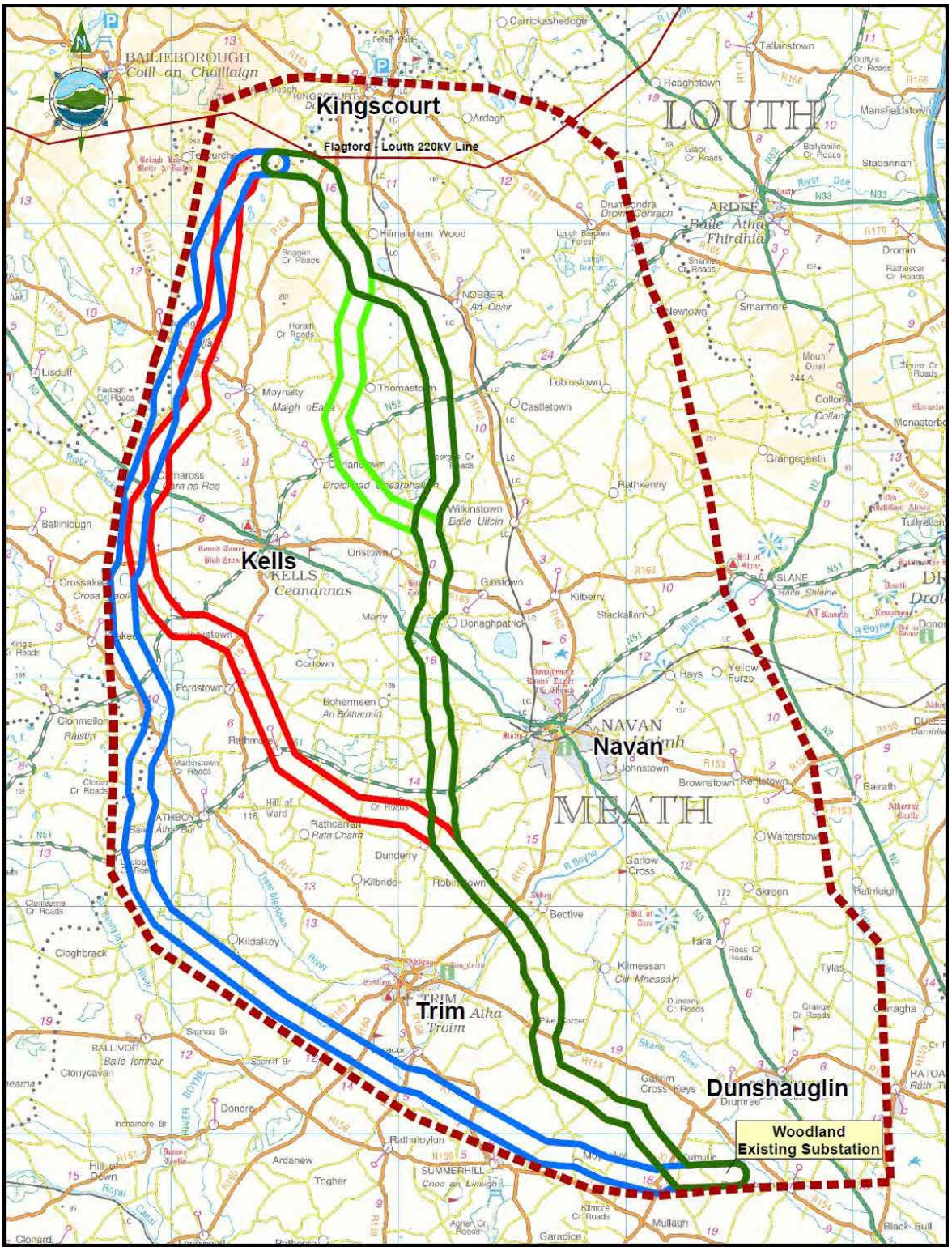


Figure 9: Route Corridor Options for the MSA (Amended)

6.2 Environmental Overview of Potential Corridors

This section of the Re-evaluation Report presents the key environmental and other constraints associated with these identified route corridor options, having regard to updated constraints information. The re-evaluation is briefly summarised below. 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.

6.2.1 Ecology

From an ecological perspective, the key constraints relate to designated sites, protected species (including Whooper Swans) and habitats.

A significant, stable and increasing population of Whooper Swans utilise the CMSA and MSA study areas. 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).

In Meath (MSA) these birds have limited roost site availability and the key roost sites are Tara Mines Tailings Ponds, Headford Estate (lakes) and the townland of Cruicetown. Other small lakes including Whitewood Lough are also used irregularly, usually by low numbers of Whooper Swans. Foraging areas are widespread and change year to year based on agricultural management (food availability). Key sites are large arable fields in the Blackwater River Valley; however, Whooper Swans can be present at a widespread number of locations especially where potatoes are available.

In Monaghan/Cavan (CMSA) Whooper Swan distribution and their habitat is slightly different and consists of numerous small lakes and surrounding improved farmland. Once Whooper Swans arrive for the winter at these sites they are relatively sedentary, roosting/ feeding on lakes and feeding (at some locations) on adjacent fields. Regular flightlines are not significant (except at a few key areas). Irregular undetectable flight lines (e.g. every 2 to 3 weeks) occur between lake sites during the winter period, depending on food availability, disturbance etc.

In relation to Whooper Swans (and other wildfowl), regardless of the conclusions of this Preliminary Re-evaluation Report, and indeed, which route corridor option is eventually selected, it is the case that suitable mitigation measures at particular locations can and will be developed in consultation with National Parks and Wildlife Service (NPWS) as part of the final line design.

In addition, the proposed overhead line (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;

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

- The avoidance of significantly more important Whooper Swan sites (e.g. Dromore River Wetlands, located west of the CMSA); and

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

Cavan-Monaghan Study Area (CMSA):

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

- ***Designated Sites / Proposed Designated Sites –*** The CMSA largely consists of improved farmland with scattered lakes and ponds with associated wetlands in drumlin hollows. No designated sites are crossed by any of the route corridor options. Hence there is no clear difference in potential impacts to designated sites from any of the route corridor options. The location of designated sites relative to all route corridors is detailed in Map 2 (CMSA) contained in Appendix A. 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 project, those sites are being treated as pNHAs.

- ***Other Habitats -*** All route corridor options include relatively small areas of locally 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 location of these habitats relative to the study area are detailed in Map 2 (CMSA) contained in Appendix A and summarised below in Table 13.

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 13: Summary of Noteworthy Areas (Habitats) Crossed by Each Route Corridor Option (CMSA)

Most of these habitats can be appropriately avoided at route identification, and by detailed alignment design. Generally, the shortest route would be likely to have the least impact on hedgerows/field boundaries.

- ***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 significant coarse fisheries. Game fisheries (brown trout predominantly) are localised and associated with the Rivers Glyde and Fane, and their tributaries. The route corridor options pass 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.

- ***Wintering Birds*** – Surveys for wintering birds have been undertaken over four wintering periods (2007-2011) 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 the key bird species requiring consideration (listed on Annex 1 of EU Birds Directive), being recorded at 50 sites in the study area. Whooper Swan numbers and frequency of site usage is variable throughout the winter and inter-year. Whooper Swans move between lakes throughout the winter, though flights are generally irregular. A summary assessment of each site importance and its relative location is set out in Table 14 herein. Also detailed are identified clusters of sites (lakes/ponds).

	Site Name	Forage (F) / Roost (R) or Both (B)	Route Corridor Option A	Route Corridor Option B	Route Corridor Option C
Cluster 1	Comertagh Lough	B	✓✓✓	✓✓✓	
	Mill Lough	B	✓✓✓	✓✓✓	
	Raferagh (Pond)	B	✓✓✓	✓✓✓	
Cluster 2	Crossduff Lough	B	✓✓		
	Lough Egish	B	✓✓	✓✓	
	Lough Morne	B	✓✓		
	Lurgacham (fields)	B	✓		
Cluster 3	Bawn Lakes	B	✓		
	Bellatrain Lough	B	✓✓		
	Derrygooney Lough	B	✓✓		
	Lisnakillewbane Lough	B	✓✓		
	Lough Namachree	B	✓✓		
	Shantonagh Lough	B	✓✓		
Cluster 4	Ballintra	F	✓✓✓		
	Tonyscallan Lough	B	✓✓✓		
	Toome or Crinkell Lough	B	✓✓✓		
Cluster 5	Corliss Lough	B			✓✓
	Drumlougher	B			✓✓
	Kiltybane Lough	B			✓✓
	Lough Alina	B			✓✓
	Lough Patrick	B			✓✓
Other Recorded Sites	Annaghierin Lough	B	✓✓		
	Barnagrow Lough	B	✓✓		
	Blaney Castle Lake or Muckno Lough	B			✓✓
	Cordoo Lough	B	✓		
	Creeve Lake	B	✓✓		
	Creevekeeran	F			✓
	Creevy Lough	B		✓✓	✓✓
	Derrynaloobinagh	B	✓✓		
	Rahanns, Ballyhoe	B	✓✓	✓✓	✓✓
	Drumillard Lough	B			✓✓
	Druminnick Lough	B	✓✓		
	East Laragh Lough	F		✓✓✓	
	Fane River	B			✓✓
	Lackagh	B	✓✓	✓✓	
	Laragh Lough	B		✓✓	
	Lismagurshin or Cremartin Lough	B	✓✓		
	Lough Major	B	✓✓		
	Lough Nagarnaman	B		✓✓	
	Lough Nahinch	B	✓✓		
	Lough Ross	B			✓✓
	Lough Sillan	B	✓		
	Lough Smiley (Lake north of here)	B		✓✓	
	Milltown Lough	B	✓✓		
	Muckno Mill Lough	B			✓✓

	Muckno Mill Lough (Tributary to north)	B			✓✓
	Mullyore Flood	B	✓✓		✓✓
	Terrygeely	B	✓✓		
	Tievaleny Lough	B	✓✓		
	Tullyvaragh Upper	B			✓✓

Table 14: Whooper Swan Sites in Vicinity of Each Route Corridor Option and Evaluation of Significance (CMSA)

NOTES

- Nos. ticks relates to site significance
- R= Roost Area, F = foraging Area, B = Roost and Forage Area
- WS = Whooper Swan
- Orange highlight sites (clusters of sites) are considered to include a relatively significant flight line relative to route corridor

✓✓✓✓✓	Internationally/ Nationally important (WS). Regular roost/ foraging Area	WS Flightline probable/ confirmed relative to corridors
✓✓✓✓	Internationally/ Nationally important (WS). Regular roost/ foraging Area	No significant WS Flightline relative to corridors
✓✓✓	Local (Higher Value)/ County importance (WS). Irregular Foraging area for Internationally/ nationally important nos.	Flightline probable/ confirmed relative to corridors.
✓✓	Local (Higher Value)/ County importance (WS/ other wildfowl).	No significant flightline likely/ very irregular relative to corridors
✓	Historical / occasional WS site or other wildfowl (No current evaluation)	No significant flightline likely relative to corridors

The key significant points regarding Whooper Swan and each of the route corridor options include:

- In terms of ***Route Corridor Option A***- A regular flightline has been confirmed across this route corridor option immediately east of Loughs Tonyscallon and Crinkell. Relatively regular flightlines also occur across this route corridor option in the vicinity of Comertagh Lough and surrounding ponds including Raferagh pond. Outside these areas Whooper Swan flights are irregular and no flights have been recorded across this route corridor.

- In terms of ***Route Corridor Option B*** – Up to Winter (2010/2011) Whooper Swan flightline surveys were not conducted extensively on this route corridor option compared to Route Corridor Option A. Based on survey findings to date a relatively irregular flightline occurs across this route corridor option to the east of Laragh Lough. No other significant flights were noted or are likely relative to this route corridor.

- In terms of ***Route Corridor Option C*** – Up to this Wintering Survey Period (2010/2011), Whooper Swan flightline surveys were not conducted extensively on this route corridor option compared to Route Corridor Option A. Extensive flightline surveys were carried out this Wintering Survey Period focussing on potential higher risk areas including Muckno Mill Lough (area), Lough Patrick (area), Lough Drumillard, Lough Tullyvaragh, Lough Creevy and Lough Nagarnaman. No significant flightlines were noted relative to this route corridor.

The wintering bird surveys undertaken over the past four years (inclusive of this year) 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 fact is considered in this assessment. It should also be noted that sites utilised by Whooper Swans (hence assessment area) could change in the future hence ongoing future monitoring is recommended.

- ***Other Birds*** **-** Mute Swan 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.

Meath Study Area (MSA):

Map 2 (MSA) contained in Appendix B identifies the route corridor options for the MSA with the Ecological Constraints in the area. The constraints are also summarised below in Table 15.

- ***Designated Sites / Proposed Designated Sites*** **-** Route Corridor Option 1 crosses the River Boyne and Blackwater cSAC three times. Route Corridor Options 2 and 3 cross the River Boyne and Blackwater cSAC twice. Mitigation can be designed for all route corridor options which avoid impacts to the sensitive receptors in this site. This site is selected for aquatic species, specific habitats and otter.

- ***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.

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

Most of these habitats can be effectively avoided at detailed alignment 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.

- ***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 significantly 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.

- ***Wintering Birds*** – Whooper Swan are considered a key wintering bird species requiring consideration in the MSA. Surveys for all wintering birds have been undertaken over four wintering periods (2007-2011) within all route corridors and up to 10 km from here as Whooper Swan in particular can cover significant diurnal migrations. Whooper Swans have been recorded at 31 sites (including historical data) in the study area. The numbers and frequency of usage is variable between these sites throughout the winter and inter-year. A summary of all sites and its relative location is set out below in Table 16 herein.

  Note that in the MSA study area; "Foraging sites" (F) will depend on the type of crop planted and inter year usage which is highly variable in County Meath. The assessment detailed is based on findings to date within the study area, but could change significantly in the future. The key sites in Meath are "Roost" (R) and "Both" (B) sites which do not significantly vary.

Site Name	Forage (F) / Roost (R) or Both (B)	Route Corridor Option 1	Route Corridor Option 2	Route Corridor Option 3A	Route Corridor Option 3B
Balgeeth	F		✓✓✓		
Balrath (area)	F		✓✓✓		
Barfordstown	F		✓		
Batterstown	F			✓✓	✓✓
Black Lough	R	✓			
Bloomsbury	F			✓✓✓	✓✓✓
Fyanstown (area)	B			✓✓✓✓✓	✓✓✓✓✓
Sedenrath (area)	F			✓✓✓	✓✓✓
Tara Mines Tailings Pond	R			✓✓✓✓✓	✓✓✓✓✓
Breakey Lough (area)	B	✓✓	✓✓		
Carlanstown	F			✓	
Carnaross	B	✓✓✓	✓✓✓		
Clooney lough (area)	F				✓✓
Grange	F			✓✓	
Emlagh	F			✓	
Fordstown	F		✓		
Headford	R			✓✓✓✓✓	✓✓✓✓✓
Liscartan	F			✓	✓
Cruicetown	B			✓✓✓✓✓	✓✓✓✓✓
Newcastle lough	R			✓✓✓	✓✓✓
Newrath	F			✓✓✓	✓✓✓
Newtown	F			✓✓✓	✓✓✓
Whitewood Lough	R				✓✓✓
Mullagheven	F			✓✓	
Nr Tara Mines	F			✓✓✓	✓✓✓
Mullagh	R	✓✓			
Randelstown	F			✓	✓
southeast of Trim	F	✓✓			
Tankardstown	F			✓	✓
Teltown	F			✓✓	✓✓
Yellow River	F			✓✓	✓✓

Table 16: Whooper Swan Sites in Vicinity of Each Route Corridor Option and Evaluation of Significance (MSA)

NOTES

- Number of ticks relates to site significance
- R= Roost Area, F = foraging Area, B = Roost and Forage Area
- WS = Whooper Swan

NOTES CONTINUED

✓✓✓✓✓	Internationally/ Nationally important (WS). Regular roost/ foraging Area	WS Flightline probable/ confirmed relative to corridors
✓✓✓✓	Internationally/ Nationally important (WS). Regular roost/ foraging Area	No significant WS Flightline relative to corridors
✓✓✓	Local (Higher Value)/ County importance (WS). Irregular foraging area for Internationally/ nationally important nos.	Flightline probable/ confirmed relative to corridors.
✓✓	Local (Higher Value)/ County importance (WS/ other wildfowl) Irregular	No significant flightline likely/ very irregular reletive to corridors
✓	Historical / occasional WS site or other wildfowl (No current evaluation)	No significant flightline likely reletive to corridors

Flightline across corridor linked to Cruicetown
Flightline across corridor linked to Tara Mines tailings Pond
Flightline across corridor linked to Carnaross
Flightline across corridor linked to Balgeeth/ Balrath

The key significant points regarding Whooper Swan and each of the route corridor options are:

- In terms of ***Route Corridor Option 1*** - A relatively regular flightline exists in the Carnaross area as birds forage in the vicinity of the River Blackwater. The birds roost at variable locations including a flooded area of the River Blackwater (beside the new M3 alignment), Lough Ramor or possibly Headford Estate, meaning this route corridor option would be crossed.

  Also of note is the (at least occasional) presence of Whooper Swans close to the Boyne River, 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.

- In terms of ***Route Corridor Option 2*** - Based on information gathered to date a flightline exists in the Carnaross and Balrath areas. At Carnaross birds feed in the vicinity of the River Blackwater (Carnaross) and roost here or fly to Lough Ramor or possibly Headford Estate meaning this route corridor option would be crossed.

  A flightline was confirmed across this route corridor in the Balrath/ Balgeeth area during Wintering Survey Period 2, (2008/2009) and this winter (2010/2011) as birds forage in open farmland around extensive arable farmland utilising available flood areas for roosting.

- In terms of ***Route Corridor Option 3A*** - wintering bird surveys confirmed regular flightlines exist between Tara Mines Tailings Ponds and a number of sites in the Blackwater River Valley. During winter 2010/2011 a second flightline was confirmed between Cruicetown and areas to the south-west, including the eastern edge of Route Corridor Option 3A.

- In terms of ***Route Corridor Option 3B*** - in addition to the flightline between the Tara Mines Tailings Pond and sites in the Blackwater River Valley, referred to in respect of

Option 3A, a flightline also exists across this route corridor option between Cruicetown and Whitewood Lough and potentially areas east of here. The vast majority of Whooper Swans (which occasionally reach internationally significant numbers) stay in the vicinity of Cruicetown for roosting and foraging. Foraging flocks also fly to available food (e.g. Potato fields) up to 3 km from here mostly as noted, to the west/ south-west of Cruicetown (away from route corridor) and potentially east of here (across route corridor).

- 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. This species is not considered sensitive to the development as they are a skilled flier and frequently forage close to existing HV transmission lines.

Other Birds - Cormorant, Grey Heron and Mute Swan utilise the River Boyne and Blackwater and unrecorded flightlines will cross all route corridors at River Crossings. Other species are not considered at risk for example Kingfisher are not considered to be at risk as riparian areas are avoided and this species is not considered sensitive to transmission line developments.

6.2.2 Landscape

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

Cavan-Monaghan Study Area (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 (CMSA) included in Appendix A identifies the route corridor options for the CMSA with the Landscape Constraints in the area.

In summary:

- ***Route Corridor Option A*** – has the least potential to be visible and has the least potential for visibility from sensitive receptors, even though it passes close to two scenic routes near Lough Egish and Shantonagh Lough;

- ***Route Corridor Option B*** – is located along the most elevated underlying topography of the three routes and will cause the most widespread visibility especially from portions of the N2, though it is the shortest route; and

- ***Route Corridor Option C*** – passes closest to the most significant landscape resources – i.e. Lough Muckno and the outskirts of Castleblayney .

Meath Study Area (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 Pan (CDP), including those from the Hill of Tara and The People's Park Lighthouse, Kells. 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. A number of existing transmission lines traverse the landscape, along with national roads and the M3 motorway. Map 3 (MSA) contained in Appendix B 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 ground than Route Corridor Options 3A and 3B which would result in a transmission line within the corridor being visible over a wider area. It passes within 4km to the west of the panoramic viewpoint at Kells, although visibility would be extremely limited at this distance. 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;

- ***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. It however, traverses more areas of higher ground than Options 3A and 3B which would result in a transmission line within the corridor being more visible over a wider area. It passes 6 km to the west of the Hill of Tara, and visibility would not be an issue at this distance. 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;

- ***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 6km to the west of the Hill of Tara. 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; 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 6km to the west of the Hill of Tara. This route corridor option crosses the least roads of all four options as well as having the least number of major river crossings.

6.2.3 Geology

Cavan-Monaghan Study Area (CMSA):

Map 4 (CMSA) contained in Appendix A identifies the route corridor options for the CMSA with 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.

Meath Study Area (MSA):

Map 4 (MSA) contained in Appendix B identifies the route corridor options for the MSA with geological constraints in the area.

In terms of geological heritage no geological pNHAs are located along any route corridor options. Seven County Geological Sites 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.

6.2.4 Water

Cavan-Monaghan Study Area (CMSA):

Based on the desk study of the various route options, the total number of river and stream crossings vary between each of the route corridor options. These are identified on Map 5 (CMSA) contained in Appendix A. 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 within 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.

Meath Study Area (MSA):

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

6.2.5 Settlements

Cavan-Monaghan Study Area (CMSA) and Meath Study Area (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 line 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 positioning of the transmission line within any route corridor. Map 6 (CMSA) contained in Appendix A and Map 6 (MSA) contained in Appendix B identifies the route corridor options for the CMSA and MSA illustrating both Settlement Constraints and Population Densities of the area.

An estimate[16] of the number of dwellings generally within the 1 km route corridors based on a representative distance of 500 m each side of an indicative line route and within 100 m of the indicative line routes [17] is illustrated in Table 17 and 18 below. In order to provide some indication of the population within the representative100 m and 500 m distances from each side of the indicative line routes, the average household size based on the CSO statistics is used; the most recent CSO statistics are for 2006, which state that average size for private households is 2.81.[18]

Population densities were sourced from the Census, 2006, published by the CSO. Map 6 (CMSA) contained in Appendix A and Map 6 (MSA) contained in Appendix B 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 the route corridors.

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

[17] 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.

[18] This information is based on the CSO statistics; http://www.cso.ie/statistics/size of households.htm

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	115	383	1,076
Route Corridor Option B	43 km	52	146	449	1,262
Route Corridor Option C	48 km	55	155	509	1,430

Table 17: Estimated Indicative Population (CMSA)

It is apparent from Table 17 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	90	559	1,571
Route Corridor Option 2	62 km	31	87	517	1,452
Route Corridor Option 3A	58 km	21	59	604	1,697
Route Corridor Option 3B	57 km	17	48	575	1,616

Table 18: Estimated Indicative Population (MSA)

It is apparent from Table 18 that Option 3B, which is the shortest option, has the least number of dwellings along its length with regard to residential dwellings within 100m either side of the indicative line route.

6.2.6 Cultural Heritage

For the purposes of this study all archaeological and architectural sites within a wider study area have been summarised in the tables below. 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. For the purpose of this particular analysis distances are measured from the centre of a potential line route within each corridor.

The purpose of Tables 19 and 21 is to identify archaeological and architectural features where there is potential for direct impacts. The purpose of Table 20 and 22 is to identify archaeological and architectural features where there is potential for indirect impacts (i.e. visual)

Cavan-Monaghan Study Area (CMSA):

Potential for Direct Impacts: All known archaeological and architectural sites within a representative distance of 500 m of a potential line route within each corridor are summarised in Table 19 below. These are sites where, given their proximity to the proposed route corridor options, there is a 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 the Republic of Ireland (ROI) and Northern Ireland (NI). Map 7 (CMSA) contained in Appendix A identifies the route corridor options for the CMSA with Cultural Heritage Constraints in the area.

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

Note: all sites within 500m of centreline of potential line route

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 20. 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: 20: Potential for Indirect Impacts on Cultural Heritage (CMSA)

Note: distances taken from the centreline of proposed route corridors

As can be seen from Table 20, 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.

Meath Study Area (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 21; 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 with 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 (Archaeological sites in the ownership of the local authority) status 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 m 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; 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 Demesnes 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 m, though 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 21: Potential for Direct Impacts on Cultural Heritage Sites (MSA)

Note: all sites within 500m of centreline of potential line route

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 22. A representative distance of between 2 and 10 km from the indicative line route (centreline) within the route corridor are 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, 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 - The 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 though as noted previously, there are fewer of these sites in close proximity (500 m). An ACA at Ardbraccan is located approximately 600 m 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.

In light of the sensitivity of Meath Study Area (MSA) and the potential that the proposed development may have significant impacts upon important cultural heritage sites within the region, windscreen surveys were undertaken. The windscreen survey highlighted sites where there was a potential for significant impacts upon the setting of cultural heritage sites along all route corridor options. The results of this work are discussed further in the Chapter 7.

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

Note: distances taken from the centreline of proposed route corridors

6.2.7 Utilities and Infrastructure

Cavan-Monaghan Study Area (CMSA):

Map 8 (CMSA) contained in Appendix A 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.

Meath Study Area (MSA):

Map 8 (MSA) contained in Appendix B 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.

6.3 Conclusions

This 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 did not have material implications for the nature and location of the previously identified route corridor options. It was also recognised that a number of potential constraints within the route corridors are site or area specific rather than being general to the overall corridor, and thus potential impacts can be minimised through appropriate route selection and design.

In summary, EirGrid and its consultants are satisfied that the updated constraints do not have material implications for the locations of the previously identified route corridor options. In addition, the consultants are satisfied that no additional and/or previously unidentified route corridor emerges from this 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 are found.

It remains clear that each of the identified route corridor options contains environmental constraints, notwithstanding the fact that the route identification process ensures the avoidance of the most significant of the identified constraints to the maximum practical extent. A number of identified potential constraints within the route corridors are site or area specific, and thus potential impacts on these can be mitigated through appropriate route selection (see Chapter 8).

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.

7 PRELIMINARY COMPARATIVE EVALUATION OF FEASIBLE ROUTE CORRIDORS

The selection of a preferred route corridor for the previous Meath-Tyrone 400 kV Interconnection Development involved a comparative evaluation of the identified route corridor options. The objective was to evaluate and compare route corridor options taking account of a wide range of technical, environmental 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*' (RPS Planning & Environment March 2009) (publically available from www.eirgrid.com). The Evaluation Document referenced a number of other reports including:

- ESBI and AOS Planning. Route Constraints Report (September 2007). Publically available from www.eirgrid.com.
- ESBI and AOS Planning. Route Constraints Report (September 2007) Addendum Report (May 2008). Publically available from www.eirgrid.com.
- Socoin and TOBIN Consulting Engineers. Constraints Report 1 (July 2007). Publically available from www.eirgrid.com; and
- Socoin and TOBIN Consulting Engineers. Constraints Report 1 (July 2007) Addendum Report (May 2008). Publically available from www.eirgrid.com.

EirGrid and its project consultants originally identified a diverse range of issues which could potentially comprise selection 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 23.

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

7.1.1 Preliminary 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.

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 that such criteria detailed above remain broadly neutral for all identified potential route corridor options.

For the purpose of this re-evaluation process, 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, taken to mean a "best-fit" to meet the parameters of the project. These criteria are identified below. The consultants are also using this re-evaluation process to streamline and simplify 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 24: Re-evaluation Criteria

7.2 Preliminary 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. This qualitative approach thus 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.

When comparing one criteria against another, consideration has been taken of whether or not potential impacts can be mitigated. Clearly, it is reasonable to consider that, if there are likely to be long term adverse significant residual impacts which cannot be mitigated in respect of a particular criterion, these are considered more important, and therefore rank higher, when comparing route corridors.

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 – 43.7 km	Route Option 1 – 65 km
Route Option B – 40.5 km	Route Option 2 – 62 km
Route Option C – 45.3 km	Route Option 3A - 58 km
	Route Option 3B – 57 km

Table 25: Length of Route (CMSA and MSA)

7.2.1 Environmental and Other Issues Considered which Result in no Significant Differences between the Route Corridor Options

Of the natural and artificial environmental and other constraints identified in Chapters 5 and 6 it is considered that some of these result in no significant differences between the route corridor options. These are set out below.

7.2.1.1 Geology

The geology criteria include potential impact of the different route corridor options on geological pNHAs and CGSs.

Cavan-Monaghan Study Area (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 design to ensure any potential impacts can be minimised. Overall in this context there is no significant difference between each route corridor option.

Meath Study Area (MSA):

Based on the geological heritage areas, there are no significant differences between any route corridor options. A section of route corridor 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 design to ensure any potential impacts can be minimised. Overall 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.

7.2.1.2 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 infrastructure. Each of the various identified route corridor options includes a number of watercourse crossings. Appropriate mitigation measures can be incorporated into the detailed design to ensure any potential impacts on water bodies can be 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 every 350 – 400 m, the potential adverse impact of an overhead line (OHL) crossing of a river or lake is low.

Cavan-Monaghan Study Area (CMSA)*:*

As mitigation measures can be incorporated into the detailed design, there are no significant differences between any of the route corridor options.

Meath Study Area (MSA):

As mitigation measures can be incorporated into the detailed design, 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.

7.2.1.3 Settlements

The settlement criteria include potential impact of the different route corridor options on settlements including both urban settlements and rural dwellings. While a longer route corridor will typically have more dwellings within the corridor it is not necessarily the case and there are variables depending on the representative distance measured from the centre line of a potential line route within each corridor (i.e., 100 m or 500 m). This is evident, albeit not to any significant degree, in Tables 17 and 18 in Chapter 6.

All route corridor options avoid the main identified settlements. While the predominance of dispersed rural settlement within the overall study area will affect the positioning of the transmission line within any route corridor and appropriate mitigation measures will need to be incorporated into the detailed design, 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.

7.2.1.4 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.

7.3 Key Environmental and Other Issues

Of the natural and artificial environmental and other constraints identified in Chapters 5 and 6, it is considered that some of these result in differences between the route corridor options. These are set out below.

7.3.1 Ecology

As identified in the previous Chapters, the Ecology criteria include potential impact of the different route corridors on a range of considerations.

Cavan-Monaghan Study Area (CMSA):

No significant impacts are likely to arise to designated sites including Natura 2000 sites from any route corridor option.

In relation to undesignated significant habitats and (indirectly) fisheries:

- ***Route Corridor Option A*** - crosses potentially more cutover bog sites (High Local / County significance) compared to other route corridor options. However, relatively more sensitive specific habitats within these sites, such as (priority) habitats listed in the EU Habitats Directive, can be avoided;

- ***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; hence potential impacts to hedgerows are likely to be lower on this corridor compared to the longest Route Corridor Options A and Route Corridor Option C; and

- ***Route Corridor Option C*** - includes more wetland and riparian / aquatic (fishery) areas and hence in terms of habitats and fisheries has higher potential risks compared to Route Corridor Options A and B. Wetland habitats and riparian/aquatic areas are considered to be more sensitive to potential impacts compared to other described habitats.

No significant difference exists between any of the options regarding designated sites including Natura 2000 sites from any route corridor option.

In terms of undesignated habitats and fisheries, Route Corridor Option B is favoured due to it being the shortest route and having less potential impacts to sensitive habitats particularly bog sites. This is followed by Route Corridor Option A, while Route Corridor Option C is potentially the 'Less Preferred' option.

In respect of Whooper Swans (and other wildfowl), the re-evaluation finds that:

- ***Route Corridor Option A -*** has more sites utilised by Whooper Swans relative to the other route corridor options, although many of these sites are >2 km from this route corridor option. A confirmed regular flightline crosses this route corridor option in the Ballintra / Lough Tonyscallon area. A significant flightline also occurs in the Comertagh Lough area. A number of other potential risk sites were monitored though no significant flightline activity has been noted. It should be noted that Route Corridor Option A was much more intensely studied for flightlines than Route Corridor Options B and C up to 2010 as it comprised the subject of the previous Meath-Tyrone 400 kV Interconnection Development proposal. All route corridor options were intensively surveyed for flightlines during Winter Survey Period No. 4, 2010/2011.

- ***Route Corridor Option B -*** is likely to have the lowest potential impact, as most of the sites are irregularly utilised or the focus of flying Whooper Swans and foraging areas were away from this route corridor option. The exception is 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 is generally avoided.

- ***Route Corridor Option C*** - has potentially the next lowest risks. Ten Whooper Swan sites were noted close to this route corridor, several of which (including Lough Patrick, Alina and Tullyvaragh Upper) being regularly utilised by larger flocks of Whooper Swan. The Muckno Mill Lough area had a potential irregular flightline 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), though this has not been confirmed to date during extensive surveys conducted this winter (2010/2011).

The more significant wetland sites in this region of Counties Monaghan and Cavan (e.g. Dromore lakes) are located to the west of all corridor options. Hence risks to waterfowl including Whooper Swan are effectively minimised at this stage through avoidance of relatively much more important areas.

Within the study area defined and based on the wintering bird surveys to date (2007 to 2011) - Route Corridor Option B is the 'More Preferred' option followed by Route Corridor Option C, followed by Route Corridor Option A.

In relation to Whooper Swans (and other wildfowl), as set out in Chapter 6 regardless of the conclusions of this Preliminary Re-evaluation Report, and indeed, which route corridor option is eventually selected, it is the case that suitable mitigation measures at particular locations can and will be developed in consultation with National Parks and Wildlife Service (NPWS) as part of the final line design.

In addition, 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 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 electricity line infrastructure; and

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

Meath Study Area (MSA):

In relation to undesignated significant habitats:

- ***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 which includes a lake and surrounding mixed woodland. It also crosses the Boyne and Blackwater cSAC 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 hence potential impact to hedgerows/linear woodland would be more significant compared to the other three route corridor options;

- ***Route Corridor Option 2*** - crosses two small areas of woodland which can be avoided. This route corridor option crosses the River Boyne and Blackwater cSAC at two points where impacts to riparian and aquatic (fisheries) habitats can be avoided. This is the second longest option hence potential impact to hedgerows (field boundaries) would be more significant than Route Corridor Options 3A and 3B and less than Route Corridor Option 1;

- ***Route Corridor Option 3A*** - crosses three small areas of woodland and a wetland which can be avoided though tree trimming would be required at some locations. This route corridor option crosses the River Boyne and Blackwater cSAC 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 hence impacts to hedgerows/ linear woodland would be expected to be less than on 3A and 3B; and

- ***Route Corridor Option 3B*** - crosses four small areas of woodland and a wetland. In general these areas are avoided, though tree trimming would be required at specific locations. This route corridor option crosses the River Boyne and Blackwater cSAC 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 hence impacts to hedgerows/ linear woodland would be expected to be less on Route Corridor Options 3A and 3B.

In terms of designated sites, habitat and fisheries Route Corridor Option 3A and/ or 3B are the 'More Preferred' option followed by Route Corridor Option 2, with Route Corridor Option 1 the 'Less Preferred'.

In respect of Whooper Swans the re-evaluation finds that:

- ***Route Corridor Option 1*** - is likely to have the lowest potential impact, as most of the sites noted (except Carnaross) are irregularly utilised or the focus of flying Whooper Swans and foraging areas 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 3 A -*** has potentially the next lowest risk for impacts. This option includes one significant flight line between Tara Mines Tailing ponds (as also does 3B) and a large range of sites in the Blackwater valley and environs; No other regular flight line was noted on this route though potential occasional foraging areas exist close to Cruicetown. 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. In addition a cluster of relatively irregular though consistent foraging sites in the Balrath/ Balgeeth area and flight activity noted highlighting that this option would be crossed. Significant displacement risks are likely to be low on this route.

- ***Route Corridor Option 3B*** - has the largest number of sites in its vicinity including regular roost sites at Tara Mines Tailings Pond, Newcastle Lough and Whitewood Lough. It also has a significant roost and foraging site close by at Cruicetown. Confirmed flightlines occur across this Route Corridor Option at two extensive locations including between Cruicetown and various sites including Whitewood/ Newcastle Loughs and between Tara Mines Tailing ponds and a large range of sites in the Blackwater valley and environs. Significant displacement risks are likely to be low on this route.

Within the study area defined and based on wintering bird surveys carried out over four winter survey periods to date (2007 to 2011) Route Corridor Option 1 is the 'More Preferred' Option, followed by Route Corridor Option 3A, followed by Route Corridor Option 2, followed by Route Corridor Option 3B

These surveys highlight that Whooper Swans are mobile in nature though key areas (roost sites) are evident particularly Cruicetown, Tara Mines Tailings Ponds, Headford Estate and foraging grounds in the Blackwater River Valley. Whatever route corridor option is selected mitigation measures can be put in place to ensure any potential impact are minimised as per standard international approaches and best practice. In addition further monitoring during all phases of the project will be implemented to determine site specific mitigation requirements if they arise.

As set out in Chapter 6 regardless of the conclusions of this Preliminary Re-evaluation Report, and indeed, which route corridor option is eventually selected, it is the case that suitable mitigation measures at particular locations can and will be developed in consultation with NPWS as part of the final line design.

In addition, the proposed overhead line development 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, 72 km of 110 kV, 92 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 significantly more important Whooper Swan sites (Dromore River Wetlands), located west of the study area; and

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

7.3.2 Landscape

The landscape criteria include potential impact of the different route corridors on a range of considerations including: Protected Views and Prospects, Designated Areas of High Scenic/Amenity Value, Non-Designated but Scenic Landscapes and Landscape Character. It should be noted that any transmission line will be generally visible when seen in close proximity, but visibility will generally diminish as the distance increases.

In addition, the proposed OHL development must always be considered in the context of the extent of the existing wirescape network across the study area.

Cavan-Monaghan Study Area (CMSA):

In summary:

- ***Route Corridor Option A*** - is the second longest route. It will have least visibility as it is located on less elevated underlying topography than Route Corridor Option B;

- ***Route Corridor Option B*** - is the shortest route corridor. However, it will be the most conspicuous in the wider landscape as it is located along the most elevated underlying topography of the three route corridor options; and

- ***Route Corridor Option C*** - is the longest route and also has the greatest capacity to affect sensitive landscapes and regionally significant landscape resources due to its proximity to Lough Muckno.

Having regard to landscape criteria Route Corridor Option A is the 'More Preferred' followed by Route Corridor Option B, with Route Corridor Option C being the 'Less Preferred'.

Regardless of the conclusions of this Preliminary Re-evaluation Report, and indeed, which route corridor is eventually selected, it is the case that it is generally difficult to adopt mitigation measures to minimise the potential visual impact of an overhead 400 kV transmission line. The only realistic measure in this regard is by appropriate routing to avoid or minimise potential visual impact.

Meath Study Area (MSA):

In summary:

- ***Route Corridor Options 1 and 2*** - are the longest route corridors. Both route corridors cross a slightly larger area of higher ground resulting in potentially higher visibility of a transmission line over a wider area. They also cross a higher number of roads with more potential for visibility of the transmission line at close proximity;

- ***Route Corridor Option 3A*** - is similar to 3B but passes close to a scenic viewpoint at Kilbeg, close to Whitewood Lough and avoids a demesne landscape at Brittas; and

- ***Route Corridor Option 3B*** - is the shortest route corridor, along with route corridor 3A. Route corridor 3B crosses the least amount of higher ground, and has the least number of road crossings (i.e. main opportunities for viewing the proposal at close range), as well as having the least number of major river crossings. It however passes a demesne landscape at Brittas and passes close to Whitewood Lough.

Having regard to landscape criteria Route Corridor Options 3A and 3B are the 'More Preferred' followed by Route Corridor Option 1 and 2 being the 'Less Preferred'.

Again, it is the case that it is generally difficult to adopt mitigation measures to minimise the potential visual impact of an overhead 400 kV transmission line. The only realistic measure in this regard is by appropriate routing to avoid or minimise potential visual impact.

7.3.3 Cultural Heritage

The cultural heritage criteria 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 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. At this stage of the design process it is possible to adjust the design of the line 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, where possible, as the principal mitigation measure, will ensure that direct impacts across all possible route corridors 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, therefore there may be residual indirect impacts on sites/features of Cultural Heritage.

As the vast majority of direct impacts can be mitigated through design, this re-evaluation focuses on considering the potential for indirect impacts.

Cavan-Monaghan Study Area (CMSA):

There are no World Heritage Sites and no Areas of Significant Archaeological Interest within close proximity to any of the potential route corridors. There are numerous Records of Monuments and Places (RMP) and Sites and Monuments Records within the representative distance of 2 km of each of the route corridor options. As previously advised, for the purpose of this particular analysis distances are to be measured from the centre line of the indicative line route within each corridor option.

- ***Route Corridor Option A*** –There are no National Monuments and two Scheduled Monuments within a representative distance of 5 km from 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 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 this route corridor option. This also has a higher number of architectural sites within the representative distance of2 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 a potential for significant impacts upon setting, with Route Corridor Option C being the 'Less Preferred'.

In overall terms, there are no significant differences between Route Corridor Option A and B, with the 'Less Preferred' option being Route Corridor Option C.

Meath Study Area (MSA):

In summary:

- ***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 Llyods, St Ciaran's Well, Castlekeeran Church & Crosses,) identified during the windscreen survey where there was a potential for significant impacts upon setting;

- ***Route Option 2*** is less preferred as there are 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 were found to be 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 was 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 were found to be three (Bective Abbey, Kilbeg Graveyard, Cruicestown Church & Cross) where there was a potential for significant impacts upon setting; and

- ***Route Corridor Option 3B*** is the more preferred option as it 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 to the other route corridor options, only one site was noted, namely Bective Abbey, where there was a potential for significant impacts upon setting. It is noted that the route corridor passes through 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.

7.4 Conclusions

The emerging preferred route corridor for the Interconnection Development within the identified mid-country study area, presents what is considered to constitute the most appropriate balance between the various technical, environmental and community evaluation criteria, as re-evaluated above. In this regard, while the re-evaluation process concentrates on the key environmental criteria, as set out in Section 7.1, 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 re-evaluation process.

The majority of potential impacts can be mitigated as part of the detailed design. However having regard to the nature of an OHL project, there will be some potentially significant visual impacts which cannot be mitigated. Appropriate route selection, and the avoidance of the most sensitive visual receptors, is the only meaningful mitigation measure to mitigate against potential landscape impacts. In addition, 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;.

Ecological constraints for both study areas include wintering birds, which are protected by European Union and Irish legislation. However, appropriate mitigation measures, based on the results of wintering bird surveys, which have been carried out over a number of years, can and will be developed in consultation with NPWS as part of the final line design.

In summary, in the CMSA, **Route Corridor Option A** is the preliminary 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 can be mitigated. Similarly, in the MSA, **Route Corridor Option 3B** is the preliminary preferred option, as it is considered to create the lowest potential visual impact on the landscape, with all other potential significant environmental impacts capable of being mitigated.

Accordingly, Route Corridor Option A and Route Corridor Option 3B is the preliminary recommendation of the consultants as the preferred route corridor for the-North South Interconnection Development.

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' and less preferred' relevant to a particular criteria compared to the 2007 Route Constraints Reports and the 2009 Route Corridor Evaluation Document. However, the overall conclusions of the re-evaluation process are generally consistent with the conclusions of these documents.

8 PRELIMINARY INDICATIVE LINE ROUTE

8.1 Background to the Identification of a Preliminary Indicative Line Route

As previously noted, the original route identification process carried out in respect of the 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 led to confirmation of that previous development proposal. This includes technical, environmental, planning and other reports (as described previously in this Report), and also includes 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). It has also had careful regard to the considerable volume of written and oral submissions which were presented by Prescribed Bodies, other stakeholders, and the general public, during the previous application.

The current re-evaluation process has facilitated the consultants in undertaking a process to address issues/information raised since December 2009, which are considered relevant for this phase i.e., the preliminary identification of an indicative line route within the identified preferred route corridor. Perhaps unsurprisingly, given the extent of detailed study and assessment that informed the previous application for statutory approval of the Meath-Tyrone 400 kV Interconnection Development, the preliminary indicative line route identified in this Preliminary Re-evaluation Report is broadly similar to the previously proposed line route, but incorporating localised modifications as follows:

- A modification to the line route in order to take account of the construction of new houses occurring since the preparation and submission of the previous application in December 2009; and

- Modification arising as a result of the decision not to proceed with the intermediate substation as part of the new application for approval of the Interconnection Development.

These recommended modifications are illustrated in Figure Map 9 (CMSA) and Map 9 (MSA) which shows the overall indicative route corridor with the amended line route therein.

Other potential localised modifications are matters that are best dealt with in consultation with the competent authorities, and in reference to the conclusions of ongoing studies. The actual necessity or appropriateness of such potential modifications will therefore be confirmed at a later stage in the overall progression towards an application for the North-South Interconnection Development.

At this stage in the re-evaluation process, EirGrid and its consultants are of the consideration that on the basis of the re-evaluation of updated environmental constraints and other information, a viable and environmentally acceptable preliminary indicative line route for a 400 kV OHL exists and there are no material implications which would warrant the use of underground cable (UGC) along any part of the preliminary indicative line route other than on the identified section within Woodland Substation.

Overall, it should be noted that the current line route remains indicative for the purposes of this Preliminary Re-evaluation Report. The preferred project solution will emerge from the re-evaluation process (as outlined in Section 1.2), and will follow further detailed design and survey work, in consultation with An Bord Pleanála, Prescribed Bodies, other stakeholders, landowners and the general public.

8.2 Summary of Preliminary Indicative Line Route

A summary description of the preliminary indicative line route and how it compares with the original line route which was brought forward to planning is set out below:

Cavan-Monaghan Study Area (CMSA):

In the CMSA the preliminary indicative line route is broadly similar to the original line route (i.e., Route Corridor Option A), as outlined below:

- The line route commences at the NIE line route at the border crossing points north-east of Clontibret;
- The line route continues in a southerly direction circumventing Drumgristin and Coogan's Loughs 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 Annayalla;
- 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 has been modified slightly in order to connect the CMSA with the MSA identified line route as an intermediate substation is not required within the next 10 years; and

- The CMSA connects with the MSA identified line route in the vicinity of the townland of Clonturkan Co. Cavan;

This is illustrated on Figure 10 and Map 9 (CMSA) in Appendix A.

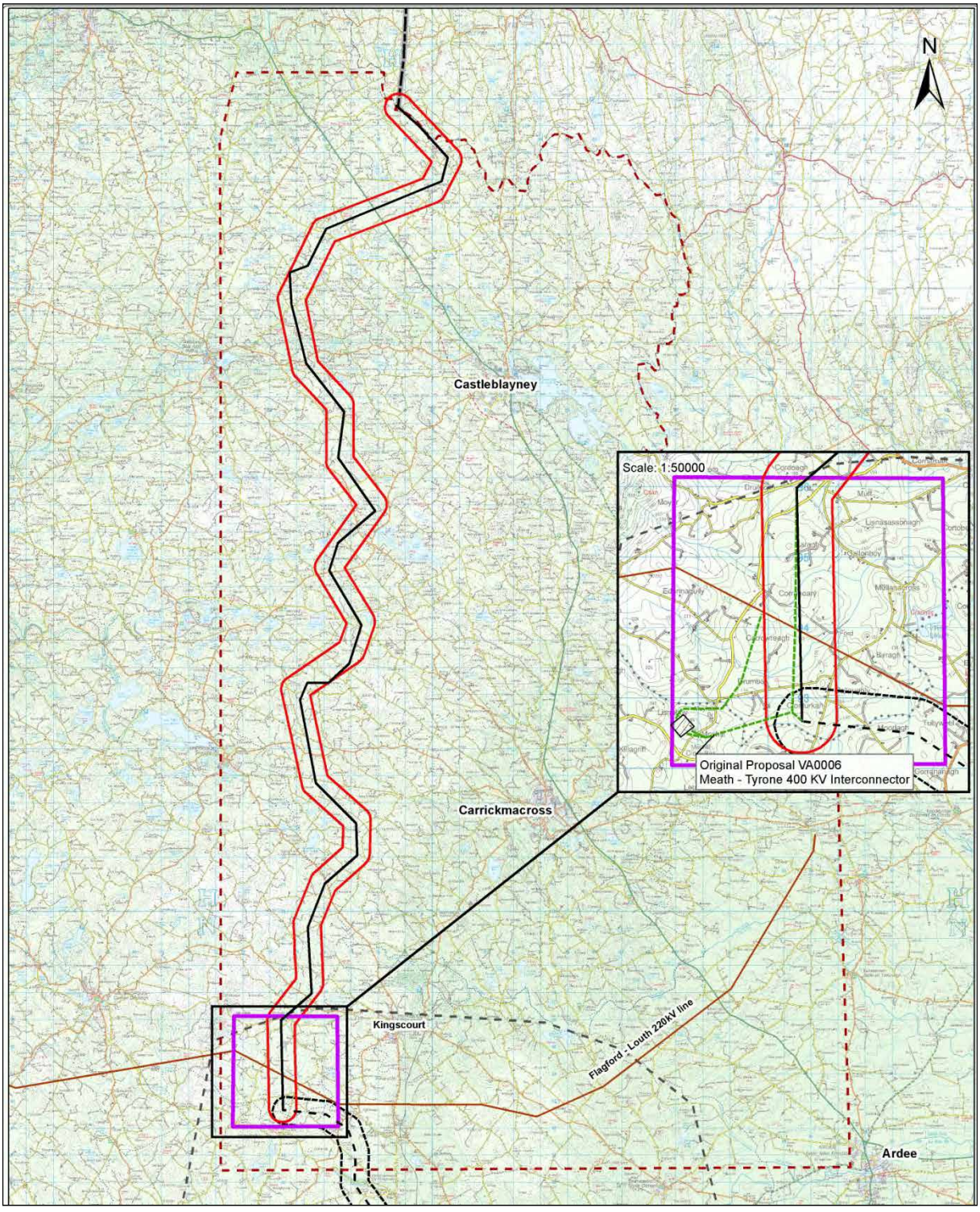


Figure 10: Preliminary Indicative Line Route (CMSA)

Meath Study Area (MSA):

In the MSA the preliminary indicative line route (i.e., Route Corridor Option 3B) is similar to the original line route with a small number of localised alterations, as outlined below:

- The route has been modified slightly in order to connect the MSA 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;
- Route 3B 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, it 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 and Bective Abbey which 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 of 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 then 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 11 and Map 9 (MSA) in Appendix B.

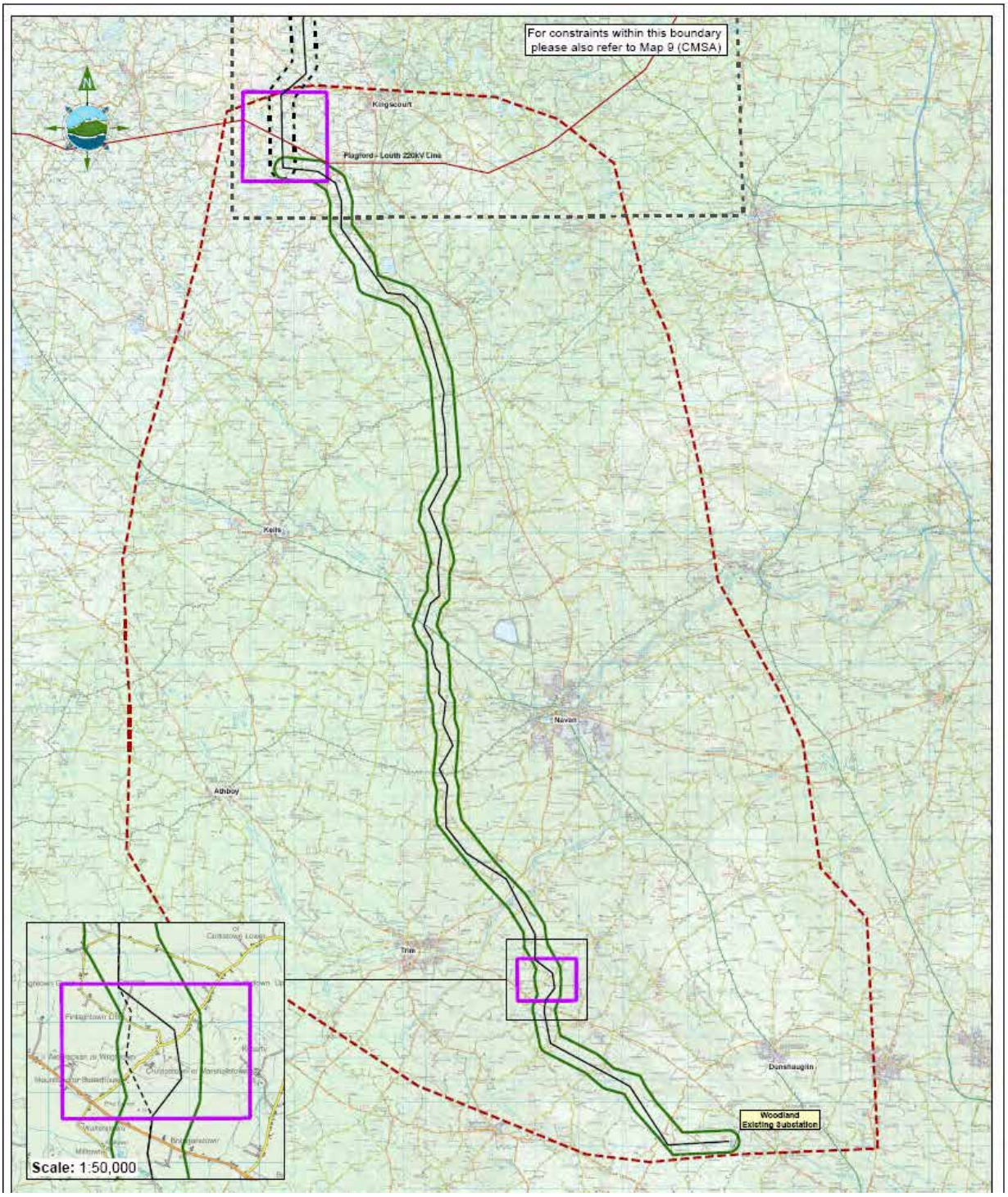


Figure 11: Preliminary Indicative Line Route (MSA)

9 OVERALL CONCLUSIONS OF THIS PRELIMINARY RE-EVALUATION REPORT

- There remains a clear and immediate strategic need for an additional high-capacity North-South interconnector.

- There remains a clear need for a reinforcement of the transmission network in the north-east area of the Republic of Ireland.

- 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.

- There remains an identified need for a 400 kV intermediate substation in the vicinity of the point of intersection with the existing Flagford-Louth 220 kV OHL. That need is however not expected to arise for at least another ten years. In accordance with proper strategic planning and sustainable development, therefore it has been decided that such a substation shall not be included in the new application for approval of the Turleenan-Woodland 400 kV Interconnection Development.

- In the Republic, the 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 and reported. Route corridor options have also been reviewed and qualitatively rated and re-evaluated. On the basis of this re-evaluation the overall preferred route corridor with an amended preliminary indicative line route which EirGrid's consultants are recommending be brought forward to the next phase for the Interconnection Development i.e., route confirmation, detailed design, preparation of EIS and planning application is Route Corridor Option A and Route Corridor Option 3B (as summarised in section 8.2). The preliminary indicative line route identified is broadly similar to that previously proposed line route, but incorporating localised modifications as follows:

    - A modification to the line route in order to take account of the construction of new houses occurring since the preparation and submission of the previous application in December 2009; and

    - Modification arising as a result of the decision not to proceed with the intermediate substation as part of the new application for approval of the Interconnection Development.

These recommended modifications are illustrated in Figure Map 9 (CMSA) and Map 9 (MSA) which shows the overall indicative route corridor with the amended indicative line route therein.

Other potential localised modifications are matters that are best dealt with in consultation with the competent authorities, and in reference to the conclusions of ongoing studies. The actual necessity or appropriateness of such potential modifications will therefore be confirmed at a later stage in the overall progression towards an application for the North-South Interconnection Development.

At this stage in the re-evaluation process, EirGrid and its consultants are of the consideration that on the basis of the re-evaluation of updated environmental constraints and other information, a viable and environmentally acceptable preliminary indicative line route for a 400 kV OHL exists and there are no material implications which would warrant the use of underground cable (UGC) along any part of the preliminary indicative line route other than on the identified section within Woodland Substation.

Overall, it should be noted that the current line route remains indicative for the purposes of this Preliminary Re-evaluation Report. The preferred project solution will emerge from the re-evaluation process (as outlined in Section 1.2), and will follow further detailed design and survey work, in consultation with An Bord Pleanála, Prescribed Bodies, other stakeholders, landowners and the general public.

LIST OF ABBREVIATIONS

ABP	An Bord Pleanála
ACA	Architectural Conservation Areas
ASSI	Area of Special Scientific Interest
CBSA	Cross Border Study Area
CGS	County Geological Sites
CHS	Cultural Heritage Site
CMSA	Cavan-Monaghan Study Area
cSAC	candidate Special Area of Conservation
EIS	Environmental Impact Statement
ES	Environmental Statement
GSI	Geological Survey of Ireland
HVAC	High Voltage Alternating Current
HVDC	High Voltage Direct Current
IAA	Irish Aviation Authority
IGI	Institute of Geologist of Ireland
LCA	Landscape Character Areas
LCA	Landscape Character Assessment
MLCA	Meath Landscape Character Assessment
MSA	Meath Study Area
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
pNHA	proposed Natural Heritage Areas
RMP	Records of Monuments and Places
RPS	Record of Protected Structures
ROI	Republic of Ireland
RPA	Registered Protected Areas
RPS	Registered Protected Structures
SAC	Special area of Conservation
SEM	Single Electricity Market
UGC	Underground Cable

REFERENCES / BIBLIOGRAPHY

References in order as they appear in the text

CHAPTER 1

NIE. Planning Application to the Northern Ireland Planning Service (Ref. O/2009/0792/F).

EirGrid. Planning Application to An Bord Pleanála (An Bord Pleanála Reference VA0006)

CHAPTER 2

DCENR. The All-Island Energy Market, A Development Framework (November 2004). Publically available from http://www.dcenr.gov.ie.

Irish Government. The National Development Plan 2007-2013 (2007). Publically available at http://www.ndp.ie.

DCENR. Delivering a Sustainable Energy Future for Ireland–White Paper (March 2007). Publically available from http://www.dcenr.gov.ie.

NIE. Tyrone – Cavan Interconnector Environmental Statement (2009)

EU. Single Electricity Market Directive (2003/54/EC). Publically available from http://europa.eu/legislation.

EU. Safeguarding Security of Electricity Supply Directive (2005/89/EC). Publically available from http://www.energy.eu/directives.

EU. Renewables Directive (2001/77/EC). Publically available from http://eur-lex.europa.eu.

EU. National Renewable Energy Action Plans Directive (2009/28/EC). Publically available from http://www.energy.eu/directives.

EU. Decision 1364/2006/EC of the European Parliament and Council. Publically available from http://eur lex.europa.eu.

RPS Planning & Environment for EirGrid Plc. Strategic Issues Review (November 2008). Publically available from http://www.eirgrid.com.

EirGrid. Generation Adequacy Report 2009 – 2015 (July 2009). Publically available form www.eirgrid.com).

EirGrid and SONI. All-Island Generation Capacity Statement 2011 – 2020. Publically available from www.eirgrid.com

CHAPTER 3

Statutory Instrument Number 445/2000. Publically available from http://www.irishstatutebook.ie.

EirGrid Plc, Meath-Tyrone 400 kV Interconnector Development- Environmental Impact Statement, (2009). Publically available from www.eirgrid.com.

Ecofys. Study on the Comparative Merits of Overhead Electricity Transmission Lines versus Underground Cables (2008). Publically available from http://www.dcenr.gov.ie.

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). Publically available from www.eirgrid.com.

Transgrid Solutions Inc. Investigating the Impact of HVDC Schemes in the Irish Transmission Network (2009). Publically available from www.eirgrid.com.

UCTE. UCTE Statistical Yearbook. (2000 and 2009). Publically available from www.ucte.org.

Secretary General of UCTE. Letter from the Secretary General of UCTE to APG (the Austrian Power Grid Company) (2008). Publically available fromhttp://www.eirgrid.com/aboutus/publications/).

ENTSO-E. Ten Year Network Development Plan 2010 – 2020 (2010). Publically available from www.entsoe.eu.

Cigré. Update of Service Experience of HV Underground and Cable Systems, ISBN 978 (2009). Publically available from Cigré (http://www.cigre.org) on request.

Nexans. Web page content. Publically available from www.nexans.com/eservice/Corporate-en/navigatepub_0_-28532/Nexans_wins_contract_for_the_Malta_to_Sicily_power.html.

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).

ENTSO-E and Europacable. Joint Paper - Feasibility and Technical Aspects of Partial Undergrounding of Extra High Voltage Power Transmission Lines (December 2010). Publically available from http://ec.europa.eu/energy.

CHAPTER 4

RPS Planning & Environment for EirGrid Plc. Strategic Issues Review (November 2008). Publically available from http://www.eirgrid.com.

EirGrid. Meath-Tyrone 400 kV Interconnection Development Environmental Impact Statement (2009). Publically available from http://www.eirgrid.com.

ESBNG: Kingscourt – Woodland 400 kV Feasibility Study (2005). Publically available from

www.eirgrid.com.

Socoin/Tobin Response to An Bord Pleanála – Kingscourt to Woodland Route Comparison Report (December 2008). Publically available from www.eirgrid.com.

CHAPTER 5

ESBI and AOS Planning. Route Constraints Report (September 2007). Publically available from www.eirgrid.com.

ESBI and AOS Planning. Route Constraints Report (September 2007) Addendum Report (May 2008). Publically available from www.eirgrid.com.

Socoin and TOBIN Consulting Engineers. Constraints Report 1 (July 2007). Publically available from www.eirgrid.com.

Socoin and TOBIN Consulting Engineers. Constraints Report 1 (July 2007) Addendum Report (May 2008). Publically available from www.eirgrid.com.

National Roads Authority (NRA). 2010 Project Management Guidelines. Publicly available from www.nra.ie.

Foss, P. and Crushell, P. Monaghan Fen Survey (2008).

National Roads Authority (NRA). Guidelines for Ecological Assessment of Road Schemes (2009). Publicly available from www.nra.ie.

Monaghan County Council. Monaghan County Development Plan 2007 – 2013 (2007). Publically available from www.monaghancoco.ie.

Cavan County Council. Cavan County Development Plan 2008 – 2014 (2008). Publically available from www.cavancoco.ie.

Meath County Council. Meath County Development Plan 2007 – 2013 (2007). Publically available from www.meath.ie.

Meath County Council. Draft Tara Skryne Landscape Area Explanatory Document (2010). Publically available from www.meath.ie.

CHAPTER 6

ESBI and AOS Planning. Route Constraints Report (September 2007). Publically available from www.eirgrid.com.

Socoin and TOBIN Consulting Engineers. Kingscourt to Woodland Constraints Report Volume 1. (July 2007). Publically available from www.eirgrid.com.

ESBI and AOS Planning. Route Constraints Report (September 2007) ADDENDUM (May 2008).

Publically available from www.eirgrid.com.

Socoin and TOBIN Consulting Engineers. Kingscourt to Woodland Powerline Addendum Report 1 (May 2008). Publically available from www.eirgrid.com.

Meath County Council. Meath County Development Plan 2007 – 2013 (2007). Publically available from www.meath.ie

Meath County Council. Draft Tara Skryne Landscape Area Explanatory Document (2010). Publically available from www.meath.ie

CHAPTER 6

ESBI and AOS Planning. Route Constraints Report (September 2007). Publically available from www.eirgrid.com.

Socoin and TOBIN Consulting Engineers. Kingscourt to Woodland Constraints Report Volume 1. (July 2007). Publically available from www.eirgrid.com.

ESBI and AOS Planning. Route Constraints Report (September 2007) Addendum (May 2008). Publically available from www.eirgrid.com.

Socoin and TOBIN Consulting Engineers. Kingscourt to Woodland Powerline Addendum Report 1 (May 2008). Publically available from www.eirgrid.com.

EirGrid Plc. Tyrone-Cavan Interconnector & Meath Cavan Transmission Circuit – Corridor Evaluation Document (March 2009). Publically available from www.eirgrid.com.

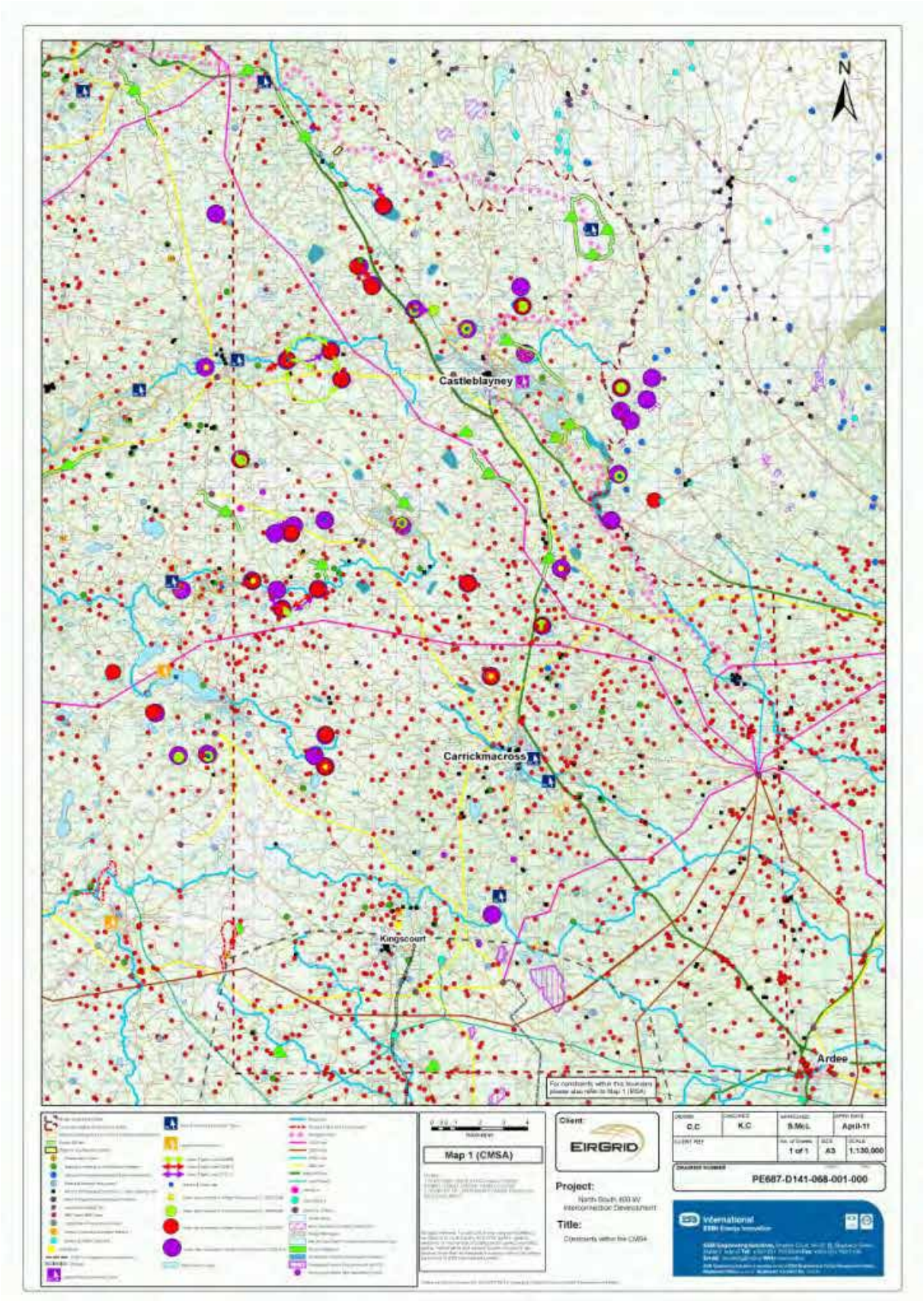
CHAPTER 7

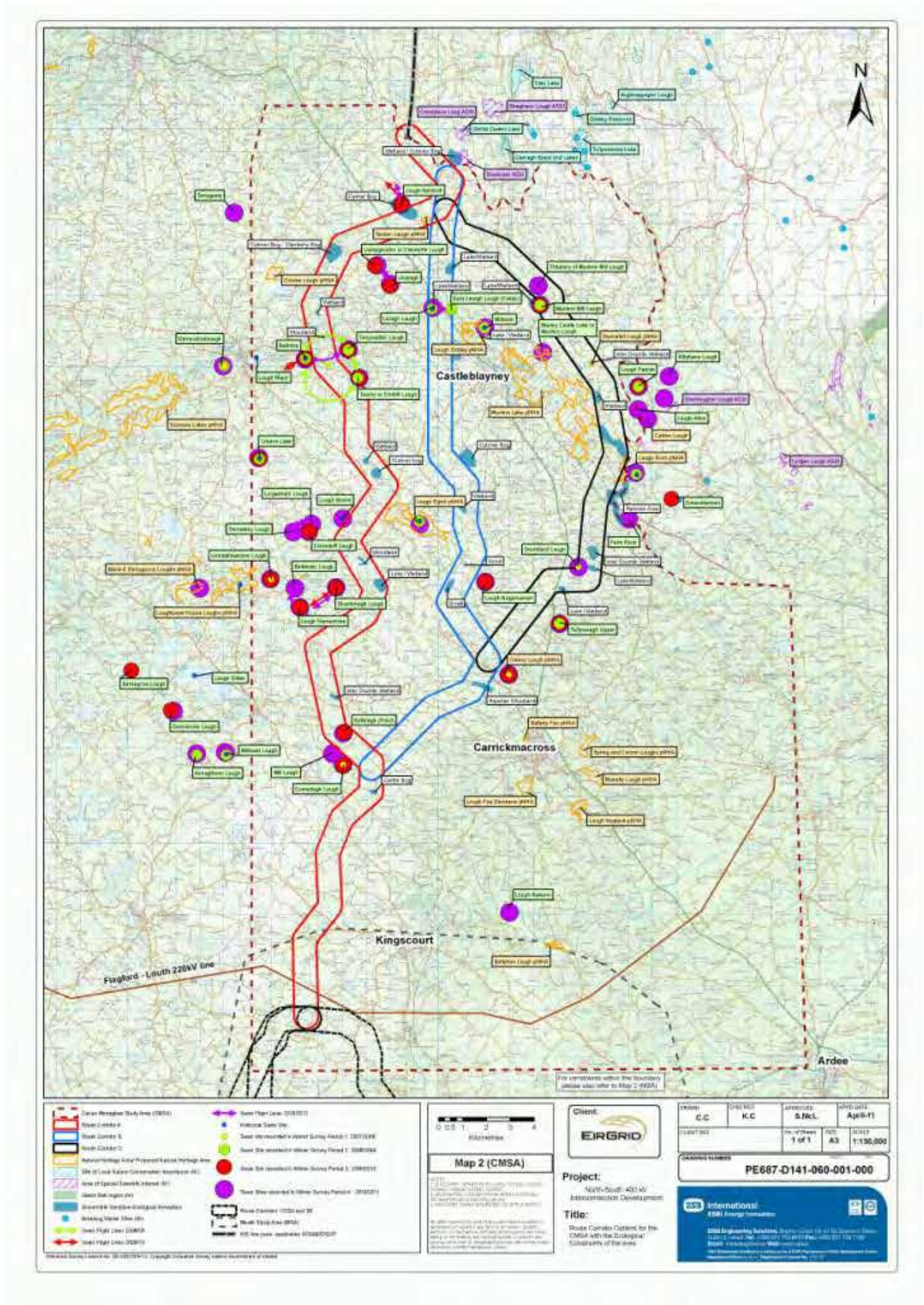
RPS on behalf of EirGrid Plc. Tyrone-Cavan Interconnector & Meath Cavan Transmission Circuit – Corridor Evaluation Document (March 2009). Publically available from www.eirgrid.com.

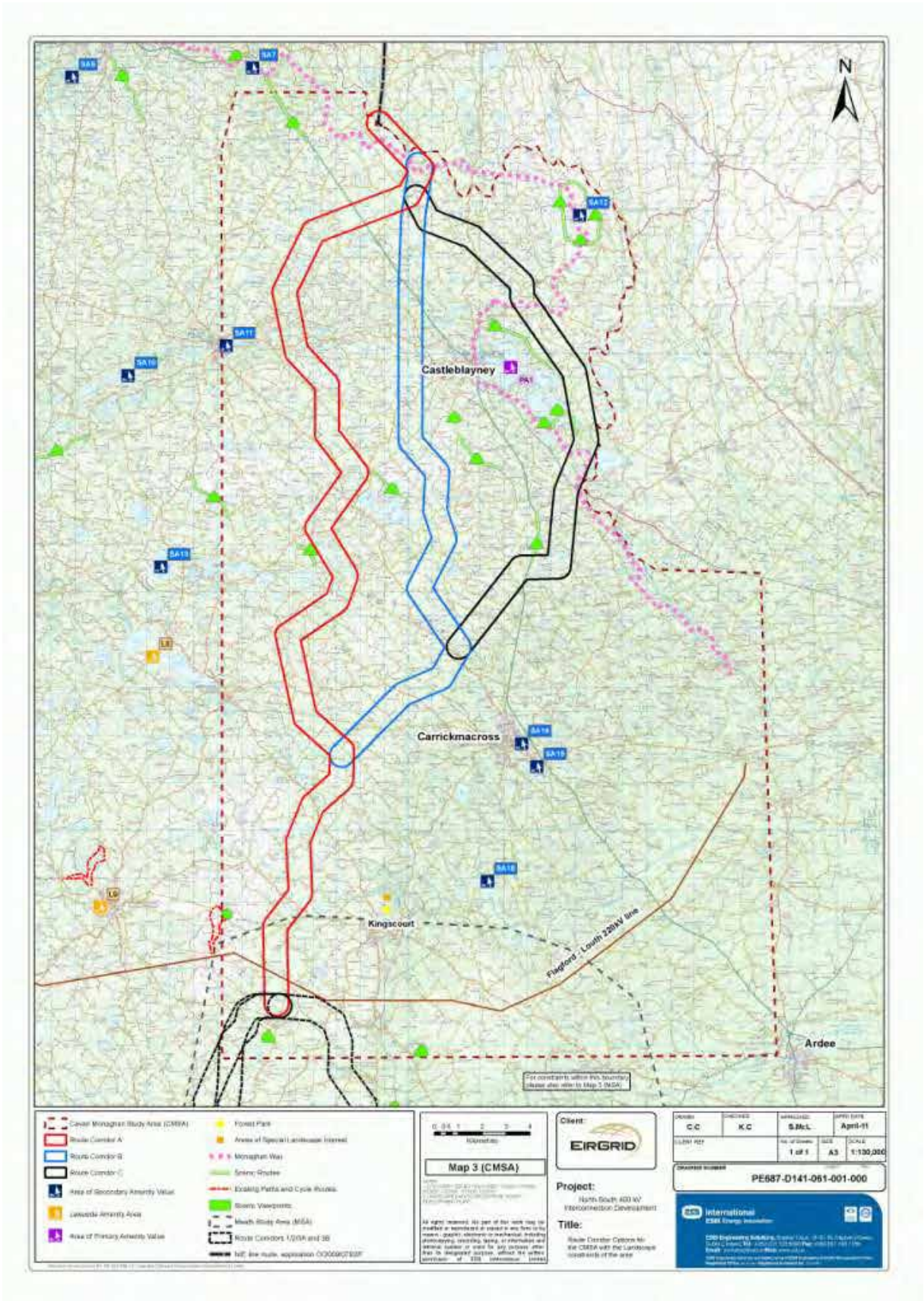
APPENDIX A

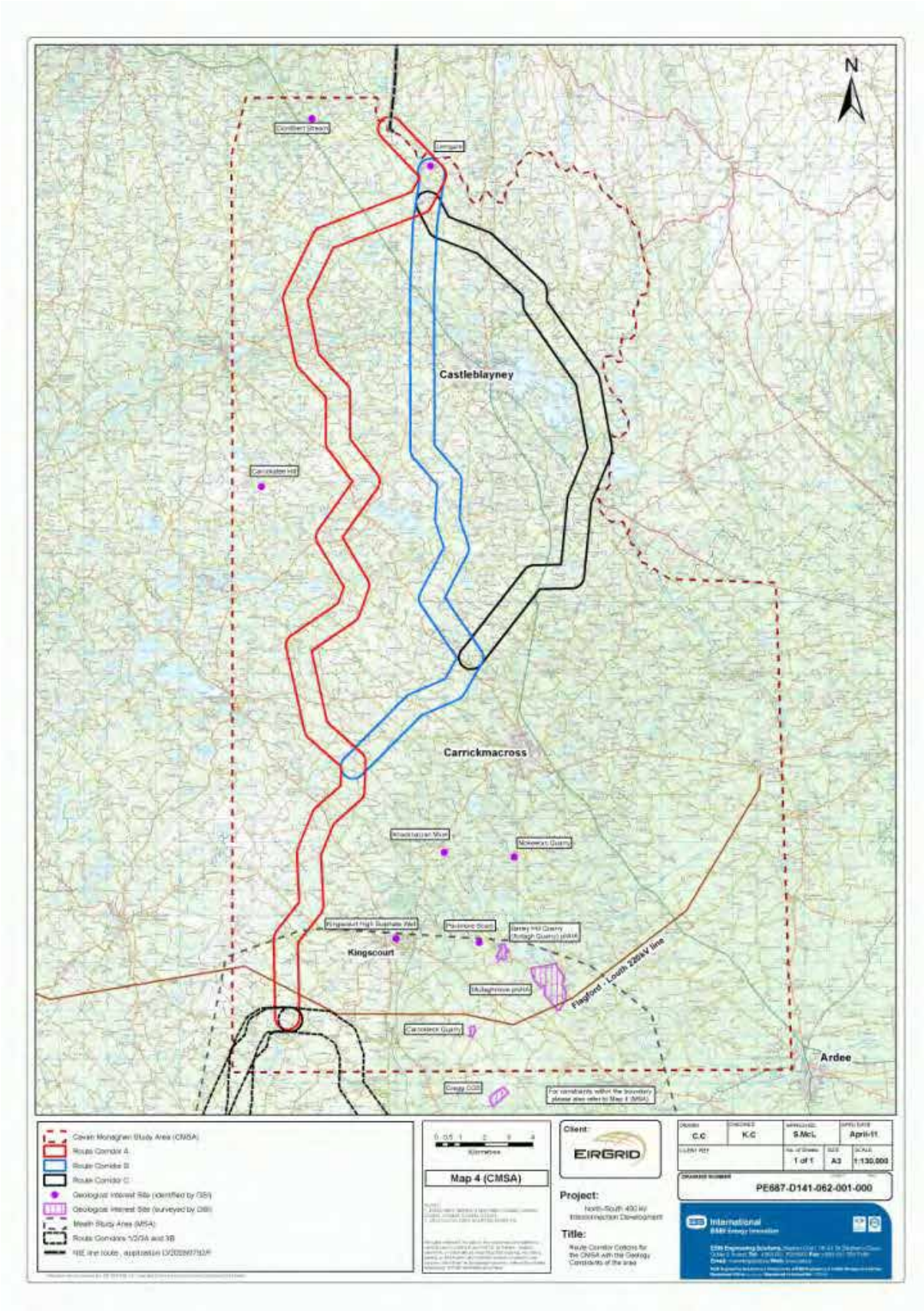
MAPS RELATING TO THE

CAVAN – MONAGHAN STUDY AREA (CMSA)


N
Castleblayney
Carrickmacross
Kingscourt
Ardee
Map 1 (CMSA)
EIRGRID
Project:
Title:
PE687-D141-068-001-000


N
Castleblayney
Carrickmacross
Kingscourt
Flagford - Louth 220kV line
Ardee
Map 2 (CMSA)
Client:
EIRGRID
Project:
North-South 400 kV Interconnection Development
Title:
Route Corridor Options for the CMSA with the Ecological Constraints of the area
PE687-D141-060-001-000


N
SA6
SA7
SA12
SA11
SA10
Castleblayney
SA13
SA14
SA15
Carrickmacross
SA16
Kingscourt
Flagford - Louth 220kV line
Ardee
Map 3 (CMSA)
EIRGRID
Project:
North South 400 kV Interconnection Development
Title:
PE687-D141-061-001-000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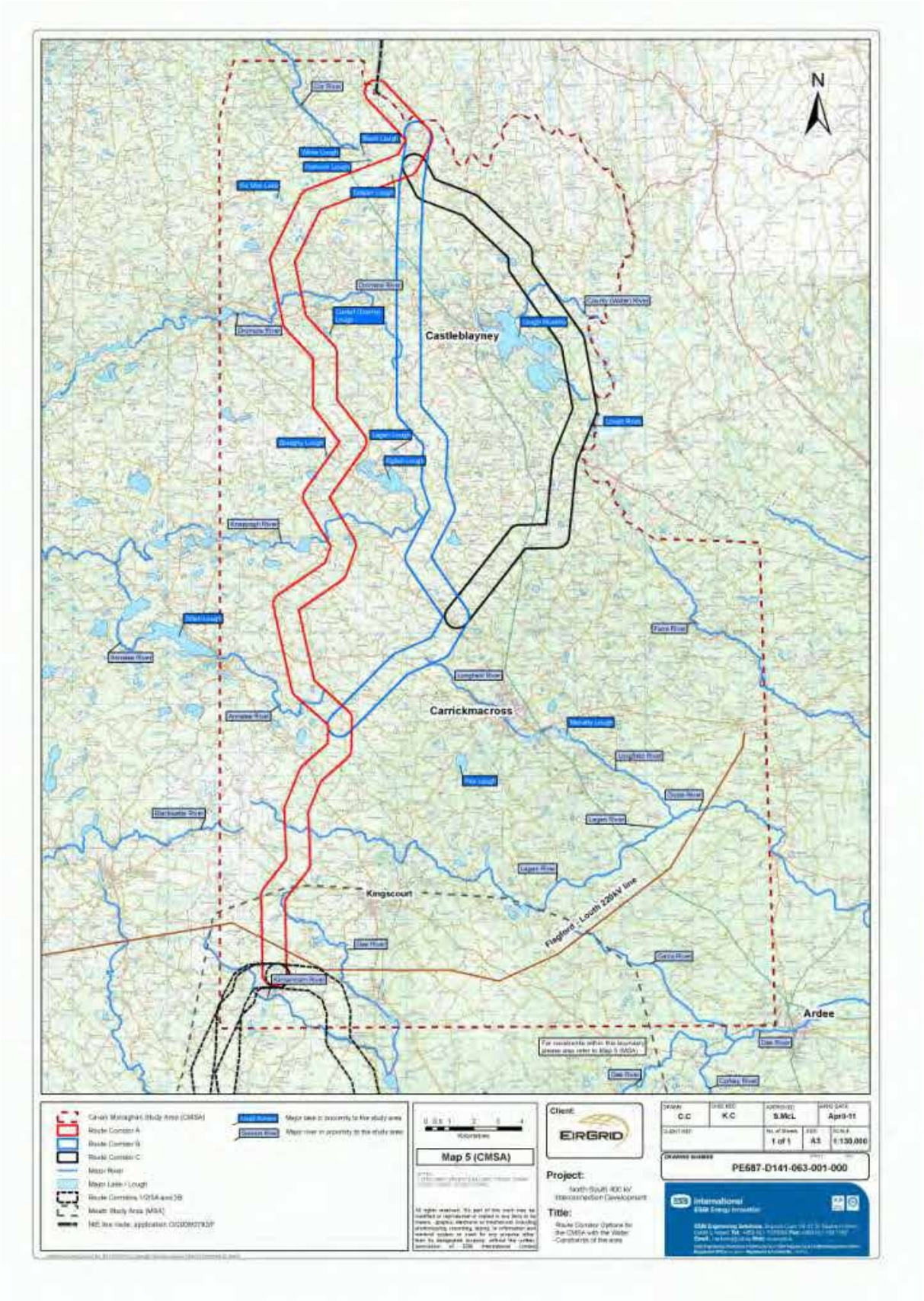
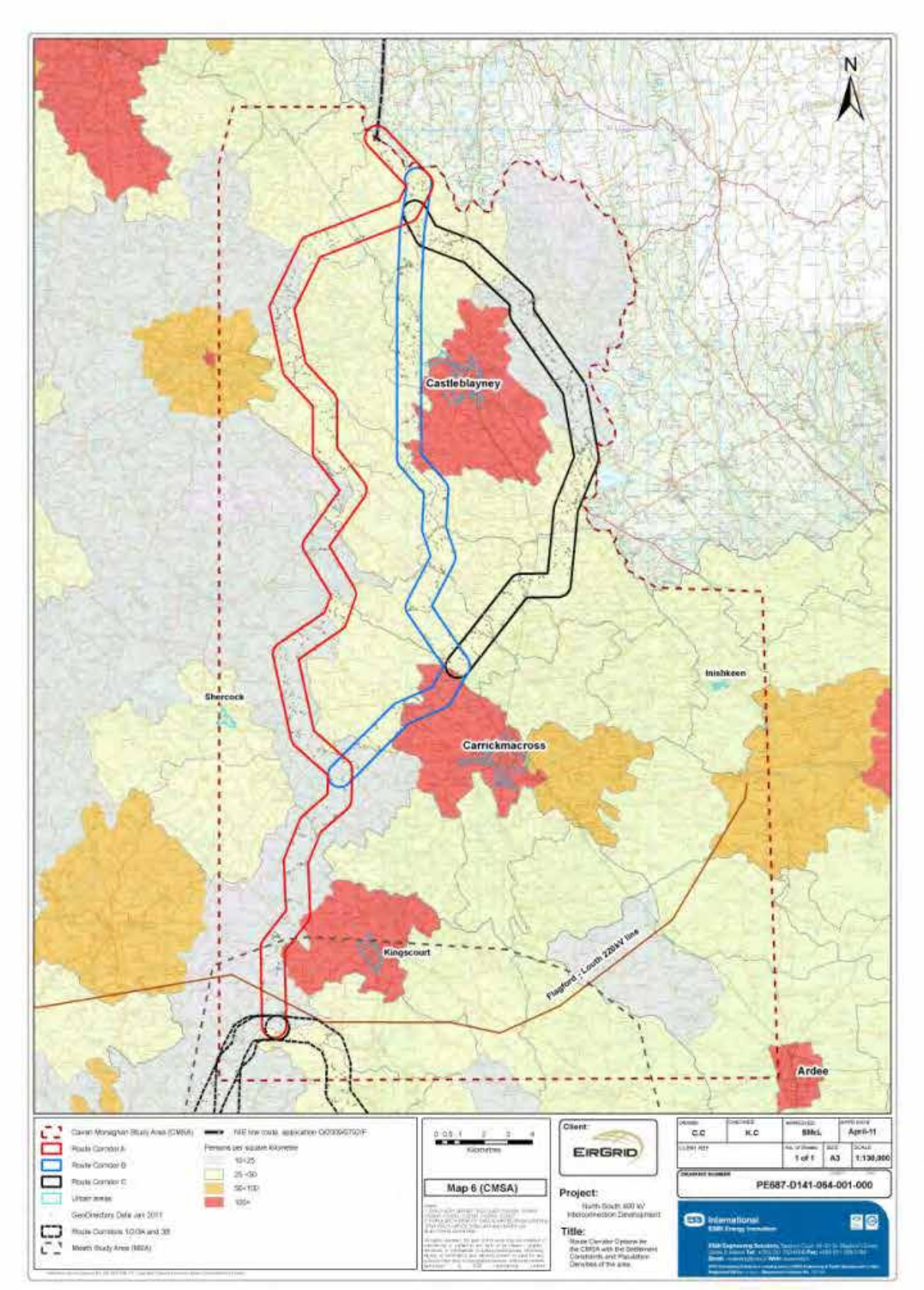
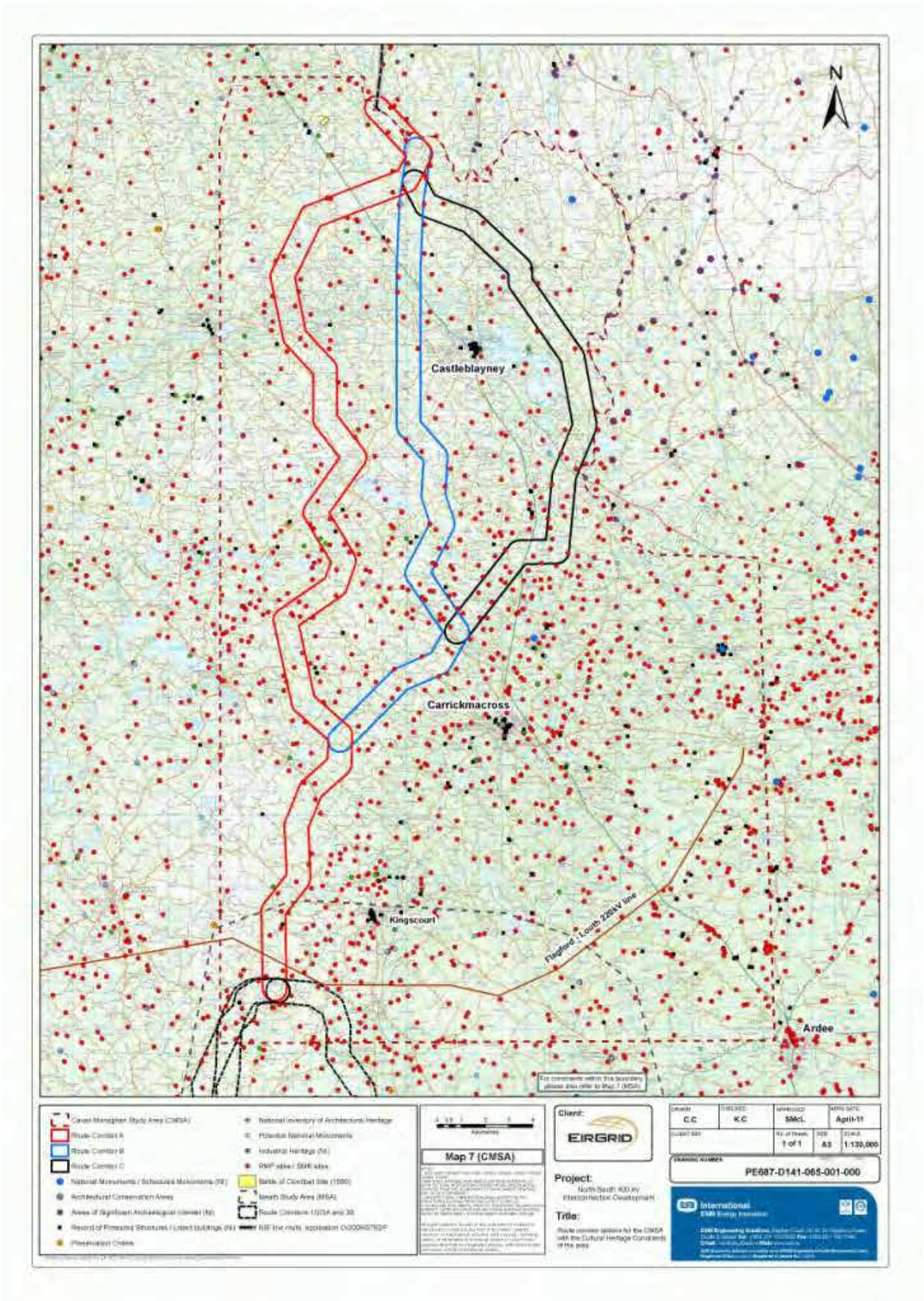
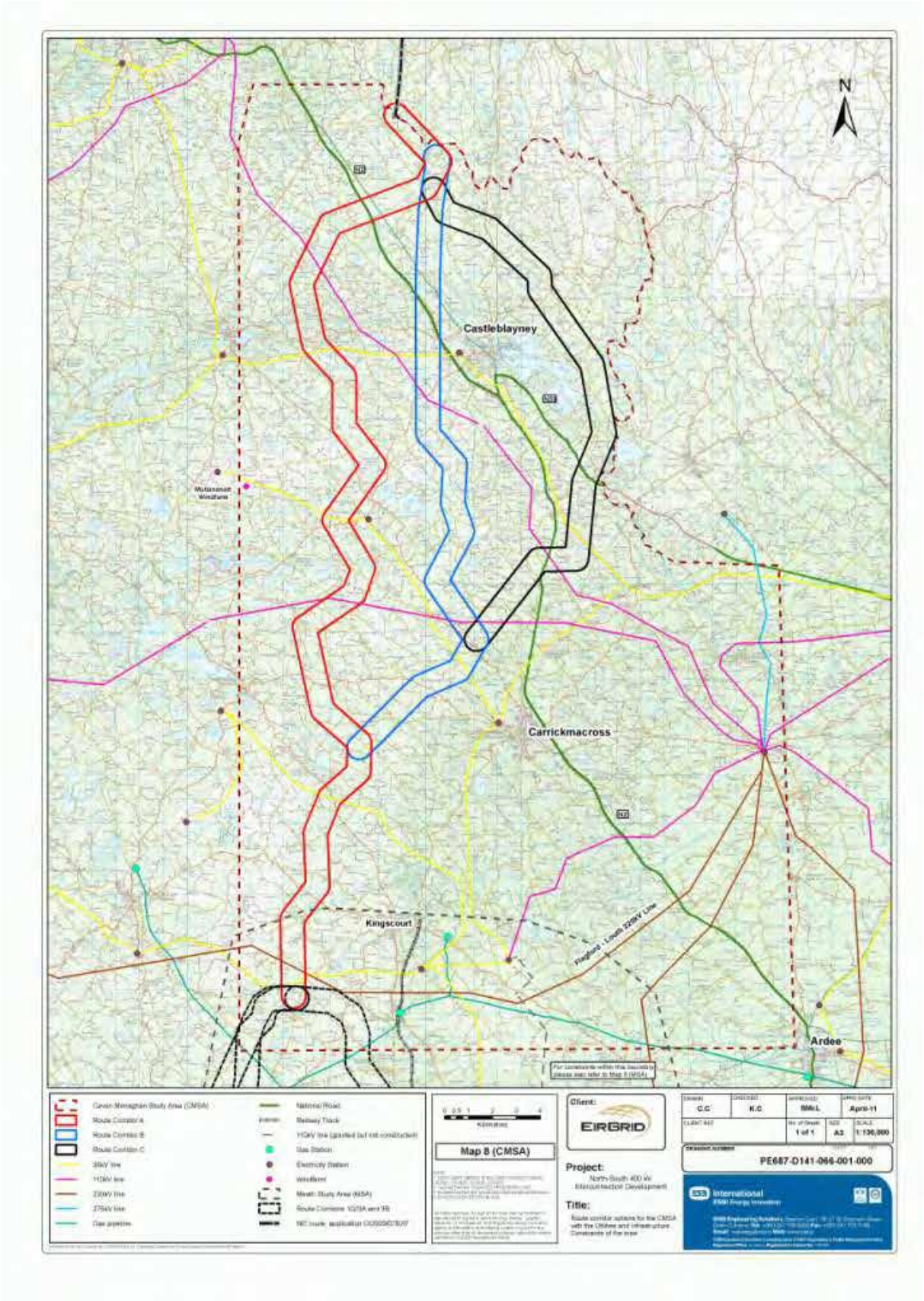
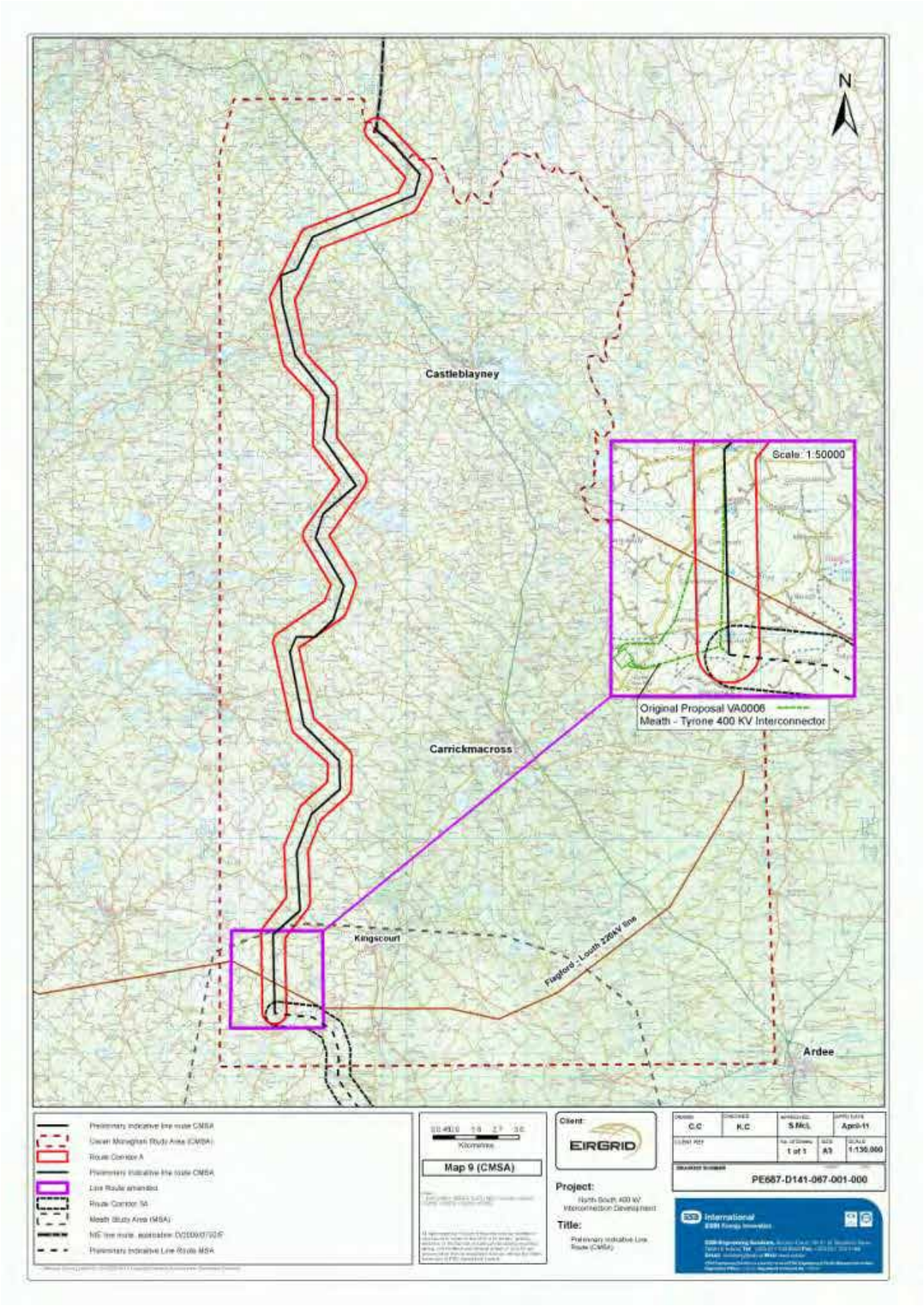
Castleblayney
Carrickmacross
Kingscourt
Ardee
Flagford - Louth 220kV line
Map 4 (CMSA)
EIRGRID
Project:
Title:
PE687-D141-062-001-000


N
Castleblayney
Carrickmacross
Kingscourt
Ardee
Flagford - Louth 220kV line
Map 5 (CMSA)
EIRGRID
Project:
Title:
PE687-D141-063-001-000


N
Castleblayney
Shercock
Carrickmacross
Inishkeen
Kingscourt
Ardee
Flagford - Louth 220kV line
Map 6 (CMSA)
EIRGRID
Project:
Title:
PE687-D141-064-001-000


N
Castleblayney
Carrickmacross
Kingscourt
Ardee
Flagford - Louth 220kV line
Map 7 (CMSA)
Client:
EIRGRID
Project:
Title:
PE687-D141-065-001-000

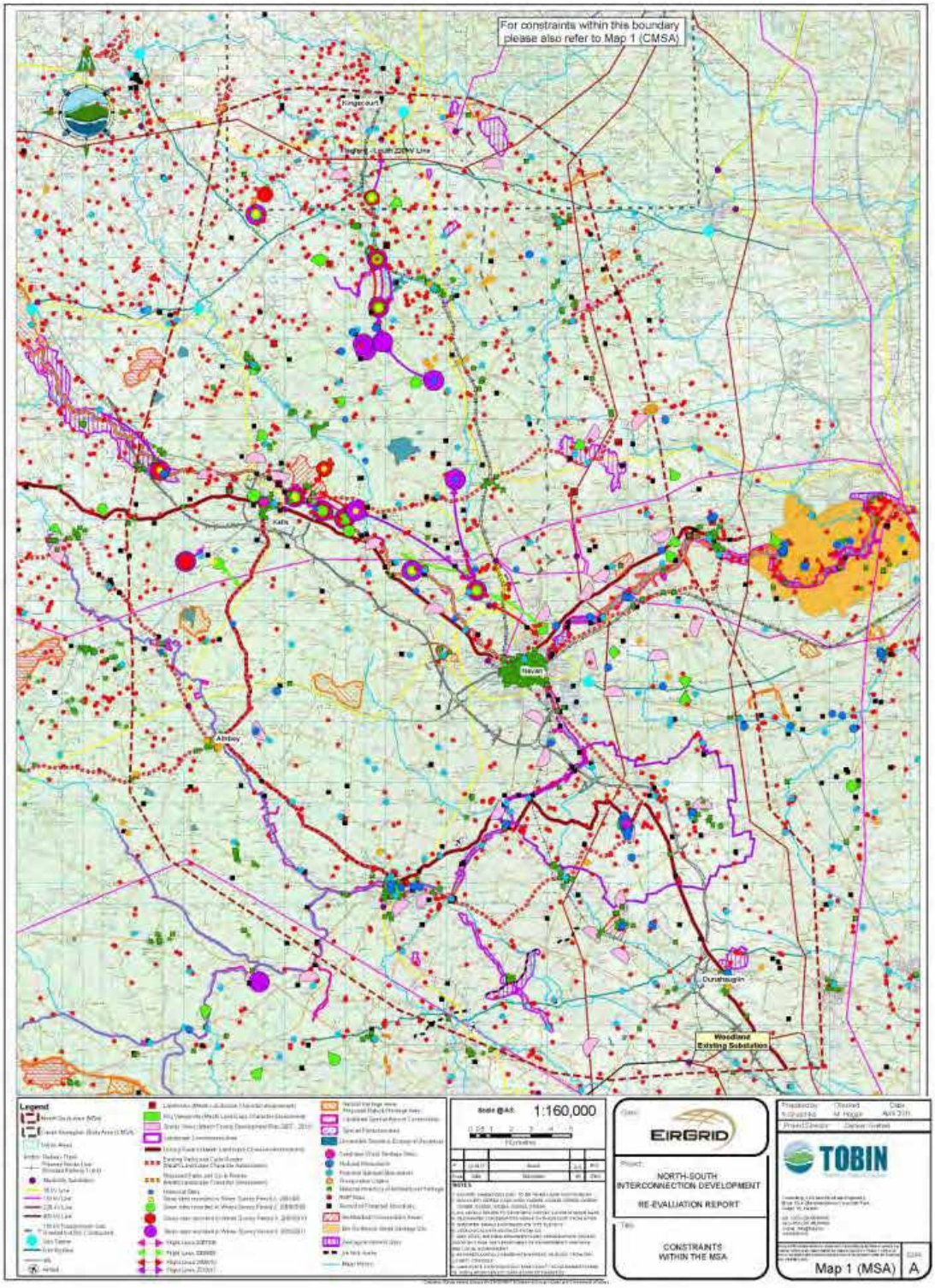

N
Castleblayney
Carrickmacross
Kingscourt
Ardee
Flagford - Louth 220kV Line
Map 8 (CMSA)
EIRGRID
Project:
North-South 400 kV Interconnection Development
Title:
PE687-D141-066-001-000

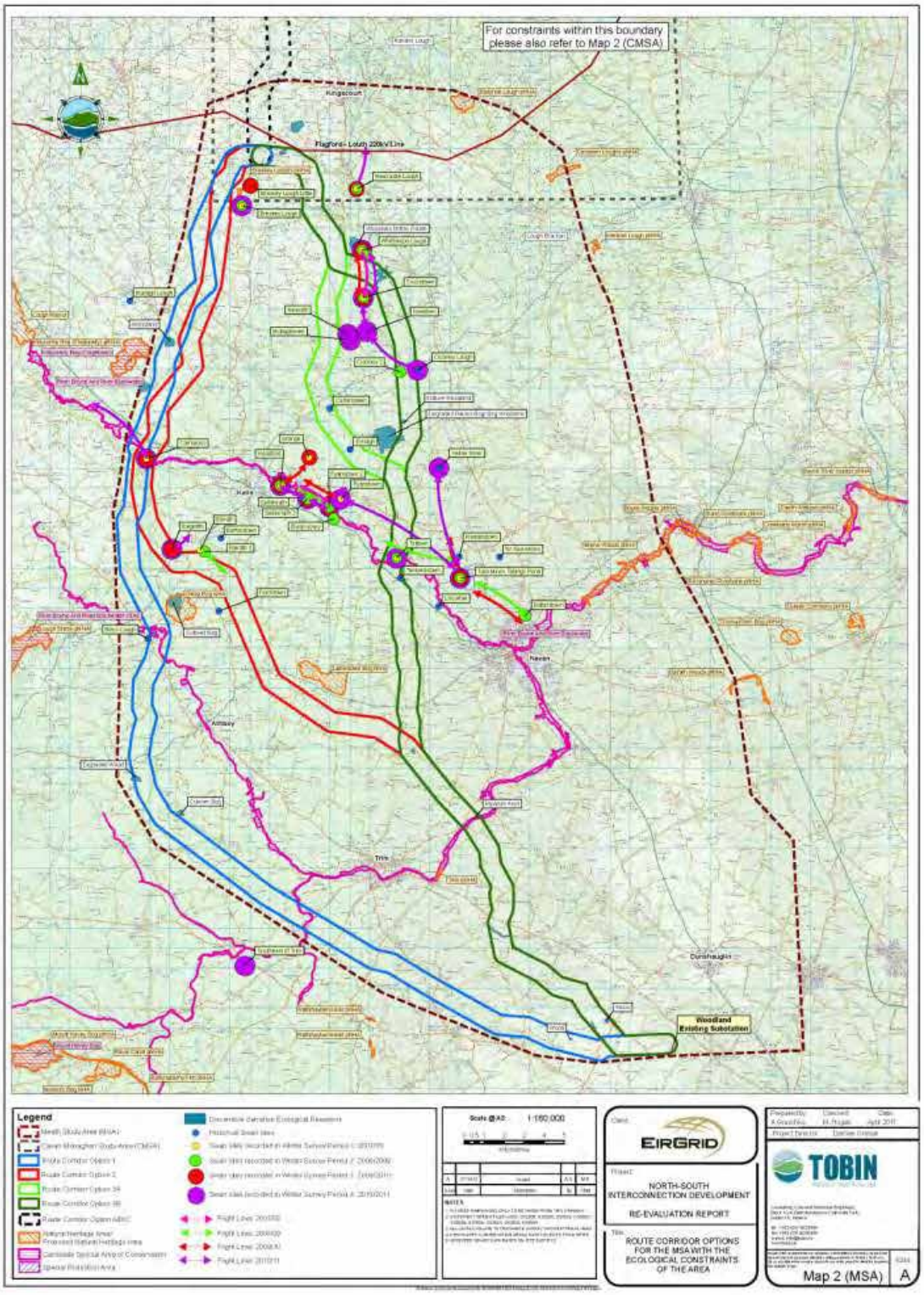

N
Castleblayney
Scale: 1:50000
Original Proposal VA0006
Meath - Tyrone 400 KV Interconnector
Carrickmacross
Kingscourt
Flagford - Louth 220kV line
Ardee
Map 9 (CMSA)
Client:
EIRGRID
Project:
Title:
PE687-D141-067-001-000

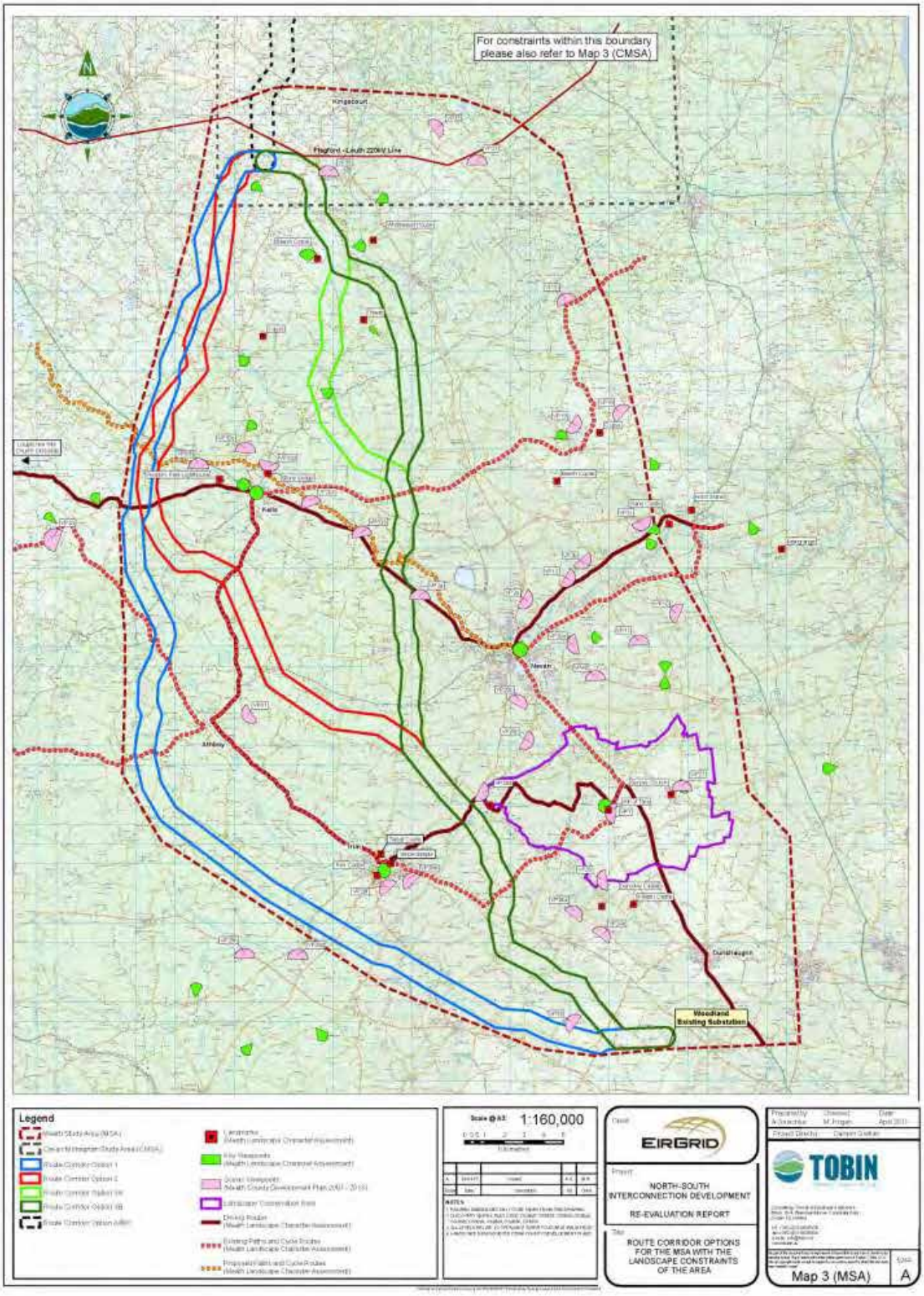
APPENDIX B

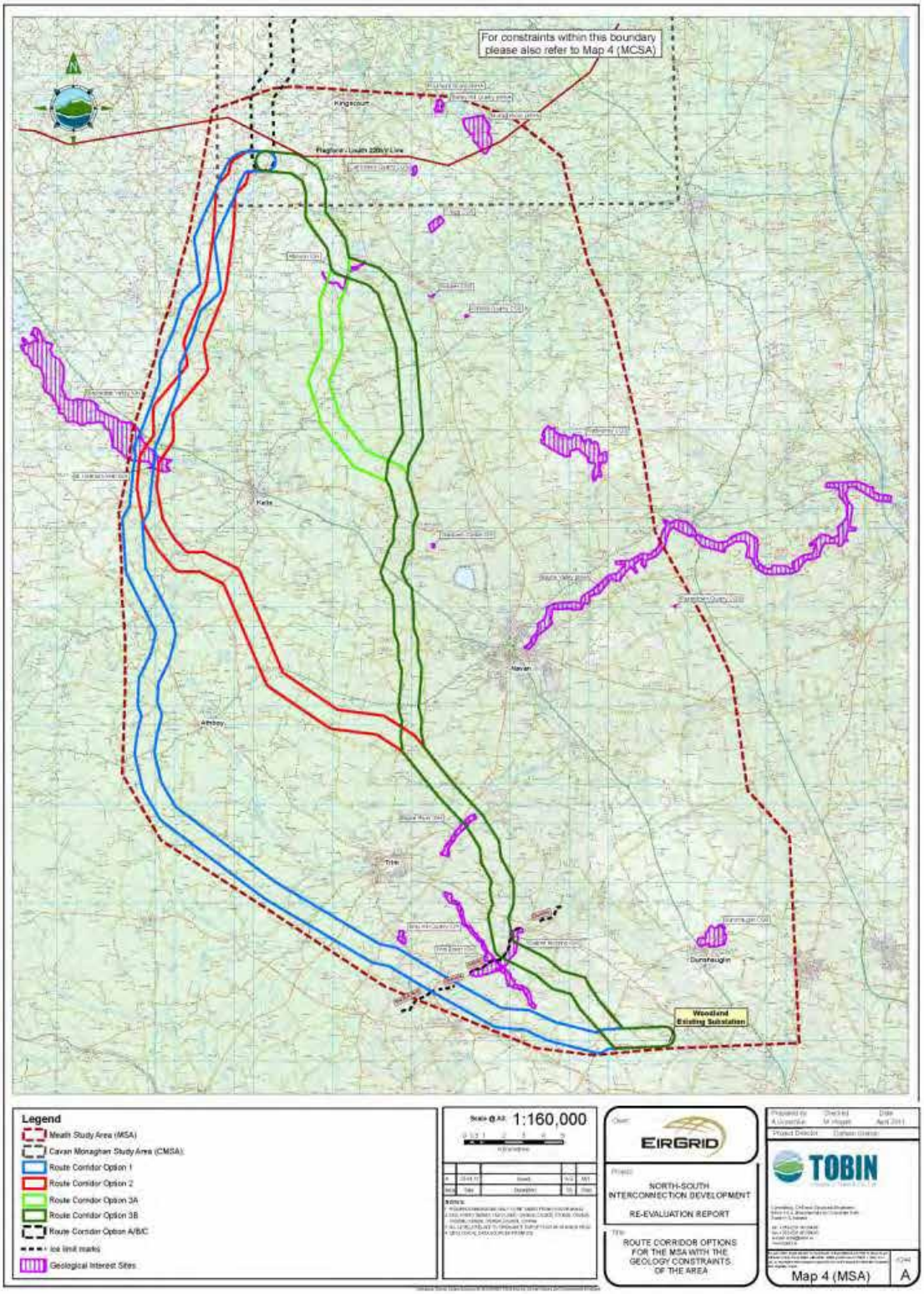
MAPS RELATING TO THE

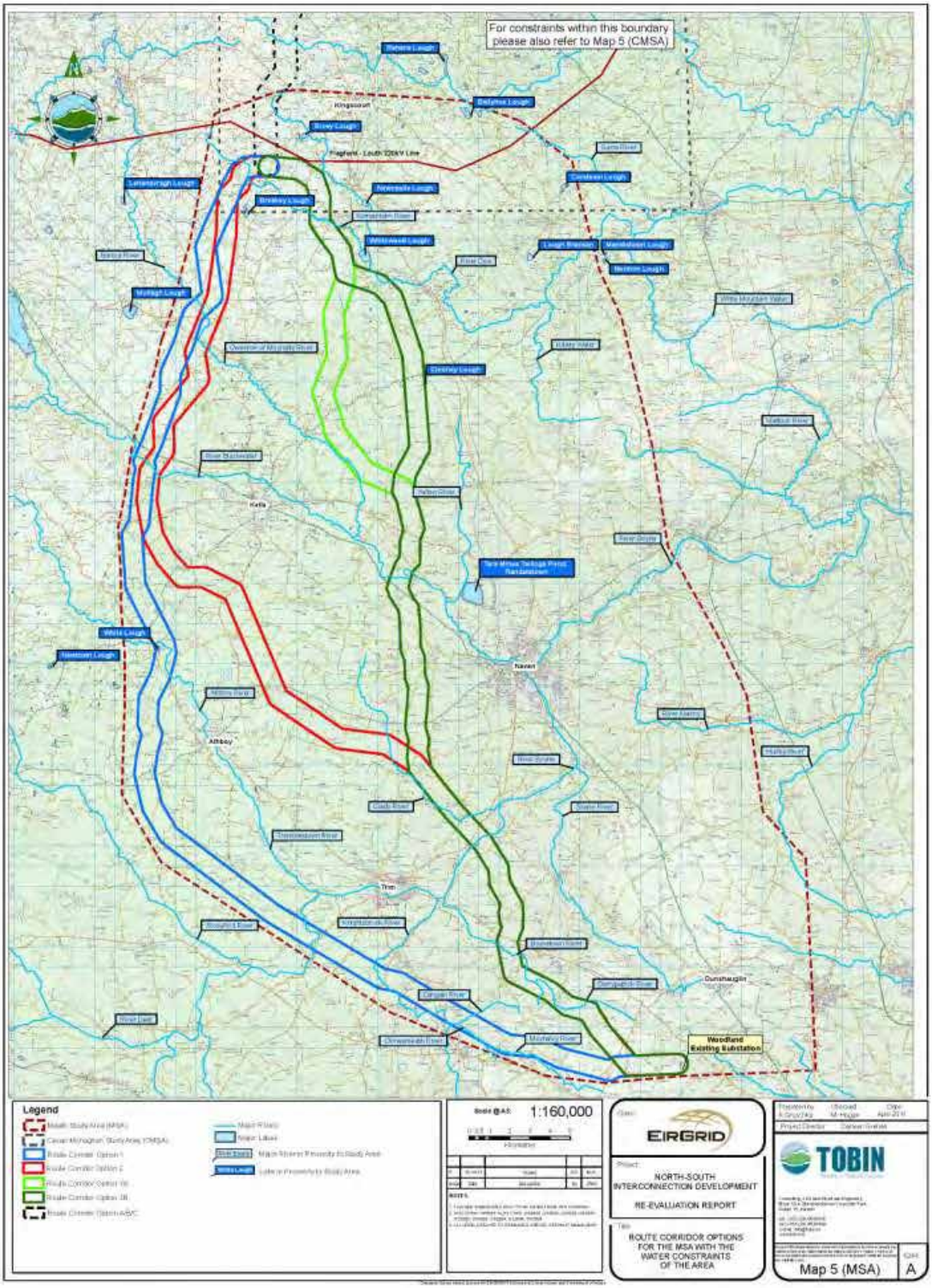
MEATH STUDY AREA (MSA)

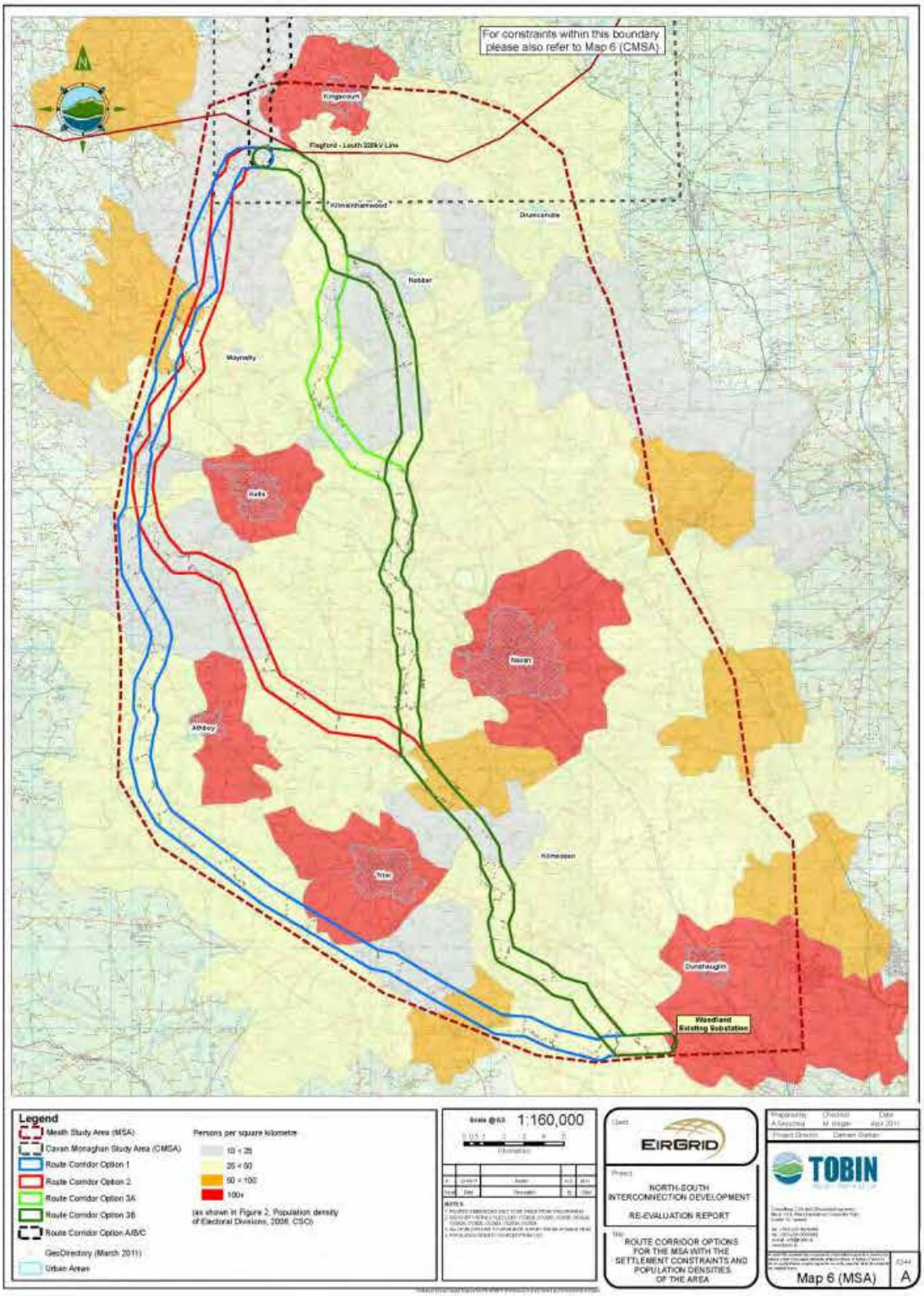

For constraints within this boundary please also refer to Map 1 (CMSA)
Kingscourt
Tighernagh - Louth 220kV Line
Kells
Navan
Athboy
Dunshaughlin
Woodland Existing Substation
Legend
Scale @ A3: 1:160,000
EIRGRID
TOBIN
NORTH-SOUTH INTERCONNECTION DEVELOPMENT
RE-EVALUATION REPORT
CONSTRAINTS WITHIN THE MSA
Map 1 (MSA)
A

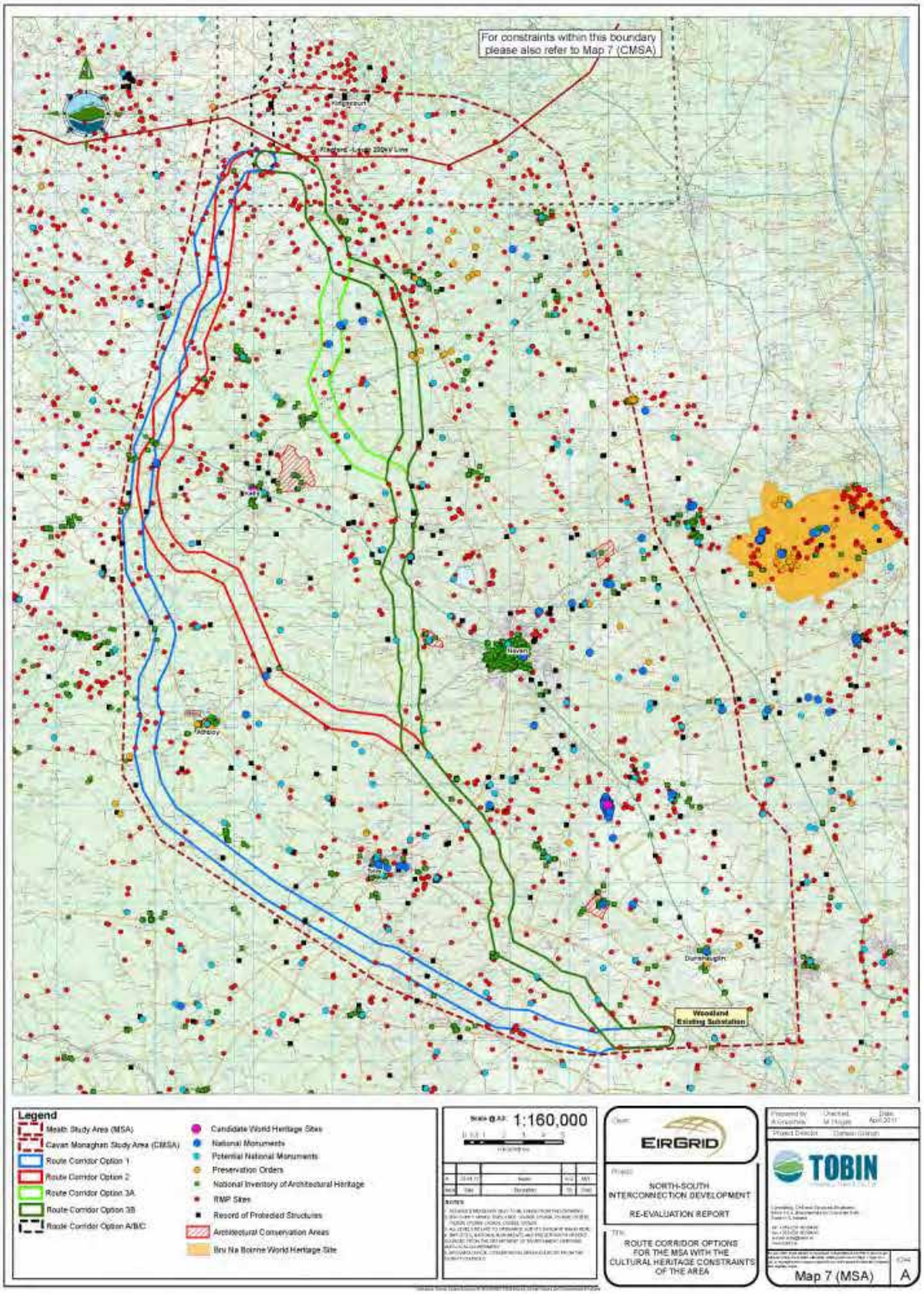

For constraints within this boundary please also refer to Map 2 (CMSA)
Kingscourt
Flagford - Louth 220kV Line
Kells
Navan
Ashbourne
Trim
Dunshaughlin
Woodland Existing Substation
Legend
Scale @ A2 1:150,000
EIRGRID
TOBIN
NORTH-SOUTH INTERCONNECTION DEVELOPMENT
RE-EVALUATION REPORT
ROUTE CORRIDOR OPTIONS FOR THE MSA WITH THE ECOLOGICAL CONSTRAINTS OF THE AREA
Map 2 (MSA)
A

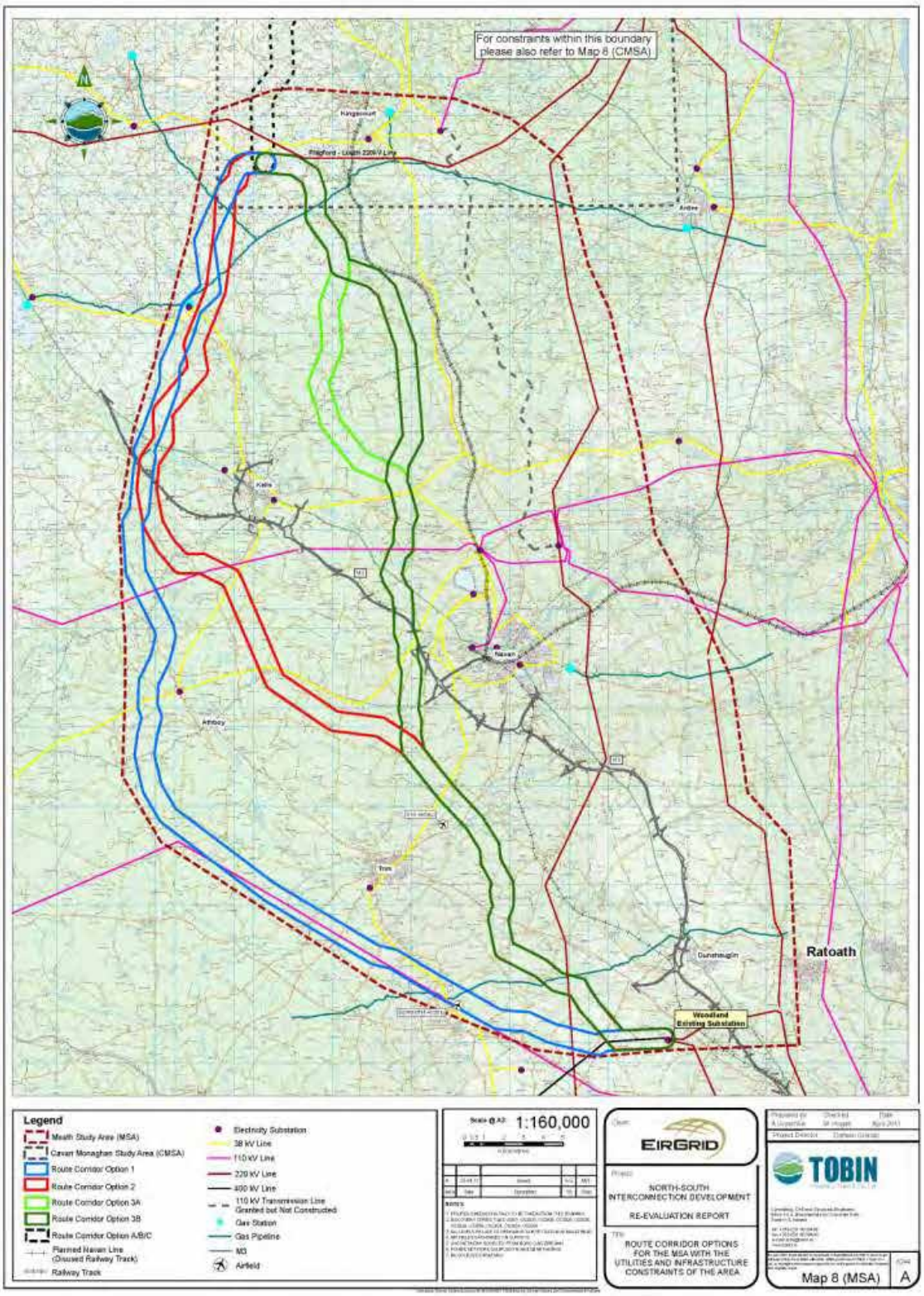

For constraints within this boundary
please also refer to Map 3 (CMSA)
Kingscourt
Flagford - Louth 220kV Line
Kells
Navan
Athboy
Trim
Dunshaughlin
Woodland
Existing Substation
Legend
Scale @ A3: 1:160,000
EIRGRID
TOBIN
NORTH-SOUTH
INTERCONNECTION DEVELOPMENT
RE-EVALUATION REPORT
ROUTE CORRIDOR OPTIONS
FOR THE MSA WITH THE
LANDSCAPE CONSTRAINTS
OF THE AREA
Map 3 (MSA)
A

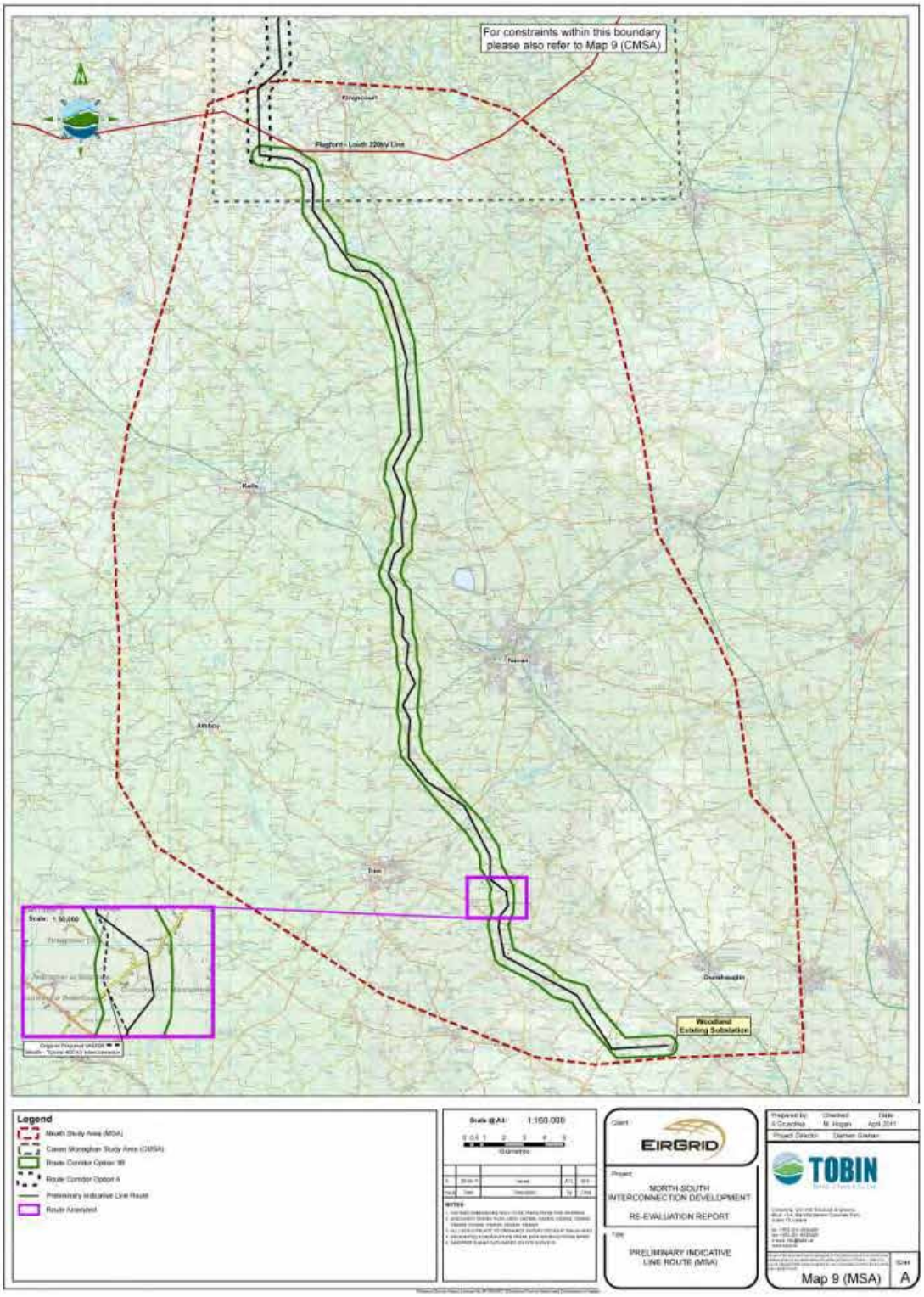

For constraints within this boundary please also refer to Map 4 (MCSA)
Kingscourt
Kells
Navan
Ardbraccan
Trim
Dunshaughlin
Woodland Existing Substation
Legend
Meath Study Area (MSA)
Cavan Monaghan Study Area (CMSA)
Route Corridor Option 1
Route Corridor Option 2
Route Corridor Option 3A
Route Corridor Option 3B
Route Corridor Option A/B/C
Ice limit marks
Geological Interest Sites
1:160,000
EIRGRID
NORTH-SOUTH INTERCONNECTION DEVELOPMENT
RE-EVALUATION REPORT
ROUTE CORRIDOR OPTIONS FOR THE MSA WITH THE GEOLOGY CONSTRAINTS OF THE AREA
TOBIN
Map 4 (MSA)
A


For constraints within this boundary please also refer to Map 5 (CMSA)
Legend
Scale @ A3: 1:160,000
EIRGRID
TOBIN
NORTH-SOUTH INTERCONNECTION DEVELOPMENT
RE-EVALUATION REPORT
ROUTE CORRIDOR OPTIONS FOR THE MSA WITH THE WATER CONSTRAINTS OF THE AREA
Map 5 (MSA)
A


For constraints within this boundary please also refer to Map 6 (CMSA)
Kingscourt
Flagford - Louth 220kV Line
Drumconrath
Nobber
Maynalty
Navan
Athboy
Trim
Kilmessan
Dunshaughlin
Woodland Existing Substation
Legend
Meath Study Area (MSA)
Cavan Monaghan Study Area (CMSA)
Route Corridor Option 1
Route Corridor Option 2
Route Corridor Option 3A
Route Corridor Option 3B
Route Corridor Option A/B/C
GeoDirectory (March 2011)
Urban Areas
Persons per square kilometre
10 < 25
25 < 50
50 < 100
100+
as shown in Figure 2, Population density of Electoral Divisions, 2006, CSO)
Scale @ A3 1:160,000
EIRGRID
NORTH-SOUTH INTERCONNECTION DEVELOPMENT
RE-EVALUATION REPORT
ROUTE CORRIDOR OPTIONS FOR THE MSA WITH THE SETTLEMENT CONSTRAINTS AND POPULATION DENSITIES OF THE AREA
TOBIN
Map 6 (MSA)
A


For constraints within this boundary please also refer to Map 7 (CMSA)
Kingscourt
Kingscourt - Louth 220kV Line
Navan
Ashbourne
Woodland Existing Substation
Legend
Meath Study Area (MSA)
Cavan Monaghan Study Area (CMSA)
Route Corridor Option 1
Route Corridor Option 2
Route Corridor Option 3A
Route Corridor Option 3B
Route Corridor Option A/B/C
Candidate World Heritage Sites
National Monuments
Potential National Monuments
Preservation Orders
National Inventory of Architectural Heritage
RMP Sites
Record of Protected Structures
Architectural Conservation Areas
Bru Na Boinne World Heritage Site
Scale @ A3: 1:160,000
EIRGRID
NORTH-SOUTH INTERCONNECTION DEVELOPMENT
RE-EVALUATION REPORT
ROUTE CORRIDOR OPTIONS FOR THE MSA WITH THE CULTURAL HERITAGE CONSTRAINTS OF THE AREA
TOBIN
Map 7 (MSA)
A


For constraints within this boundary please also refer to Map 8 (CMSA)
Ratoath
Woodland Existing Substation
Legend
Meath Study Area (MSA)
Cavan Monaghan Study Area (CMSA)
Route Corridor Option 1
Route Corridor Option 2
Route Corridor Option 3A
Route Corridor Option 3B
Route Corridor Option A/B/C
Planned Navan Line (Disused Railway Track)
Railway Track
Electricity Substation
38 kV Line
110 kV Line
220 kV Line
400 kV Line
110 kV Transmission Line Granted but Not Constructed
Gas Station
Gas Pipeline
M3
Airfield
Scale @ A3: 1:160,000
EIRGRID
NORTH-SOUTH INTERCONNECTION DEVELOPMENT
RE-EVALUATION REPORT
ROUTE CORRIDOR OPTIONS FOR THE MSA WITH THE UTILITIES AND INFRASTRUCTURE CONSTRAINTS OF THE AREA
TOBIN
Map 8 (MSA)
A


For constraints within this boundary please also refer to Map 9 (CMSA)
Woodland Existing Substation
Legend
EIRGRID
TOBIN
NORTH-SOUTH INTERCONNECTION DEVELOPMENT
RE-EVALUATION REPORT
PRELIMINARY INDICATIVE LINE ROUTE (MSA)
Map 9 (MSA)
A