

Tyrone - Cavan Interconnector

Volume 3 - Part 1 of 5

Consolidated Environmental Statement
Appendices



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**This document is Volume 3 : Appendices Part 1 of the
Tyrone – Cavan Interconnector Environmental Statement (ES).**
The whole ES consists of a number of documents printed separately and should be read
together.

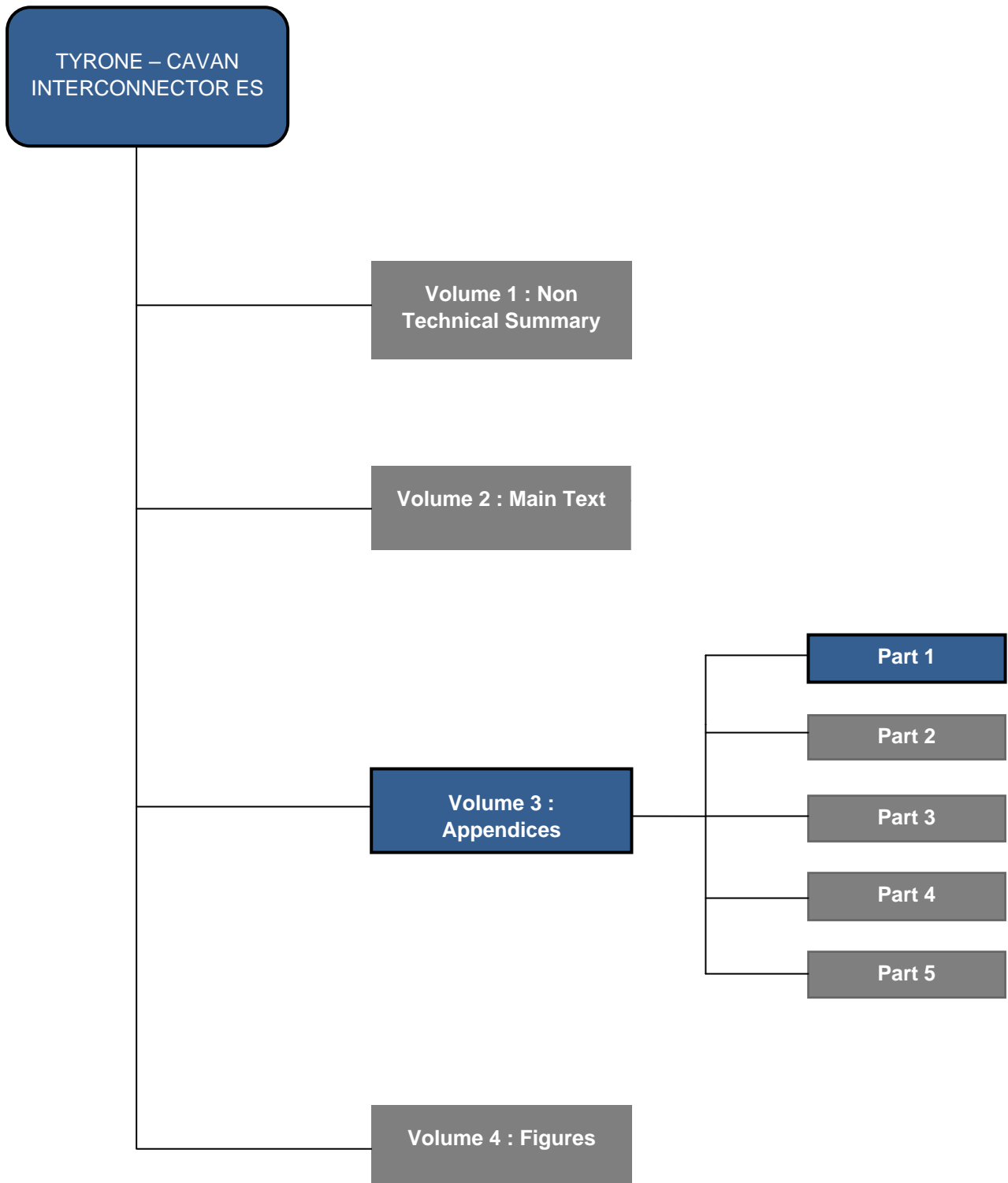


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For ease of use this document has been printed in A4 format. Should a larger format be required, an electronic version is available at www.nie.co.uk.

Alternatively a printed A3 version may be obtained by contacting NIE at:

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Appendix 2A Utility Regulator Letter

30th April 2013

John Fitzgerald
Director, Grid Development
Eirgrid plc
The Oval, Shelbourne Road
Dublin 4

David de Cassesres
NIE Ltd
120 Malone Road
Belfast
BT9 5HT

Dear John/ David

Re. North South 400kV Interconnection Development

The SEM Committee wishes to thank EirGrid, SONI and NIE (the Companies) for the update provided to the Committee on the progress made by the Companies in the development of the proposed 400kV second North South interconnector last November. At that meeting the Committee articulated its view of the importance of this project as a critical component of a fully functioning, efficient electricity market on the island of Ireland and one which will play a significant role in helping to integrate renewable generation in both Ireland and Northern Ireland.

Since then EirGrid and SONI have published the Generation Capacity Statement 2013 - 2022 which shows increasingly tight supply margins in Northern Ireland post 2016 but which would be mitigated by the development of a second North South interconnector and you have also advised that as per your most recent studies, under the assumptions employed, the benefits in terms of reduced production costs and enhanced capacity sharing which would result from the project's development will be of the order of €20m per annum rising to closer to €40m per annum in the medium term.

All of the above point to the relevance of the second North South interconnector to the successful implementation of the policy objectives of competitiveness, sustainability and security of supply in both Ireland and Northern Ireland and the necessity to advance and deliver this project, and to not only deliver it but deliver it as a matter of urgency. The SEM Committee is charged with protecting the interests of electricity customers on the island of Ireland. To that end the Committee is concerned that the absence of vital infrastructure is costing customers.

Of course the project must not only be progressed quickly but also cost effectively. The Committee understands from the Irish government review that the cost for the undergrounding of the project would be significantly higher than the AC overhead line construction employed elsewhere in Europe. The regulatory authorities would therefore be of the view that customers should not be expected to pay for any unnecessary costs associated with undergrounding of the cables given there would be no enhancement in service.

The Committee therefore emphasises the need for the timely progress of the project and notes that it is also important that all statutory, environmental and local considerations are taken into account in bringing the project forward.

The Committee is happy that you show or provide a copy of this letter of support for the project to any such body as you believe may be necessary or beneficial in advancing the project and achieving the necessary consents. The Committee would ask that the Companies keep the Committee abreast of progress.

Yours sincerely

A handwritten signature in blue ink that reads "Alan Rainey". The signature is written in a cursive style and is underlined with a single horizontal line.

Alan Rainey
Chairman, SEM Committee

Appendix 4A ECOFYS Letter

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 Ireland

Your Reference

Our Reference
 KBK PPSMDE061266

Name: Kirsten Bürger
 Phone: +49 (0) 30 28773578 -10

Date:
 4 July 2008

Dear Katherine Licken,

I understand that the department plans to publish the "Study on the Comparative Merits of Overhead Electricity Transmission Lines versus Underground Cables" next week.

I would like to take the opportunity to emphasise the key message of the executive summary again in brief:

1. The study notes that internationally, diminishing public acceptance for new overhead lines has become an important driver for the assessment of underground cables as an alternative. The study also reports the continued technology development in the field of underground cables at high and extra high voltages.

2. The study states however, that the size and number of existing underground cables internationally is limited and the majority of existing projects do not represent transmission connections in conventional networks. It also notes that underground transmission cables can be expected to have forced outage rates (likelihood of unplanned system breakdowns) which are at least 10 times higher than that of overhead lines. This is a severe limitation for underground cables. Currently, underground cables do not therefore compare to overhead lines in terms of adequacy of the electricity transmission system and in terms of reliability and security of electricity supply.

3. For two specific case studies the study revealed the capital costs of underground cables would be about five times that of overhead lines and the lifecycle costs would be about three times that of overhead lines. Further the study notes that the cost estimates for underground cable proposals rely on assumptions derived from limited experience and provisional industry information and could therefore be even higher.

ECOFYS

4. In relation to electro-magnetic fields, the study notes that EirGrid designs and operates overhead lines in compliance with WHO guidelines on magnetic field exposure. In practice, under normal operating conditions in Ireland, magnetic field strengths directly under transmission lines are as low as 10-20% of the maximum levels recommended in the WHO guidelines.

The difference in transmission adequacy is the dominating criterion when comparing the technologies. Other aspects certainly affect the overall technology evaluation. However, any of the advantages of underground cables which were identified in the study cannot compensate for the negative impact on transmission adequacy.

I hope this brief summary is helpful when communicating the findings of the study to a broader public. I look forward to explaining these and the other findings more in detail when meeting the Joint Oversight Committee.

Yours sincerely,



Karen Burges
Manager Power Systems and Markets
Ecofys Germany GmbH (Berlin)

Appendix 4B PB Power Report (2013)



April 2013

CAVAN-TYRONE & MEATH-CAVAN 400 KV TRANSMISSION CIRCUITS

COMPARISON OF HIGH VOLTAGE
TRANSMISSION OPTIONS:

ALTERNATING CURRENT
OVERHEAD & UNDERGROUND, &
DIRECT CURRENT UNDERGROUND

TECHNOLOGY AND COSTS UPDATE

SINCE PUBLICATION OF THE 2009
REPORT

*Prepared for Northern Ireland Electricity and
for EirGrid*

3511435A

FINAL

**PARSONS
BRINCKERHOFF**

CAVAN-TYRONE & MEATH- CAVAN 400 kV TRANSMISSION CIRCUITS

**Comparison of High Voltage Transmission
Options:**

**Alternating Current Overhead & Underground,
& Direct Current Underground**

Technology and Costs Update


Since Publication of the 2009 Report

Delivered to
Northern Ireland Electricity
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Report Title	:	CAVAN-TYRONE & MEATH-CAVAN 400 kV TRANSMISSION CIRCUITS Comparison of High Voltage Transmission Options: Alternating Current Overhead & Underground, & Direct Current Underground
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EXECUTIVE SUMMARY

1. Significant changes are currently planned for the structure of the island of Ireland electricity supply network. One major component of the plan, an interconnector often referred to as "the North-South Link (N-S Link), comprises two single transmission circuits linking Tyrone to Cavan and Cavan to Meath.
2. Overhead line (OHL) has been the standard transmission technology around the world for many years, however feasible alternatives to OHL do exist for some transmission applications so, in 2008, EirGrid and Northern Ireland Electricity (NIE) jointly commissioned Parsons Brinckerhoff to consider the alternatives to 400 kV alternating current (AC) OHL for the N-S Link.
3. The results of this study, which included on-site assessments as well as a desk-top review by technical specialists, was reported in February 2009 – see Bibliography reference (1), and is referred to in this document as the '2009 Report'. However, in order to pursue their planning applications, NIE and EirGrid now require an update of the technical options and cost estimates provided there. They have thus requested Parsons Brinckerhoff to provide this cost update in the light of any recent technical developments. This present document reports the results of that task.
4. Comparative cost estimates have been provided for 400 kV AC overhead line and underground cable (UGC) options, and for a high voltage direct current (HVDC) voltage sourced converter (VSC) underground cable option. In all cases the estimates assume the full Tyrone – Cavan – Meath route would be built.
5. Alternative configurations of the HVDC options have been considered – in particular, the use of 1500 MW capacity converters and HVDC circuit breakers, and exploitation of the existing HVDC East-West interconnector. However, some of these technologies are still developing into commercial reality, and a separate 3-terminal link using 720 MW terminals, as costed and compared in this document, appears to be the best techno-economic HVDC option at present.
6. These cost estimates offer a comparison between alternative technologies for the N-S Link, but do not attempt to include all the costs for the final N-S Link project. In particular, other work at the three connecting substations, and work on other parts of the network that might be required at the same time, is not included. We provide single line diagrams that indicate, for each alternative, what equipment has been costed.
7. Whole-of-life cost estimates are presented – that is, the cost of planning and constructing the equipment, and the cost of running it throughout its life. The discounted cash flow technique is used to compare these lifetime costs; a discount rate of 8.1% is applied – see Section 3.2 of this document for further details.
8. Our estimates for the full Tyrone – Cavan – Meath route are summarised in the following table. Please note that the currency values here have been rounded to the nearest €5M.

Total: Turleenan - Kingscourt - Woodland €M			
	AC OHL (base case)	AC UGC	HVDC-VSC UGC
Construction + IDC	125	890	990
Transformers and switchgear	40	45	15
Construction Total	165	935	1005
Lifetime running	55	90	110
40 year replacement	5	45	55
Whole of life Total	225	1070	1170
Lifetime difference above OHL (€M)	0	845	945
Construction difference ratio (times)	1	5.7	6.1
Lifetime difference ratio (times)	1	4.8	5.2

Source: Tables in this Addendum

9. The above costs are presented separately for each Company – NIE, and EirGrid – in Appendix B.
10. In summary, the most cost effective solution for the proposed N-S Link would be an AC overhead line, estimated to cost around €165M to construct and around a further 35% of this to run over its lifetime.
11. An AC underground cable is estimated to cost over 5.7 times as much as AC overhead line to construct, and would also cost significantly more than overhead line to run, over its lifetime.
12. Similarly, HVDC UGC links would be expected to cost 6 times as much as AC overhead line to construct, and would then cost twice as much as overhead line to run, over its lifetime.

1 INTRODUCTION

1.1 Background

13. Significant changes are currently planned for the structure of the island of Ireland electricity supply network. One major component of the plan, often referred to as “the North-South Link (N-S Link), comprises two single transmission circuits linking Tyrone to Cavan and Cavan to Meath. Together, these two circuits would significantly strengthen the existing transmission network, to the benefit of both Northern Ireland (NI) and the Republic of Ireland (RoI).
14. The N-S Link plans represent a close collaboration between Northern Ireland Electricity Ltd (NIE) and EirGrid plc (EirGrid), and the concept of this N-S Link has been under development by both companies for a number of years. The technology envisaged for these two new circuits is single circuit 400 kV alternating current (AC) overhead line.
15. Overhead line (OHL) has been the standard transmission technology around the world for many years, simply because it has been the lowest cost option by some margin, and is also, all else being equal, the quickest to construct. However, feasible alternatives to OHL do exist for some transmission applications, and so, in 2008, EirGrid and NIE jointly commissioned Parsons Brinckerhoff to consider the alternatives to 400 kV AC OHL for the N-S Link. The requirement was (i) to establish whether an underground solution to the Tyrone-Cavan-Meath transmission requirement was viable from the technical and landscape viewpoints, and (ii) to estimate comparative costs for overhead and underground options, both AC and high voltage direct current (HVDC). The results of this study, which included on-site assessments as well as desk-top review by technical specialists, was reported in February 2009 – see Bibliography reference (1), and is referred to in this document as the ‘2009 Report’.

1.2 The Need for this Update

16. In both NI and the RoI there remains the need to make available the results of the Parsons Brinckerhoff study to public scrutiny. In Northern Ireland, NIE’s application for planning consent for the NI section of the proposed N-S Link triggered a Public Inquiry in the first quarter of 2012, however this Public Inquiry was subsequently suspended. NIE is now making preparations to resume the planning application, and therefore requires an update of the supporting technical evidence.
17. In the RoI, EirGrid had submitted an application for planning approval in December 2009. This application came to an oral hearing before An Bord Pleanála in May 2010, but was subsequently withdrawn in June 2010. The consideration of the technical alternatives section of the Environmental Impact Statement (EIS) associated with that planning application placed considerable reliance on the findings of the 2009 Report and, since EirGrid intends to submit a revised planning application, they are preparing a new EIS which requires up to date information.
18. In 2011 an International Expert Commission (RoI IEC) was set up by the RoI Minister for Energy, Pat Rabbitte, to review the N-S Link proposals and studies associated with them. The report of the RoI IEC, referred to in this Addendum as the RoI IEC 2011 Review, was published in January 2012 – see Bibliography reference (2).
19. Amongst the previously published technical reports considered by the RoI IEC 2011 Review was the Parsons Brinckerhoff 2009 Report. The RoI IEC concluded, in reference to that report, that “the results are correct and the analysis is very robust. However, today the

results may be different both in cost and technical performance given the recent technological developments”.

20. In order to pursue their planning applications, therefore, NIE and EirGrid require an update of the technical options and cost estimates for the N-S Link. They have thus requested Parsons Brinckerhoff to update the cost element of their 2009 Report in the light of any recent technical developments. This present document reports the results of that task.

1.3 Scope of Work

21. The scope of work comprises updating the cost estimates provided in the 2009 Report, and extends to taking into account the possibility that new technology might offer cheaper solutions than were previously available. Most of the technical and landscape, aspects of the 2009 Report have not been revisited, however. In particular, the functional requirements of the N-S Link (for example, running voltage, transmission capacity) are assumed here to be unaltered from 2009.
22. This current document should thus be considered an addendum to the original 2009 Report, and should be read in conjunction with it to obtain a full understanding of the considerations upon which it is based. Accordingly, within the text that follows, this document will be referred to as the ‘Addendum’.
23. We have been asked to present the cost updates in a single currency – namely Euros.
24. Part of the scope of work for this Addendum was to address the RoI IEC’s comments which were pertinent to the 2009 Report. These comments are presented in Appendix A of this Addendum, and references to the body of the text are made there, as appropriate. We note here, however, that whilst the RoI IEC recommended against a fully undergrounded AC solution for system technical reasons, a fully undergrounded AC solution has nevertheless been costed in this addendum in the interests of completeness and to assist any consideration of partial undergrounding of the route.

1.4 Which Costs?

25. The aim of the study is to estimate the differences in cost between the transmission circuit technology alternatives – for example, the cost difference between OHL and underground cables (UGC). In the interests of simplifying like-for-like comparisons, we have included in our estimates the costs of appropriate designs of transformer and switchgear where these differ between technology options, although we have not included elements of the project that are common to all technology options, and we have not extended the estimates to cover payments to landowners – see Footnote ¹.
26. Our approach to these connection costs applies equally to AC and to HVDC transmission technology. The latter requires dedicated converter stations to be placed between the HVDC and the AC elements of the transmission network, so converter station costs are also included in our estimates.
27. We have summarised the above approach for each type of technology (overhead AC, underground AC, and underground HVDC) in a series of single line diagrams, each of which is placed at the start of its relevant section. Figure 1, on Page 16, focuses on the overhead line option, whilst Figure 2, Page 21, and Figure 3, Page 33 cover the underground AC cable

¹ Payments to directly impacted landowners – for example purchase of rights of way or easements, compensation for loss of development rights or forestry rights, or flexibility payments agreed with farming representative bodies – are very site-specific, and so are not included in our estimates.

and the underground HVDC cable options respectively. In each of these diagrams we have shown firstly, in red, the equipment we have costed, and secondly in blue, other equipment common to all technology options which has thus not been costed.

1.5 Information Sources

28. In February 2012 the UK Department of Energy and Climate Change (DECC) published a Parsons Brinckerhoff Electricity Transmission Costing Study, whose primary purpose was to provide British planning officers and other stakeholders in UK transmission construction plans with a robust, independent comparison of transmission technology costs. This document is freely available for download from the Institution of Engineering and Technology website – see Bibliography reference (3) and forms the basis of many of the cost estimates in this report. It is referred to in this document as the DECC Costing Study.
29. Where appropriate information is not available from the DECC Costing Study, Parsons Brinckerhoff transmission specialists have made their own estimates based upon information from recent contracts, tempered with their own experience.
30. In all cases we present here second half 2012 costs, with cost information being adjusted, as appropriate, with British Electrotechnical and Allied Manufacturers' Association (BEAMA) price indices.

1.6 Content of this Addendum

31. This report comprises the following sections:
 - i This present Introduction,
 - ii A brief overview of technology changes since 2009 that could have a significant impact on transmission cost estimates for the N-S link,
 - iii Updated cost estimate tables for Chapter 8 of the 2009 Report,
 - iv Updated cost estimate text and table for Chapter 9 of the 2009 Report,
 - v A bibliography of referenced information sources, and
 - vi A list of acronyms used, and their meanings.

1.7 Format of the Cost Estimate Tables

32. To facilitate “read-across” of the updated tables into the original 2009 Report, each of the Chapter 8 tables is presented here in the same format as in the 2009 Report. There is one general exception to this, however. As requested, we have restricted the estimates tables to contain costs in Euros (€) only.

2 RECENT TRANSMISSION TECHNOLOGY CHANGES**2.1 General**

33. The essence of electricity transmission is to provide efficient and economic paths for the flow of electric current (conductors) whilst at the same time providing safety from the high voltage for those nearby. Whichever technology is employed, transmission is a complex task, so there are a number of aspects where designers could seek to make improvements. We identify here three design improvements over the last four years which could affect transmission cost estimates for the proposed N-S Link. These are now described in turn.

2.2 Overhead Lines – No Significant Technical Changes

34. Many transmission companies around the world are facing increasing public pressure to find less visually intrusive transmission technologies than the traditional OHL supported by steel lattice towers. Architecturally designed alternatives proliferate, however, few, to date have been proven to achieve the rigorous strength, performance, and maintenance requirements.
35. Aside from these architecturally triggered developments (which are as likely to increase OHL costs as to decrease them) we are not aware of any recent technical advances in OHL technology that would significantly affect the cost estimates, and so our cost estimates are again based upon the use of the “IVI-type” single circuit steel lattice towers.

2.3 Underground Cables – Improved Backfill, and Higher DC Voltages

36. Current designs for new AC transmission voltage UGC most frequently adopt cross-linked polyethylene (XLPE) insulation, and this is the type that was assumed for the 2009 Report. Cable designs themselves have not changed fundamentally since then, however new options for cable trench backfill – the material which surrounds the cables at the bottom of the cable trench – offer limited potential to reduce the capital cost of the cable itself.
37. Cables are traditionally laid within cement-bound-sand (CBS) to stabilise their temperatures under a wide variety of operating conditions. Though CBS is not, itself, particularly good at heat dissipation, it is a relatively cheap solution to the issue of thermal stability. However, newer materials, with improved thermal conductivity, are now available for this purpose, and in some circumstances this allows for a lower cost cable to be installed. An example of this backfill material is ThermoCem® Plus.
38. Since the new cable backfill materials are more costly than CBS, each application requires its own assessment regarding the comparative cost benefit of the CBS option and the alternatives.
39. In the case of underground cable for the proposed 135 km N-S Link, the project could see marginal financial benefits from an improved backfill, though a small fluctuation in cable material prices can overwhelm the financial benefits of improved backfill material. Thus, whilst recognising here the existence of improved backfill materials, we have not sought to influence our cost estimates either way on account of their availability.
40. Regarding HVDC cable voltages, steady development in HVDC cable designs now makes the use of +/- 320 kV HVDC cables commercially feasible. Higher voltages still are mooted for the future, but at this stage these do not offer a commercial prospect to the N-S Link.

2.4 HVDC – VSC Designs

2.4.1 Technical Improvements

41. For many years HVDC technology has been available for electricity transmission, though its use is restricted to applications where its higher cost is specifically justified. Special converter stations, or terminals, connect HVDC circuits to the rest of the AC transmission network, and it is these converter stations, that represent the majority of the cost.
42. Operational limitations imposed by the “classic” current-sourced-converter (CSC, line commutated converter, LCC) designs comprise the other reason why HVDC transmission has not been used routinely. Nevertheless, this design of HVDC has offered cost and / or technical benefits in three main areas:
 - i. Transmission over very long distances over land,
 - ii. Transmission undersea, where distances exceed around 80 km, and
 - iii. Transmission between two systems with differing AC frequencies.
43. It was this classic CSC converter technology that was reviewed in the N-S Link 2009 Report.
44. Whilst the classic CSC technology was briefly reviewed in the 2009 Report, this option would not have offered serious competition to the AC alternatives from the point of view of system flexibility and security – its principle advantage being the efficient transport of bulk supplies over long distances. It has thus not been further reviewed in this Addendum.
45. Recent advances in converter technology have been adding to the advantages that may be offered by HVDC. The new voltage sourced converter (VSC) designs offer a number of extra advantages including:
 - i. The potential to offer stabilising and reactive power services to the AC network(s) to which they are connected, and
 - ii. The ability to offer black start capability at either end.
46. When comparing VSC with CSC, the following additional advantages are available from VSC:
 - i. Smaller footprint on the ground (only about 40% land-take is required when compared to the same transmission capacity CSC),
 - ii. The ability to quickly change the direction of flow of power without requiring a reversal of the direct current polarity,
 - iii. Improved stability of the HVDC link operation, particularly when connected to electrically weak and isolated AC networks (such as can exist on the island of Ireland),
 - iv. The option of using lighter construction polymeric cables, as a result of the absence of polarity reversal, which allows longer cable sections between joints, and
 - v. The better facilitation of multi-terminal working – that is to say, the possibility of making a connection (or more than one) part way along the overall HVDC circuit.
47. On the other hand, significant disadvantages to VSC designs, in comparison with CSC alternatives have, in the past, included:
 - i. relatively low transmission capacity,
 - ii. poor operating efficiencies, and

- iii. higher capital and operating costs per MW capacity, and
 - iv. limited overload capability.
48. Disadvantages i and iii remain relevant today, though market pressures are reducing their significance gradually. The VSC converter operating efficiencies mentioned in item ii are now around 99%, so approaching those of CSC designs, which currently stand at about 99.25%. (Note: Each VSC converter station typically exhibits around 1% losses at full load, so a three terminal link such as would be required for the N-S Link would incur up to 3% converter losses plus the losses from the overhead lines or underground cables.)

Future Availability of 1500 MW VSC Converters

49. Although VSC converter maximum capacities lag significantly behind those of CSC, designs continue to improve. The largest VSC installation currently in operation is EirGrid's 500 MW East-West Interconnector (the +/- 200 kV subsea interconnector connection between Woodlands Substation, Meath, and Connah's Quay Substation, UK). However, a 1000 MW +/- 300 kV bipole design is due to be commissioned between France and Spain in 2013, and a 715 MW 500 kV monopole converter is to be commissioned between Norway and Denmark in 2014 – see Bibliography references (4) and (5), and also the Footnote². We anticipate that 1500 MW bipole VSC designs – that is, converters that match the capacity specified for the proposed N-S Link – are thus likely to be commercially available by around 2016.

2.4.2 Future Availability of HVDC Circuit Breakers

50. Circuit breakers allow immediate disconnection between two operational parts of an electricity power network. Whilst this function is most normally used to configure the network to normal running conditions, and to disconnect sections of the network for planned maintenance, circuit breakers are also essential in the process of isolating faulted circuits quickly enough to protect personnel and equipment whilst maintaining the overall stability of the power supply.
51. AC circuit breakers have been available for many years but, at the time of writing, commercially available high voltage transmission circuit breakers for HVDC do not exist. The Rol's International Expert Commission (RoI IEC) has forecast that HVDC circuit breakers will become commercially available by 2013. This prediction is coming to pass in a limited way; more than one HVDC equipment supplier has announced the existence of a design for an HVDC circuit breaker.
52. In practice, however, the specification, availability, and costs, of these devices are either still obscure, or not developed. There is no track record of a practical transmission device operating in a commercial environment, and we note that confidence in their imminent arrival for commercial operation is low. Indeed, transmission connections are being planned on the assumption that such equipment will still not be available by 2019.
53. This being the case, at present it is impractical to provide an HVDC network (with more than two terminals) with the same operational flexibility as an AC equivalent. Our view, therefore, is that NIE and EirGrid's plans should assume that HVDC circuit breakers would not be available for the N-S Link project, and to plan a system that does not require them. Given the developers' recent announcements, however, in the event that an HVDC solution is chosen for the N-S Link, a design which allowed for retrofitting of HVDC breakers in the medium to long-term (as, for example, the USA's Tres Amigas project) may be considered appropriate.

² This particular VSC installation, at Skagerrak, is due to be configured as 'pole (4)', operating as half of a bi-pole with the existing LCC (CSC) pole (3). We understand that the switchgear arrangements will be complex, to allow for reverse power flow. As such, it would represent a 'one off' solution rather than a template for future schemes.

2.4.3 Implications of a Single Tyrone – Meath HVDC Circuit

54. With the classic CSC HVDC technology, it was assumed in 2009 that the N-S Link would have comprised two separate circuits – Tyrone-Cavan and Cavan-Meath – requiring a total of 4 converter stations. With the newer VSC solution, however, there is the option to build a single Tyrone-Meath circuit, with an HVDC “tee-off” connection for Cavan – thus requiring only 3 converter stations.
55. There are a number of pros and cons to a three-terminal solution. Benefits include:
- i. Less ground space required for the middle connection in Cavan, and
 - ii. a significant capital cost saving over the 4-converter CSC option, for the Cavan connection.
56. Disadvantages of the three-terminal solution can include:
- i. lower operational flexibility for Cavan connectees (a single converter outage at Cavan – planned or unplanned) would leave generation and load customers connected at Cavan zero (or 50%) access to the N-S Link (depending on whether a fully rated neutral connection is installed alongside the +/- pole connections),
 - ii. depending upon the connection configuration at Cavan, lower partial availability of the N-S Link (some equipment failures would cause non-scheduled outages for the entire link), and
 - iii. lower system security (non-scheduled outages of the entire link are likely to have greater impact on the overall system security than non-scheduled outages of half of the link, so again, a bipole installation with neutral connection would be the preference operationally).
57. These operational disadvantages could be mitigated with high-speed off-line segmentation of the HVDC circuit, which would allow two of the three sections of the HVDC connection to return to service after the faulted section had been isolated. Since the whole purpose of the N-S Link would be to strengthen and secure the Irish transmission network, such a segmentation facility could be a prudent and important part of a practical HVDC solution, which would lift the level of operational facilities closer to that of the AC options. In the interests of comparing like with like, we have thus included HVDC circuit selector facilities in the costs for the HVDC option. We note however that the selectors would comprise high-speed off-line HVDC devices, for which tried and tested technology already exists, rather than HVDC on-line circuit breakers. We have assumed this facility would be located coincident with the Kingscourt HVDC converter.
58. Since a 3-terminal solution is likely to be of significantly lower cost than a 4-terminal solution, for the purposes of this update we have costed the three-terminal option, with high-speed off-line circuit segmentation as depicted in Figure 3, Page 33.
59. Whether a 3- or 4- terminal solution was adopted, a “Special Protection Scheme” would be required across the all-island transmission network to fully integrate the HVDC interconnector. Detailed studies would be required to ascertain the fault scenarios with significant impact on the island system, and the occurrence of each of these would need to be signalled back to the 3 HVDC terminals to trigger automatic responses to avoid system instability. Indicative cost estimates relating to these studies and facilities are incorporated in this Addendum, although it is important to realise that only detailed Electrotechnical studies would be able to identify the full extent of the requirement.

2.4.4 Relevance of East-West Interconnector Infrastructure

60. The question has been asked: "What advantages could there be for a future HVDC N-S Link from the existing HVDC E-W Interconnector?". Two notional benefits perceived by proponents of this approach are:
- i. Sharing converter equipment between the two installations, to save on capital cost, and
 - ii. Direct connection through Woodlands Substation at HVDC, to save on operational cost associated with electrical losses.
61. Briefly explained, the E-W Interconnector comprises a 500 MW VSC link from Woodlands Substation, Meath, to Deeside Substation, UK, which operates at +/- 200 kV (for further details, see, for example, Bibliography reference (6)). Since there is already a 500 MW converter at Woodland Substation, the first benefit sought would be that this converter, together with a new 1000 MW converter, would provide the 1500 MW capacity required for the N-S Link, thus achieving capital cost savings over the construction of a 1500 MW terminal.
62. At the same time, connecting together the HVDC conductors for the N-S Link and the E-W Interconnector would allow power not required at the Woodland AC substation to pass straight through between N-S and E-W, avoiding the double conversion energy losses for power transmitted from HVDC to AC, and back again to HVDC (around 3% energy losses: 2% from the older E-W Interconnector, and 1% from a new N-S link). This should deliver operational savings, as mentioned above.
63. To achieve these benefits, the proposed N-S Link would need to be of VSC design, and would need to operate at the same HVDC voltage as the E-W Interconnector. At the time of writing, the design voltage of a future 1500 MW VSC link is uncertain, but 1000 MW links currently on order for Europe (see paragraph 49 above) will operate at +/-320 kV – that is, at significantly higher voltages than the E-W Interconnector. We believe it to be extremely unlikely that a 1500 MW design could compromise on operating voltage adequately to allow successful connection to the E-W Interconnector.
64. A further technical factor comes into play when two HVDC installations are connected together – namely fault levels. Direct connection of a new N-S Link to the E-W Interconnector at HVDC would tend to impose excessive fault levels on the existing equipment. Matching N-S Link fault levels to those of the existing equipment would almost certainly significantly compromise the operation of the new transmission plant.
65. Against these disadvantages, the capital and operational savings of installing a 1000 MW converter at Woodlands, instead of a 1500 MW might, on present estimates, amount to some tens of millions of Euros. However, this financial benefit would have to be set against:
- i. the operational risks of devising a unique running regime,
 - ii. the costs of overcoming the voltage and fault level issues mentioned above, and
 - iii. the costs of re-engineering the control systems on the existing E-W Interconnector.
66. Further consideration of the technical factors associated with a N-S Link / E-W Interconnector connection at HVDC is beyond the scope of this report but, given the technical disadvantages mentioned above, we consider it extremely unlikely that any cost-reducing synergy would be found between the existing E-W Interconnector and the proposed N-S Link.

2.4.5 Summary of Position on HVDC Technology

67. Given all the above considerations, we cannot see any benefit to Ireland of rejuvenating reviews of the classic CSC (LCC) HVDC. However, with current state of development of VSC technology, and given the further VSC developments expected in the near future, we do consider it appropriate to review potential VSC costs alongside those of AC technologies.
68. HVDC circuit breakers of the capacity required for the N-S Link are not expected to become commercially available in the near term, and their availability should not be assumed for the N-S Link. As an alternative to HVDC circuit breakers, auto-disconnector technology (similar in concept to the auto-reclose cycle widely used on AC networks) could offer short-term system performance inferior to, but of the same order as, the AC alternatives.
69. With VSC technology, a N-S Link could, by around 2016, comprise either two circuits linked via the AC network at Cavan, or a single direct Tyrone – Meath circuit with a Cavan tee-off. We have estimated costs for the latter, this requiring three, rather than four, terminals, and thus offering the lower cost HVDC option.
70. It is theoretically possible to connect the proposed N-S Link to the existing E-W Interconnector on the HVDC side, but the design limitations are likely to be very substantial. On the initial view developed here, it seems probable that the financial benefits anticipated in 65 above would be outweighed by the limitations.

3 THE CHAPTER 8 COST TABLES AND PARAGRAPHS

3.1 General

- 71. This chapter contains updates for the tables and text of the 2009 Report which refer to costs. No attempt is made to repeat, or update, other information or lines of argument here; the 2009 Report itself provides the context of these cost estimates.
- 72. What this report does do, however, is to update transmission costs on the basis of current technology, rather than that which prevailed during the preparation of the 2009 Report. Further detail on the changes in technology since that time may be found in Section 2 above.

3.2 Costing Assumptions and Approximations

- 73. Rounding: Costing estimates presented in the following tables are rounded as appropriate; however, the calculations behind the tables are not rounded. This approach preserves the integrity of the calculations themselves; however it can cause an apparent discrepancy between last significant digits of associated numbers. The conclusions of this report are never affected by such rounding discrepancies.
- 74. Equipment design life: Transmission equipment is often specified to have an operational life of 40 years or more. Actual equipment life will vary not only with its design, but with the maintenance / overall regime and with the system and environmental conditions in which it operates. We have assumed a 40-year life.
- 75. Cost base: Transmission costs presented in this Addendum are 1st quarter 2013 estimates.
- 76. Foreign exchange rates: Transmission equipment may be sourced from many places around the world so the information we have used to estimate costs has originated from more than one currency base. In addition, some commodities are traditionally quoted in a particular currency so, for example, overhead line tower steel prices are frequently quoted in US dollars (USD). Of course, the rates continue to change daily, however the set we have used for the present estimates are:-

Currencies	Exchange Rate
EUR/GBP	1.208
USD/GBP	1.613

- 77. Currency basis: The 2009 Report was originally commissioned by EirGrid and, though NIE subsequently took on the role of principal client for the study, for comparison purposes the transmission costs were all placed on a euro (EUR) basis, and then key costs were converted to pounds sterling (GBP) with then-prevailing exchange rate. On this occasion, however, even though the update has been commissioned by NIE, we have been requested to present the costs in a single currency, that being EUR.
- 78. Exchange rate volatility: At the time the 2009 Report was in preparation, exchange rates were much more volatile than recently. For example, in the last quarter of 2008 the number of euros to the pound dropped by nearly 20% (a change rate of around 2% per week), whilst in the last 6 weeks of 2008 USD/GBP rate also moved at around 2% per week – but in the opposite direction. In comparison, over the last 12 months neither exchange rate has varied by more than around 9% (EUR/GBP) and 5% (USD/GBP) in total. (Source: Oanda – average weekly bid rates.) The above exchange rate factors render it inappropriate to make close comparisons between the 2009 and the current cost estimates.

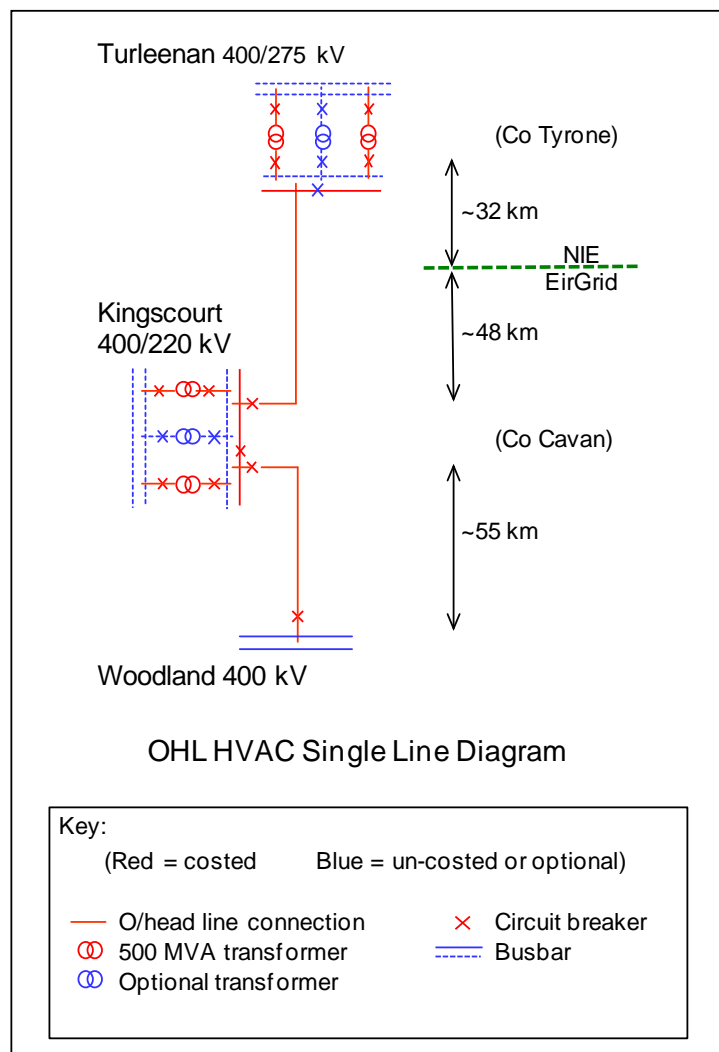
79. Construction Costs: For the purposes of estimating whole-of-life costs, construction costs are deemed here to include a notional interest during construction (IDC) sum. (Calculation of IDC is described in the 2009 Report.)
80. Operation Costs: Operational costs comprise, in these estimates, the sum of:
- i. The cost of the annual energy losses from the transmission circuit,
 - ii. The annualised cost of the power losses to the system, and
 - iii. The annual operation and maintenance (O&M) costs.
81. Discounted Cash Flow Calculation: Construction and operation costs are calculated on a discounted cash flow basis (DCF), using the annual discount rate declared in Table 8-21, page 30 of this document. This figure (8.1%) is the average of the weighted average cost of capital (WACC) for the UK and the RoI (6.41% and 9.74% respectively), and is declared in Table 7.3, p25, of the CER document AIP/SEM/12/078 – see Bibliography reference (7). (Further description of the DCF calculations may be found in Section 8.1 of the 2009 Report.)
82. Losses: Technical losses, which contribute to the lifetime operational costs, have been estimated from the electrical characteristics of the overhead line, underground cable, and HVDC converters whose costs have been estimated in this document. They are based upon an average circuit loading of 34% capacity - 500 MW. This assumption, along with the magnitudes of energy and power losses for overhead lines and underground cables, are assumed unchanged from the 2009 Report. The losses assumed for the HVDC converters have been newly calculated for the conditions of this assessment.
83. Energy Losses Cost: The costs of whole-of-life energy loss costs are based upon a short-run marginal cost (SRMC) of €60.66 / MWh. This figure has been derived from the average system marginal price for Ireland over the last five years or so, which was sourced from a spreadsheet – see Footnote ³ – published on the website of the Single Electricity Market Operator for Ireland (SEMO) – see Bibliography reference (8). (Further description of energy losses calculations may be found in Appendix D of the DECC Costing Study.)
84. Power Losses Cost: The costs of whole-of-life power loss costs are based upon the long-run marginal cost (LRMC) of best new entrant (BNE) Peaker plant in Table 11.1, p45, of the 2012 publication AIP/SEM/12/078 by the Irish Utility Regulator, the Commission for Energy Regulation (CER) – see Bibliography reference (7). We adjust the BNE Peaker figure (€78.18 / kW pa) to take account of associated transmission capacity. (Further description of power losses calculations may be found in Appendix D of the DECC Costing Study.)
85. Other whole-of-life costs: Maintenance costs are estimated as a percentage of the capital costs of equipment – see Table 8-21, on page 30 of this document.
86. Estimate Range: Given the above assumptions and considerations, we describe all the costs in this section as ‘central estimates’, with a working variance of +/- 20% for planning purposes.

³ SEMO System Marginal Price (EP2) from 11Dec07-18Feb13 is published on the SEMO website, under their General Publications – System marginal Price For All Gates in a file called SMP2007-2013.xls. (“EP2” denotes “Ex-Post Initial MSP Software Runs (including subsequent Settlement Reruns)”, which we estimate to be adequately stable for deriving SRMC.

3.3 Section 8.3 HVAC OHL Costs: Table 8-1 – Table 8-4

87. The equipment costed for the overhead line technology option comprises (i) one single circuit 400 kV overhead line from Turleenan to Kingscourt, and (ii) a further 400 kV overhead line from Kingscourt to Woodland. At Turleenan and at Kingscourt no 400 kV connection points currently exist so, to make the technology alternatives as comparable as possible (and unlike the previous estimates) this time we have also costed, (iii) for each of these two locations, two 500 MVA transformers along with associated switchgear and connections – see Footnote ⁴. Finally, at Woodland, where 400 kV connections already exist, for the same reason we have costed (iv) switchgear (one circuit breaker bay) and associated connections.
88. The equipment we have costed is shown in red in the following diagram.

Figure 1 - Costed and Non-Costed Equipment – the Overhead Line Option



Source: Parsons Brinckerhoff - see Section 1.4 for further details.

⁴ Switchgear costs are mentioned in paragraph 25, and further detail is provided in Section 3.6, Page 39. Switchgear costs are added into the final cost comparisons in Section 4, Table 9-1 on Page 41.

3.3.1 Assumptions

89. In the OHL costs tables we make the following key assumptions:
- i. Construction costs are based upon those of the DECC Costing Study, but have been adjusted for the twin bundle ACSR (aluminium conductor steel reinforced) Curlew phase conductor of the proposed N-S Link OHL. Construction project launch and management fees are 10% of the capital costs of the OHL materials, erection, tower foundations and site access costs.
 - ii. Overall build contingency comprises an additional 10% of the estimated OHL capital costs.
 - iii. We assume that two transformers would be installed at Turleenan and Kingscourt in the first instance, for system security and maintenance purposes. We believe it is unlikely that three transformers would be needed immediately at either of these two sites since, although 3 x 500 MVA units would be required there to achieve the full specified 1500 MVA transmission capacity, it seems probable that two transformers at each site would provide adequate capacity for some years. For this reason, costs for these third transformers are not included in the main cost estimate tables.
 - iv. Losses costs are based upon the proposed twin bundle Curlew conductor, and upon an average circuit loading factor of 34%, as in 2009. Whilst the technical losses are assumed unaltered, the costs of these losses are updated as described in the three paragraphs starting at Paragraph 82, Page 15.

3.3.2 The Tables

90. The following tables incorporate our cost estimate updates for the overhead lines tables in the 2009 Report. The first table, Table 3.2, re-states physical parameters that were used to calculate losses.

Table 3-2, p28 – Assumptions for losses calculations

Power factor:	unity		
System voltage:	400kV		
Parameters per phase / pole:-	AC OHL - twin Curlew (2x600 mm ² ACSR)	AC UGC (1x1200 mm ² aluminium XLPE)	HVDC UGC (1x1600 mm ² aluminium XLPE)
R (ohms / km)	0.03	0.025	0.021
X (ohms / km)	0.13	0.24	
B (microsiemens / km)	4.4	57	
Other parameter assumptions are to be found in Table 8-5.			

Table 8-1, p95 – Unit Costs of HVAC OHL

	€/ km	% of Total
Materials	250	28%
Time (Contractor)	460	50%
Other costs	50	5%
Engineering & Project Management	70	8%
Supply Total	830	91%
OHL Supply Contingency @ 10% (see text)	80	9%
Supply Total estimate, inc. Contingency	920	100%
Land Access Management, incl. land owner compensation	(Beyond scope of report)	
PB estimate- lower	740	80%
PB estimate- upper	1100	120%

Source: DECC Costing Study

T8-1

91. The proportion of cost against the contractor's time reflects the increasing expectation of effort to accommodate safety and environmental requirements before construction can begin. Note – this Table 8-1 does not include interest during construction (IDC), however IDC will be found in Table 8-4.

Table 8-2, p96 – OHL Lengths and Cost Estimates

OHL Route Section Length Estimates (km)			
Meath-Cavan, EirGrid	Cavan-Tyrone, EirGrid	Cavan-Tyrone, NIE	Whole Route
52.9	44.7	30.7	128.2

Source: Parsons Brinckerhoff 2009 Report Table 8-2

Note: The above distances are used to allow like-for-like comparison of OHL and UGC costs, and should not be taken to represent a particular route.

		OHL Route Section Cost Estimates			
Units	Overall OHL Unit cost	Meath-Cavan, EirGrid	Cavan-Tyrone, EirGrid	Cavan-Tyrone, NIE	Whole Route
€M	0.9/km	49	41	28	118

Source: This Addendum Table 8-1

T8-2

Table 8-3, p96 – OHL Maintenance Costs

O&M – OHL (% of capital value per annum) = 0.2%

Table 8-4, p98 – OHL Discounted Cash Flow – Lifetime Costs Example

The table presented here is an augmented version of that presented in the 2009 Report. Extra columns are provided to allow present values to be seen separately for interest during construction, end of life replacement and operating costs. Discount rate is 8.1%:

OHL - 400kV "I-V-I" towers - 600sqmm Curlew ACSR - 2 Condr/phase - 500MW Load											
Year	Electrical Losses		Costs (€M)								
	Energy Losses (GWh.pa)	Power losses (MW)	Circuit Construction Capital	IDC	Total Construction + IDC	End-of-life Replacement	Annual Energy Losses	Annualised Power Losses	Annual O&M	Total Operating Costs	Total Cashflow
1			59.0	2.4	61.4						61.4
2			59.0	7.2	66.2						66.2
3	54.6	13.9					3.3	1.4	0.2	5.0	5.0
4	54.6	13.9					3.3	1.4	0.2	5.0	5.0
5	54.6	13.9					3.3	1.4	0.2	5.0	5.0
39	54.6	13.9					3.3	1.4	0.2	5.0	5.0
40	54.6	13.9				134	3.3	1.4	0.2	5.0	139
Totals	2,075		118	10	128	134	126	54	9	189	450
40 year PV (€M)			114	9	123	6	36	15	3	54	183

Sources: Various - see N-S Link 2009 text.

T8-4

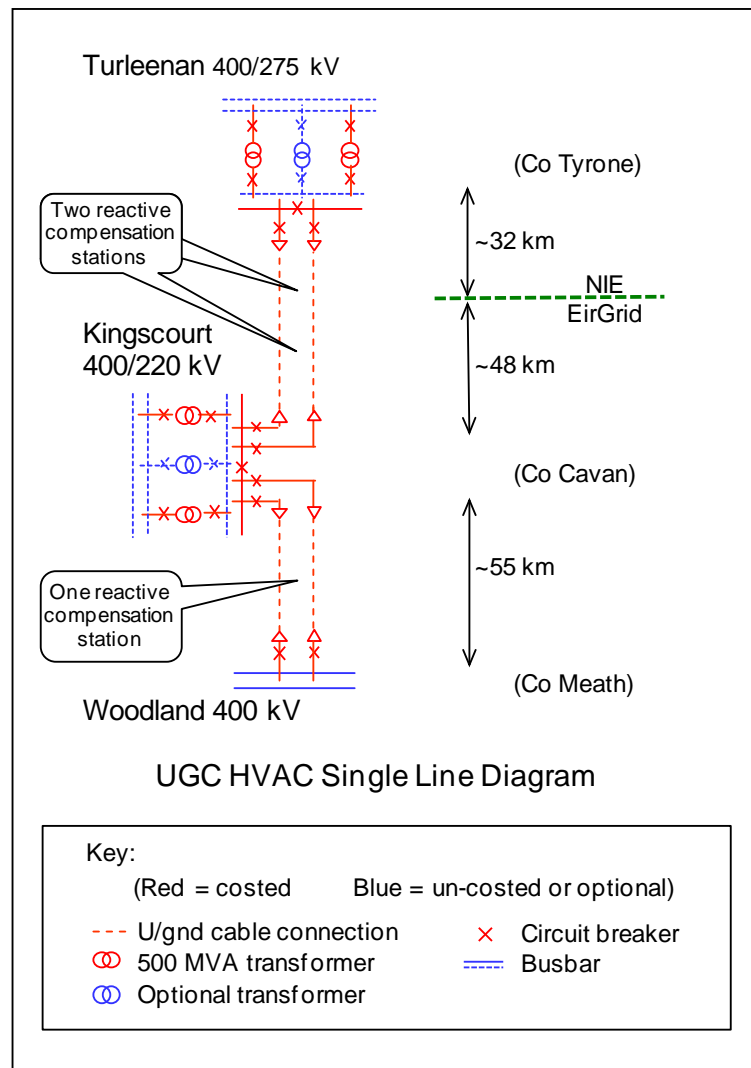
Note – in the above table, acronyms have the following meanings:

- OHL – overhead line
- IVI – name for the overhead line tower type selected by NIE and EirGrid
- ACSR – aluminium conductor, steel reinforced (a conductor type)
- MW – megawatts
- GWh.pa – gigawatt hours per annum
- IDC – interest during construction
- O&M – operations and maintenance
- PV – present value (of a series of costs over time)

3.4 Section 8.4 HVAC UGC Costs: Table 8-5 – Table 8-22

92. The equipment costed for the underground cable technology option comprises (i) a double circuit 400 kV cable from Turleenan to Kingscourt, and (ii) a further double circuit 400 kV cable from Kingscourt to Woodland – see Paragraph 94 for an explanation of the double circuit arrangement. As for the overhead line option, (see Page 16 for further explanation) we have also costed, for each of Turleenan and Kingscourt, (iii) two 500 MVA transformers along with associated connections and switchgear. At Woodland we have costed (iv) two circuit breakers and associated busbar bay equipment and installation procedures. Finally, to accommodate the underground cable in the existing AC network, we have costed (v) reactive compensation at each substation and at three intermediate locations along the cable route, as noted in Figure 2. (This mirrors our reactive compensation assumptions in the 2009 Report.)
93. The costed equipment is indicated in red in the following diagram.

Figure 2 - Costed and Non-Costed Equipment – the Underground Cable Option



Source: Parsons Brinckerhoff - see Section 1.4 for further details.

94. The circuit layout shown in Figure 2 for the underground cable option is more complex than that for the overhead line because, although only a single transmission circuit is required, 2 cable cores would be required for each electrical connection (referred to as “two-cores-per-phase”) in order to provide adequate transmission capacity.
95. We have assumed that operational benefit would be taken from this necessary extra physical complexity by investing a little extra in switchgear to keep the two cores electrically separate. Such an arrangement would result in significant improvements in system security, and in availability during maintenance. The extra cost for this arrangement (which is effectively two circuits, each with half the required total transmission capacity) would be that of the extra switchgear and associated civils, controls and protection at the three substations – estimated at around €5.1M installed. Whilst this adds some 0.5% to the costs for the underground AC cable option, it should overcome to a great extent the transmission system operator’s concerns regarding the poorer availability for service of UGC compared to OHL.

3.4.1 Assumptions

96. In the UGC costs tables we make the following additional key assumptions:
- i. Construction costs are based upon those of the DECC Costing Study, but indexed to the current period using BEAMA labour and equipment price indices. An adjustment has also been made to take account of the use of aluminium rather than copper conductor cables.
 - ii. The 135 km of underground cable would require substantial reactive compensation, and the same configuration has been assumed as for the 2009 Report – namely dynamic compensation (for example, static var compensators or statcoms) at each of the substations, and passive compensation (shunt reactors) at three intermediate stations. The 2009 Report designs and costs have been adopted here, but indexed to the current period using BEAMA labour and equipment price indices.
 - iii. Special construction costs (for example, river and motorway crossings) are estimated half those of the DECC allowance, since there would be fewer such crossings per km in Ireland than assumed in the DECC case study.
 - iv. Construction project launch and management costs – which include survey, route access, route accommodation, and other owner costs as well as contractor accommodation and management – are estimated at 15% of the capital costs of the reactive compensation and UGC materials, terminations, and installation costs.
 - v. Build contingency costs are estimated at 15% of the UGC capital costs, reflecting the greater uncertainty associated with underground works.
 - vi. Losses costs are based upon 400kV XLPE-insulated aluminium UGC, and upon an average circuit loading factor of 34%, as in 2009. Whilst the technical losses are assumed unaltered, the costs of these losses are updated as described in the three paragraphs starting at Paragraph 82, Page 15.

3.4.2 The Tables

97. The following tables incorporate our cost estimate updates for the underground cables tables in the 2009 Report.

Table 8-5, p99 – AC Cable Parameters: Assumptions

Voltage Rating:	400kV
Overall Capacity:	1500MVA continuous (2165 Amps per phase)
Number of cable cores per phase:	2 circuits, each 1 core per phase (therefore total of 6 phase cable cores)
Cable type:	1200 mm ² aluminium conductor, lead sheath
Method of burial	Direct burial, at 750mm centres spacing, and about 1000mm cover to ground level. The 2 sets of 3 phase cores to be buried in separate trenches spaced at 5000mm between centres (not ducted, except at crossings).
Loading for loss calculations	500MVA (as for OHL)
Other parameter assumptions are to be found in Table 3-2.	

Table 8-6, p101 – Civil Engineering – Preliminary Works Costs

Civil Preliminary Works and General Charges for Overall Route (not including contingency)	Estimate (€M)
Construction (including plant, equipment, mobilisation supervision for all suppliers)	4.4
Surveys, photographic & engineering records	1.2
Other (including security, storage, communications, welfare, reinstatement)	6.3
Total	12.0

Source: DECC Costing Study and 2009 Report

T8-6

Table 8-7, p101 – Civil Engineering – Preliminary Works Costs by Route Section

Civil Preliminary Works and General Charges for Overall Route, including contingency	Meath-Cavan - EirGrid - (€M)	Cavan-Tyrone - EirGrid - (€M)	Cavan-Tyrone - NIE - (€M)	Totals (€M)
1. Proportion of these charges apportioned to each section of the route	40%	35%	25%	100%
2. Apportioned charges :	4.8	4.2	3.0	12.0
3. Contingency for preliminary works & general charges @ 10%:	0.5	0.4	0.3	1.2
Totals for preliminary works & general charges	5.3	4.6	3.3	13.2

Source: Table 8-6 and 2009 Report

T8-7

Table 8-8, p102 – Civil Engineering – Estimated Costs per km

Schedule of UGC civil works per km rates, inc. contingency:	Unit cost (€M/km)	Contingency (%)	Unit cost including contingency (€M/km)
A. Trench Preparation: (including trenching, shuttering, backfilling and reinstating, but not cable-pulling):			
1. Landscape types 1 & 2 (cost per km)	1.38	15%	1.58
2. Landscape types except 1 & 2 (cost per km)	1.40	15%	1.61
B. Cable Installation - both landscape types:	0.54	10%	0.59

Source: DECC Costing Study and 2009 Report

T8-8

Table 8-9, p103 – Trenchless Crossings – Unit Cost

Directional drilling unit cost estimate (7 bores per metre):	(€/m)
Estimated cost per metre (1 x 250mm dia core)	0.65
so,	
Estimated cost per metre (7 x 250mm dia cores)	4.6
Geological uncertainty factor (30%), see 2009 Report, para 432	1.4
Total Estimated cost /m (7 cores) incl. uncertainty factor	5.9

Source: DECC Costing Study and 2009 Report

T8-9

Table 8-10, p103 – Special Civil Works Lump Sum Costs

Schedule of directional drilling costs:	Unit cost (€M)
1. Trenchless Crossing - Large River @ 150m	0.89
2. Trenchless Crossing - Medium River @ 70m	0.41
3. Trenchless Crossing - Road @ 40m	0.24
4. Trenchless Crossing - Motorway @ 70m	0.41

Source: DECC Costing Study and 2009 Report

T8-10

Table 8-11, p104 – Special Civil Works Lump-Sum Costs by Route Section

Numbers of crossings, by route section:	Meath-Cavan EirGrid	Cavan-Tyrone EirGrid	Cavan-Tyrone NIE	Totals
1. Trenchless Crossing - Large River @ 150m	2	0	1	3
2. Trenchless Crossing - Medium River @ 70m	22	15	11	48
3. Trenchless Crossing - Road @ 40m	5	6	4	15
4. Trenchless Crossing - Motorway @ 70m	2	1	0	3

Directional drilling costs, including contingency, by route section	Meath-Cavan EirGrid - (€M)	Cavan-Tyrone EirGrid - (€M)	Cavan-Tyrone NIE - (€M)	Totals (€M)
1. Trenchless Crossing - Large River @ 150m	1.8	0.0	0.9	2.7
2. Trenchless Crossing - Medium River @ 70m	9.1	6.2	4.6	19.9
3. Trenchless Crossing - Road @ 40m	1.2	1.4	0.9	3.5
4. Trenchless Crossing - Motorway @ 70m	0.8	0.4	0.0	1.2
Totals	12.9	8.0	6.4	27.3
5. Contingency for underground crossings @ 15%:	1.9	1.2	1.0	4.1
Total costs of underground crossings	14.8	9.3	7.3	31.4

Source: DECC Costing Study and 2009 Report

T8-11

Table 8-12, p105 – Summary of Civil Works Lump-Sum Costs, by Route Section

Total special civil costs, including contingency by route section	Meath-Cavan EirGrid - (€M)	Cavan-Tyrone EirGrid - (€M)	Cavan-Tyrone NIE - (€M)	Totals (€M)
1. Civil preliminary works and general charges:	5.3	4.6	3.3	13.2
2. Directional drilling:	14.8	9.3	7.3	31.4
Total special civil costs	20.1	13.9	10.6	44.6

Source: DECC Costing Study and 2009 Report

T8-12

Table 8-13, p107 – Intermediate Reactive Compensator Costs

See 'Reactive Compensation' in the following revised Table 8-16

Table 8-14, p108 – Static Var Compensator Costs

See 'Reactive Compensation' in the following revised Table 8-16

Table 8-15, p108 – Summary of Compensation Costs

See 'Reactive Compensation' in the following revised Table 8-16

Table 8-16, p109 – Underground Cable Unit Costs

UGC Cost per km estimates (including contingency)	Landscape types 1 & 2 (€M/km)	Landscape types except 1 & 2 (€M/km)	One-off costs per Overall Project (€M)
Civils:			
Civils preliminary and special works, including mobilisation & directional drilling			44.6
Trench civils	1.6	1.6	
Civil supply - cable terminations			0.2
civil installation - cable pulling	0.6	0.6	
Total civil works	2.2	2.2	44.8
Total civil works per km, inc. apportioned one-off costs	<u>2.5</u>	<u>2.5</u>	
Electrical:			
Cable electrical supply	2.7	2.7	included in per km rate
Cable electrical installation	0.4	0.4	
Total cable electrical works	3.1	3.2	0.0
Total cable electrical works per km	<u>3.1</u>	<u>3.2</u>	
Reactive Compensation:			
Intermediate reactive compensation			41.6
Cable-end reactive compensation			47.2
Total reactive compensation	0.0	0.0	88.9
Total reactive compensation apportioned per km	<u>0.7</u>	<u>0.7</u>	
Totals:			
Project management	included	Included	
Overall supply, install, and contingency unit rates, incl. project management, with one-off costs apportioned over total length of connection (135.3 km)	<u>6.3</u>	<u>6.4</u>	

Source: DECC Costing Study and 2009 Report

T8-16

Table 8-17, p110 – Terrain Types, Corridor Lengths, Lengths Allowances

Terrain Area	Note	Terrain Pattern	Minimum Route Length (m)	Corridor Section	UGC Length Allowance (%)	Adjusted Length (m)	Cumulative Adjusted Lengths (m)
1	S of Turleenen	2aa	3,552	Cavan-Tyrone, NIE	5%	3,730	
2		2a	5,291	Cavan-Tyrone, NIE	5%	5,556	
3	River Blackwater	RC1	150	Cavan-Tyrone, NIE	10%	165	
4		2aa	2,364	Cavan-Tyrone, NIE	5%	2,482	
5		2a	14,964	Cavan-Tyrone, NIE	5%	15,712	
6	N of Border	2	4,340	Cavan-Tyrone, NIE	3%	4,470	32,115
7	S of Border	2	4,003	Cavan-Tyrone, EirGrid	3%	4,123	
8		2ab	8,272	Cavan-Tyrone, EirGrid	10%	9,099	
9		2b	2,822	Cavan-Tyrone, EirGrid	10%	3,104	
10		2a	21,554	Cavan-Tyrone, EirGrid	5%	22,632	
11	N of Kingscourt	2b	8,013	Cavan-Tyrone, EirGrid	10%	8,814	47,772
12	S of Kingscourt	2b	2,800	Meath-Cavan, EirGrid	10%	3,080	
13		2bb	9,783	Meath-Cavan, EirGrid	10%	10,761	
14		1	11,711	Meath-Cavan, EirGrid	3%	12,062	
15	River Blackwater	RC2	150	Meath-Cavan, EirGrid	10%	165	
16		1	12,342	Meath-Cavan, EirGrid	3%	12,712	
17	River Boyne	RC3	150	Meath-Cavan, EirGrid	10%	165	
18	N of Woodland	1	15,967	Meath-Cavan, EirGrid	3%	16,446	55,392
Totals			128,228			135,279	135,279

Source: 2009 Report

Table 8-18, p111 – Terrain Pattern Lengths by Corridor Section

Terrain Pattern	Corridor Section length (km)			
	Meath-Cavan, EirGrid	Cavan-Tyrone, EirGrid	Cavan-Tyrone, NIE	Whole Route
1	41.6	-	-	41.6
2	-	4.1	4.5	8.6
2a	-	22.6	21.4	44.1
2aa	-	-	6.2	6.2
2ab	-	9.1	-	9.1
2b	3.1	11.9	-	15.0
2bb	10.8	-	-	10.8
Totals	55.4	47.8	32.1	135.3
	40%	35%	25%	100%

Source: N-S Link 2009 Report

T8-18

Table 8-19, p112 – Terrain Pattern, Drum Length and Unit Costs

Terrain Pattern	Drum Length (m)	UGC unit cost (€/km)
1	690	6.26
2	690	6.26
2a	625	6.38
2aa	625	6.38
2ab	625	6.38
2b	625	6.38
2bb	625	6.38

Source: DECC Costing Study

T8-19

Table 8-20, p112 – UGC Installed Costs, by Corridor Section

Terrain Pattern	Overall Unit cost (€/km)	Corridor Section UGC Cost Estimates			
		Meath-Cavan, EirGrid (€M)	Cavan-Tyrone, EirGrid (€M)	Cavan-Tyrone, NIE (€M)	Whole Route (€M)
1	6.26	260	-	-	260
2	6.26	-	26	28	54
2a	6.38	-	144	137	281
2aa	6.38	-	-	40	40
2ab	6.38	-	58	-	58
2b	6.38	20	76	-	96
2bb	6.38	69	-	-	69
Totals		348	304	204	857

Source: T8-18, T8-19

T8-20

98. The following table states our assumption about the appropriate discount rate for the lifetime cost calculations (see also text, Paragraph 81).
99. The same table also contains our assumptions about average maintenance costs over the life of the equipment for the different technology options. In each case the assumption is expressed as percentage of capital cost per year:

Table 8-21, p101 – Cash Flow Discount Rate and Maintenance

Cash Flow Discount Rate (%) =	8.1
-------------------------------	-----

O&M - OHL (% of capital cost of OHL, pa) =	0.2
O&M - UGC (% of capital cost of UGC, pa) =	0.025
O&M - HVDC (% of capital cost of converters, pa) =	0.4

Source: Parsons Brinckerhoff

T8-21

Table 8-22, p115 – UGC Discounted Cash Flow – Lifetime Costs

The table presented here is an augmented version of that presented in the 2009 Report. Extra columns are provided to allow present values to be seen separately for interest during construction, end of life replacement and operating costs. Discount rate is 8.1%:

AC Underground Cable - 400kV XLPE - 1200 sqmm Aluminium - 2 Core/ph - 500MW Load, 400Mvar Comp every 30km:											
Year	Electrical Losses		Costs (€M)								
	Energy Losses (GWh.pa)	Power losses (MW)	Circuit Construction Capital	IDC	Total Construction + IDC	End-of-life Replacement	Annual Energy Losses	Annualised Power Losses	Annual O&M	Total Operating Costs	Total Cashflow
1			428.4	17.4	445.8						446
2			428.4	52.1	480.5						480
3	103.2	16.5					6.3	1.7	0.2	8.2	8
4	103.2	16.5					6.3	1.7	0.2	8.2	8
5	103.2	16.5					6.3	1.7	0.2	8.2	8
39	103.2	16.5					6.3	1.7	0.2	8.2	8
40	103.2	16.5				972.5	6.3	1.7	0.2	8.2	981
Totals	3,922		857	69	926	973	238	64	8	310	2,209
40 year PV (€M)			825	66	890	47	68	18	2	88	1,025

Sources: Various - see N-S Link 2009 text.

T8-22

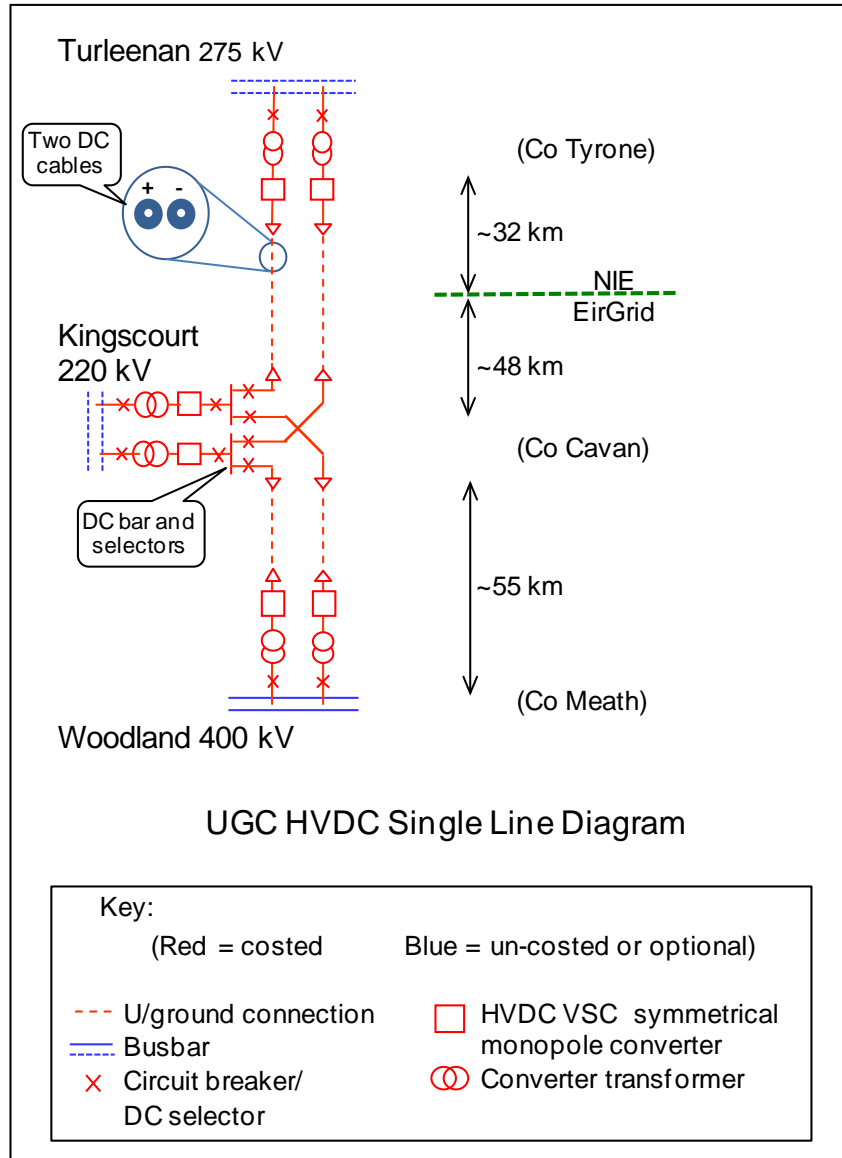
The acronyms used in the column headings of this table are explained below Table 8-4, on page 20 above.

Section 8.4 HVDC Costs: Table 8-23 – Table 8-23a

100. In the HVDC costs tables we have omitted the classic LCC converter technology, concentrating instead upon the VSC approach. This is because VSC technical characteristics are more applicable to the Irish N-S Link than LCC.
101. Cost estimates are based upon a +/- 320 kV bipole arrangement (as is, for example, the France Spain interconnector currently being delivered) since we believe that this provides the optimum balance of HVDC transmission capacity, control facility and service track record. For a single HVDC circuit this would require two aluminium cable cores per pole (in the same way that a single circuit AC underground option would require two aluminium cable cores per phase) – and we have assumed 1600 mm² conductors for the HVDC option.
102. Although the stated requirement for the N-S Link interconnector is 1500 MVA, no HVDC VSC converter of this size has ever been built. Without a track record for a 1500 MW converter it is difficult for NIE and EirGrid to be confident of the performance of such a device, if ordered, or indeed of its delivery date. However, 720 MW units have been ordered for the Swedish South Western Link, the first of which are due to be in service in 2014. We have thus based our cost estimate on two identical, parallel-running 3-terminal links, each with a capacity of 720 MW.
103. With this arrangement, two, electrically independent, 720 MW converters would be installed at each of the substations at Turleenan, Kingscourt and Woodland.
104. Regarding transmission capacity, the difference in transfer capacity between 1440 MW DC and 1500 MVA AC is negligible, and either would be acceptable to both of the Irish transmission system operators.
105. We note that, whilst the nominal transfer capacity of the HVDC option would be 1440 MW, converter and underground cable losses would require additional power input to the link. Depending upon the power transfer and the configuration of the multi-terminal link, losses could vary – see Table 8-23a, Page 35.
106. When weighing the pros and cons of AC and DC, it is worth noting that, under emergency conditions, AC networks are able to “give a little”, and can offer extra capacity in the short term to overcome the emergency. However, HVDC networks do not have this characteristic. It is thus necessary to be certain that an HVDC link is specified to meet all anticipated emergency conditions.)
107. Turning to the transmission itself, we have estimated the construction costs for both HVDC overhead line and HVDC underground cable, as these were both presented in the original Table 8-23. However, we have then concentrated on the underground option for lifetime cost estimates since, although there would be a lower visual impact from HVDC OHL than from the AC equivalent, some impact would still be likely.
108. Just as for the AC options’ costs presented in the previous sections, the HVDC cost estimates here are based on the DECC Costing Study, and the information is then adjusted to the present day and to meet the particular requirements of this interconnector.
109. Apart from the HVDC overhead lines mentioned in Paragraph 107, the equipment costed for the HVDC technology option comprises (i) two +/-320 kV cable pairs from Turleenan to Kingscourt, and (ii) a further two +/-320 kV cable pairs from Kingscourt to Woodland. At each substation we have costed (iii) two 720 MVA HVDC VSC converter stations, each connected as a symmetrical monopole. Finally, at Kingscourt, we have costed (iv) two HVDC busbars and associated offline HVDC selectors, which would allow the remaining two stations on either connector to operate in the event of the failure of the third station.

110. The costed HVDC equipment is indicated in red in the following diagram.

Figure 3 - Costed and Non-Costed Equipment – the HVDC Underground Option



Source: Parsons Brinckerhoff - see Section 1.4 for further details.

3.4.3 Assumptions

111. Other assumptions we have made include:

- i. An assumption that, since there would be two electrically independent HVDC links, a symmetrical monopole arrangement without neutral return would be acceptable to the system operator. The arrangement depicted in Figure 3 uses a symmetrical monopole configuration so, as indicated in the diagram, only 2 HVDC cables are required for each three-terminal link – a total of 4 cables running in parallel. No “neutral” or earth return cable has been costed.

- ii. Each converter would require up to 5 days maintenance outage each year, with a consequent loss of transmission capacity of that section of the N-S Link for that period.
- iii. We have assumed a 500 MW average load for calculating losses (as assumed for the AC options). We have interpreted this as two locations contributing around 375 MW each, and the third end extracting 750 MW. Such an arrangement would result in around 0.6% losses for the three converters together, and this is the level of converter losses we have assumed for these calculations. (To put this assumption into context, two VSC converters are normally assumed to have a total of around 1.8% losses between them at full load.)
- iv. For simplicity, cable losses for the entire route length have been calculated for a 500 MW load.

3.4.4 Strategic Spares Holding

112. One aspect of the HVDC option which we have not costed here, but which could have significant cost and would need careful consideration, is that of strategic spares. The 6 converters would be unique on the all-island transmission network so, unlike much of the equipment required for the AC alternatives, there would be no pre-existing stock of spares. Since the availability of replacement parts in the event of equipment failure has a large bearing on the availability – and thus the commercial viability – of the whole installation, a careful study of appropriate stock levels of key items would need to be made. We do not include a recommendation for stock-value here since such a cost benefit analysis is beyond the scope of this study.

3.4.5 The Tables

113. The following tables incorporate our cost estimate updates for the HVDC tables in the 2009 Report. Regarding the first table, Table 8-23, the 2009 version included costs for an LCC HVDC option as well as for VSC. However, the LCC option has been excluded from this update, as mentioned in Paragraphs 44 and 100, so the converter cost estimates in this table now all relate to VSC converters.

Table 8-23, p116 – Comparative costs of HVDC solutions

(€M)	Build costs	Running costs
Overhead Line:		
3 Converters	445	
Whole route overhead line	107	
Totals	552	
Underground Cable:		
3 Converters	445	See Table T8-23a
Whole route underground cable	508	
Totals	953	

Source: DECC Costing Study

T8-23 & para 473

Table 8-23a – HVDC with UGC Discounted Cash Flow – Lifetime Costs

This is a new table, not presented in the original N-S Link 2009 Report. It provides further detail on the lifetime cost estimates of the HVDC option using underground cable. Energy and power losses depend upon a complex set of link and load configurations, but this example relates to an average of 34% (500 MW) transfer. At peak loading, and depending upon configuration, we estimate that losses might rise to a little over 32 MW (~ 97% efficiency). Discount rate is 8.1%:

VSC HVDC - 1200 sqmm Aluminium XLPE Underground Cable - 2 Core/pole - 500MW Load											
Year	Electrical Losses		Costs (€M)								
	Energy Losses (GWh.pa)	Power losses (MW)	Circuit Construction Capital	IDC	Total Construction + IDC	Mid-life refurbishment + End-of-life Replacement	Annual Energy Losses	Annualised Power Losses	Annual O&M	Total Operating Costs	Total Cashflow
1			476.5	19.3	496						496
2			476.5	57.9	534						534
3	87.1	10.1					5.3	1.0	3.8	10.1	10
4	87.1	10.1					5.3	1.0	3.8	10.1	10
5	87.1	10.1					5.3	1.0	3.8	10.1	10
20	87.1	10.1					5.3	1.0	3.8	10.1	10
21	87.1	10.1				7.3	5.3	1.0	3.8	10.1	17
22	87.1	10.1					5.3	1.0	3.8	10.1	10
39	87.1	10.1					5.3	1.0	3.8	10.1	10
40	87.1	10.1				1,082	5.3	1.0	3.8	10.1	1,092
Totals	3,311		953	77	1,030	1,089	201	39	145	385	2,504
40 year PV (€M)			917	73	990	53	57	11	41	110	1,153

Sources: Various - see N-S Link 2009 text.

T8-23a

The acronyms used in the column headings of this table are explained below Table 8-4, on page 20 above.

3.5 Switchgear and Transformer Costs

114. As an addition to the costs provided in the 2009 Report, we offer here some estimates for the switchgear and transformer costs associated with each transmission option. This is because the technology options do not all require the same amount of switchgear or the same number of transformers, and so where these requirements differ between options we can make a more like-for-like comparison of the technology options' costs by including the switchgear and transformer costs that are dependent upon technology option.
115. The switchgear we have costed is indicated in the single line diagrams of Figure 1, Figure 2, and Figure 3. These items are dependent upon the technology option being considered, and it may be inferred from these diagrams that our cost estimates for Turleenan and Kingscourt don't include all the costs for developing new substations at these two sites. [Omitting, in this way, the development costs that are common to all technology options, is in line with the objective of this study, which is to establish cost differences between the technology options. Since we have excluded from the assessment the cost of project elements common to all options, our estimates should not be construed as comprising the full costs of the N-S Link.]
116. Regarding the AC options, both overhead and underground, since the proposed AC overhead line is specified at 400kV, transformers and associated switchgear are assumed at both Kingscourt (220 kV) and Turleenan (275 kV) – see also Paragraph 87 and Assumption (iii) at Paragraph 89. In addition, at Kingscourt, there would be the need to manage the connections going south and north. Since no 400 kV substation exists there at present, we have included costs for a single busbar substation that would allow any two of the three connections to continue to operate in the event of a failure of the third connection. See Paragraph 94 for a brief explanation of the differences between the OHL and UGC AC connections.
117. Regarding the HVDC option, all three connections would require HVDC converter stations, of which transformers already form an integral part. Thus, whilst AC connections would still be required at all three substations, the AC switchgear would be simpler, and thus less costly than for AC. However, in order to retain operational flexibility, the costs of a DC selector arrangement at, or near, Kingscourt are included – see paragraphs 57 and 109.
118. The following table indicates the switchgear costs that could be anticipated at each connection point for the AC and the HVDC options. We have designated this new table as Table 8-23b:

Table 8-23b – Switchgear Cost Estimates

	Switchgear - AC OHL (€M)	Switchgear - AC UGC (€M)	Switchgear - HVDC (€M)
Turleenan	18.0	20.0	3.7
Kingscourt	21.1	23.2	7.6
Woodland	1.7	2.7	3.3
Total	40.7	45.9	14.7

Sources: Parsons Brinckerhoff

T8-23b

119. These switchgear costs are added into the overall technology comparisons in Table 9-1 “Summary of Cost Estimates for the N-S Link. (That table also appears in the Executive Summary.)

4 THE CHAPTER 9 COSTS CONCLUSIONS

4.1 Paragraphs 542 to 548 in Section 9.3 of the 2009 Report

120. Cost estimate updates for the AC and VSC HVDC options for the proposed N-S Link interconnector are summarised in the following table. The €M values have been rounded to the nearest €5M, however the ratios (the last two lines) have been calculated from unrounded results:

Table 9-1, p136 – Summary of Cost Estimates for the Whole N-S Link

	Total: Turleenan - Kingscourt - Woodland €M		
	AC OHL (base case)	AC UGC	HVDC-VSC UGC
Construction + IDC	125	890	990
Transformers and switchgear	40	45	15
Construction Total	165	935	1005
Lifetime running	55	90	110
40 year replacement	5	45	55
Whole of life Total	225	1070	1170
Lifetime difference above OHL (€M)	0	845	945
Construction difference ratio (times)	1	5.7	6.1
Lifetime difference ratio (times)	1	4.8	5.2

Source: Tables in this Addendum

121. The above costs are presented separately for each Company – NIE and EirGrid – in Appendix B.
122. The first column of this summary Table 9-1 relates to the 1500 MVA 400 kV AC single circuit overhead line option, including associated switchgear at the three substations. It indicates that the estimate to construct the equipment, including interest during construction, is €165M. The present value of the lifetime running costs (which are mainly caused by electrical losses) would be expected to amount to around a further €55M, and the present value to replace the equipment as new at the end of its nominal 40 year asset life, would be in the order of €5M, including a 5% dismantling charge for the equipment being replaced. The whole-of-life cost of the overhead line option is thus estimated at €225M.
123. The middle column indicates the equivalent set of costs for the 400 kV AC underground cable option, again including associated switchgear at the three substations. Construction costs are estimated at €935M, or 5.7 times that of overhead line. Lifetime running costs (losses) are estimated at €90M, and end-of-life replacement at €45M. The whole of life total cost is thus estimated at €1070M, or 4.8 times greater than that of the electrically equivalent overhead line.
124. The final column of Table 9-1 indicates the equivalent costs for six +/- 320 kV 720 MW VSC HVDC terminals connected together with underground cable and appropriate AC and HVDC switchgear (the latter including only currently available technology, offline

HVDC selectors). Construction costs are estimated at around €1005M, or 6.1 times that of the AC overhead line alternative. Lifetime running costs (mainly losses) are estimated at €110M, and end-of-life replacement at €55M. The whole of life total cost is thus estimated at €1170M, some 5.2 times the cost of the electrically equivalent overhead line.

4.2 Paragraphs 551 to 553 in Section 9.4 of the 2009 Report

125. The most cost effective solution for the proposed N-S Link would be to use AC overhead line, estimated to cost around €165M to construct and around a further 35% of this to run, over its lifetime.
126. An AC underground cable is estimated to cost over 5.7 times as much as AC overhead line to construct, and would also cost significantly more than overhead line to run, over its lifetime.
127. Similarly, HVDC UGC links would be expected to cost 6 times as much as AC overhead line to construct, and would then cost twice as much as overhead line to run, over its lifetime.

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6 GLOSSARY AND ACRONYMS

2009 Report	Parsons Brinckerhoff feasibility and costs estimating study for the N-S Link - see Bibliography
AC	alternating current
Addendum	This 2013 document, which presents updated cost estimates from the original 2009 Report.
BEAMA	British Electrotechnical and Allied Manufacturers' Association
CBS	cement-bound-sand - the material traditionally used to surround direct-buried high-voltage cables to stabilise the cable temperature
CER	Commission for Energy Regulation
CSC, LCC	current-sourced-, or line-commutated- converter - the "classic" design of HVDC converter
DCF	discounted cash flow
DECC Costing Study	UK Department of Energy and Climate Change (DECC) Electricity Transmission Costing Study by Parsons Brinckerhoff - see Bibliography
DECC	Department of Energy and Climate Change
EirGrid	EirGrid plc
EIS	Environmental Impact Statement
E-W Interconnector	East-West Interconnector, the 500 MW VSC HVDC link From Woodlands Substation, Meath, to Deeside Substation, UK
HVDC	high voltage direct current
IDC	interest during construction
LCC	See CSC
LRMC	long-run marginal cost
NI	Northern Ireland
NIE	Northern Ireland Electricity Ltd
N-S Link	North-South Link - the proposed pair of single transmission circuits linking Tyrone to Cavan and Cavan to Meath
O&M	operation and maintenance
OHL	overhead line
RoI IEC 2011 Review	International Expert Commission Review of the N-S Link - see bibliography
RoI IEC	International Expert Commission
RoI	Republic of Ireland
SEMO	Single Electricity Market Operator for Ireland
SRMC	short-run marginal cost
UGC	underground cables
VSC	voltage sourced converter - the more recent design of HVDC converter, sometimes referred to as "light".
WACC	weighted average cost of capital

Appendix A - International Expert Commission (RoI IEC) Review - Responses

A.1 Introduction

The previously referenced RoI IEC 2011 Review, that was commissioned by the Government of Ireland, made a number of observations regarding the February 2009 Report. The RoI IEC's observations with particular relevance to the scope of this Addendum, along with brief responses to the observations, are presented here.

A.2 HVDC Technology Options, including VSC

The RoI IEC 2011 Review noted (page 10) regarding the consideration of the HVDC option, that "... most attention is paid to line commutated HVDC and almost none to the modern Voltage Source Converter (VSC) version. Today the situation is entirely different compared to when the report was written regarding technical data such as commercial availability of higher voltages and significantly lower losses".

Response – The impact of recent advances in VSC HVDC technology on transmission costs are taken into account by the cost estimates in this Addendum.

A.3 Availability of HVDC Circuit Breakers

The RoI IEC 2011 Review (Page 26) noted regarding the consideration of the HVDC option that "DC breakers are under development and are expected to be commercially available on the market in 2013. This allows increased flexibility for construction of DC Grids."

And again, on Page 62, the Review noted "With a VSC HVDC it will in the near future (availability of DC breakers) be possible to expand the system to a multi-terminal system (compare with the South-West Interconnector between Sweden and Norway). This will reduce the number of converters and make the expansions relatively cheaper."

Response – The availability of DC breakers, and their possible operational impact upon an HVDC option for the N-S Link, is discussed in Future Availability of HVDC Circuit Breakers, Page 10 of this Addendum.

A.4 Availability of HVDC Circuit Breakers

When members of the RoI IEC appeared before the parliamentary committee in February 2012 there was some discussion about the possibility of rationalising on number of HVDC converters once DC breakers became available. In particular it was said that there might be some savings to be made by sharing the converter installed at Woodland Substation for the East West HVDC Interconnector with the proposed N-S Link.

Response – This concept is discussed in "2.4.4 Relevance of East-West Interconnector Infrastructure", Page 12 of this document.

Appendix B – Summary Cost by Company

B.1 Introduction

This appendix presents an NIE / EirGrid breakdown of the costs summary given in Table 9-1 on Page 38. Note that the cost ratios in these estimates are not identical for the two companies simply because the distribution of equipment (and therefore cost) between the two jurisdictions is not balanced in the same way for each technology alternative.

Firstly, Table 9-1 is provided again below, for easy reference, then overleaf these figures are split between NIE and EirGrid according to the costs that are expected to be incurred each side of the border. Please note that some rounding errors occur in the breakdowns.

B.2 Total Tyrone–Cavan–Meath Route Costs Summary (Table 9-1)

(Figures rounded to nearest €5M)

Total: Turleenan - Kingscourt - Woodland €M			
	AC OHL (base case)	AC UGC	HVDC-VSC UGC
Construction + IDC	125	890	990
Transformers and switchgear	40	45	15
Construction Total	165	935	1005
Lifetime running	55	90	110
40 year replacement	5	45	55
Whole of life Total	225	1070	1170
Lifetime difference above OHL (€M)	0	845	945
Construction difference ratio (times)	1	5.7	6.1
Lifetime difference ratio (times)	1	4.8	5.2

Source: Tables in this Addendum

B.3 NIE Costs Summary

(Figures rounded to nearest €5M)

NIE proportion - €M			
	AC OHL (base case)	AC UGC	HVDC-VSC UGC
Construction + IDC	30	210	280
Transformers and switchgear	20	20	5
Construction Total	45	230	285
Lifetime running	15	20	35
40 year replacement	0	10	15
Whole of life Total	60	265	335
Lifetime difference above OHL (€M)	0	200	275
Construction difference ratio (times)	1	4.9	6.0
Lifetime difference ratio (times)	1	4.3	5.5

Source: Tables in this Addendum

B.4 EirGrid Costs Summary

(Figures rounded to nearest €5M)

EirGrid proportion - €M			
	AC OHL (base case)	AC UGC	HVDC-VSC UGC
Construction + IDC	95	680	710
Transformers and switchgear	25	25	10
Construction Total	115	705	720
Lifetime running	40	65	75
40 year replacement	5	35	40
Whole of life Total	160	810	835
Lifetime difference above OHL (€M)	0	645	670
Construction difference ratio (times)	1	6.1	6.2
Lifetime difference ratio (times)	1	5.0	5.1

Source: Tables in this Addendum

**Appendix 4C Turleenan - Kingscourt 400kV Project Visual Assessment
of New Tower Outline 2007**

Turleenan - Kingscourt 400kV Project
Visual Assessment of New Tower Outline

EirGrid
23/08/07

Prepared by: 
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Turleenan - Kingscourt 400kV Project

Rev No	Comments	Date
3	Revised Project name	18/01/08
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Reference

Date Created 23/08/07

This contains confidential and commercially sensitive information, which shall not be disclosed to third parties.

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Comparative Visual Appraisal

1 Introduction

1.1 Background

The existing single interconnector linking the electrical grid between Northern Ireland and the Republic of Ireland is at full capacity and as a result is a considerable constraint to cross-border electricity transfer. It lacks the capacity to accommodate the continued increase of renewable energy generation but more importantly a single outage would result in the loss of the interconnector. These constraints and the planned introduction of the Single Electricity Market (SEM) mean that a new interconnector is required. An additional North-South interconnector will facilitate greater cross-border electricity transfer capacity, aid operation of the SEM and provide the grid capacity necessary to accommodate the continued increase of renewable energy generation.

A new North-South interconnector, running from County Tyrone to County Cavan is proposed which will comprise a number of elements including a new 400kV transmission line from Turleenan to Kingscourt linking the new electricity substations. Currently, Environmental Impact Assessments (EIAs) are being undertaken for the northern and southern sections of the route by Faber Maunsell and ESBI respectively.

In order to complete the respective EIAs, a decision has to be made as to the type of tower which will be used as a support structure for the new transmission line. To this end, EirGrid has commissioned Faber Maunsell to undertake a comparative visual appraisal of four tower types which could be used to support the new 400kV transmission line. The recommendations resulting from this appraisal will be used to inform the decision as to which tower will be used for the North-South interconnector.

1.2 Comparative Visual Appraisal of Towers

One of the most likely major effects of an overhead transmission line is the visual impact. The visual effects of a transmission line relate to the visibility of the towers, insulators and conductors. There are no means of technically reducing this other than choice of support structure and careful routing. The choice of tower type is therefore important if the visual impact of the transmission line is to be minimised. The different types of lattice steel towers have different visual effects. Visual effect varies with tower height, tower type (base size, arm size, form and amount of structure) and tower family.

This report documents the findings of the comparative visual appraisal of four tower types:

- NL 401 (existing tower type);
- CIVI-1 (hot rolled);
- CVVV-I (hot rolled); and
- Inverted Delta (hot rolled).

The basis of the appraisal is founded on the potential comparative visual effects that each of the four towers may have when considered in the context of the landscape through which the proposed transmission line would route. By considering the various components and characteristics of the tower types, a number of evaluation criteria have been established which have been used to form the basis of the comparative visual appraisal. All criteria have a bearing on how the towers are viewed in the landscape and their resulting visual impact and enable a logical, transparent and thorough approach to evaluating which tower design would be most sympathetic to the surrounding landscape.

1.3 Construction Forms

There are two processes by which the individual members which form the lattice-like structure of towers can be manufactured, hot rolled or a combination of hot rolled followed by cold

formed. Although this visual appraisal focuses only on tower models constructed via the hot rolled process this section briefly considers both and how they may influence the appearance of towers. The main differences resulting from these methods relate to the number and thickness of the individual members a tower will comprise.

Hot rolling of steel involves raising the temperature of steel such that it can be deformed or rolled into the required shapes. During rolling, deformation of material occurs between sets of dies or rollers which form the molten steel into the standard structural shapes. Given the nature of this process only a limited number of shapes or profiles can be achieved. As a result, towers comprising hot rolled steel require a greater number of individual members compared to the equivalent cold formed tower.

As the name "cold formed" suggests, no heat is required to form the shapes, unlike hot-rolled steel. A wide variety of shapes can be achieved, and hence the tower design can be optimised. This is a particular advantage when designing for compressive loads. In this situation the bar profile can be changed to include flange end stiffeners e.g. a 90° or channel section with lips. The addition of lips means the bar has a larger cross-sectional effective area and has greater resistance to local buckling. Overall this leads to the use of bars which have a much longer unsupported length. The use of redundant bracing bars is greatly reduced and the net effect is a more open or transparent tower.

To assist in the comparison, Figure 1.1 provides an illustration of hot rolled and cold formed versions of the CIVI-I tower model. As can be seen the cold formed model comprises fewer individual members, however, despite the larger number of members making up the hot rolled version the degree to which this influences the appearance of the towers is minimal. Both versions appear almost identical as the overall shape and scale of the tower structure exerts a greater influence on how the tower is viewed.



CIVI-I model (*Hot rolled*)



CIVI-I-CF model (*Cold formed*)

2 Methodology

A logical and transparent approach to the comparative visual appraisal has been devised and is described in detail in this section.

2.1 Landscape Character

To ensure that the potential visual effects of the tower designs are effectively evaluated, the landscape character of the areas in which they would be located have been reviewed. Establishing the baseline landscape character enables an understanding of how the tower designs could affect the character and perception of the surrounding landscape. Fundamentally this means the tower designs can be considered in terms of their “fit” within the landscape and their subsequent impacts on visual amenity.

A review of the regional landscape character assessment documents, where available, has been undertaken to establish at a wider, regional level the key components, features and characteristics that contribute to the quality and perception of the landscape.

2.2 Description of Tower Designs

The four tower designs are illustrated in a number of CAD drawings and 3D models. These have been reviewed along with the technical specifications of the designs and a description of each model has been prepared. The descriptions consider the tower designs in terms of:

- Design density;
- Physical parameters of the structure (e.g. height, footprint, etc.);
- Specific design features; and
- Phasing arrangement;

2.3 Evaluation Criteria

In order to ensure the visual appraisal is undertaken in a logical and consistent manner evaluation criteria have been established against which each tower design has been compared and comparative visual impacts evaluated.

The criteria are based on the design characteristics of the individual towers, however, it is recognised that some the tower design characteristics exert a greater influence on how the towers are viewed in the landscape and their resulting visual impact. Consequently a weighting factor has been applied to all of the criteria in order to express the importance of each design element in determining the potential visual impact.

It is also recognised that visual impact analysis relies less upon measurement and more upon experience and professional judgement. Similarly a number of the design parameters considered require a greater degree of subjective opinion in determining their potential visual impact than others which are more objective and quantifiable. Consequently, the evaluation criteria have been divided into two separate types:

- Quantitative criteria; and
- Qualitative criteria.

2.3.1 Quantitative Criteria

These criteria relate to the more definable and objective design parameters of the towers and comprise the following elements:

- Design features;
- Design density and outline complexity;
- Phasing arrangement;
- Finish;

- Tower erection;
- Height;
- Weight;
- Span lengths; and
- Footprint.

2.3.1.1

Design Features

The form of the towers can vary in terms of width, height and base footprint. All of these factors will influence the overall shape of the tower.

2.3.1.2

Design Density and Outline Complexity

The density and complexity of the towers will vary according to the number of members they comprise. The members form the lattice-like structure which forms the tower. The number and thickness of the individual members will vary according to the different models.

2.3.1.3

Phasing Arrangement

The phasing arrangement encompasses the conductors, insulators and overhead conductors linking the towers together. The orientation of the phasing arrangement and where it is located on each tower, both laterally and vertically is variable. The insulators attached to the tower cross arms support the conductors and insulate the conductor from earth. Insulators are made from glass, porcelain or a polymeric compound. This appraisal considers the use of glass or composite insulators and a judgement has been made on the type which is considered to be least visually intrusive. Additionally, dependent on the proximity and alignment of tower structures the sag in overhead conductors between towers is also variable. For the purposes of this comparative appraisal the sag between the structures has been assumed to be the same.

2.3.1.4

Finish

The finish is anticipated to be the same for each tower design, however, it is recognised that the colour and texture of the tower is an important consideration in how visible the tower is in the landscape. Generally, after weathering, towers turn a dull grey colour, however, the colour of a tower is generally only distinguishable at relatively short distances. As distance increases the towers start to appear as grades of light and dark.

2.3.1.5

Tower Erection

Although construction is unlikely to vary significantly between the tower types, the visual impacts associated with the construction of the pylon merit consideration. Factors that have been considered include the scale of the equipment used during construction and the length of time required to erect a tower. Temporary access would be required for the construction of the structures in order to facilitate erection and installation of the foundations.

The construction of high voltage towers follows a well established sequence of activities as identified below:

- Pre-construction activities (preparation of access and ground surveys);
- Excavation and construction of tower foundations;
- Delivery of tower components;
- Erection of tower;
- Erection and stringing of insulator and conductor;
- Commissioning of overhead line; and
- Clearance and reinstatement of sites and restoration of access routes.

2.3.1.6

Height

The height is based on the total height of the tower structure. Generally the taller the structure, the more prominent it will appear in the landscape.

- 2.3.1.7 **Weight**
The weight of the tower provides an indication of its overall size and construction requirement. The estimated weight of each of the towers includes an allowance for bolts, plates and zinc and varies from 18 to 35% depending on tower type.
- 2.3.1.8 **Span length**
The span length is the average distance between two support structures i.e. the length of overhead line linking two adjacent towers. The greater the span length the fewer support structures required.
- 2.3.1.9 **Footprint**
The footprint is the area occupied by the base of the tower. Generally the larger the footprint, the greater the area of disturbance and the more visually intrusive the tower base would be when viewed in more immediate and mid-ground views. However, the variations in tower base are minor and would have a comparatively negligible effect on land take or views.

- 2.3.2 ***Qualitative Criteria***
The qualitative criteria have considered the more subjective elements of the design and the collective effect of the tower structure within the landscape. These principally relate to how the towers appear and fit within the landscape, both in terms of the actual tower structure and as part of a continuous overhead line. These more qualitative considerations are an essential part of the overall appraisal process in analysing the comparative visual impacts of the tower structures and ascertaining how the fabric, character and quality of the landscapes in question can accommodate the changes proposed.

Photomontages have been produced to illustrate each of the four tower designs and these have been used to inform the more subjective judgements which have been made about the potential integration of the tower designs into the landscape.

- 2.3.3 ***Photomontages***
Photomontages have been produced for each of the four tower designs to inform the comparative visual appraisal by providing an accurate representation of how each of the tower designs would appear within the landscape.

Photomontages have been prepared to illustrate the front and side elevations of each of the four tower designs also incorporating a section of overhead line. To ensure consistency and to allow for direct comparisons to be made, a photomontage has been produced for each of the four tower designs, from the same viewpoint illustrating the front elevation and a second viewpoint for the side elevation. The photomontages for each of the tower designs and elevations also illustrate the towers with both composite and glass insulators. In total 16 photomontages have been produced as follows:

- View illustrating front elevation of each of the four tower designs with glass insulators;
- View illustrating front elevation of each of the four tower designs with composite insulators;
- View illustrating side elevation of each of the four tower designs with glass insulators; and
- View illustrating side elevation of each of the four tower designs with composite insulators.

The photomontages have informed the qualitative element of the assessment. A further explanation and method statement is provided in Section 5.1.

2.4 **Comparative Evaluation**

- 2.4.1 ***Quantitative Evaluation***
The quantitative evaluation criteria have been used to generate a matrix whereby each of the criteria considered have been assigned a score based on the extent to which they influence the appearance of each individual tower:

- 1; Negligible/minor influence
- 2; Moderate Influence
- 3; Major Influence

As some of the design parameters/evaluation criteria will have a greater influence and bearing on how the towers are viewed in the landscape and their consequent visual impact, a weight has been assigned to each of the criterion based on the importance of the individual design parameters with regards to appearance. For example the design density and outline complexity would have a greater influence on the appearance of the tower in the landscape than the weight or footprint. The weighting applied is identified below:

- 1; Negligible/minor influence
- 2; Moderate Influence
- 3; Major Influence

The scores and weightings for each element of the towers have been multiplied together and summed to provide an overall score.

The overall scores have been categorised into a range of predicted effective visual impacts based on the minimum possible score (18) and the maximum possible score (54):

- Negligible 1-18
- Low 19- 25
- Medium 26- 32
- High 33- 39
- Very high (maximum impact) 40+

The higher the score, the greater the comparative visual impact of that structure. It should be noted, however, that the scores are comparative and a high score would not necessarily result in a major adverse visual impact when considered as part of a transmission line. Similarly a structure which results in a low score could still generate moderate or major adverse impacts when considered as part of the 400kV transmission line route assessment.

2.4.2

Qualitative Evaluation

The qualitative evaluation provides a professional judgement on the potential integration of the towers into the landscape including their collective effect as part of a continuous overhead line. The photomontages have informed the qualitative evaluation by providing an accurate visual representation of how each of the tower structures would appear and 'sit' in the landscape.

2.5

Recommendation

Based on the matrix and the photomontages a single tower design has been identified as the recommended tower model to be incorporated into the design of the North-South interconnector between Northern Ireland and the Republic of Ireland. This tower type is considered to be most sympathetic to the surrounding landscape and likely to result in least visual impact when considered comparatively between the four tower models in this appraisal. A recommendation has also been made with regard to whether a glass or composite insulator would result in least visual impact.

3 Landscape Character

The baseline landscape context helps contribute to an understanding of how the various scales and forms of the different tower structures could prove inappropriate or intrusive in the context of the landform, settlement and character of the landscape. To this end, this section identifies the landscape character through which the 400kV transmission line would be routed and has been informed by the landscape character assessments undertaken as part of the EIA process for the 400kV transmission line. The landscape components and features identified below are typical of and share similar characteristics to many of the rural landscapes of Northern Ireland and the Republic of Ireland in which the towers would be used in the future. It was therefore considered that this would provide a valuable tool in understanding how the potential components of the wider countryside would relate to the more specific assessment criteria used in this comparative appraisal.

3.1 Landscape Character - Northern Ireland Section of Interconnector

The Northern section of the interconnector falls within the boundaries of two Landscape Character Areas (LCAs) as defined in the Northern Ireland Landscape Character Assessment Series, Environment and Heritage Service, July 1999:

- LCA 47 - Loughgall Orchard Belt; and
- LCA 66 - Armagh Drumlins.

Both LCAs lie within an area defined as the Central Lowlands. The general landscape of both areas is the result of the early Tertiary subsidence of the Loch Neagh Basin. There are no strong topographical barriers in the region and boundaries between the LCAs tend to be subtle.

3.1.1 *LCA 47 - Loughgall Orchard Belt*

The Loughgall Orchard Belt extends from Portadown to the M1 motorway, the River Blackwater and Armagh. The area is characterised by low rolling drumlins which fall towards Lough Neagh to the north and to the slopes of the Blackwater valley to the west. It is crossed by numerous small river valleys and streams, tributaries of the Rivers Blackwater and Bann. The underlying geology is a mix of sedimentary and contemporaneous igneous rocks and gives rise to rich brown soils.

The upper slopes within the Loughgall Orchard belt are a mixture of pasture and arable fields, enclosed by hedgerows and some hedgerow trees. Roadside hedgerows are mostly well maintained and there are a number of short avenues of mature beech and ash trees. Blocks of attractive, well kept orchards are located on the steeper sheltered drumlin slopes of favourable aspect.

Regenerating alder, birch and willow are found on the moss and previous peat extraction has left a typical pattern of rectangular working sites linked by access tracks. There are numerous wooded designed estate landscapes, parklands, woodland and attractive loughs. There is a dense scattering of farms and dwellings scattered along the sides of lanes and at the end of access tracks, as well as villages such as. Many cottages are of traditional simple styles, with a narrow layout and whitewashed exterior.

Numerous large houses, and churches are a feature of the area. Stone buildings and traditional gate posts are also quite common. Dwellings are connected by hedge lined winding minor roads and roller coasting 'A' roads. Two lines of pylons cross the landscape.

This is a varied landscape, with a mix of scales and landscape patterns. In some areas there are pleasant long views across mixed farmland to farmsteads, churches and woodlots, but elsewhere, views are more contained by narrow tree-lined roads or regenerating scrub.

Demesne woodland includes that at The Argory (a National Trust property). The planted woodlands are mainly of beech and oak with an understorey of predominantly alien species including rhododendron, cherry laurel, and snowberry.

Lowland raised bog is extensive across the north of the LCA and extends southward into the Blackwater valley.

The key landscape characteristics of Loughgall Orchard Belt are:

- Low rolling drumlins falling towards Lough Neagh crossed by numerous small river valleys and streams and separated by low lying areas of moss.
- Varied rural landscape pattern, with mixed farmland and horticulture; extensive orchards on sheltered drumlin slopes.
- Wooded designed estate landscapes, parklands and attractive loughs, hilltop copses, mature trees and neat clipped hedges.
- Two types of woodlands: demesnes woodland and wet woodland.
- Lowland raised bog is extensive across the north of the LCA.. Almost all has been cut-over in the past, much has been colonised by birch woodland and little intact bog remains.
- Numerous scattered dwellings connected by hedge lined winding roads.
- Many traditional buildings including parish churches.
- Long views to Lough Neagh and Portadown area from hill tops.

3.1.2

LCA 66 - Armagh Drumlins

This LCA lies within the region described as the Uplands and Drift Covered Lowlands of Down and Armagh. The generally subdued relief of the area provides the unity of this region. Relative relief is provided in the north by the Silurian hills, The Newtownhamilton Plateau in south Armagh, the Caledonian igneous complex of Slieve Croob. Below ca 350m, there is an almost complete mantle of drumlins forming an internationally acknowledged type example of a 'drumlin swarm'.

The Armagh Drumlins cover an extensive area of rolling north - south orientated drumlins. They are overlooked by the Carrigatuke Hills to the south and fall towards the Loughgall Orchard Belt and fringes of Lough Neagh to the north. The area is drained by numerous small winding streams that are frequently tributaries of the Callan River. Occasional loughs and sedgy mosses occupy the hollows between drumlins. The landform becomes progressively lower and the drumlins more pronounced to the north. River and stream valleys, loughs and mosses are sensitive to changes in water quality and water table, the latter being easily affected by development.

Land use is dominated by improved pastures, which are separated by overgrown hedgerows and tree belts. Mature hedgerow ash trees are common.

There are a number of wooded historic estates, which are associated with stone walls and stands of mature trees.

Woodlands occupy c.2% of the LCA, almost all is broadleaved or mixed and most is associated with present or former estates.

There are numerous scattered dwellings and farms, connected by a network of winding, hedged roads. Large farm barns and ruined stone cottages are common features. The city of Armagh, with its tall spires, is a focus for local roads and views. The area also includes smaller settlements such as Keady and Richhill. New development is prominent on ridge-lines around the outskirts of Armagh. Archaeological features such as Navan Fort, on the outskirts of Armagh, are of national significance. There are open views across the landscape from higher points, whilst the landscapes between the hills are intimate and enclosed.

The key landscape characteristics of the Armagh Drumlins are:

- Extensive area of rolling drumlins overlooked by the Carrigatuke Hills to the south and crossed by numerous, small winding river valleys.
- Improved pasture separated by bushy hedgerows and tree belts.
- Numerous scattered dwellings and farms connected by network of winding, hedge-lined roads.
- Wooded historic estate and park landscapes.

- Woodlands are almost all long-established' broadleaved or mixed and most is associated with present or former estates.
- Open views across landscape from higher points; intimate enclosed landscapes between hills.
- Significant archaeological sites.

3.2 **Landscape Character - Republic of Ireland Section of Interconnector**

The Southern section of the interconnector project falls within or in close proximity to the following Landscape Character Areas (LCAs) as defined in the Draft Monaghan Landscape Character Assessment Report which was undertaken by Environmental Resources Management Ireland Limited in association with ERA - Maptec Ltd.

- LCA 6 Mulliyash Uplands;
- LCA 5 Monaghan Drumlin Uplands;
- LCA 7 Ballybay Castleblayney Lakelands;
- LCA 8 Drumlin & Upland Farmland of South Monaghan; and
- LCA 9 Carrickmacross Drumlin & Lowland Farmland.

3.2.1

LCA 6: Mulliyash Uplands

This landscape character area is located on the eastern side of the County. It extends from the Monaghan drumlin uplands as an elevated plateau and series of foothills leading up to and including the unique summit of Mulliyash Mountain.

This is an open pastoral landscape located in an elevated plateau like setting with views towards Mulliyash Mountain as a major focal point in the area. This landscape features a small scale field pattern bounded by neatly cut hedgerows. Farming activities and farm dwellings are present although overall, this is a quiet, tranquil and relatively remote landscape setting. The open plateau renders it visually exposed. Mulliyash is a distinctive landmark mountain with a somewhat linear ridge summit which presents against the skyline. Unfortunately the beauty of this is greatly compromised by the presence of extensive coniferous forestry which is very much out of character with the area generally.

A network of small roads permeate this landscape. Settlements are very small and often occupy intersecting roads or crossroads. Many of the dwellings are very traditional and feature white render or stone and many are well sited on the lower slopes of rolling hills or drumlins.

Key characteristics of this area are:

- A variable topography comprising a flat plateau in the western part of the LCA which extends eastward towards the drumlin foothills leading to the summit of Mulliyash Mountain.
- Drumlins in this LCA are steep sided and are strongly aligned in a north west to south east orientation thereby reflecting the direction of the ice flow during the ice ages.
- Loughs and watercourses are almost absent from this landscape apart from a larger lough featuring a crannog near Drumleck.
- Landscape pattern is strongly defined as small to medium scale pastoral fields bounded by cut hedgerows with occasional mature trees. This pattern is obliterated and replaced with solid coniferous forest at Mulliyash.
- Large tracts of commercial coniferous forestry are present and reach up to the summit of Mulliyash Mountain.
- Long range views towards this mountain can be gained from many locations.
- Views of the Mourne Mountains can be gained from the eastern side of Mulliyash Mountain.

3.2.2

LCA 5 Monaghan Drumlin Uplands

This LCA extends across almost the entire width of the county. It is an upland landscape comprising upland drumlins and drumlin foothills which form a ridgeline associated with the Longford Down inlier, formed in the geological past as referenced below. This elevated landscape overlooks the town of Monaghan from the south.

This is a farmed upland landscape which is relatively remote, being distant and elevated topographically from major and minor towns or settlements. Nonetheless human activity in the form of farming and presence of farmsteads is quietly evident. The landscape pattern is

relatively strong and takes the form of cut or managed hedgerows mostly with some hedge trees abounding pastoral fields. On the east side, many of these hedgerows feature gorse. Occasional clumps of deciduous woodland are located in this landscape. Small watercourses and streams are present albeit flow is very slow and sometimes stagnant. Occasional patches of marshland and areas of localised flooding are located in the low lying areas. Dwellings are frequently well located in secluded locations on the lower slopes of the drumlin hills. Many of these are traditional or indeed of a modern simple design that sits well in this landscape setting. Occasional industrial heritage remnants include a disused waterwheel and associated millrace.

Key characteristics are:

- Elevated landscape featuring drumlin hills and small to medium sized loughs. These drumlins are not so steep sided and they do not follow a particular strong alignment and as such, the pattern of glaciation is not very pronounced.
- Occasional rock outcrops on the eastern side near the townland of Annyalla.
- Occasional loughs and areas of marchland located between drumlin hills.
- Landuses mostly given to pastoral farming. Hedgerows featuring native species define the field boundaries, some of these are cut and some are not cut or managed. Hedge trees are fairly frequent.
- N2 National route extends northwards on the east side of this LCA. The continued widening and upgrading of this route causes changes to landscape character at local level.
- Long ranging views to the south and the north can be gained at particular points along the highest elevations of this ridgeline. The views extend for many kilometres.

3.2.3

LCA 7 Ballybay Castleblayney Lakelands

This is a low Lakeland landscape which extends across the width of Monaghan County. It is present as a channel located between two upland ridgelines.

This is a low lying pastoral landscape which is present as an east west channel located or enclosed between two upland landscapes located to the north and south. The landscape contains widely spaced drumlin hills which, on the west side, exhibit in part, an east west pattern or alignment. On the east side, these drumlin hills are strongly aligned in a north west to south east pattern and are reflecting the orientation of ice flow which was moulded these hills accordingly. This character area contains numerous loughs, the majority of which present as highly scenic landscapes. The largest of these is Lough Muckno which is linked to the town of Castleblayney on the east side. Further west, near Rockcorry, loughs of a substantial size include Inner lough and Drumlona lough which are located near the wooded demesnes of Fairfield and Dartry. Crannogs are a feature of many of the sloughs and in the more low lying areas these are fringed with large areas of marsh supporting reeds. Rivers and smaller watercourses extend through this landscape in an east west orientation, the most important of these brings the Dromore River which links many of the loughs. Traditional stone bridge crossing feature occasionally on these rivers. A regional road route links the principal towns of Ballybay and Castleblayney and a dismantled railway line, which indeed is not especially visible in this landscape, also follows the same orientation.

The pastoral landscape pattern comprises small medium sized fields bounded by hedgerows which vary in form, some presenting as cut managed hedge rows and some presenting as uncut hedges comprising many maturing trees.

Key characteristics are:

- Low lying pastoral landscape with frequent widely spaced drumlins.
- Numerous loughs, some of which are substantial in size and are among the largest in the County.
- Regional road route follows the line of the low lying channel in the east west orientation and links the towns of Ballybay and Castleblayney.
- Rivers and smaller watercourses follow an east west orientation and frequently link the loughs.
- Scattered designed landscapes include the Fairfield demesne and Dartry House.
- Remnants of the industrial past include a dismantle railway line which extends across the landscape from Cootehill (outside the county) to Castleblayney and thereafter extending northwards.

3.2.4

LCA 8 Drumlin & Upland Farmland of South Monaghan

This is an upland landscape which extends across the width of the county. It is located immediately south of the Ballybay Lakeland landscape and extends southward covering a relatively large geographic area that overlooks the lowlands of Carrickmacross.

This upland landscape is associated with the Longford Down Inlier and its elevated topography arises from the folding of rock strata and mountain building period in the geological past. The majority of this area comprises smooth drumlin hills used as a pasture. Hedgerows are for the most part uncut and contain many mature deciduous trees. The loughs range in size and the largest of these is Lough Egish. The majority are fringed with reeds and riparian vegetation. Large areas of marshland in the inter drumlin hollows and these areas support willow (*salix* spp) and alder (*Alnus*) tree species.

Occasional traditional farmhouses are located in this landscape, some rendered in white and some built in stone.

The most elevated parts of the landscape are highly remote and feature rock outcrops. Although grazed in part by sheep, the farmland is impoverished and there is no strong field pattern. Boundaries to fields are somewhat fragmented and in many places, hedgerows are replaced by stone walls in variable condition. Occasional plantations of coniferous forestry are located in this landscape.

Key characteristics are:

- An elevated landscape containing drumlin hills that are given over to pastoral uses. Strong field pattern evident as defined by hedgerow boundaries.
- Areas of rock outcrop are present at the highest elevations. These areas feature more impoverished pasture. Field boundary pattern is broken or lost in these locations.
- Plenty of clumps of gorse located in the higher more impoverished areas.
- Frequent medium to large sized Loughs, the largest being Lough Egish.
- The Clarebane river which flows out of Lough Egish is aligned with the county boundary.
- Long range views can be gained from the more elevated parts of this landscape towards adjacent low lying areas to the north.
- No major settlements. Extensive regional and minor road system.

3.2.5

LCA 9 Carrickmacross Drumlin and Lowland Farmland

This character is located in the southern end of the County and comprises lowland farmland which surrounds the town of Carrickmacross.

This is a mixed landscape type topographically comprising low drumlin hills and undulating farmland. Field patterns are strongly defined by hedgerows which comprise a mixture of cut or managed hedges and uncut hedges containing mature deciduous trees. Large areas of marshy land are located at lower lying elevations.

The River Fane is the principal watercourse and much of the farmland located around this river is remarkably flat. In this area, the scale of the field pattern is larger than those generally found in Monaghan's landscapes. Boundaries are generally defined by cut hedgerows. The line of the dismantled railway line follows the line of the river and viaduct sections are well vegetated with woody native shrub species. Attractive traditional stone arch bridges associated with this rail line feature as crossings over minor roads.

Key characteristics are:

- Topographically, this landscape comprises a mixture of undulating farmland and low lying drumlins. The drumlins are most strongly aligned in a north west-south east orientation in the northern half of the character area.
- The River Fane flows in the same orientation as the strongly aligned drumlin groups and flows through the town of Inniskeen on the eastern side of the County.
- Frequent loughs are located in this landscape and range from small to medium in size. Some of these feature crannogs.

- Large areas of mature deciduous woodland are located to the south of Carrickmacross. Occasional clumps of mature deciduous woodland are located throughout.
- Coniferous forestry plantations are located in this character area including one particularly large plantation located in the south.
- Intact hedgerows pattern comprising a mix of managed and unmanaged hedgerows.
- Remnants of Industrial heritage in the form of a dismantled railway are present.
- Carrickmacross is the principal settlement.

4 Proposed Tower Designs

This section outlines the four tower designs under consideration and provides a brief overview of their design features including design density, external appearance, height and phasing arrangement. The tower designs are also illustrated in a number of technical drawings and 3D models (refer to Figures 1-4).

4.1 NL-401

The NL-401 tower design is illustrated in Figure 1 and represents the existing tower model design currently used.

The tower stands 32.5m tall and has a base 7.61m square. The side elevation forms a tapering profile from the base width of 7.6m to a narrow 700mm point. In front elevation the tower tapers from the base until its narrowest point, 13m high where it divides into two sections. These angled sections extend back outwards to form a rough V-shape, until they reach the cross arm from which the phasing arrangement is hung. The 21m long cross arm is at a height of 26m. The cross arm extends beyond the V-shape forming 4.6m long wings symmetrically arranged on either side of the structure. From each wing, the insulators are arranged in vertical formation. From the centre section of the cross arm a further pair of insulators form a V-shape, the point of the V being in the centre of the tower structure. From the cross arm, on either side of the structure, two large earthwire peaks extend.

In both front and side elevation the tower forms a symmetrical structure comprised of a typical steel lattice structure composed of a large number of smaller members.

4.2 CIVI-1

The tower design is illustrated in Figure 2.

The tower has an overall height of 32m and a base 7.6m square. The side elevation forms a tapering profile from the base to a point 1m in width at the top of the structure. The side elevation profile whilst not as narrow as the existing tower design (NL-401) does provide a far more open lattice structure in its lower 20m.

In front elevation the tower tapers from the base up to 20.1m and creates a narrower column than the existing tower design (NL-401). From the top of this column, the tower forms an approximate diamond shape with two arms angled away from the column to support two symmetrical 4.156m side wings. The wings, at the mid-section of the diamond shape, are located symmetrically at a height of 26m, on either side of the structure. From these wings the insulators are arranged in a vertical formation. Unlike the NL-401 model the CIVI-1 has no cross arm, connecting the wings. Instead two separate arms are angled back towards the centre of the tower structure where they link together completing the diamond shape. At either side of the top of the diamond, smaller wings support the earth wire. Arranged in vertical formation from the lower section of the top two arms, insulators form a V-shape pointing to the centre of the structure.

In both front and side elevation the tower forms a symmetrical structure comprised of a typical steel lattice framework composed of a large number of smaller members. The tower maintains a more open lattice structure compared with the existing tower design with the raised centre phase and subsequent reduction in horizontal spacing further enhancing the transparency of the structure.

4.3 CVVV-I

The tower design is illustrated in Figure 3.

The CVVV-I model in both side and front elevations has a similar overall shape to the CIVI-1 model above, with a relatively narrow column with individual, symmetrical arms forming a diamond shape located at the top of it. There are, however, slight differences in the alignment of the wings on either side of the mid-section of the diamond shape and there are also no wings at the top of the structure. The other major difference is the alignment of the phasing arrangements. The insulators on each wing, either side of the tower, form a V-shape as opposed to a vertical formation. The third pairing hang from the upper most arm of the diamond, forming a V-shape in the centre of the structure.

In both front and side elevation the tower forms a symmetrical structure comprised of a typical steel lattice framework composed of a large number of smaller members. The tower maintains a similarly open lattice structure to tower CIVI-1 compared with the existing tower design.

4.4

Inverted Delta

The tower design is illustrated in Figure 4.

The overall height of the structure is 34.5m which is taller than all of the previous tower designs with a similar base area of 7.6m square. The column of the inverted delta tower appears both wide and tall both when viewed in side and front elevation. The side elevation forms a tapering profile although it is wider than the other tower designs with a 2m wide profile at the top of the tower.

In front elevation the tower narrows slightly from its base to a height of 14.5m, forming a shorter column structure than the other tower designs. On top of the column, arms curve away from the structure, roughly forming a U-shape. Sitting on top of the 'U' is essentially a cross arm, the section being angled at the centre to point downwards to the tower column. Two wings point inside the 'U', the tip of each wing supporting a V-shaped insulator arrangement. Above this V-shape hanging from the cross arm are a further two V-shaped insulator arrangements. This tower displays the narrowest phase to phase spacing of 7.5m compared to 21m on the existing tower design (NL-401) thereby creating a narrower conductor profile.

In both front and side elevation the tower forms a symmetrical structure comprised of a typical steel lattice framework composed of a large number of smaller members. In side elevation the tower maintains a similar open lattice structure to towers C-IVI-1 and CVVV-I compared with the existing tower design. However, in front elevation the tower forms a wider and bulkier structure compared with the slightly more elegant structures evident in the above tower designs.

5 Photomontages

Photomontages have been produced for each of the four tower designs to inform the comparative visual appraisal by providing an accurate representation of how each of the tower designs would appear within the landscape. In order to provide a comparative analysis of the towers, a single viewpoint was used in which each of the four towers was superimposed to reflect their front elevation. A further viewpoint was also identified to illustrate each of the tower designs in side elevation along with a section of overhead line.

The two viewpoint locations that were considered to be representative of a typical landscape along the interconnector route were agreed with EirGrid, ESBI and NIE. The two viewpoints selected provided a view representative of the general landscape character reflected along the route corridor. Photographs were taken at each of the agreed viewpoints and their locations noted using a hand held GPS. The photomontages are illustrated in Figures 5 to 8 with a supporting description in Section 6.2.

5.1 Photomontage Methodology

The following method statement provides an explanation of the approach taken in producing the photomontages.

5.1.1

Using Autodesk Viz:

- 3D computer models of the proposed towers were built based on the AutoCAD drawings supplied by ESBI.
- Tower positions that best showed the tower construction were used. These positions do not form part of the North/South interconnector line.
- Obvious landmarks, visible in the photographs, were taken from the ordnance survey data and built within the 3D model to use as control points when matching the model to the photographs.
- Virtual cameras were positioned within the model universe at the same location, height and pointing in the same direction as the camera used to take the actual photographs. The virtual cameras' field of view (focal length) was matched to that used on site.
- Looking at the computer model through each of the virtual cameras, the relevant photograph was displayed as a backdrop.

5.1.2

Using Autodesk Viz and Adobe Photoshop:

Using the control points within the computer universe, the model was checked against each photograph. The position rotation and field of view of the camera was adjusted to ensure the best match. The original photograph was rotated as required and cropped to its original size to ensure it was level.

5.1.3

Using Adobe Photoshop:

The view that was taken as panorama (2 pictures overlapping) was joined together. Frame marks were included on a separate layer to show where the original single pictures were positioned.

5.1.4

Using Autodesk Viz:

Viewed through each of the virtual cameras, the model was rendered as a two-dimensional image for each photographic frame used. The resolution assigned to the rendered image matched that of the photograph

5.1.5

Using Adobe Photoshop:

This image was cut and pasted within the frame marks on top of the original photograph. By matching each rendered image of the model to each frame mark on the photomontage - the effects of increase in scale as the distance from the centre of the image increases was matched.

Colour, contrast, brightness and texture were adjusted to best match the existing photograph. Foreground (from the photograph) was then created as a layer in front of the model and displayed as such.

6 Comparative Visual Appraisal

6.1 Environmental Factors

The extent to which the tower structures appear visible within the landscape can vary according to a number of factors including viewer distance and whether or not the towers, insulators and conductors are on the skyline or seen against a background as well as weather conditions. The range of factors can include:

- Conflict of alignment with flow of landform;
- Complexity and intimacy of landform and land cover;
- Profiles related to skylines;
- Background texture and colour; and
- Climatic conditions.

Landform and topography can play a key role in reducing the visual impact of the towers and of the transmission line as a whole. Routing and the specific location of towers should take advantage of, and respond to, opportunities for screening provided by landform. Topography can also be used to prevent skylining (breaking the sky line) by avoiding prominent hilltops and ridgelines.

Weather is another important factor in determining the extent of visual impact. Weather can effect the distance it is possible to see the tower (visual range) and also the effectiveness of the background in providing an effective backcloth, for example, low cloud could obscure the distant hills which provide the backcloth for the towers, thereby making them more prominent. Where pylons are viewed against the sky, lighting characteristics of the sky can vary greatly and change the visibility of the pylons. Certain climatic conditions can therefore diminish visibility as well as enhance it.

The photographs used to generate the photomontages were taken when weather conditions were clear and bright with good visibility. As noted above the extent to which a tower is visible in the landscape can vary significantly depending on weather conditions. However, for the purposes of this visual appraisal, the weather conditions are considered to be as reflected in the photomontages to allow for an equal and level comparison to be made between the four tower designs.

6.1.1 *The Holford Rules*

Although developed in 1959, the electrical industry generally regards the Holford Rules and the subsequent reviews and supplementary notes as the starting point for routeing overhead transmission lines. The basic premise of the rules is that the extent of the visual impact of an overhead line can be reduced through careful routeing.

It has been assumed that the Holford Rules or similar best practice routeing methodology (detailed work instructions prepared by EirGrid and NIE) has informed the development of the Turleenan to Kingscourt route. By following the rules the line should avoid areas of high amenity value and use landform where possible to reduce the visual intrusion of the towers.

6.2 Quantitative Appraisal

This section provides an analysis of the four tower designs against the various design parameters which comprise the quantitative evaluation criteria, taking into account the previously determined weighting to provide an overall comparative score. The methodology and approach is detailed in Section 2, however, a brief outline of the approach is identified below for ease of reference.

Design Parameter	Detail	Score	Weighting	Total
Design Features Design Density and outline complexity Phasing Arrangement Finish Tower Erection Height Weight Span Length Footprint	Description of the tower design components in relation to each of the specific design parameters	Scores awarded are as follows: 1 no difference-minor 2 moderate 3 major	Weightings are awarded to design parameters considered to have a greater role in altering the landscape character of the area or resulting in potential visual impacts.	Scores are multiplied by the weightings to give a value for each parameter. These are then added together to give a total for each tower design.

The quantitative appraisal for each tower type is outlined below.

6.2.1

NL 401

Table 6.1 Tower NL 401 Quantitative Appraisal

Design Parameter	Detail	Score	Weighting	Total
Design Features	The tower forms a symmetrical structure with a V-shape sitting on top of a tall, wide column. Located at the top of the 'V' is a cross arm which supports the phasing arrangement. Above the cross arm are two large earthwire peaks .	2.5	2	5
Design Density and Outline Complexity	Members form a dense lattice arrangement. Individual members are relatively thin but more numerous increasing the density and complexity of the structure. The upper and narrower sections of the tower that support the phasing arrangement comprise a greater number of members and therefore are greater in density and complexity.	3	3	9
Phasing Arrangement	Phasing arrangement height – 21.7- 26m The phasing arrangement comprises three pairs of conductors/insulators all at identical heights. On the two wings of the tower the pairings hang vertically and in the centre of the tower the arrangement forms a V-shape. The phasing spacing is the largest with a 21m width	3	3	9
Finish	Grey matt finish	1	1	1
Tower Erection	Assume general construction methods would be employed	1	1	1
Height	Tower Height – 32.25m	2	3	6
Weight	7950kg	1	1	1
Span length	Maximum Span - 500m Maximum Equivalent Span – 385m	1	2	2
Footprint	57.88m ²	1	2	2
				36

6.2.2

CIVI-1

Table 6.2 Tower CIVI-1 Quantitative Appraisal

Design Parameter	Detail	Score	Weighting	Total
Design Features	The tower's overall shape comprises a diamond located at the top of a relatively narrow column. Located on either side of the diamond shape, at the very top of the diamond and half way down it, are two pairs of wings which support the phasing arrangements.	2	2	4
Design Density and Outline Complexity	Members form a dense lattice arrangement. Individual members are relatively thin but more numerous giving a dense appearance particularly to the upper and narrower sections of the tower that support the phasing arrangement.	3	3	9
Phasing Arrangement	Phasing arrangement height – 21.7- 26m The conductor/insulator arrangement takes the form of 3 pairs, 2 located on the wings hanging vertically and a single V-shaped arrangement in the centre of the tower. The V-pairing is at a greater height than the two vertical hanging pairs on the wings of the tower. The phase to phase spacing is 19m.	2	3	6
Finish	Grey matt finish	1	1	1
Tower Erection	Assume general construction methods would be employed	1	1	1
Height	Tower Height – 32m	2	3	6
Weight	9050kg	1	1	1
Span length	Maximum Span - 500m Maximum Equivalent Span – 385m	1	2	2
Footprint	57.76m ²	1	2	2
				32

6.2.3

CVVV-I

Table 6.3 Tower CVVV-I Quantitative Appraisal

Design Parameter	Detail	Score	Weighting	Total
Design Features	The tower's overall shape comprises a diamond located at the top of a relatively narrow column. Located on either side of the diamond shape, half way down, are two pairs of long wings which support the phasing arrangements.	2.5	2	5
Design Density and Outline Complexity	Members form a dense lattice like arrangement. Individual members are relatively thin but more numerous increasing the density and complexity of the tower. The upper sections of the tower which support the phasing arrangement are of greater density and complexity than the lower section of the tower.	3	3	9
Phasing Arrangement	Phasing arrangement height – 21.7- 30.55m The conductor/insulator arrangement takes the form of 3 V-shaped pairs located on the wings and in the centre of the tower. The	2	3	6

	arrangements on the wings are at identical heights and lower than the central pairing. The phase to phase spacing is 14.49m (second smallest)			
Finish	Grey matt finish	1	1	1
Tower Erection	Assume general construction methods would be employed.	1	1	1
Height	Tower Height – 32m	2	3	6
Weight	9150kg	1	1	1
Span length	Maximum Span - 500m Maximum Equivalent Span – 385m	1	2	2
Footprint	57.76m ²	1	2	2
				33

6.2.4

*Inverted Delta***Table 6.4 Tower Inverted Delta Quantitative Appraisal**

Design Parameter	Detail	Score	Weighting	Total
Design Features	The tower comprises a tall, wide column with two curved arms forming a rough U-shape above it. Located at the top of the 'U' is a cross arm with a downwards kink at the centre of it. Two small wings point in toward the centre of the tower from the 'U' and support a V-shaped phasing arrangement. Above this 'V' an additional two V-shaped arrangements hang from the cross arm.	3	2	6
Design Density and Outline Complexity	The lower section of the tower comprises fewer members however, above 14.5m the design density and complexity increases. There are a large number of members supporting the phasing arrangements leading to increases in the density and complexity.	3	3	9
Phasing Arrangement	Phasing arrangement height – 21.7- 31.9m The conductor/insulator arrangement takes the form of 3 V-shaped pairs located in the centre of the tower. Two 'V's' are located above the third. The phase to phase spacing is the narrowest with a 7.5m width.	2	3	6
Finish	Grey matt finish	1	1	1
Tower Erection	Assume general construction methods would be employed.	1	1	1
Height	Tower Height – 34.5m	3	3	9
Weight	11,800kg	1	1	1
Span length	Maximum Span - 500m Maximum Equivalent Span – 385m	1	2	2
Footprint	57.76m ²	1	2	2
				37

6.3 Qualitative Appraisal

The following section provides a description of each of the tower designs when viewed in the landscape both in terms of the potential integration of the towers into the landscape and their collective effect as part of a continuous overhead line. The photomontages which have formed the basis of this appraisal are illustrated in Figures 8a to 11b.

6.3.1 *NL 401*

The photomontages illustrating the existing tower design NL401 are presented in Figures 5a and 5b.

This existing tower design when viewed in side elevation creates a relatively tapered profile of a dense lattice framework which is also reflected in the front elevation. Whilst the upper half of the structure is more open than the lower half the upper narrower sections of the tower that support the phasing arrangement form a denser and more complex structure which increases their visual prominence. The cross arms create a strong horizontal form in the upper two thirds of the structure from which the simple phasing arrangement is supported. The two large earthwire peaks further accentuate the visual prominence of the tower in the landscape, although despite these prominent design features, the tower displays a reasonably even and centrally proportioned visual focus. The phasing arrangement creates a simple form which contributes positively to the overall appearance of the tower although the large phase to phase spacing increases the conductor profile and prominence of the conductors in the landscape. The symmetrical and balanced form of the tower provides a comparatively sympathetic fit within the landscape although this is somewhat negated by the more obtrusive design features.

6.3.2 *CIVI-1*

The tower design is illustrated in Figure 6a and 6b.

This tower design comprises a relatively narrow column particularly when viewed in side elevation with a diamond shape arrangement in the upper third of the structure which results in a slightly more elegant form than the existing tower design described above. The phasing arrangement is simple and relatively compact which contributes positively to the overall appearance of the structure within the landscape. The members do, however, form a dense lattice arrangement particularly in the upper and narrower sections of the tower which support the phasing arrangement, which gives the tower a slightly more substantial mass. The symmetrical and balanced form of the tower combined with its relatively elegant form provides a comparatively sympathetic fit within the landscape.

6.3.3 *CVVV-1*

The tower design is illustrated in Figure 7a and 7b.

This model in both side and front elevations is similar to the C-IVI-1 model above with a relatively narrow column supporting symmetrical arms forming a diamond shape structure in the upper third of the tower. However, the combination of longer side arms and a more complicated phasing arrangement results in a slightly less elegant structure. The phasing arrangement is comparatively more complicated than the above models with the resulting effect that when viewed in more immediate views the overall tower structure appears to be more prominent. The extended length of the side arms also adds to a more dominant visual form comparatively less able to be sympathetically sited in the landscape.

6.3.4 *Inverted Delta*

The tower design is illustrated in Figure 8a and 8b.

This tower design forms a prominent structure within the landscape. The tower is taller than the other designs and consequently is a comparatively more dominant structure when viewed in both immediate and more distant views. When viewed in both front and side elevation the profile is wider than the other tower designs although the phase to phase spacing is narrow resulting in a narrower conductor profile which helps create a more compact wirescape profile. The proportions of the tower result in a bulkier mass which creates the overall sense of a more

substantial and visually prominent structure. This tower design is considered to be the least sympathetic to the landscape and to have the greatest comparative visual impact. When comparing the photomontages the Inverted Delta design is a considerably more dominant form than the other designs.

6.4 Insulator Types

The photomontages also depict the use of two different types of insulator; glass and composite. Whilst the choice of insulator type has not formed part of the comparative visual appraisal of the actual tower designs, the difference between the two insulator types in terms of relative visual impact has been considered.

The photomontages suggest that the glass insulators would be more visible and prominent than the composite insulators which do not draw attention to the insulator arrangement in the same way that the glass insulators do. The glass insulators tend to reflect the light more and consequently make the insulator arrangement appear to be more conspicuous which in turn affects the visual perception of the overall tower design when seen in the landscape. Composite insulators can be glazed grey to reduce visibility against different backgrounds under various light conditions which creates a less prominent insulator arrangement within the overall tower structure.

Consequently it is recommended that composite insulators are used rather than glass.

6.5 Comparative Matrix

The table below provides a summary of the visual appraisal scores, their comparative visual impact and the recommended tower design with least comparative visual impact.

Table 6.7 Summary of Comparative Visual Appraisal

Tower Design	Quantitative Appraisal Score	Effective Comparative Visual Impact	Order of preference
NL-401	36	High	3rd
CIVI-1	32	Medium	1st
CVVV-1	33	High	2nd
Inverted Delta	37	High	4th

7 Recommendations

7.1 Summary of Comparative Appraisal

The four tower designs have been appraised using a transparent and logical approach to evaluate the comparative level of visual impact associated with each of the tower designs.

NL-401 is the existing tower design currently used and the remaining three tower types, CIVI-1, CVVV-1 and Inverted Delta, have been designed as hot rolled models.

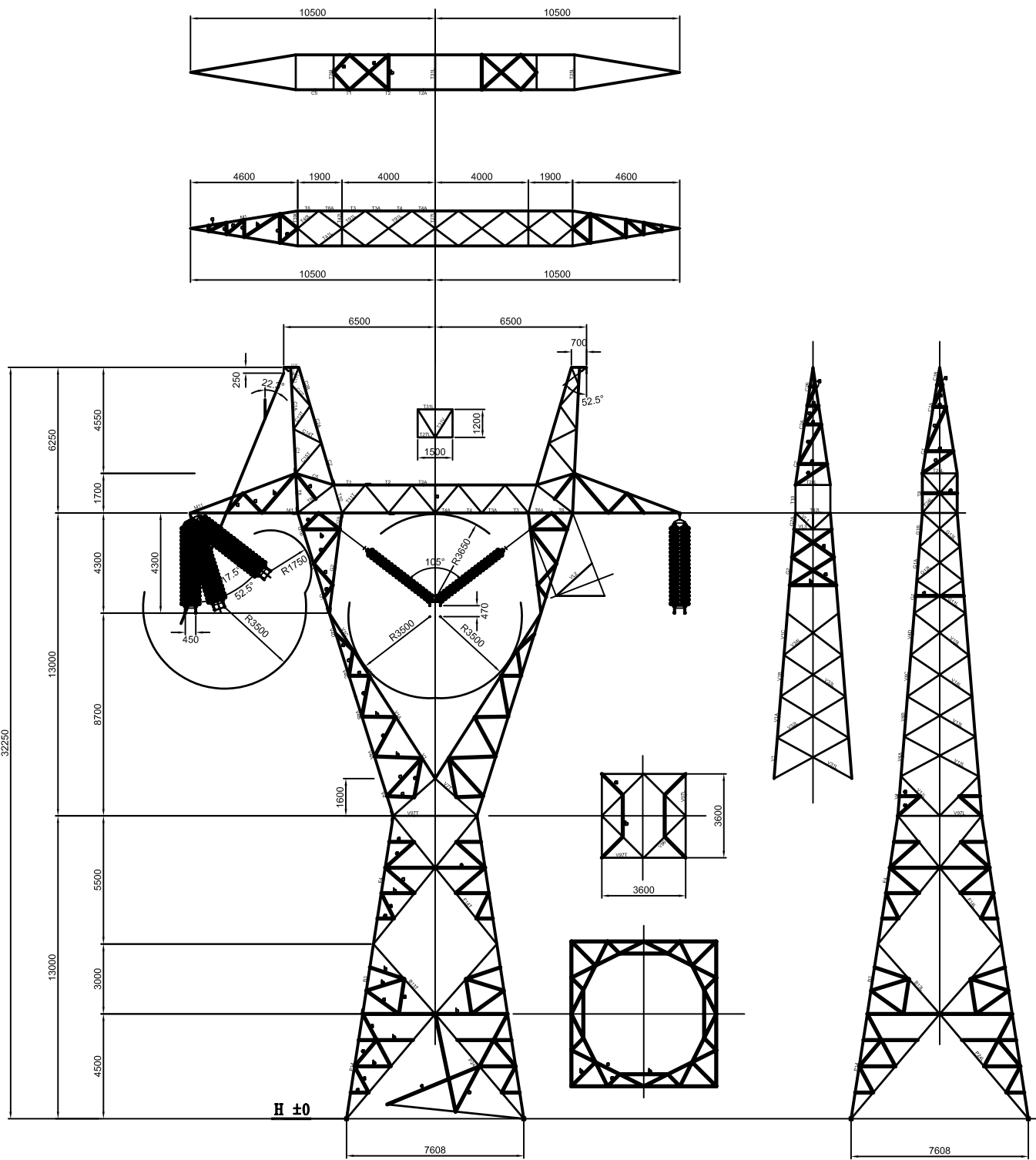
All of the tower designs are symmetrical in form with similar weight, footprint and finish. The span lengths are the same thereby resulting in a similar frequency of supports along a length of overhead line and they also have a similar capacity for flexible routing. The overall height of the towers is also similar with the exception of the Inverted Delta tower type which is taller by a further 2.5m.

The main difference in the visual appearance of the towers and consequently their ability to more or less successfully be accommodated into the landscape is related to the specific design features, density, outline complexity and phasing arrangements. The existing tower NL-401 design features are such that a relatively denser and more complex structure is created although the phasing arrangement is relatively compact and simple. Tower designs CIVI-1 and CVVV-1 follow a relatively similar structure although the phasing arrangement and design density is more complex in tower CVVV-1 than CIVI-1 increasing the towers visual prominence in the landscape. The increased height of the Inverted Delta tower combined with its greater width and bulk creates the most substantial and visually prominent form out of all the structures.

7.2 Recommended Tower Design

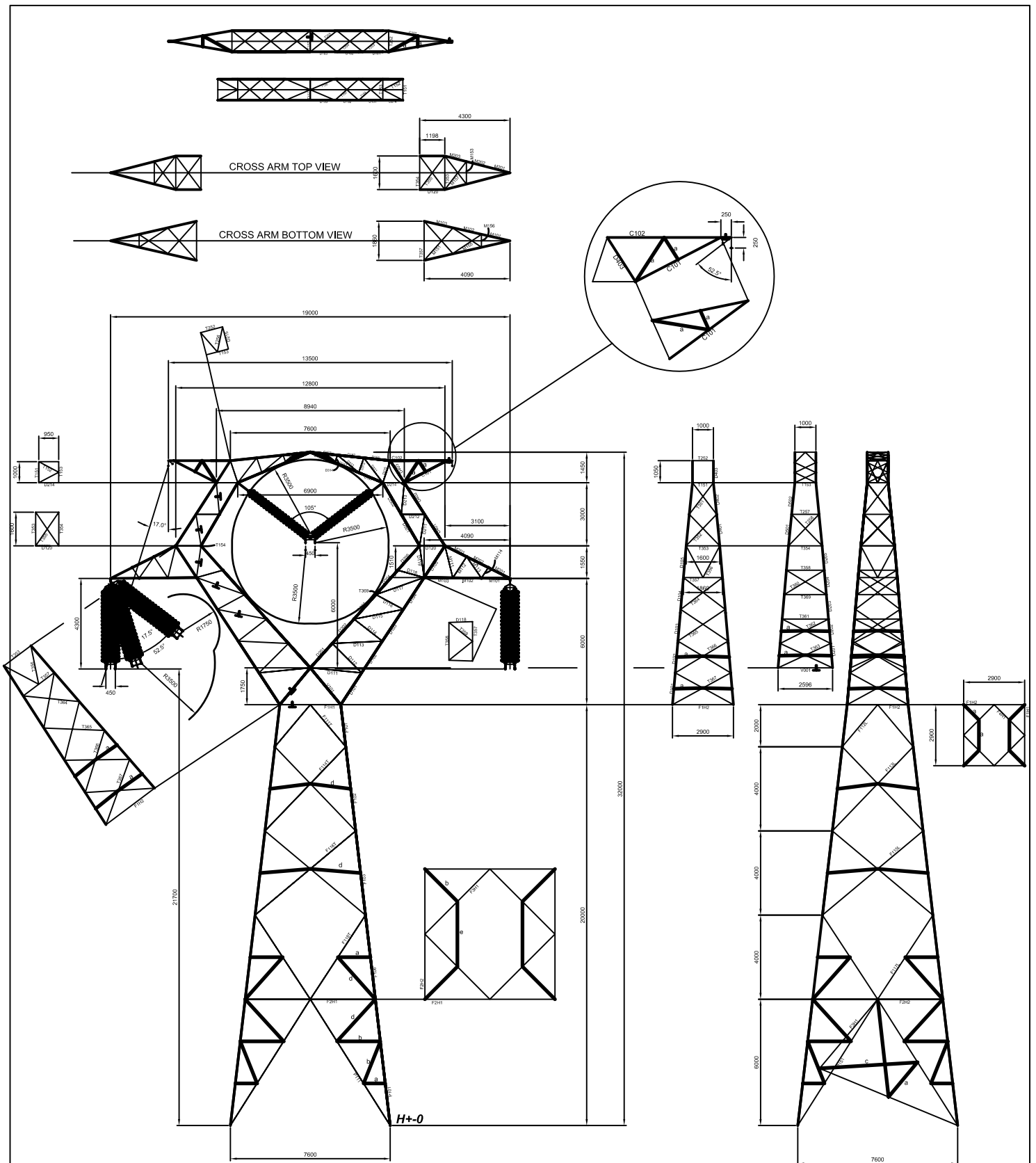
Only one tower design, CIVI-1, has been identified through the comparative visual appraisal as being of medium visual impact. This tower type had the lowest appraisal score which was also supported by the more qualitative analysis undertaken using the photomontages. This tower design is considered to comparatively have the least visual impact.

It is therefore recommended that tower design **CIVI-1** is used as the support structure in the proposed Turleenan to Kingscourt 400kV project.



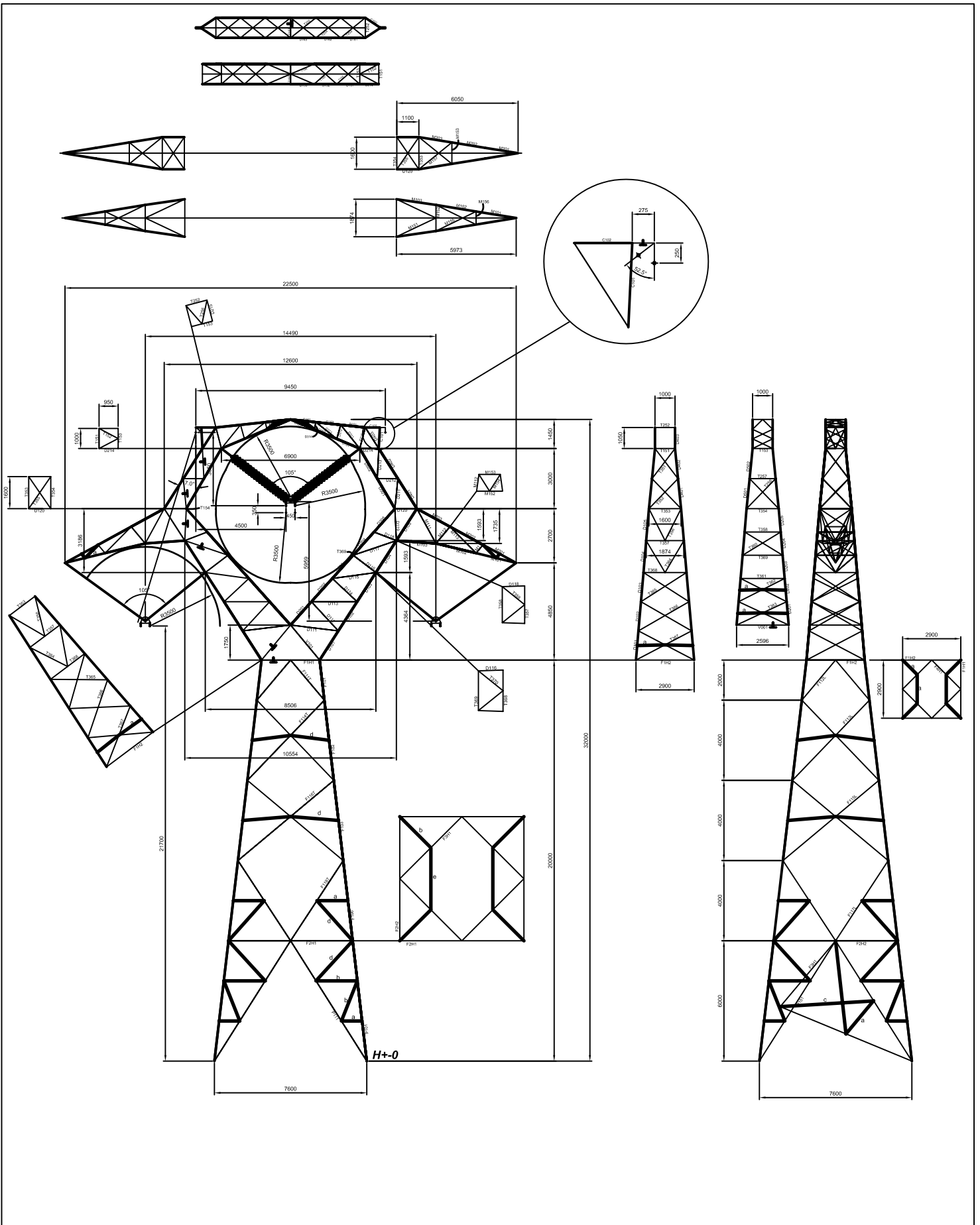
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  <p>Pylon design undertaken by ESB International</p>	Title Figure - 1 NL401		
	Drawn EIRGRID	Checked RK	Project No. 53888
	Scale NTS	Date 29/11/07	 



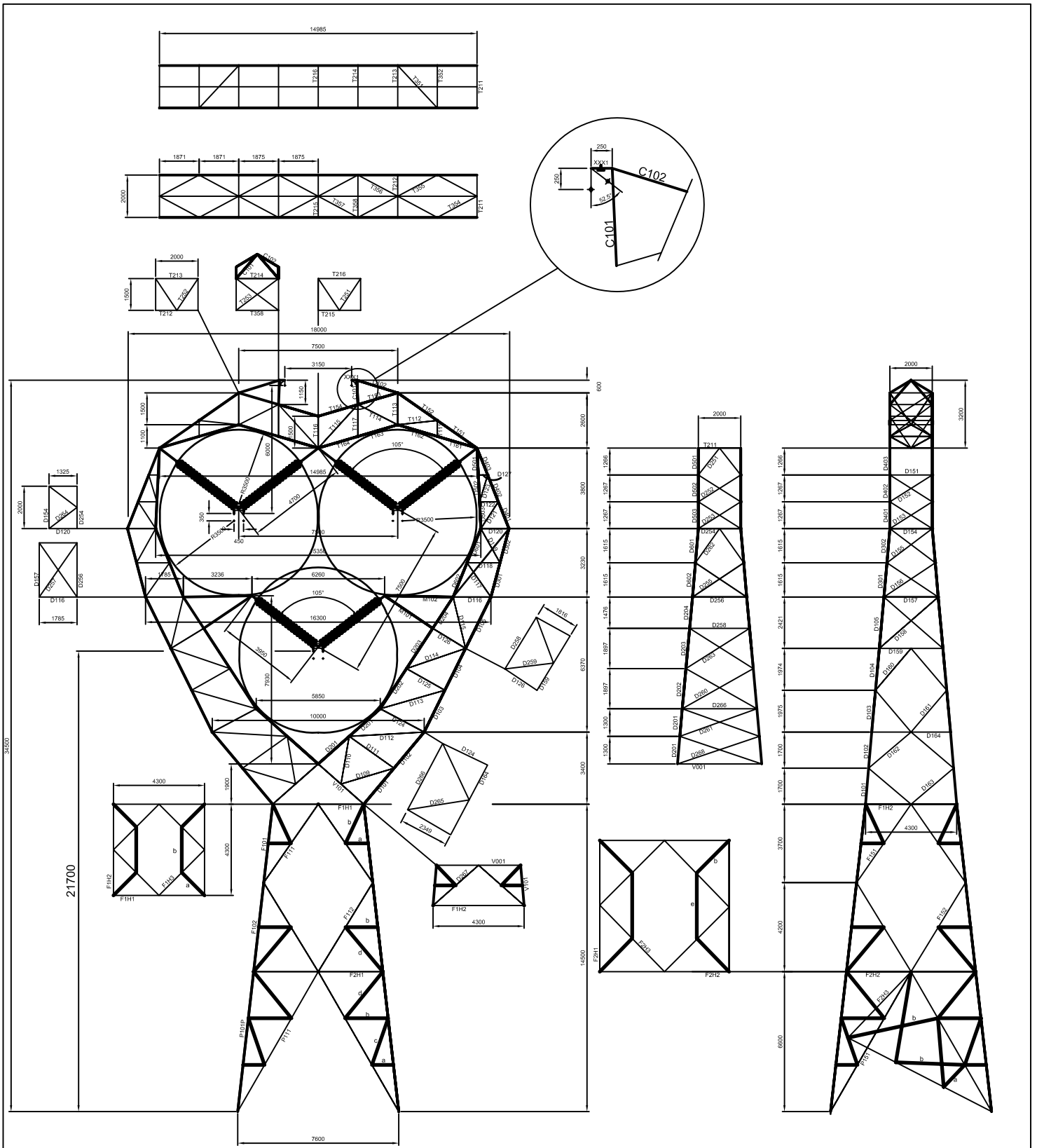
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  <p>Pylon design undertaken by ESB International</p>	Title Figure 2 - CIVI-1		
	Drawn EIRGRID	Checked RK	Project No. 53888
	Scale NTS	Date 29/11/07	 



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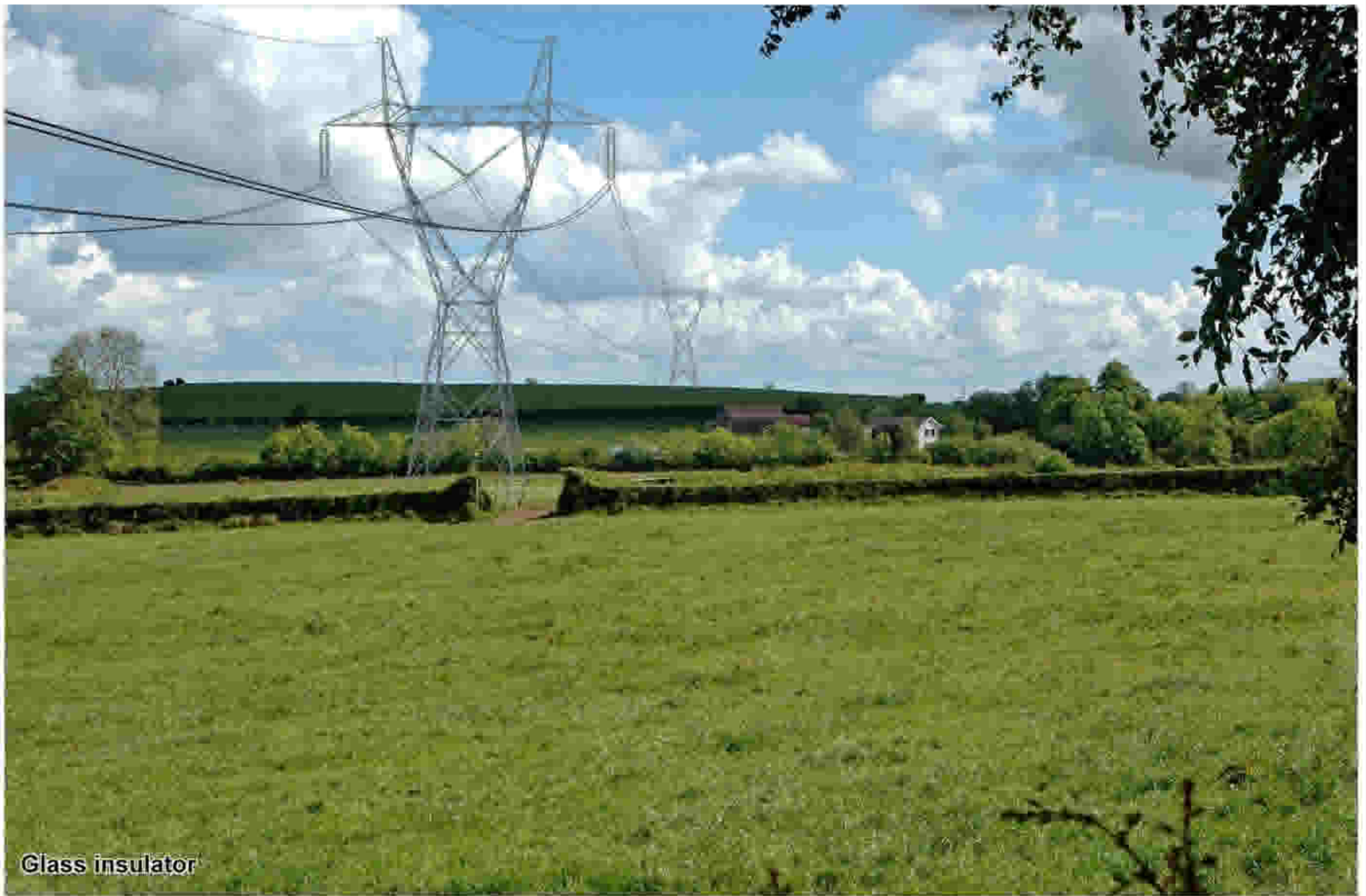
 		Title Figure 3 - CVV-1	
		Drawn EIRGRID	Checked RK
Pylon design undertaken by ESB International		Scale NTS	Date 29/11/07
		 	



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  <p>Pylon design undertaken by ESB International</p>	Title Figure 4 - Inverted Delta		
	Drawn EIRGRID	Checked RK	Project No. 53888
	Scale NTS	Date 29/11/07	 



Glass insulator



Composite insulator

Client



Title

Figure 5a NL401 Photomontage Front Elevation

Drawn

VB

Project No.

53888

Checked

RK

Date

13/08/07

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Glass insulator



Composite insulator

Client



Title

Figure 5b NL401 Photomontage Side Elevation

Drawn

VB

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Glass insulator



Composite insulator

Client



Title

Figure 6a CIVI-1 Photomontage Front Elevation

Drawn

VB

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Glass insulator



Composite insulator

Client



Title

Figure 6b CIVI-1 Photomontage Side Elevation

Drawn

VB

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Date

13/08/07

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Glass insulator



Composite insulator

Client



Title

Figure 7a CVVV-1 Photomontage Front Elevation

Drawn
VB
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Date
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Glass insulator



Composite insulator

Client



Title

Figure 7b CVVV-1 Photomontage Side Elevation

Drawn

VB

Project No.

53888

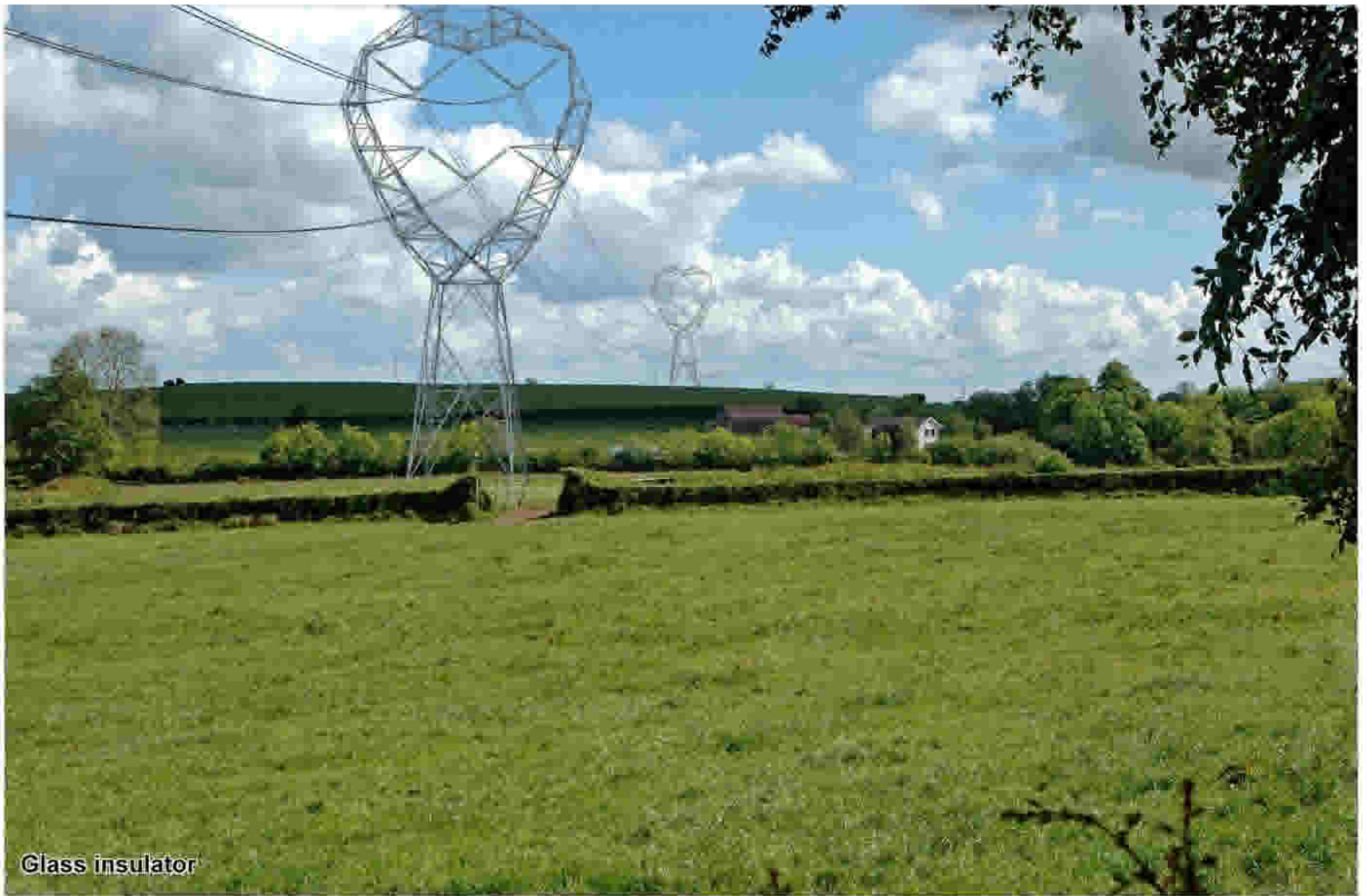
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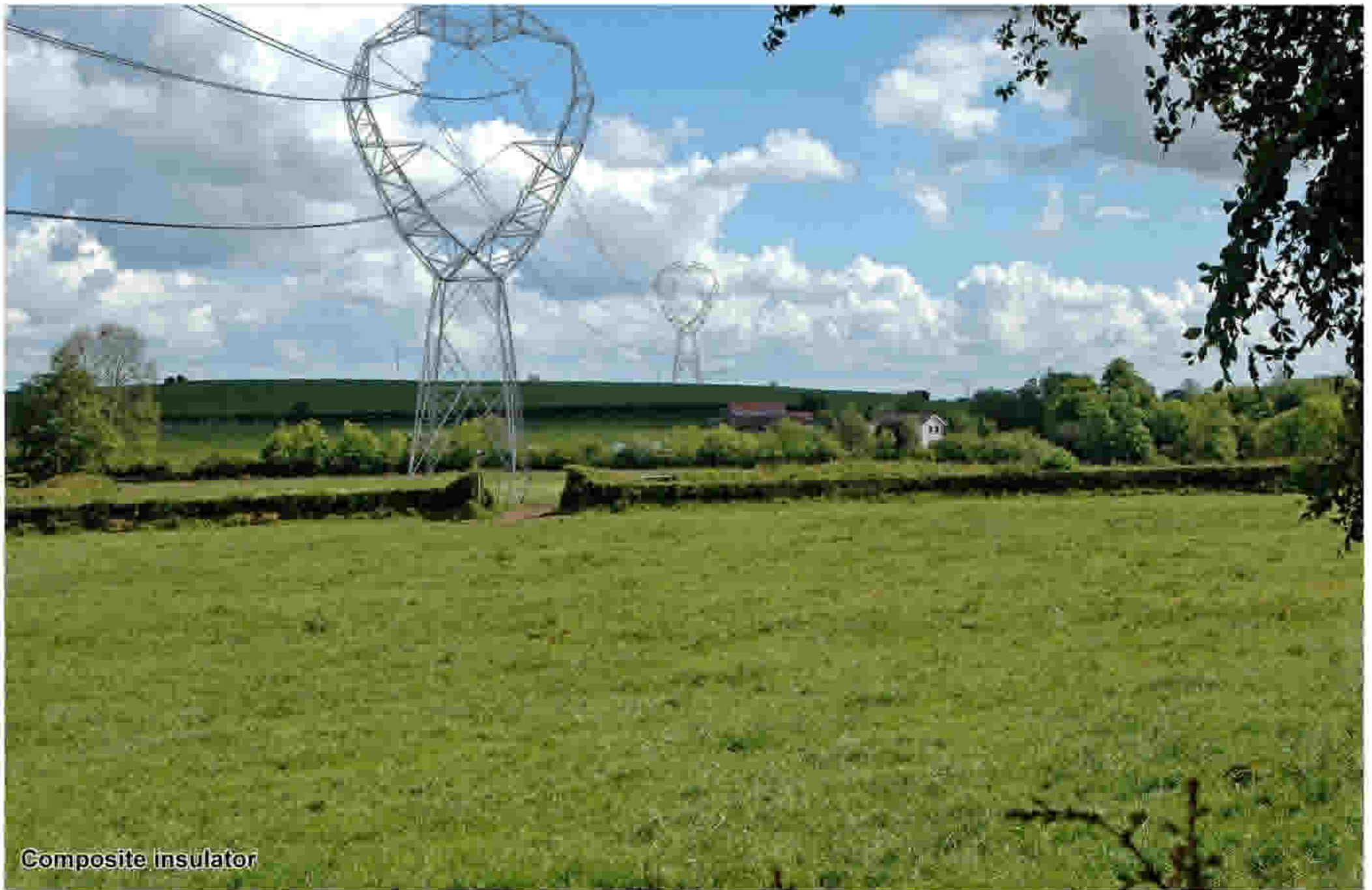
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Glass insulator



Composite insulator

Client



Title

Figure 8a Inverted Delta Photomontage Front Elevation

Drawn

VB

Project No.

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Date

13/08/07

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Glass insulator



Composite insulator

Client



Title

Figure 8b Inverted Delta Photomontage Side Elevation

Drawn

VB

Project No.

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**Appendix 5A Outline Construction Environmental Management Plan
(OCEMP)**

Appendix 5A: Outline Construction Environmental Management Plan

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1.1 Executive Summary

1. The ES has been prepared, inter alia, in order to outline the proposed mitigation measures which will be used to eliminate or minimise the impacts of the Proposed Development. The construction and operational phase for the substation, towers, overhead line and associated works has been assessed within the assessment chapters of the ES and mitigation measures proposed. These measures have been included in this Outline Construction Environmental Management Plan.
2. This Outline CEMP will be a key part of the construction contract to ensure that all mitigation measures, which are considered necessary to protect the environment, prior to construction, during construction and/or during operation of the Proposed Development, are fulfilled. NIE shall be responsible for ensuring that the contractor manages the construction activities in accordance with this Outline CEMP. The contractor will prepare a CEMP which is in accordance with the Outline CEMP to ensure that construction delivers the mitigation measures set out within this Environmental Statement.
3. Objectives and measures are also included for the management, design and construction of the project to control the material impact of construction insofar as it may affect the natural environment and the environment, local residents and the public in the vicinity of the construction works. In order to achieve this, NIE and its contractor will adopt the objectives and control measures set out in this Outline CEMP with respect to:
 - Water Environment;
 - Soils, Geology and Groundwater;
 - Ecology;
 - Noise;
 - Cultural Heritage;
 - Landscape and Visual;
 - Community Amenity and Land Use;
 - Socio- Economics;
 - Telecommunications and Aviation Assets;
 - Flood Risk; and,
 - Transport.

1.2 Introduction

1.2.1 Purpose of a Construction Environmental Management Plan

4. The main purpose of a CEMP is to:

- Provide a mechanism for ensuring that measures to mitigate potentially adverse environmental impacts are implemented;
- Ensure that good construction practices are adopted throughout the construction of the Proposed Development;
- Allow for prompt response if any unacceptable adverse impacts are identified, with the provision of appropriate avoidance/and or mitigation measures as required in accordance with the Environmental Statement;
- Provide a framework for compliance auditing and inspection to enable NIE to be assured that its aims with respect to environmental performance are being met.

1.2.2 The Proposed Development

5. The Proposed Development is summarised below:

- The Proposed Substation: the construction and operation of a new 275kV / 400kV (source) substation at Turleenan townland, north-east of Moy, County Tyrone (hereafter referred to as the substation);
- The 275kV Towers: the removal of an existing 275kV suspension tower and the construction and operation of two new 275kV terminal towers, including the temporary diversion of the 275kV line, to provide for connection of the Turleenan substation to NIE's existing 275kV line;
- The 400kV Towers and Overhead Line: the construction and operation of a single circuit 400kV overhead transmission line supported by 102 towers for a distance of some 34.1km, from the source substation (at Turleenan) to a border crossing between the townlands of Doohat or Crossreagh, County Armagh and Lemgare, County Monaghan, where it will tie into the future ESB network. The overhead line will continue on in the Republic of Ireland with all further towers being proposed by EirGrid for placement within that jurisdiction. However, owing to geographic border definitions in the immediate area of the border crossing, there will be 200m of line oversail in the Northern Ireland townland of Crossbane; and,
- Associated Works: Works to include site levelling, site preparation works, modifying existing access points, construction of new access points, construction of new access lanes, construction of working areas, stringing areas, guarding, site boundary fencing, related mitigation works, formation of access tracks and other associated works at the substation and at the tower locations.

1.2.3 Construction Period and Stages

1.2.3.1 Construction Period

6. The construction period for the Proposed Development is anticipated to be up to three years from the start of the site works.

1.2.3.2 Overview of Overhead Line Construction Stages

7. The construction of the overhead line will be undertaken in five general stages, according to the following sequence, on a rolling programme of estimated durations:

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

1.2.3.3 Overview of Substation Construction Stages

8. The substation construction can be split into seven stages:

- Site Entrance;
- Access Roads;
- Site Clearance, Landscaping and Preparation of Bund Construction;
- Install Drainage and Ducting;
- Construction of Roads and Bases within the Site;
- Installation of Equipment and Construction of Buildings; and,
- Completion of Access Road and Entrance, Including Final Surfacing.

1.3 Overview of Project Environmental Management

1.3.1 Environmental Management Principles

9. NIE views' managing the environmental impact of its activities as an essential part of its business and is committed to a programme of environmental improvement.
10. NIE is certified to International Organisation for Standardisation (ISO) 14001:2004 and requires its contractors to comply with the requirements of its certification. As part of this requirement for certification NIE has an Environmental Policy which underscores the high priority that the company accords to environmental issues and sets goals for continual environmental improvements. The Environmental Policy covers the company's employees and the contractors who work with NIE.
11. The policy framework commits the company to work to protect the environment and apply ways of minimising environmental impacts. Selected principles from the policy of immediate relevance to the Proposed Development are:
 - To mitigate the impact of NIE's activities on the environment and develop procedures to prevent or abate any forms of pollution resulting from NIE's activities;
 - To promote the efficient use of resources and energy;
 - To control waste management and recycling in a manner that reduces NIE's burden on landfill and maximises our reuse of materials;
 - To minimise the impact of NIE's transport fleet on the environment;
 - To commit, where possible, to environmentally sustainable procurement principles, and to encourage those principles throughout NIE's supply chain.
12. NIE will require its contractors to comply with the principles of its Environmental Policy and undertake this project in an environmentally sensitive manner and in particular (which will be contractually enforced) to:
 - Meet the requirements of all relevant legislation, codes of practice and standards as identified in the ES;
 - Limit the adverse environmental impacts as identified in the ES.

1.3.2 CEMP Development Responsibilities

13. As the project proponent, NIE will have ultimate responsibility for the implementation of the CEMP and will work to ensure that the activities of its contractors are conducted in accordance with the mitigation measures set out in the Environmental Statement and the conditions in the planning permission.
14. The CEMP will set out the arrangements for preventing, mitigating and controlling environmental issues and impacts by those carrying out the work and all others who may be affected by it, in accordance with the measures set out within this Outline CEMP.
15. The Contractor employed to undertake the construction of the Proposed Development will be responsible under legislation and the Contract, for minimising and controlling the potential environmental impacts of all Contract activities.

1.4 Project Environmental Mitigation

1.4.1 Overview

16. The main purpose of the Environmental Statement is to identify environmental impacts with a view to avoiding, minimising or reducing them, particularly at the planning and design phase of the project. Project environmental mitigation will be detailed through the preparation of the CEMP in accordance with this Outline CEMP and Environmental Statement.
17. Electricity transmission construction and reinstatement techniques that minimise environmental impacts are well established and when properly executed are unlikely to lead to any significant adverse long-term impacts. The techniques are identified within this ES which sets out the construction proposals with specific mitigation measures contained in the specialist chapters. Those measures are identified within this Outline CEMP.
18. All mitigation measures used during construction will be consistent with the measures set out in the Environmental Statement and this document.

1.4.2 Construction Environmental Management Plan

19. The CEMP will contain :
 - A statement of the environmental aims and policy objectives of the project;
 - Relevant legislation and regulations that must be complied with;
 - The real and potential environmental effects as identified in the ES;
 - A schedule of environmental mitigation measures;
 - Roles and responsibilities of key individuals;
 - Environmental awareness training programmes;
 - Environmental monitoring programmes and monitoring specifications;
 - Inspection and auditing programmes; and,
 - Reporting programmes and procedures.

1.4.3 Consultations

20. A range of consultations have been undertaken as part of the EIA with statutory and non-statutory bodies in order to ascertain the interests and concerns of key Consultees and authorities. The consultations provided useful information for formulating constraints avoidance and mitigation measures to be implemented to help reduce the impacts of greatest significance.
21. Consultation with relevant organisations will continue throughout all stages of the project and will focus on construction and mitigation measures to ensure that all necessary consents and licences are obtained.
22. The Contractor will be responsible for keeping a record of all of its consultations with statutory and non-statutory organisations including those with an environmental conservation mandate and for copying all correspondence (sent and received) and

meeting notes to NIE. It will be the Contractor's responsibility to prepare and update the consultation record.

23. Communication channels will be established and recorded within the CEMP to ensure that good relations are maintained with all parties potentially affected by the project. NIE and the Contractor will liaise with local communities, landowners and other interested parties.
24. The results of ongoing and future consultations will feed into the development of the CEMP including detailed restoration proposals and working method statements, consistent with measures set out in this Outline CEMP.
25. By way of example of the purpose of consultations, in recent consultations (2012), RSPB referred to Barn Owl Surveys and recommended that responsibility for appropriate surveys at a pre-works stage, in suitable nesting habitat such as at Artasooly Wood, is placed with the ecological clerk of works. These measures will be implemented by NIE.

1.4.4 Environmental Legislation, Policy and Guidance

26. There are numerous standards that will be incorporated into the CEMP to ensure that the potential environmental effects of the project are addressed. Issues relating to health and safety will be addressed in a separate Health and Safety Plan. Environmental management throughout the life of the Tyrone – Cavan 400kV Interconnector project will be dictated by a number of requirements including those:
 - Prescribed in existing legislation (including the need for other licenses or permits);
 - Established under industry codes of good practices;
 - Contained within NIE Environmental Policy Statement and the requirements of ISO 14001;

1.4.5 Environmental Roles and Responsibilities

27. A Project Team organisational chart will be incorporated into the CEMP by the Contractor for the construction phase of the works.
28. It is an NIE requirement that there be a dedicated Environmental Officer attached to the NIE Project Team and an Environmental Representative with responsibility for environmental issues within the Contractor team identified prior to commencement of works.

1.4.5.2 Northern Ireland Electricity Environmental Management Team

29. The NIE Project Manager is supported on environmental issues by the NIE Environmental Officer. Environmental issues will be dealt with in accordance with NIE's Health, Safety & Environmental Procedures.
30. The NIE Project Manager is also supported by the following personnel:
 - Land Agent;
 - Wayleave Officer;
 - Communications Advisor;
 - Project Engineers; and
 - Senior Transmission Inspectors.

1.4.5.3 Contractor's Environmental Management Team

31. The Contractor will for the contract, provide descriptions of the role of the Contractor's Environmental Representative and supporting staff, giving details of their specific environmental responsibilities and duties.
32. The descriptive roles, responsibilities and duties of these individuals will be duly incorporated into the CEMP. Any change of personnel will be subject to prior approval by the NIE Project Manager. In particular the Contractor will provide the names of the Contractor Environmental Representative and those environmental staff that may be available for monitoring, inspection and auditing with their relevant qualifications.
33. It is a NIE requirement that the contractor appoints as a minimum:
 - An Environmental Representative dedicated to the project who has relevant Environmental and Transmission construction experience; and be available until complete reinstatement of the project has been achieved;
 - An environmental Incident Response Team comprising as a minimum 2 trained people and an excavator based on the site and available during all construction hours;
 - The Contractor shall also make available adequate spill kits, portable bunds and gas cages throughout the construction phase of the project.

1.4.6 Environmental Training and Awareness

34. The NIE Environmental Officer will support the NIE Project Manager in managing the provision of environmental training for NIE project personnel in accordance with ISO 14001 System Training Procedure.
35. The Contractor will:
 - Be responsible for providing and recording induction training at the commencement of and throughout the construction phase of the project for the construction workforce;
 - Be responsible for providing ongoing environmental awareness training and 'tailgate/toolbox talks' as appropriate for the work being conducted throughout the project;
 - Maintain a record of all training provided and undertaken by all site staff;
 - Prepare a Tyrone – Cavan 400kV Interconnector booklet containing the project's environmental rules and bullet points summarising good practice. This booklet will be submitted to the NIE Project Manager for review prior to the commencement of the construction phase and upon acceptance, will be issued to all site operatives and staff working on the project; and,
 - Produce a 'Foreman's folder' containing site rules, the above mentioned booklet, environmental tailgate/toolbox talks, key environmental constraints; emergency response and reporting procedures and contact details; waste management procedures and the like relating to the project. The folder will be provided for all foremen working across the project as it is understood multiple teams may be working in different locations at the same time.

1.4.7 Site Waste Management Plan

36. The Contractor will develop a Site Waste Management Plan and procedures that will address the requirements set out in:
 - The requirements of the Environmental Statement;

- This Outline Construction Environmental Management Plan;
- The NIE Environmental Policy Statement on Waste Management; and,
- All current Local and National waste management legislative obligations.

1.4.8 CEMP Environmental Management Procedures

37. The Contractor must set out within the CEMP procedures for managing, controlling and monitoring the environmental issues of the Project. The contractual requirement will require that the construction phase for this project will not start until the CEMP has been accepted by the NIE Project Manager or his nominee.

1.4.9 Documentation Retention for inspection

38. The Contractor is to retain the following documentation on site to be made available for audit and inspection by NIE and those persons authorised by NIE or any relevant regulatory authority:
- Relevant Environmental Procedures;
 - Details of any protected land sites to be encountered during the works;
 - Licenses associated with waste management and disposal;
 - Waste transfer documents;
 - Authorisation(s) for Consent to Discharge (as required).
 - Construction Method statements;
 - Tailgate/toolbox talks;
 - Training Records
 - Relevant Material Safety Data Sheets, (MSDS).

1.4.10 Audits and Inspections

39. Before construction commences, the Contractor will produce a programme of construction audits and inspections. This will include weekly and monthly inspections and a full audit at least once during the life of the project. The actual frequency will be agreed by the Contract Manager in conjunction with NIE Environmental Officer.
40. The Contractor will ensure that his schedule of internal audits and inspections covers the planning, design, site surveys/studies, and site investigation and construction phases. The Contractor is responsible for site environmental inspections and audits in accordance with the arrangements detailed in his Environmental Management System where relevant.
- The Contractor will detail arrangements for inspections and auditing (including sub-contractors); the preparation of checklists;
 - The proposed inspection/audit programme;
 - The reporting of non-compliances to NIE; and,

- Arrangements to ensure the close-out of actions.
41. All audit reports will be copied to NIE'S Project Management Team within 3 days of completing an audit.
 42. The Contractor must demonstrate how the provisions of the CEMP are being complied with to NIE satisfaction. This will include a programme of monthly audits and daily site inspections by the Contractor's environmental staff.
 43. NIE will reassure itself that the Contractor is complying with the CEMP by instigating inspection and monitoring and will conduct inspections to ensure that good environmental practice is being followed in all working areas
 44. In addition to inspection, the CEMP and the Construction Team may be formally audited for environmental compliance
 45. Both inspection and auditing results will play an important part in reviewing and updating the CEMP as the project develops.
 46. NIE will undertake audits and inspections of its contractors' Environmental Management Systems.

1.4.11 Project Environmental Mitigation Measures

Table 21.1 of Chapter 21 of the ES is replicated below and identifies the location, the mitigation measures, the timing of implementation of those measures and the monitoring requirements for each environmental impact identified within the ES for which NIE will be responsible.

Item	Location	Mitigation Objective and Commitment	Mitigation Measure	Timing of Mitigation Measure	Monitoring Requirements	Comment
GENERAL CONSTRUCTION						
5.1	Substation	Noise mitigation of transformers	The transformers will be immediately south of the GIS building. They will be connected via underground cabling and will be contained by 12.5m high wall barriers on three sides. This is a fire protection and noise mitigation measure	Construction phase	None	
5.2	Substation	Mitigation of the drainage for the proposed substation site (hardstanding area and access road)	The drainage for the proposed substation site (hardstanding area and access road) has been designed in accordance with the Sustainable Drainage Systems (SuDS) principles and the Construction Industry Research and Information Association (CIRIA) SuDS Manual 2007. A three stage treatment to ensure water quality has been designed.	Construction and operational phases	Ongoing	
5.3	General	Mitigation of the existing field drainage systems (e.g. piped drainage pipes)	If existing drainage is discovered at the location of a tower foundation, typically this drainage will be removed from the tower foundation construction area. New drainage trenches will be dug on one or as many sides of foundation as required, or alternatively a number of drains can be replaced by a larger single drain inserted, which bisects the tower foundation. Any new drainage is based on a new site specific drainage design that will be completed by the appointed contractor and in agreement with the affected landowner(s)	Construction phase	None	
WATER ENVIRONMENT (CHAPTER 8)						
8.1	Towers 20, 21, 33, 44, 48, 68, 78, 81, and 87	Reinstatement of ephemeral drainage ditch impacted during construction of the tower	Pre-construction survey to record existing conditions. Landscape proposals to reinstate ditch following completion of the works.	Following installation of the tower.	None.	Not applicable.

Item	Location	Mitigation Objective and Commitment	Mitigation Measure	Timing of Mitigation Measure	Monitoring Requirements	Comment
8.2	All construction sites	To prevent water pollution	Construction will be undertaken in accordance with best practice guidance, and any consents and licences required by regulatory bodies. Site specific mitigation measures will be developed following a risk assessment to be completed during detailed design. Section 8.5 of the ES sets out a palette of mitigation measures that can be adopted to ensure that pollution does not occur.	During construction.	A monitoring strategy has been proposed during construction.	
8.3	All construction sites	To prevent water pollution	A Pollution Prevention Plan, including an emergency response procedure, will be prepared. Any vehicles used on site will well maintained and checked daily. Drip trays will be fitted to static plant and biodegradable oil used. Spill kits will be stored on site and staff trained in their use. Concrete will be batched offsite. Fuel will be stored and refuelling activities will only take place in designated areas of the working areas. Concrete washing activities will also only take place in the working areas and wash waters collected for appropriate disposal offsite at a licensed land fill.	During construction.	A monitoring strategy has been proposed during construction.	
SOILS, GEOLOGY AND GROUNDWATER (CHAPTER 9)						
9.1	Construction area	Minimise impacts to soils	Controlling working practices, for example, by minimising land take to that required for the construction process; avoiding repetitive handling of soils; minimising vehicle movements off-road; and minimising the size of stockpiles to reduce compaction of soils. Re-instatement of soils to their original location, wherever practical.	Construction Phase	None	None

Item	Location	Mitigation Objective and Commitment	Mitigation Measure	Timing of Mitigation Measure	Monitoring Requirements	Comment
9.2	Construction area	Prevent spread of Potato Wart Disease (PWD).	NIE would contact DARD regarding the safe disposal or replacement of soils affected by Potato Wart Disease (PWD). Where off-site removal of infested soil is unavoidable, NIE would seek advice on the selection of suitable disposal sites and agree a methodology for the works prior to the issue of the necessary movement licence, which would include the measures to be adopted to prevent the spread of the disease. Even if affected soils are not removed off-site, NIE will agree with the Contractors measures to minimise the risk of spreading of the disease, such as cleaning the wheels of all lorries leaving the construction areas prior to accessing the public road and cleaning of all tools and earth-moving equipment after use in infested areas to avoid carrying infested soil onto unaffected agricultural land.	Construction Phase	None	None
9.3	Construction area	Effective treatment of spoil material	NIE would ensure that a methodology would be agreed for the disposal of all spoil arising from the excavations and that any disposal of the spoil on agricultural land would not be carried out without the benefit of appropriate permissions from the statutory authority (DOE and DARD).	Construction Phase	None	None
9.4	General	Dealing with unexpected contaminated land	Specific proposals would be prepared, following the granting of planning permission to facilitate the management of any contaminated material unexpectedly excavated as part of the construction of the development.	Pre-construction	None	None

Item	Location	Mitigation Objective and Commitment	Mitigation Measure	Timing of Mitigation Measure	Monitoring Requirements	Comment
9.5	Water well survey study area (approximately 300m from the tower locations).	Minimising impact to private water supplies	A water well survey would be carried out over an area approximately 300m from each tower location where dewatering will be required. If private wells, boreholes or springs are present in the survey area, an assessment would be carried out of the likely impact of dewatering pumping on the source and the need for the provision of a temporary alternative supply for the period of dewatering. Should the assessment show that there is a risk of derogation of an existing water supply source, a replacement supply would be provided. This may consist of the provision of a temporary supply, such as a water bowser, to ensure a continued water supply to properties.	Construction Phase	Monitoring required during construction	None
9.6	Substation	Controlling storage of materials	Impacts on groundwater following construction of the Proposed Development would be limited to issues associated with the storage and use of contaminants (i.e. oils and fuels) at the proposed substation. Provided that these substances are stored and used in accordance with standard guidelines and practices, potential risks to groundwater and surface water quality would be negligible.	Operational phase	Ongoing to ensure compliance	None
9.7	Substation	Minimise groundwater deterioration from sewage and foul water disposal	Use of septic tank soakaway. The soakaway drains will be appropriately located to allow attenuation of contaminants in the underlying unsaturated zone. There will be a minimum 2m of unsaturated ground below the soakaway drains.	Operational phase	None	None
9.8	Construction area	Minimise impacts from dewatering	(See Water Environmental Mitigation (Chapter 8) for details)	Pre - construction and Construction Phase	Ongoing during preconstruction and construction.	None

Item	Location	Mitigation Objective and Commitment	Mitigation Measure	Timing of Mitigation Measure	Monitoring Requirements	Comment
ECOLOGY (CHAPTER 10)						
10.1	General	To minimise impacts to Hedgerows and scattered trees	Works in the vicinity of trees should conform to BS 5837:2012, Trees in relation to design, demolition and construction- Recommendations. Hedgerows will be protected by scaffolding when conductors are drawn between towers. Where hedgerows in the vicinity of towers are to be lowered, a height of at least 2m should be retained in order to maintain bat flightlines. Minimal lengths of hedgerow should be removed where this is essential, and gaps should be replanted with native species following the works. Wherever possible, hedgerow trees will be pollarded rather than removed. New hedges of equal length planted where hedgerows removed (or donation made to conservation charity to plant replacement trees)			
10.2		To minimise impacts to Fen	Trampling and the use of machinery on saturated, quaking surfaces will be avoided.			
10.3		To minimise impacts to Breeding birds	Any removal/reduction of hedgerow trees, cutting of hedgerows and clearing of scrub will take place outside the bird-nesting period, which in Northern Ireland is generally taken as March to August inclusive. This will apply to both the construction and operational (line maintenance) phases. Potential bird nesting habitat in close proximity to works that take place between March and August should be checked by a competent ecologist to ensure that there will be no adverse impact on protected bird species.			
10.4		To minimise impacts to Wintering birds	Attachment of clearly visible markers on overhead lines posing a high collision risk. To be fitted to the earth line (highest line) between T30 and T43.			

Item	Location	Mitigation Objective and Commitment	Mitigation Measure	Timing of Mitigation Measure	Monitoring Requirements	Comment
10.5		To minimise impacts to Bats	A dusk and dawn bat survey will be carried out at potential roosts immediately prior to demolition/felling. If bats are found work will be suspended until consultation with NIEA. If bats are found after/during demolition/felling work must be stopped until consultation with NIEA. Felling of potential roosting trees will be carried out in the presence of a licensed bat worker following best practice guidelines. 100 new bat boxes provided to mitigate for loss of potential tree roosts. Hedgerow replacement to compensate for loss of foraging habitat although all hedgerows will be cut to only 2m keeping commuting integrity intact.			
10.6		To minimise impacts to Badgers	Any excavations left unattended overnight should be either covered or ramped in at least one location to allow mammals to avoid becoming trapped. Repeat badger surveys will be carried out within 100m of the development immediately prior to the commencement of work. If setts are found work will be suspended until consultation with NIEA.			
10.7		To minimise impacts to Otter	Any excavations left unattended overnight should be either covered or ramped in at least one location to allow mammals to avoid becoming trapped.			
10.8		To minimise impacts to Irish hare	Any excavations left unattended overnight should be either covered or ramped in at least one location to allow mammals to avoid becoming trapped.			

Item	Location	Mitigation Objective and Commitment	Mitigation Measure	Timing of Mitigation Measure	Monitoring Requirements	Comment
10.9		To minimise impacts to Fish/Watercourses	Waters high in suspended solids produced as a result of de-watering during the excavation and construction of tower bases should be contained and treated prior to discharge. Treatment will be provided to intercept surface water draining from the substation site, and will intercept any suspended solids prior to discharge of water to a watercourse. The contractor will be required to provide a method statement designed to prevent adverse impacts on rivers and other watercourses. Tower locations will be sufficiently remote from watercourse channels, to ensure that work practices do not result in bank damage, and care will be taken to prevent ingress of silt into watercourses. Where crossing of watercourses for construction access is unavoidable, an initial draw-line will be flown across major rivers, which will then be used for winching the operational conductors to the tower position. The initial draw-line will be thrown across narrow watercourses, and a similar procedure followed.			
10.10		To minimise impacts to Smooth newt	Waters high in suspended solids produced as a result of de-watering during the excavation and construction of tower bases should be contained and treated prior to discharge. Treatment will be provided to intercept surface water draining from the substation site, and will intercept any suspended solids prior to discharge of water to a watercourse. The contractor will be required to provide a method statement designed to prevent adverse impacts on rivers and other watercourses. Tower locations will be sufficiently remote from watercourse channels, to ensure that work practices do not result in bank damage, and care will be taken to prevent ingress of silt into watercourses. Where crossing of watercourses for construction access is unavoidable, an initial draw-line will be flown across major rivers, which will then be used for winching the operational conductors to the tower position. The initial draw-line will be thrown across narrow watercourses, and a similar procedure followed.			

Item	Location	Mitigation Objective and Commitment	Mitigation Measure	Timing of Mitigation Measure	Monitoring Requirements	Comment
10.11		To minimise impacts to White clawed crayfish	Waters high in suspended solids produced as a result of de-watering during the excavation and construction of tower bases should be contained and treated prior to discharge. Treatment will be provided to intercept surface water draining from the substation site, and will intercept any suspended solids prior to discharge of water to a watercourse. The contractor will be required to provide a method statement designed to prevent adverse impacts on rivers and other watercourses. Tower locations will be sufficiently remote from watercourse channels, to ensure that work practices do not result in bank damage, and care will be taken to prevent ingress of silt into watercourses. Where crossing of watercourses for construction access is unavoidable, an initial draw-line will be flown across major rivers, which will then be used for winching the operational conductors to the tower position. The initial draw-line will be thrown across narrow watercourses, and a similar procedure followed.			
NOISE AND VIBRATION (CHAPTER 11)						
11.1	Development wide	To not exceed threshold values for airborne sound generated by construction activities at nearest noise sensitive receptors	Adopt best practice for construction of the substation and towers and limit hours of working	Construction	Occasional monitoring using type 2 Sound level meter at noise sensitive receptors.	Threshold for significant effects based on BS5228:2009

Item	Location	Mitigation Objective and Commitment	Mitigation Measure	Timing of Mitigation Measure	Monitoring Requirements	Comment
11.2	Development wide	To not exceed threshold values for ground borne vibration generated by construction activities at nearest noise sensitive receptors	Adopt best practice for construction of the substation and towers and limit hours of working	Construction	Occasional monitoring-vibration levels during construction phase will fall to typical ambient levels given separation distances	Threshold for significant effects based on BS5228:2009 and BS7385:1993
11.3	Development wide	To meet WHO Guidelines on Community noise	Limited number of HGV movements per hour or daily basis near to dwellings on haul routes	Construction	N/A	Assessed using haul road method in BS5228:2009. Takes account of HGV movements/speed/distance from receptor
11.4	Development wide	To not exceed threshold values for noise and vibration under BS4142:1997, BS8233:1999, WHO Guidelines on Community Noise 1999 and BS5228:2009/BS7385:1993	Substation has significant attenuation due to structure and distance to nearest noise sensitive receptors	Operational	N/A.	External noise targets based on lowest recorded background noise levels near to the proposed substation

Item	Location	Mitigation Objective and Commitment	Mitigation Measure	Timing of Mitigation Measure	Monitoring Requirements	Comment
11.5	Development wide	To not exceed threshold values for noise and vibration under BS4142:1997, BS8233:1999, WHO Guidelines on Community Noise 1999 and BS5228:2009/BS7385:1993	Substation has significant attenuation due to structure and distance to nearest noise sensitive receptors	Operational	N/A.	External noise targets based on lowest recorded background noise levels near to the proposed substation
CULTURAL HERITAGE (CHAPTER 12)						
12.1	Development wide	To record any previously unrecorded archaeological remains.	Archaeological watching brief	Construction	Ongoing	
12.2	Site 71 (Near to Tower 91)	To ensure protection of the rath	Fence off prior to construction	Construction	During set-up and intermittently.	
LANDSCAPE AND VISUAL (CHAPTER 13)						
13.1	Substation site	Minimise landscape and visual impacts	Landscape proposals (including earth mounding) are proposed at the substation site. Proposed planting would be implemented in the first planting season following completion of the earth works Plant species chosen would be fast growing native species to complement existing planting in the local area. The planting would be protected by rabbit proof fencing and would be subject to a management program to ensure objectives are met.	Construction Phase	Ongoing maintenance	

Item	Location	Mitigation Objective and Commitment	Mitigation Measure	Timing of Mitigation Measure	Monitoring Requirements	Comment
13.2	Substation	Minimise landscape and visual impacts	Complete earth mounding and planting prior to the installation of substation components. Provide the minimum height of bunds to immediately screen the lower construction elements. Grade new landforms gradually into existing surrounding levels. New planting to complement existing visual character - use indigenous hedge and trees along with fast growing nurse and climax trees. Minimise the use of roadside signs relating to the completed development. All metal security fencing would be finished in galvanised/painted grey. Other field enclosures would be timber post with appropriate galvanised wire, and planted with local hedge and tree species, to match existing. Security lighting will be activated by movement sensors only and will be located to minimise lighting spillage and pollution on the local area. Reflective finishes on all construction elements have been avoided. To further reduce the visual impact, the buildings have been designed to complement the building appearance and character local to the area, with particular regard to their scale, form and finish, as detailed in Chapter 5 of the ES.	Construction and Operational Phase	Ongoing maintenance	
13.3	Tower Working Areas	Restoration of affected vegetation post construction	At the end of the construction process, land affected by the working areas would be fully reinstated as pasture or planted to replace any vegetation lost as a result of the works. Care would be taken to ensure there would be no remaining areas of compacted land. Any fencing and/or hedging removed to accommodate working areas or access tracks would be replaced to an equivalent or better quality in keeping with the rural landscape upon completion of the construction period.	Construction Phase	Five year maintenance period (to be agreed with landowner)	
13.4	Temporary access tracks	Restoration of affected vegetation post construction	Temporary access tracks and track-ways would be reinstated following construction.	Construction Phase	Five year maintenance period (to be agreed with landowner)	

Item	Location	Mitigation Objective and Commitment	Mitigation Measure	Timing of Mitigation Measure	Monitoring Requirements	Comment
13.5	Temporary Access Widening and Visibility Splays	Restoration of affected vegetation post construction	If it is determined by the Department that temporary traffic measures are not to be used, existing accesses could be temporarily enlarged to accommodate the larger types of construction vehicles. The area of affected vegetation would be reinstated.	Construction Phase	Five year maintenance period (to be agreed with landowner)	
13.6	Temporary Low Voltage crossings	Restoration of affected vegetation post construction	There are 18 existing electricity lines to be undergrounded, which will be undertaken by open trench. This will result in an impact to 89m of hedgerows and treelines, which will be reinstated post construction	Construction Phase	Five year maintenance period (to be agreed with landowner)	
13.7	Permanent Tower Bases	Restoration of affected vegetation post construction	The permanently affected area of the towers is smaller than the required construction area. Of the area affected by construction, roughly 66% can be reinstated post construction. It is possible for vegetation including hedgerows to grow under each of the proposed towers; however as worst case it has been assumed that 296m of hedgerows and treelines and 3 trees will be permanently lost	Construction Phase	Five year maintenance period (to be agreed with landowner)	

Item	Location	Mitigation Objective and Commitment	Mitigation Measure	Timing of Mitigation Measure	Monitoring Requirements	Comment
13.8	Permanent area adjacent to the overhead line	Restoration of affected vegetation during operational phase	All vegetation adjacent to the conductors with the potential to fall onto the conductors will be trimmed to ensure safety clearances. This will form part of the ongoing maintenance of the Proposed Development. This is standard practice and is done for all existing overhead lines. Less trimming will be required further from the conductors as there will be less potential for falling vegetation onto the overhead line. The trimming regime will involve a scalloping or profiling effect which will minimise the effect on vegetation. It is assumed that an area of 30m from the edge of the conductors (on either side) will be required to be examined for falling hazards. The level of trimming required will be directly related to the distance from the overhead line and the height of the vegetation - i.e. the further from the overhead line, the less vegetation that is required to be trimmed. The vast majority of this vegetation within the 30m zone will be unaffected because of its height and distance from the overhead line but for safety reasons, any branches, etc with the potential to fall on the overhead line will be trimmed. Hedgerows within the 30m zone are currently regularly maintained by landowners to an approximate height of between 1m and 3m and so will not require further trimming.	Operational Phase	Ongoing maintenance	
COMMUNITY AMENITY AND LAND USE (CHAPTER 14)						
14.1	Construction phase	Minimise traffic disruption to residential, commercial and community facilities	Maintain access to residential, commercial and community facilities during construction including recreational routes such as walking and cycling routes.	Construction phase	None	See Chapter 18
14.2	Construction phase	Minimise disruption to road using community events	Roads to be maintained during construction and to be left in a condition suitable for current road use community events (e.g. road bowls). Liaison will be undertaken with community groups as appropriate to ensure mitigation of any disturbance to access.	Construction phase	None	
14.3	Construction phase	Minimise disruption to existing services	Interruptions to electrical and telephone lines should be kept to a minimum with notice given to the affected users.	Construction phase	None	

Item	Location	Mitigation Objective and Commitment	Mitigation Measure	Timing of Mitigation Measure	Monitoring Requirements	Comment
14.4	Construction phase	Fencing of substation site to prevent disruption	The site of the proposed substation will be fenced off prior to construction to ensure that the construction activities within the site have no impact on adjoining farm land.	Construction phase	None	
14.5	Construction phase	Landowner Liaison	An access officer will be appointed by the contractor to liaise with the landowners along the line route and ensure that their requirements for entry are met so far as is possible	Construction phase	None	
14.6	Construction phase	Maintain access to agricultural land	NIE will ensure that land owners have reasonable access to all parts of their farm during the construction phase to minimise or eliminate temporary farm fragmentation impacts. Where existing access roads are affected or fenced off, NIE will make all reasonable efforts to provide alternative access.	Construction phase	None	
14.7	Construction phase	Reinstatement of Hedgerows and drains/ditches	Hedgerows and drains/ditches should be reinstated after completion of works as far as is practical	Construction phase	None	
14.8	Construction phase	Follow disease protocols	Disease protocols will be adhered to and NIE will comply with any DARD regulation pertaining to animal or plant diseases. Before surveying commences the land owners will be met and a pre-survey interview will be completed. The purpose of this interview is to ask the land owner to notify NIE of any animal diseases and other risks which may arise from dangerous livestock (e.g. bulls);	Construction phase	None	
14.9	Construction phase	Landowner Notification	Farmers will be notified at least 1 week in advance of any works commencing on their farms. The contractor will make all reasonable efforts to accommodate the farmers grazing and cropping programmes and reschedule works if practical to do so.	Construction phase	None	
14.10	Construction phase	Agronomy pre-condition	An agronomy pre-condition survey will be carried out	Construction phase	None	

Item	Location	Mitigation Objective and Commitment	Mitigation Measure	Timing of Mitigation Measure	Monitoring Requirements	Comment
14.11	Construction phase	Fencing of construction areas to prevent disruption	Appropriate fencing will be erected to exclude livestock from sites of construction and to keep livestock within farm boundaries	Construction phase	None	
14.12	Construction phase	Minimise impact of rock breaking or pilling ,if required	Where rock breaking or pilling are required, owners of livestock in adjoining fields will be notified in advance.	Construction phase	None	
14.13	Construction phase	Minimise impacts to land drains	Land drains which may be potentially affected during tower foundation excavations and excavations for undergrounding will be redirected and/or reconnected in a manner that maintains existing land drainage. Before surveying commences the pre-survey interview with land owners will identify location of drains	Construction phase	None	
14.14	Construction phase	Minimise impacts to soil	All disturbed field surfaces will be reinstated. These works may be carried out by the land owner, the contractor or an agreed third party, as agreed with the land owner. Works will not be carried out following extreme rainfall to minimise damage to soil surface and minimise run-off risks. All soil disturbance works and remedies will comply with agreements made with land owners	Construction phase	None	
14.15	Construction phase	Minimise impacts from concrete	Concrete will be mixed off-site and imported to the site. The pouring of concrete for tower bases will take place within a designated area using a geosynthetic material to prevent concrete runoff into the surrounding soil. Any soil contaminated by concrete spillage will be removed to an approved waste facility	Construction phase	None	
14.16	Construction phase	Minimise impacts from pumped water	If water is being pumped from a construction site, a water filtration system will be utilised to minimise impacts on water sources.	Construction phase	None	
14.17	Construction and Operational phase	Ensure Health and Safety	NIE will provide safety information directly to all affected land owners. Anti-climbing platforms will be installed on all towers to prevent people climbing the towers	Construction phase	None	
14.18	Construction and Operational phase	Minimise impacts to electric fences	In rare cases where electric fences induce an electrical current, electric fence filters will be installed	Construction phase	None	

Item	Location	Mitigation Objective and Commitment	Mitigation Measure	Timing of Mitigation Measure	Monitoring Requirements	Comment
SOCIO-ECONOMICS (CHAPTER 15)						
15.1	Construction and Operational phase	Minimise impacts to the Linwoods bioremediation area	Mitigation measures will be required to minimise the impact to the bioremediation area. Further consultations will be required with the owner and operator of the area. It may be possible to accommodate the normal harvesting operation within the construction timetable in order to minimise losses. If this is not possible, compensation will be required for the loss of the value of the crop. In terms of the effluent treatment, consultations with the owner and operator in order to determine the layout of the pipe network and what remedial works will be required during construction and the operation of the Proposed Development. The consultations will also be needed to determine the nature of the effluent material, the rate of production from the facility, rate of discharge and the current condition of the treatment system. It is likely that alterations will be required to the pipe network, which is currently laid above ground along the rows of planted willow. If there is not capacity in the treatment system to accommodate a reduction in the willow area, alternative treatment will have to be agreed with the owner and operator (e.g. off site treatment by tanker) or compensation agreed.	Construction and Operational phase	None	
TELECOMMUNICATIONS AND AVIATION ASSETS (CHAPTER 16)						
16.1	Construction and Operational phase	To ensure no impacts to TV and radio reception	In the unlikely event of interference arising, adjustments to the orientation of the aerial of the radio or television or a similar solution should remedy the problem. No mitigation is proposed as part of this EIA.	Construction and Operational phase	Monitoring through any public complaints to NIE.	This has been assessed to be unlikely to occur.

Item	Location	Mitigation Objective and Commitment	Mitigation Measure	Timing of Mitigation Measure	Monitoring Requirements	Comment
16.2	Construction and Operational phase	To ensure no impacts to aviation	Prior to construction, the Defence Geographic Agency (DGA) (the body responsible for maintaining the aviation mapping database for the CAA and MoD) will be provided with detailed mapping of the Proposed Development (both construction and operation phase details). The Irish Aviation Authority will also be informed.	Construction and Operational phase	None	
FLOOD RISK ASSESSMENT (CHAPTER 17)						
17.1	Substation	Prevent increased runoff rates and volume	Implement Surface Water Management Strategy	During Construction	None	
17.2	All Construction Locations	Prevent increase flood risk during construction from dewatering activities	During flooding events, dewatering activities to be ceased to avoid increased discharges	During construction	None	
17.3	All Construction Locations	Prevent loss of floodplain	Ensure that any excavated material is not stored within the floodplain	During construction	None	
TRANSPORT (CHAPTER 18)						
18.1	Entrance to 31 No. listed access tracks.	Traffic Management measures	Traffic Management measures at site access - 31No. access tracks including AT2, AT10, AT14, AT20, AT24-25, AT26, AT29, AT33, AT35, AT43, AT45, AT47, AT48A, AT49, AT51, AT52, AT52SL, AT54, AT67, AT71SL2, AT74SL2, AT76, AT80, AT86, AT87B, AT88, AT89, AT90, AT93-94, AT99 and AT100.	Construction Phase	None	
18.2	Entrance to 5 No. listed access tracks and to feeder road	Traffic Management measures	Traffic Management measures required at site access and also en route to the access from the feeder road - 5No.access tracks including AT75, AT97, AT98, AT102A and AT102B.	Construction Phase	None	

Item	Location	Mitigation Objective and Commitment	Mitigation Measure	Timing of Mitigation Measure	Monitoring Requirements	Comment
18.3	Entrance to 17 No. listed access tracks.	Access widening	Access requires widening to accommodate construction vehicles - 17No. access tracks including AT7, AT13, AT18, AT19, AT30, AT34, AT41-42, AT50, AT78A, AT78B, AT79, AT81, AT82, AT83A, AT83B, AT84 and AT91.	Construction Phase	None	
18.4	Entrance to 3 No. listed access tracks and to feeder road	Access widening and traffic management measures	Access requires widening to accommodate construction vehicles and traffic management measures required en route to the access from the feeder road - 3No. access tracks including AT74, AT74SL1 and AT74SL2	Construction Phase	None	
18.5	Entrance to 101 listed access tracks (all proposed)	Access widening in-line with DCAN 15 advice	If it is determined by the Department of the Environment that temporary traffic measures are not to be used and existing accesses should be temporarily enlarged to DCAN 15 standards, then measures 18.1 to 18.4 will be superseded by this mitigation measure - 18.5. The low-loaders could enter the proposed sites and make deliveries off the public road network without requiring road or lane closures. The area required for the temporarily enlarging the existing accesses has been identified and included within the planning application boundary. Where the accesses are required to be widened to accommodate construction machinery, vegetation will be cleared and any affected services and drainage will be amended to ensure normal operation during the construction phase.	Construction Phase	None	
18.6	General	Construction Traffic Management Plan	Prior to construction, a Construction Traffic Management Plan would be prepared and submitted to Roads Service for consideration following consultation with other stakeholders such as the Police Service of Northern Ireland. An outline plan has been drawn up at this stage; see Annex 10 of Annex 12 of Appendix 18A. However, the appointed contractor would finalise this traffic management plan with Roads Service and adhere to its detailed during the construction of the line.	Construction Phase	None	

Item	Location	Mitigation Objective and Commitment	Mitigation Measure	Timing of Mitigation Measure	Monitoring Requirements	Comment
18.7	General	Travel Plan Framework	Notwithstanding a Travel Plan Framework has been developed, which includes measures related to the proposed substation. The measures include providing a staff notice board detailing sustainable transport modes and all HGVs visiting the site will be provided with information regarding suitable 'haul routes' before undertaking their journeys.	Operational Phase	Ongoing to ensure effectiveness	

ENDS

Appendix 5B Substation Drainage Technical Note

Technical Note

Project:	Tyrone To Cavan Interconnector	Job No:	60032220
Subject:	Turleenan Substation SuDS		
Prepared by:	Azaria Watson	Date:	26/02/2013
Checked by:	Paul McAleese	Date:	27/02/2013
Approved by:	Peter Robinson	Date:	28/02/2013

The purpose of this technical note is to detail the drainage proposals for the Turleenan Substation. This note outlines the three stages of treatment proposed for runoff from the site, including measures to control the sediment and hydrocarbon pollutants in line with Sustainable Drainage Systems (SuDS).

The note also outlines the design of the proposed pond. Whilst this pond will be constructed within the 1 in 100 year floodplain (Q100), the pond will be constructed below the existing ground level and as such there will be no loss of floodplain.

1. STORMWATER TREATMENT

1.1. Treatment Stages Required

For the purposes of this technical note and in accordance with Table 3.3 of the CIRIA SuDS Manual 2007 the proposed Turleenan Substation site, when constructed will be characterised as an industrial area.

From the *Northern Ireland Environment Agency River Blackwater Local Management Area (LMA) Action Plan* Issued March 2012, the River Rhone and River Blackwater were allocated as poor status in 2009.

The Rivers support a wide diversity of natural habitats, several of which are protected under European Directives. In addition to this, the river also supports a wide range of recreational activities such as angling, walking and canoeing. As such we have taken the assumption that the receiving water sensitivity is of Medium status.

Therefore in accordance with Table 3.3 of the CIRIA SuDS Manual (Table included overleaf) the number of treatment stages required at this site is three.



Receiving water sensitivity  Runoff catchment characteristic 	Low	Medium	High
Roofs only	1	1	1
Residential roads, parking areas, commercial zones	2	2	3
Refuse collection/ industrial areas/loading bays/lorry parks/highways	3	3	4

Table 3.3 Number of treatment train components (CIRIA SuDS Manual 2007)

1.2. Treatment Stages Proposed

When constructed the potential pollutants present at the substation site will be from Total Suspended Solids and Hydrocarbons with some instances of pesticides due to maintenance. From the CIRIA SuDS Manual 2007 removal mechanisms for these pollutants are included below:-

Pollutant	Removal Mechanism
Sediments Total Suspended Solids	Sedimentation, filtration
Hydrocarbons TPH, PAH, VOC, MTBE	Biodegradation, photolysis, filtration and adsorption
Pesticides	Biodegradation, adsorption volatilisation

The location requires at least 3 treatment stages on site to ensure water quality is of an acceptable quality. Proposed treatments stages/components are included below. Refer to Drawing 60032220 00 204C for the proposed drainage layout.

Treatment Stage 1 – Treatment of stormwater using infiltration (interception storage)

The site compound will be constructed of gravel material filtering the stormwater at location. This will provide pollutant filtration at source. There will also be some hydrocarbon removal at this stage as the hydrocarbons will be attached to the suspended solids removed via filtration.

The infiltration technique will treat smaller events via filtration through the soils and discharge them to groundwater.

Treatment Stage 2a – Filter Drains

Water from the site will be conveyed through a series of filter drains (half perforated and unperforated). These linear drains will be filled with a permeable material and offer filtration, adsorption, biodegradation and volatilisation pollutant removal.

There are also a number of perforated field drains proposed which will allow infiltration throughout the site.

Treatment Stage 2b – Oil interception

Two oil interceptors are proposed as shown on Drawing 60032220 00 204C. These interceptors will act to separate the hydrocarbons from the water which can then be drawn off during maintenance. Sediments will also settle within the system and can be drawn off during maintenance procedures. Interceptors shall conform to the European Standard PR EN 858 - 1 & 2.

Treatment stage 3 – Pond/Wetland

A pond has been proposed as shown on Drawing 60032220 00 204C. Ponds provide significant water quality improvements by capturing the small rainfall events and settling out fine silts and promote plant and microbial activity to encourage adsorption and biodegradation of contaminants and nutrient removal.

The permanent pool volume is effectively the volume of water that remains in a pond during dry weather periods between rainfall events. It is often known as the Water Quality Treatment Volume (or V_t). From the Flood Risk and Surface Water Management Strategy (Reference 60032220/EDI026) Dated 26/08/09 the V_t for the site is 43.5m³/ha.

Refer to Section 2 of this technical note for more details on the proposed pond/wetland.

A summary of the pollutant removal and treatment stages for the site is included below:-

Stormwater Source	Treatment stages required	Treatment Stages proposed	SuDS Component	Pollutant Removed		
				Sediments Total Suspended Solids	Hydrocarbons TPH, PAH, VOC, MTBE	Pesticides
Site Compound	3	3	Gravel compound	✓	Some removal	Some removal
			Filter drains	✓	Some removal	Some removal
			Oil Interceptor	✓	✓	
			Pond/Wetland	✓	✓	✓
Access Road	3	3	Filter Drain	✓	Some removal	
			Oil Interceptor	✓	✓	
			Pond/Wetland			✓

As shown in the table above silts/sediments will be filtered through every stage of the SuDS management train. The level of silts/sediments entering the pool will be small and as such will limit the issue of re-suspension during storm events greater than Q100.

2. POND/WETLAND DESIGN

The design of the pond has been carried out in accordance with CIRIA SuDS Manual 2007. The pond design has been based on the Flood Risk and Surface Water Management Strategy Document (Ref: 60032220/EDI026) with values of Designed Treatment Volume (V_t) taken as $43.5\text{m}^3/\text{ha}$. The designed treatment volume is designed to capture 75-90% of the storms in a year. This ensures the smaller volumes of runoff are stored within the treatment systems and appropriately treated. The smaller volumes of runoff are those in which pollution is most concentrated, as the initial runoff from surface washes the pollutants into the surface water collection systems.

Refer to **Drawing 60032220 00 205** for pond details.

The risk of pollutant mobilisation during a flood event is a low risk due to the location and low velocity of flood waters in this location. AECOM have recently agreed with SEPA¹ that it was appropriate to locate ponds/wetlands in area with flooding probability of 1:100 years where there would be low velocities on a similar basis.

The pond includes a safety bench for access during routine maintenance and an aquatic bench to support wetland planting. This acts as a biological filter and provides ecological and safety benefits.

As shown on Drawing 60032220 00 205, there will be no net loss of floodplain (Q100) as the pond will be constructed below the existing ground level.

Inlets

Inlet velocity from the access road and site compound should be between 0.3 to 0.5 m/s to avoid re-suspension of sediments. As attenuation is being provided upstream, the flows to the pond will be relatively low.

Outlet

The outlet shall be built into the embankment as shown on the drawing with easy access for maintenance. A concrete headwall will be installed in the embankment with the outlet pipework located below the permanent water level/normal water level. The outlet pipework discharges to a concrete chamber containing a weir and gate valve arrangement. The weir will control the water permanent water level and the gate valve can be opened if the pond needs to be drained for maintenance operations. The concrete chamber is located in the safety bench/dry bench area to ensure maintenance can be carried out safely.

It is assumed that regular maintenance will be carried out to ensure blockages of outlet pipework will not occur. Refer to the drawing for more details out outlet control chamber.

1. Green Networks Integrated Urban Infrastructure – Collective Architecture/AECOM 2011.

Health & Safety

High fencing tends to reduce the amenity benefits of SuDS system. Toddler-proof fencing, combined with barrier vegetation strategies and effective landscaping can be used to deter public access to open water areas and facilitate movement of wildlife. However due to the nature of the scheme NIE should determine the level of security required at the pond.

3. OIL INTERCEPTORS

Two oil interceptors are proposed for the site as shown on Drawing 60032220 00 204C. One is located at the access road and the other at the site compound. Both oil interceptors are located outside of the Q100 floodplain.

In accordance with the Northern Ireland Environment Agency's Pollution Prevention Guideline No. 3 (PPG3) "Use and Design of Oil Interceptors in Surface Water Drainage Systems, the interceptors for this site shall be Class 2 Bypass Separators.

The bypass separator will fully treat all runoff generated by rainfall rates of up to 5mm/hr. This covers over 99% of all rainfall events. Flows above this rate are allowed to bypass the separator. These are used when it is considered an acceptable risk not to provide full treatment for high flows, for example where the risk of a large spillage and heavy rainfall occurring at the same time is small.

Interceptors shall conform to the European Standard PR EN 858 - 1 & 2 which requires that all separators are to be fitted with an oil level alarm and that it should be installed and calibrated by a suitably qualified technician so that it will respond to an alarm condition the separator requires emptying.

In order to prevent the build-up of excessive levels of silt, a silt alarm may be used, however, due to the upstream drainage system (gravel compound and filter drains); it is considered that silt levels will be low.

Installation

The oil interceptors shall be installed in accordance with the manufacturer's instructions and encased 200mm of GEN3 concrete to prevent flotation of the system.

Maintenance and Use

To prevent pollution and minimise costs, the oil interceptor needs to be regularly maintained.

Every six months, or in accordance with manufacturer's instructions, experienced personnel should:-

- Physically inspect the integrity of the separator and all mechanical parts
- Assess the depth of accumulated oil and silt
- Service all electrical equipment such as alarms and separator management systems
- Check the condition of any coalescing device and replace if it is necessary

Keep a detailed log of when the separator is inspected, maintained, emptied and serviced. Also record specific events relating to the separator system such as cleaning, repairs, accidents and incidents.

All sites should empty their separator as soon as a significant quantity of oil and/or silt has built up. The retained waste, including the silt, must be removed and the separator must be refilled

with clean water before being put back in to service to prevent damage and to prevent oil passing through it. In addition to normal emptying of the separator, it will also need to be emptied right away if oil or silt levels exceed 90 per cent of the storage volume of the separator and the alarm is activated.

When the oil or silt reaches this level or after a spillage, a registered waste removal company will be employed to empty the separator. NIE will ensure the waste removal company has experience in emptying separators and that they do not allow any of the contents to escape from the outlet during emptying.

Every five years separators will be emptied and given a general inspection to test the integrity and performance of the system. The separator will be refilled with clean water following such an inspection.

Information on separator maintenance is in Part 2 of the European Standard (Reference 5).

4. KEY MAINTENANCE REQUIREMENTS FOR SuDS COMPONENTS

As with traditional drainage systems, SuDS systems require regular maintenance to ensure operational efficiency. Refer to the individual components below for its maintenance requirements

General Maintenance Requirements

SuDS Component	Maintenance Requirement
Gravel Compound	<ul style="list-style-type: none"> • Regular inspection for signs of clogging • Removal of sediment from gravel • Removal and cleaning or replacement of stone
Filter Drains	<ul style="list-style-type: none"> • Regular inspection for signs of clogging • Removal of sediment from filter drain • Removal and cleaning or replacement of stone
Oil Interceptor	Covered in Section 3 of Technical note
Pond/Wetland	<ul style="list-style-type: none"> • Litter/debris removal • Inlet/outlet cleaning • Vegetation management • Sediment monitoring and removal when required

Regular inspection and maintenance is important for the effective operation of ponds as designed. Maintenance of the Turleenan pool shall be by NIE. Refer to following pages for detailed maintenance requirements.

For detailed maintenance information for the other SuDS components refer to the CIRIA SuDS Manual 2007.

Ponds operation and maintenance requirements (from CIRIA SuDS Manual 2007)

Maintenance Schedule	Required Action	Frequency
Regular maintenance	Litter removal	As required
	Grass cutting – public areas	Monthly (during growing season)
	Grass cutting – meadow grass	Half yearly (spring, before nesting season, and autumn)
	Inspect vegetation to pond edge and remove nuisance plants (for first 3 years)	Monthly (at start, then as required)
	Hand cut submerged and emergent aquatic plants (at minimum of 0.1m above pond base. Include max 25% of pond surface)	Annually
	Remove 25% of bank vegetation from waters edge to a minimum of 1m above water level	Annually
	Tidy all dead growth before start of growing season	Annually
	Remove sediment from forebay	1-5 years, or as required
	Remove sediment from one quadrant of the main body of ponds without sediments forebays	2-10 years
Occasional Maintenance	Remove sediment from the main body of big ponds when pool volume is reduced by 20%	>25 years (usually)
Remedial actions	Repair of erosion or other damage	As required
	Aerate pond when signs of eutrophication are detected	As required
	Realignment of rip-rap or other damage	As required
	Repair/rehabilitation of inlets, outlets and overflows	As required
Monitoring	Inspect structures for evidence of poor operation	Monthly/after large storms
	Inspect banksides, structures, pipework etc for evidence of physical damage	Monthly/after large storms
	Inspect water body for signs of eutrophication	Monthly (May-October)
	Inspect silt accumulation rates and establish appropriate removal, frequencies	Half yearly
	Check penstocks and other mechanical devices	Half yearly

NOTE: Consultation with the environmental regulator shall take place prior to disposing of sediments removed from the pond.

Appendix 5C Minimum and Maximum 400kV Tower Foundations

APPENDIX 5C: Tower Dimensions

Tower No.	Tower Type	Minimum Tower Foundation Length (m)		Minimum Tower Foundation Breadth (m)	Minimum Tower Foundation Footprint (m ²)	Maximum Tower Foundation Length (m)		Maximum Tower Foundation Breadth (m)	Maximum Tower Foundation Footprint (m ²)
1	90	14.6	x	14.6	213.2	18.1	x	18.1	327.6
2	90	16.5	x	16.5	272.6	19.9	x	19.9	396.4
3	Intermediate	12.5	x	12.5	156.3	14.0	x	14.0	196.0
4	60	14.4	x	14.4	207.4	17.6	x	17.6	309.8
5	Intermediate	10.4	x	10.4	108.2	11.9	x	11.9	141.6
6	60	14.4	x	14.4	207.4	17.6	x	17.6	309.8
7	Intermediate	10.4	x	10.4	108.2	11.9	x	11.9	141.6
8	60	16.3	x	16.3	266.0	19.5	x	19.5	380.6
9	Intermediate	12.5	x	12.5	156.3	14.0	x	14.0	196.0
10	30	14.6	x	14.6	212.3	18.1	x	18.1	326.5
11	Intermediate	10.4	x	10.4	108.2	11.9	x	11.9	141.6
12	Intermediate	11.3	x	11.3	128.4	12.8	x	12.8	164.6
13	60	14.6	x	14.6	212.3	18.1	x	18.1	326.5
14	60	15.0	x	15.0	225.9	18.2	x	18.2	332.3
15	Intermediate	9.9	x	9.9	98.4	11.4	x	11.4	130.4
16	Intermediate	11.3	x	11.3	128.4	12.8	x	12.8	164.6
17	60	15.0	x	15.0	225.9	18.2	x	18.2	332.3
18	Intermediate	11.3	x	11.3	128.4	12.8	x	12.8	164.6
19	60	15.7	x	15.7	245.5	18.9	x	18.9	356.1
20	Intermediate	12.3	x	12.3	150.6	13.8	x	13.8	189.6
21	Intermediate	9.7	x	9.7	93.7	11.2	x	11.2	125.0
22	Intermediate	9.9	x	9.9	98.4	11.4	x	11.4	130.4
23	60	14.4	x	14.4	206.8	17.6	x	17.6	309.1
24	Intermediate	9.5	x	9.5	89.3	11.0	x	11.0	119.9
25	Intermediate	10.4	x	10.4	108.0	11.9	x	11.9	141.4
26	60	15.7	x	15.7	245.5	18.9	x	18.9	356.1
27	Intermediate	10.4	x	10.4	108.0	11.9	x	11.9	141.4
28	60	16.3	x	16.3	266.0	19.5	x	19.5	380.6
29	30	15.9	x	15.9	251.2	19.4	x	19.4	374.4
30	Intermediate	12.3	x	12.3	150.6	13.8	x	13.8	189.6
31	Intermediate	12.3	x	12.3	151.3	13.8	x	13.8	190.4
32	Intermediate	12.5	x	12.5	156.3	14.0	x	14.0	196.0
33	60	15.7	x	15.7	246.5	18.8	x	18.8	353.4
34	60	14.3	x	14.3	204.5	17.0	x	17.0	289.0
35	Intermediate	9.9	x	9.9	98.4	11.5	x	11.5	131.1
36	Intermediate	9.9	x	9.9	98.4	11.5	x	11.5	131.1
37	60	15.7	x	15.7	245.5	18.9	x	18.9	356.1
38	Intermediate	12.3	x	12.3	150.6	13.8	x	13.8	190.4

Tower No.	Tower Type	Minimum Tower Foundation Length (m)		Minimum Tower Foundation Breadth (m)	Minimum Tower Foundation Footprint (m ²)	Maximum Tower Foundation Length (m)		Maximum Tower Foundation Breadth (m)	Maximum Tower Foundation Footprint (m ²)
39	60	16.0	x	16.0	256.0	19.2	x	19.2	368.6
40	Intermediate	11.4	x	11.4	128.8	12.9	x	12.9	165.1
41	30	13.3	x	13.3	176.9	16.8	x	16.8	282.2
42	Intermediate	11.8	x	11.8	139.2	13.3	x	13.3	176.9
43	Intermediate	12.5	x	12.5	156.3	14.0	x	14.0	196.0
44	Intermediate	12.5	x	12.5	156.3	14.0	x	14.0	196.0
45	Intermediate	11.6	x	11.6	133.6	13.0	x	13.0	169.0
46	30	13.3	x	13.3	176.9	16.8	x	16.8	282.2
47	Intermediate	9.5	x	9.5	89.3	11.0	x	11.0	119.9
48	Intermediate	9.5	x	9.5	89.3	11.0	x	11.0	119.9
49	30	14.0	x	14.0	194.6	17.5	x	17.5	304.5
50	Intermediate	12.5	x	12.5	156.3	14.0	x	14.0	196.0
51	Intermediate	12.3	x	12.3	150.6	13.8	x	13.8	189.6
52	90	17.5	x	17.5	305.6	20.0	x	20.0	399.2
53	Intermediate	9.5	x	9.5	89.3	11.0	x	11.0	119.9
54	Intermediate	9.5	x	9.5	89.3	11.0	x	11.0	119.9
55	30	13.6	x	13.6	185.0	17.1	x	17.1	292.4
56	Intermediate	12.5	x	12.5	156.3	14.0	x	14.0	196.0
57	Intermediate	11.3	x	11.3	128.4	12.8	x	12.8	164.6
58	30	13.3	x	13.3	176.4	16.8	x	16.8	281.6
59	Intermediate	9.9	x	9.9	98.4	11.4	x	11.4	130.4
60	Intermediate	10.4	x	10.4	108.0	11.9	x	11.9	141.4
61	Intermediate	10.2	x	10.2	103.0	11.7	x	11.7	135.7
62	30	13.3	x	13.3	176.4	16.8	x	16.8	281.6
63	Intermediate	10.2	x	10.2	103.0	11.7	x	11.7	135.7
64	Intermediate	10.2	x	10.2	103.0	11.7	x	11.7	135.7
65	Intermediate	11.3	x	11.3	128.4	12.8	x	12.8	164.6
66	Intermediate	11.3	x	11.3	128.4	12.8	x	12.8	164.6
67	Intermediate	10.4	x	10.4	108.0	11.9	x	11.9	141.4
68	30	13.8	x	13.8	189.3	17.3	x	17.3	297.9
69	Intermediate	11.1	x	11.1	123.0	12.6	x	12.6	158.5
70	Intermediate	11.3	x	11.3	128.4	12.8	x	12.8	164.6
71	60	15.0	x	15.0	225.9	18.2	x	18.2	332.3
72	Intermediate	11.8	x	11.8	139.2	13.3	x	13.3	176.9
73	Intermediate	11.8	x	11.8	139.2	13.3	x	13.3	176.9
74	30	13.3	x	13.3	176.4	16.8	x	16.8	281.6
75	Intermediate	10.4	x	10.4	108.0	11.9	x	11.9	141.4
76	60	15.4	x	15.4	235.6	18.6	x	18.6	344.1
77	Intermediate	12.5	x	12.5	156.3	14.0	x	14.0	196.0
78	Intermediate	11.8	x	11.8	139.2	13.3	x	13.3	176.9
79	30	13.9	x	13.9	194.0	17.4	x	17.4	303.8

Tower No.	Tower Type	Minimum Tower Foundation Length (m)		Minimum Tower Foundation Breadth (m)	Minimum Tower Foundation Footprint (m ²)	Maximum Tower Foundation Length (m)		Maximum Tower Foundation Breadth (m)	Maximum Tower Foundation Footprint (m ²)
80	Intermediate	11.3	x	11.3	128.4	12.8	x	12.8	164.6
81	30	16.2	x	16.2	261.8	19.7	x	19.7	387.3
82	Intermediate	12.5	x	12.5	156.3	14.0	x	14.0	196.0
83	60	16.0	x	16.0	255.7	19.2	x	19.2	368.3
84	Intermediate	9.5	x	9.5	89.3	11.0	x	11.0	119.9
85	90	14.6	x	14.6	212.6	18.3	x	18.3	334.2
86	Intermediate	10.4	x	10.4	108.0	11.9	x	11.9	141.4
87	Intermediate	10.4	x	10.4	108.0	11.9	x	11.9	141.4
88	Intermediate	12.5	x	12.5	156.3	14.0	x	14.0	196.0
89	60	16.0	x	16.0	255.7	19.2	x	19.2	368.3
90	Intermediate	11.3	x	11.3	128.4	12.8	x	12.8	164.6
91	Intermediate	11.3	x	11.3	128.4	12.8	x	12.8	164.6
92	Intermediate	10.9	x	10.9	117.9	12.4	x	12.4	152.8
93	Intermediate	12.5	x	12.5	156.3	14.0	x	14.0	196.0
94	Intermediate	12.0	x	12.0	144.7	13.5	x	13.5	183.1
95	Intermediate	12.5	x	12.5	156.3	14.0	x	14.0	196.0
96	Intermediate	12.5	x	12.5	156.3	14.0	x	14.0	196.0
97	30	16.2	x	16.2	261.8	19.7	x	19.7	387.3
98	Intermediate	12.5	x	12.5	156.3	14.0	x	14.0	196.0
99	Intermediate	12.5	x	12.5	156.3	14.0	x	14.0	196.0
100	Intermediate	10.4	x	10.4	108.0	11.9	x	11.9	141.4
101	Intermediate	9.9	x	9.9	98.4	11.4	x	11.4	130.4
102	30	15.2	x	15.2	231.3	18.7	x	18.7	350.1

Appendix 5D Substation Planting Schedule

Planting Proposals for Turleenan Substation

General Tree Screening							
To be planted in single species groups of 3,5 and 7,							
Nr	Plant Name	Common Name	Initial specification	Potential Height, Spread Year 10	Potential Height, Spread Year 15	Potential Height, Spread and Growth Ultimate	Density
TBC	Alnus glutinosa	Alder	Standard; 2-3m high 8-10cm girth	9x5m	11.5x6.5m	15 high x8m	
TBC	Populus tremula	Aspen	Standard; 2-3m high 8-10cm girth	10x5m	12.5 x 6.5m	15 high x10m	
TBC	Betula pubescens	Downy Birch	Heavy standard; 3.0-3.5 high; 12-14cm girth	8x3m	9.5 x 4.5m	20 high x 10m	
TBC	Betula pubescens	Downy Birch	Standard; 2-3m high 8-10cm girth	8x3m	9.0 x 4.5m	20 high x 10m	
TBC	Fagus sylvatica	Common Beech	Heavy standard; 3.0-3.5 high; 12-14cm girth	10x5m	16 x 7.5m	25 high x 20m	
TBC	Fagus sylvatica	Common Beech	Standard; 2-3m high 8-10cm girth	10x5m	15 x 7m	25 high x 20m	
TBC	Prunus avium	Wild Cherry	Heavy standard; 3.0-3.5 high; 12-14cm girth	8x4m	11 x 5.5m	15 high x 10m	
TBC	Prunus avium	Wild Cherry	Standard; 2-3m high 8-10cm girth	8x4m	10 x 5m	15 high x 10m	
TBC	Quercus petraea	Sessile oak	Heavy standard; 3.0-3.5 high; 12-14cm girth	6x4m	8.5 x 5.5m	25 high x 25m	
TBC	Quercus petraea	Sessile oak	Standard; 2-3m high 8-10cm girth	6x4m	8 x 5m	25 high x 25m	
Whip Planting							
To be planted in single species groups of 3, 5 and 7 with rabbit guards and cains.							
Nr	Plant Name	Common Name	Initial specification	Potential Height, Spread Year 10	Potential Height, Spread Year 15	Potential Height, Spread and Growth Ultimate	Density
TBC	Alnus glutinosa	Common Alder	1.25-1.75m high; feather; 2x; B;2 brks	6.5 x 4	9 x 5m	15m high x 8m wide, Fast 500mm/yr	1/m2
TBC	Betula pubescens	Downy Birch	60-80cm high; whip; 1+1; br	3 x 3m	4.5 x 4.5m	20m high x 10m wide, Medium 300mm/yr	0.5/m2
TBC	Betula pubescens	Downy Birch	1.25-1.75cm high; feather; 2x; 2 brks; br	3.5 x 3.5m	3 x 3m	20m high x 10m wide, Medium 300mm/yr	1/m2
TBC	Corylus avellana	Hazel	50-60 high; BR; 3 brks; branched 1+2	6 x 4m	8 x 5m	10m high x 6m wide, fast 500mm/yr	0.5/m2
TBC	Corylus avellana	Hazel	1.25-1.75cm high; feather; 2x; 2 brks; br	6.5 x 4.5m	8 x 5m	10m high x 6m wide, fast 500mm/yr	1/m2
TBC	Crataegus monogyna	Common Hawthorn	60-80cm high; whip; 1+1; br	5 x 2	6.5 x 3.5m	15m high x 7m wide, Medium 300mm/yr	0.5/m2
TBC	Crataegus monogyna	Common Hawthorn	1.25-1.75cm high; feather; 2x; 2 brks; br	6 x3	7.5 x 4m	15m high x 7m wide, Medium 300mm/yr	1/m2
TBC	Fagus sylvatica	Common Beech	60-80cm high; whip; 1+1; br	12 x 9m	18 x 12m	25m high x 20m wide, V Fast 1200mm/yr	0.5/m2
TBC	Fagus sylvatica	Common Beech	1.25-1.75cm high; feather; 2x; 2 brks; br	13 x 9.5	19 x 13m	25m high x 20m wide, V Fast 1200mm/yr	1/m2
TBC	Ilex aquifolium	Common Holly	60-80cm high; whip; 1+1; br	4.5 x 2.5m	6.5 x 4.5m	8m high x 6m wide, Slow 300mm/yr	0.5/m2

TBC	<i>Ilex aquifolium</i>	Common Holly	1.25-1.75cm high; feather; 2x; 2 brks; br	5.0 x 3.0	7 x 5m	8m high x 6m wide, Slow 300mm/yr	1/m2
TBC	<i>Ligustrum vulgare</i>	Common Privet	60-80cm high; 3 brks; branched; 1+1;	3 x 3m	3 x 3m	3m high x 3m wide, Medium 300mm/yr	0.5/m2
TBC	<i>Populus tremula</i>	Aspen	60-80cm high; whip; 1+1; br	4 x 2.5m	7.5 x 5m	15m high x 10m wide, Fast 500mm/yr	0.5/m2
TBC	<i>Populus tremula</i>	Aspen	1.25-1.75cm high; feather; 2x; 2 brks; br	5 x 3.5	8.5 x 6m	15m high x 10m wide, Fast 500mm/yr	1/m2
TBC	<i>Prunus avium</i>	Wild cherry	60-80cm high; whip; 1+1; br	5 x 3m	9 x 4m	15m high x 10m wide, Fast 600mm/yr	0.5/m2
TBC	<i>Prunus avium</i>	Wild cherry	1.25-1.75cm high; feather; 2x; 2 brks; br	6 x 3.5m	10 x 4.5m	15m high x 10m wide, Fast 600mm/yr	1/m2
TBC	<i>Prunus padus</i>	Bird cherry	60-80cm high; whip; 1+1; br	5 x 3m	6.5 x 5m	15m high x 10m wide, Medium 300mm/yr	0.5/m2
TBC	<i>Prunus padus</i>	Bird cherry	1.25-1.75cm high; feather; 2x; 2 brks; br	5.5 x 3.5	7 x 6m	15m high x 10m wide, Medium 300mm/yr	1/m2
TBC	<i>Prunus spinosa</i>	Blackthorn	60-80cm; BR; 2 brks; brnched; 1+1	4 x 2m	5.5 x 4m	7m high x 4m wide, Medium 300mm/yr	0.5/m2
TBC	<i>Quercus petraea</i>	Sessile oak	60-80cm high; whip; 1+1; br	5 x 4m	7.5 x 5.5m	25m high x 25m wide, Medium 500mm/yr	0.5/m2
TBC	<i>Quercus petraea</i>	Sessile oak	1.25-1.75cm high; feather; 2x; 2 brks; br	6.5 x 5	8.5 x 6m	25m high x 25m wide, Medium 500mm/yr	1/m2
TBC	<i>Rosa canina</i>	Dog rose	60-80cm high; BR; 3 brks; Branched 1+1	2 x 2m	2 x 2m	2m high x 2m wide, Medium 300mm/yr	0.5/m2
TBC	<i>Salix caprea</i>	Goat willow	60-80cm high; whip; 1+1; br	6 x 4m	7.5 x 5.5m	10m high x 8m wide, Fast 500mm/yr	0.5/m2
TBC	<i>Sambucus nigra</i>	Common Elder	60-80cm high; whip; 1+1; br	4 x 4m	4 x 4m	4m high x 4m wide, fast 500mm/yr	0.5/m2
TBC	<i>Sambucus nigra</i>	Common Elder	1.25-1.75cm high; feather; 2x; 2 brks; br	4 x 4m	4 x 4m	4m high x 4m wide, fast 500mm/yr	1/m2
TBC	<i>Sorbus aucuparia</i>	Rowan	60-80cm high; whips; 1+1; br	4.5 x 2.5m	7.5 x 3.5m	12m high x 5m wide, Medium 500mm/yr	0.5/m2
TBC	<i>Sorbus aucuparia</i>	Rowan	1.25-1.75m high; feather; 2x; B;2 brks	6 x 3.5m	8.5 x 4m	12m high x 5m wide, Medium 500mm/yr	1/m2
TBC	<i>Taxus baccata</i>	Yew	60-80cm high;whips; 1+1; br	2.5 x 1.5m	3 x 2m	20m high x 10m wide, Slow 100mm/yr	0.5/m2
TBC	<i>Viburnum opulus</i>	Guelder rose	80-100cm; 1+2; br	3 x 2m	4 x 2m	4m high x 2m wide, fast 500mm/yr	0.5/m2

Hedgrow planting**To be planted in a double staggered row at 350mm centres and maintained at 2m high x 1-1.5m wide.**

Nr	Plant Name	Common Name	Initial specification	Potential Height, Spread Year 10	Potential Height, Spread Year 15	Potential Height, Spread and Growth (if left unmanged)	Density
TBC	Corylus avellana	Hazel	1.25-1.75cm high; feather; 2x; 2 brks; br	2 high x 1.5m wide	2 high x 1.5m wide	10m high x 6m wide, fast 500mm/yr	5 lin m
TBC	Crataegus monogyna	Common Hawthorn	1.25-1.75cm high; feather; 2x; 2 brks; br	2 high x 1.5m wide	2 high x 1.5m wide	15m high x 7m wide, Medium 300mm/yr	5 lin m
TBC	Fagus sylvatica	Common Beech	1.25-1.75cm high; feather; 2x; 2 brks; br	2 high x 1.5m wide	2 high x 1.5m wide	25m high x 20m wide, V Fast 1200mm/yr	5 lin m
TBC	Ilex aquifolium	Common Holly	1.25-1.75cm high; feather; 2x; 2 brks; br	2 high x 1.5m wide	2 high x 1.5m wide	10m high x 4m wide, Slow 300mm/yr	5 lin m
TBC	Lonicera periclymenum	Wild Honeysuckle	60-80 high; c; 3 brks; several shoots	2 high x 1.5m wide	2 high x 1.5m wide	3m high x 3m wide, V Fast 1500mm/yr	5 lin m
TBC	Prunus spinosa	Blackthorn	60-80cm; BR; 2 brks; brnched; 1+1	2 high x 1.5m wide	2 high x 1.5m wide	4m high x 4m wide, Medium 300mm/yr	5 lin m
TBC	Ulmus glabra	Wych elm	60-80cm high; whip; 1+1; br	2 high x 1.5m wide	2 high x 1.5m wide	25m high x 20m wide, Slow 300mm/yr	5 lin m
TBC	Ulmus glabra	Wych elm	1.25-1.75cm high; feather; 2x; 2 brks; br	2 high x 1.5m wide	2 high x 1.5m wide	25m high x 20m wide, Slow 300mm/yr	5 lin m

Grass**Amenity grass, or similar approved from a local source.**

% mix	Plant Name	Common Name				
60	Sauvignon	Perennial Ryegrass				
35	Barpearl	Slender creeping Red fescue				
5	Highland	Browntop Bent				

Meadow grass,**To Future Specification. All wildflower seed to be locally sourced with proof of native provenance**

Appendix 6A Consultation Summary Response Tables

Summary of 2006 Responses from EIA Consultees

Organisation	Department	2006 Comments
Armagh City and District Council.	Chief Executive	Armagh City Council requested that NIE attend a meeting with its Public Services Scrutiny Committee.
Armagh City and District Council	Environmental Health and Recreation Directorate	No reply.
BBC		The BBC supplied an engineer comment which stated: "Effects will likely be minimal, unless the pylons are sited close to habitations. A lattice type structure will impact considerably less than a solid structure of a similar size." The BBC also included a document called "The Impact of Large Buildings and Structures (including Wind Farms) on Terrestrial Television Reception."
CAA	Director of Airspace Policies	CAA stated that "the proposal does not constitute an aviation hazard, however if the design changes then re-consultation will be required."
CNCC		CNCC noted that the Council held no relevant information nor had any comments to offer at this stage and that it would await receipt of the completed EIA.
Crown Estates		No reply.
DARD	Rivers Agency	The Rivers Agency response included estimated 1 in 100 year flood levels and that any drainage works on the numerous designated and undesignated watercourses along the proposed route would require Rivers Agency consent.
DARD	The EIA Team, Environmental Policy Division	A response was received from Quality Assurance Branch, Veterinary, Forest Service and Countryside Management detailing baseline environmental data.
DCAL	Inland Fisheries	Inland Fisheries was content that the proposal would not impact fisheries during the construction phase and appropriate mitigation should be included as part of the ES.
DETI	GSNI	GSNI commented that the ES should contain information on geology, groundwater and peat deposits.
DOE NIEA	Air and Environmental Quality	Details of how the assessment should be carried out were given and information on where further information should be sought was provided.
DOE NIEA	Built Heritage	Built Heritage stated the archaeological input to ES must be completed by a professional archaeologist and conform to PPS 6. They stated that the ES should also identify known remains and provide a strategy for confirming the presence or absence of previously unrecognised archaeological remains, which must be agreed with NIEA
DOE NIEA	Countryside and Coast	NIEA Countryside and Coasts enclosed advice on the scope of works for an EIA.
DOE NIEA	Environmental Protection	Land and Resource Management submitted a response showing one site of contaminated land and details of the potential health effects of contaminated land.
DOE NIEA	Land and Resource Management	Details were sent of potential contaminated land sites around the proposed development site.
DOE NIEA	Natural Heritage	NIEA Natural Heritage sent detail relating to designated sites, flora & fauna, landscape and hydrogeology.

Organisation	Department	2006 Comments
DOE Planning Service	Special Studies Unit	Special Studies unit provided detail on information to be contained in the ES. Responses were provided by Landscape Architects Branch, EHS Natural Heritage, Directorate of Airspace Policy, EHS Protecting Historic Monuments, EHS Protecting Historic Buildings, the Department of Health, Social Services and Public Safety, Southern Health and Social Services Board, the Southern Group Environmental Health Committee, National Grid Wireless Group, Ofcom and DARD (Countryside Management). Details of an extension to the time period required for the pre-application scoping enquiry was also noted by the Special Studies Unit.
Department of Health, Social Services and Public Health		No reply.
DRD	Roads Service - Development Control	No reply.
DRD	Roads Service - Development Control (Western Division)	No reply.
DRD	Water Service	No reply.
Department of the Environment Heritage and Local Government (RoI)	Environmental Assessment Section	The Department of the Environment, Heritage and Local Government were unable to comment but asked to be kept informed as the scheme progresses.
Dungannon and South Tyrone Borough Council	Chief Executive	No reply.
Dungannon and South Tyrone Borough Council	Environmental Health Department	The Council noted that the proposed development was to be raised at a council meeting in August 2006 and that it would issue further comments at a later stage.
FCB		FCB were of the opinion there would be no threat to fisheries interest in the area and therefore have no objection to the application.
Health and Safety Executive		The Health and Safety Executive stated that they had no issue with the proposal provided all relevant legislation is adhered to.
Irish Whooper Swan Study Group		The Irish Whooper Swan Study Group were concerned with line strikes which are a major cause of death for swans and requested that the line be designed to minimise risks.
MoD	Defence Estates	No reply.
NATS	Corporate and Technical Centre	No reply.
NATS	NATS Safeguarding Office	No reply.
National Trust	Regional Office	The National Trust did not feel it could contribute anything worthwhile as it had no land holdings present in the immediate vicinity.
NITB		NITB highlighted the impact of the proposed development on the visual amenity of the region, the implications to sites designated for nature conservation, the potentially negative impacts to the landscape and resultant impacts to the economy. It also recommended that an economic impact assessment take place.
Ofcom	Television Planning and Licensing (Information)	Ofcom stated that they did not deal with this type of project anymore.
PSNI	Armagh	The PSNI raised concerns about the potential significant disruption to traffic during the implementation of the scheme and suggested it may be beneficial to liaise with PSNI Roads Policing,

Organisation	Department	2006 Comments
		Traffic Management, Lisnasharragh.
RSPB		The RSPB held limited information along the route and suggested possible enhancement measures.
Southern Group Environmental Health Committee		No reply.
Spectrum Planning (Buildings and Wind Farms)	Arqiva	Based on the information provided, Spectrum Planning had no objection.
Spectrum Planning (Buildings and Wind Farms)	National Grid Wireless UK Ltd	The National Grid Wireless UK Ltd did not raise any objections.
Spectrum Planning Department (Buildings and Windfarms)	NTL	NTL had no comment to make.
Translink		No reply.

Summary of 2007 Responses from EIA Consultees

Organisation	Department	2007 Comments
Armagh City and District Council	Environmental Health and Recreation Directorate	Comment was made as part of the Armagh City and District Council consultation.
Armagh City and District Council		The proposal was considered at a meeting of the Council's Public Services Scrutiny Committee held on 12 November 2007. The correspondence stated that the council had begun to undertake research on the health implication of the proposed development, this impact on land value and the environment and its impact on tourism.
Belfast International Airport	Belfast Flying Club Ltd	No reply.
BBC	Reception Advice	The previous letter was referred to (see Table 6.2 of 2009 ES) and still applied.
BTO		If required, the BTO would provide access to their ornithological record databases.
CAA	Director of Airspace Policies	The Director of Airspace Policies stated that because the towers would not exceed 37m in height, there was no obstruction to aviation. The relevant planning authority should also check any safeguarding maps lodged with the council to identify any aerodrome specific issues. The Director of Airspace Policies did not believe there would be any aviation charting issues. It advised contacting NATS and the MoD. (Note: since this time CAA has confirmed that they have no objection to towers under 50m).
CNCC		Neither CNCC nor the Historic Monuments Council held any relevant information but would welcome a copy of the EIA in due course.
Crown Estates		No reply.
DARD	Agri – Environmental Schemes Management Branch	The Agri-Environmental Schemes Management Branch returned responses from Veterinary Service, Forest Service and Quality Assurance Branch.
DARD	Countryside Management Division	Please see the EIA Team, Environmental Policy Division response.
DARD	County Agricultural Office	No reply.
DARD	Fisheries and Rural Policy Division	There was no formal response from the Fisheries and Policy Division; however information on fisheries was present in the DARD EIA team response (below).
DARD	Forest Service	The Forest Service indicated there are areas of privately owned/grant-aided woodland affected by the proposals.
DARD	Quality Assurance	The Quality Assurance Branch highlighted that Potato Wart Disease (PWD) was present in some areas of the proposed development.
DARD	Rivers Agency	Rivers Agency advised that it had no comment to make for inclusion in the ES.
DARD	The EIA Team, Environmental Policy Division	Responses have been received from Veterinary Service, Forest Service, Fisheries and Quality Assurance Branch. The Countryside Management Division also responded through the EIA Team to highlight that Potato Wart Disease (PWD) was present in some areas of the proposed development.
DCAL	Inland Waterways & Inland Fisheries	Inland Waterways & Inland Fisheries highlighted the potential impact to salmon associated with the proposed development.
DETI	Invest Northern Ireland	Invest NI had no comment to make.
DETI	GSNI	GSNI gave details on what parts of the geological process should be included as part of the design.
DOE NIEA	Built Heritage	No reply.
DOE NIEA	Conservation Designation	No reply.

Organisation	Department	2007 Comments
	and Protection	
DOE NIEA	Countryside and Coast	The consultation was registered as received within the EHS Countryside and Coast department.
DOE NIEA	Environmental Policy Group, Air and Environmental Quality Unit	The Environmental Policy Group assumed that air and noise assessments will take place as part of the EIA process. The Group also advised that the local councils be asked for comments.
DOE NIEA	Environmental Protection Division	No reply.
DOE NIEA	Land & Resource Management	The Land and Resource Management group sent information about potential contaminated land sites along the route and details of the other departments in NIEA.
DOE NIEA	Natural Heritage	Natural Heritage had concerns that the scheme may have adverse impacts on ASSIs, priority wetland habitats and Species of Conservation Concern.
DOE NIEA	Waste Management and Contaminated Land	No reply.
DOE NIEA	Water Management Unit	<p>NIEA WMU produced two maps showing the location of bedrock aquifers along the proposed route and groundwater vulnerability.</p> <p>Stated that the mitigation measures in Volume 2 Chapter 8 of the 2009 ES are acceptable. However, the NIEA did request a water features survey is undertaken to ensure that there are no wells or abstractions in the area that will be affected. NIEA WMU noted the need for discharge consents under the Water (Northern Ireland) Order 1999. It was highlighted that no development should take place on site until the method of site drainage / sewage effluent disposal has been agreed in writing with NIEA WMU. NIEA WMU advised of updated legislation post ES publication, specifically 'The Control of Pollution (Oil Storage) Regulations (Northern Ireland) 2010'. Finally, NIEA WMU advised of the need for concrete washings to be to an impermeable containment for disposal off-site via a licensed waste contractor.</p>
DOE Planning Service	Landscape Architects Branch	Landscape Architects Branch stated that did not hold any specific information on the site. They submitted a checklist detailing what should be included in an environmental statement.
DOE Planning Service	Divisional Planning Office (Craigavon)	The preferred route indicated on the submitted plan passed within the vicinity of a number of Unscheduled Historic Monuments. The Planning Service recommended that the EHS be contacted if further details were required.
DOE Planning Service	Divisional Planning Office (Craigavon)	The response noted a number of unscheduled historic monuments within the vicinity of the proposed development, in Armagh.
DOE Planning Service	Special Studies	No reply.
Department of Health, Social Services and Public Safety (DHSSPS)		No reply.
DRD Roads Service	Armagh Section Office	Armagh Section Office Roads Service had raised concerns at the area of the route over the A3 Monaghan Road / Long Nancy's/ Morton's Crossroads junction. They would have appreciated a more detailed position of the pylons, because long term there may be plans to reroute the road.
DRD Roads Service	Forward Planning Section	No reply.
DRD Roads Service	Moygashal Depot	Roads Service suggested that its input would be better at construction stage.

Organisation	Department	2007 Comments
DRD Roads Service	Omagh Section Office	Not applicable to the Omagh area.
Department of the Environment, Heritage & Local Government (RoI)		No reply.
Fisheries Conservancy Board		The board had no objection to the proposal as outlined because the overhead lines would cross the River Blackwater on high ground downstream of Benburb and should not impact on any fishery interests.
Health and Safety Executive		No reply.
Helicopter Training and Hire Ltd		No reply.
Historic Monuments Council		Neither CNCC nor Historic Monuments Council held any relevant information but would welcome a copy of the EIA in due course.
Irish Whooper Swan Study Group		No reply.
MoD	Defence Estates	Defence Estates Safeguarding confirmed that the MoD had no safeguarding objections to the proposal.
NATS	Corporate and Technical Centre	No reply.
NATS	NATS Safeguarding Office	No reply.
National Grid Wireless	Transmitting Section	National Grid Wireless submitted the opinion that the proposed development did not impact any of its services.
National Museums Northern Ireland	CEDaR	No reply.
National Trust	Regional Office	The proposed area did not directly affect any National trust property or land holdings so they had no specific comments to make at that time. The National Trust requested that it be kept informed at the later stages of the EIA when the Trust may be in a position to comment on specific issues.
Newry and Mourne District Council	Chief Executive	No reply.
Northern Ireland Bat Group	c/o National Museums Northern Ireland.	No reply.
NITB		No reply.
Northern Ireland Water		Northern Ireland Water submitted the documents required to request the location of services in the study area.
PSNI	Armagh District Command Unit.	No reply.
PSNI	Dungannon District Commander	No reply.
PSNI	Traffic Management	No reply.
Royal Air Force		No reply.
RSPB		Comments from the previous consultation were upheld.
Southern Education and Library Board	The Property Manager	No reply.
Southern Group Environmental Health Committee		The Southern Group Environmental Health Committee stated that they were commissioning a literature review regarding the development and felt the timescale was insufficient for them to comment.
Southern Health & Social Services Board		The Board highlighted that the HPA guidance highlights the potential need to site high voltage power sources at a safe distance from private dwellings.

Organisation	Department	2007 Comments
Spectrum Planning (Buildings and Wind Farms)	National Grid Wireless UK Ltd	No reply.
Spectrum Planning (Buildings and Windfarms)	Crown Castle Limited	No reply.
Spectrum Planning Department (Buildings and Windfarms)		No reply.
Sports Council for Northern Ireland		The council stated that the proposed overhead line did not over sail any sports pitch facilities in the area. It also could not comment on the relative distance from the facilities in terms of any best practice clearance zones. It enclosed a map of sports facilities.
The Countryside Access and Activities Network		No reply.
The Wildfowl and Wetlands Trust		No reply.
The Woodland Trust		The Woodland Trust identified ancient woodland within the scheme boundary and stated the Trust would seek the protection and buffering of such woodland. The Woodland Trust also requested a copy of the ES.
Translink		No reply.
Ulster Farmers Union		The Ulster Farmers' Union (UFU) did not believe that sufficient consideration had been given to the siting of towers near/at field boundaries as a means of minimising the impact on operational farming activities. The UFU also highlighted a specific farmer complaint.
Ulster Flying Club Ltd	Newtownards Airfield	The proposed development would not directly conflict with the Newtownards airport. It was suggested that the CAA be contacted, and that the proposed development, if built, be marked on CAA maps.
Ulster Wildlife Trust		No reply.

Summary of PAD responses from 2008 and 2009

Organisation	Department	Comment
Armagh City and District Council	Chief Executive Office	The council were opposed to the current proposals and strongly support the undergrounding of cables. They also passed on the comments made by the Environmental Health Office.
Armagh City and District Council	Environmental Health Directorate	The Environmental Health Office had concurred with those comments as made by the Southern Group Environmental Health Committee.(see below)
CAA		The CAA did not consider the scheme to be an en-route obstruction but required that the relevant planning authority should check any safeguarding maps lodged with the authority to identify any aerodrome specific safeguarding issues. It did not anticipate any aerodrome related issues. They had stated that the MOD should have been contacted for comment and if the overhead lines were over a height of 200 feet, they should be marked on CAA produced aviation charts.
DARD	Countryside Management Branch	The Countryside Management Branch submitted responses that were received from Countryside Management Branch, Forest Service and Fisheries Division.
DARD	Rivers Agency	Rivers Agency had no objections from the drainage aspect to the proposed development.
DCAL	Inland Fisheries	<p>Advised that the works have the potential to impact on tributaries of the River Blackwater catchment, namely the Ballymartrim Water and Tynan Water, both of which support populations of salmonids. The Blackwater River system was highlighted as currently one of several index catchments for the Department's Salmon Management Plan.</p> <p>DCAL stated that the operational phase of the proposed development should have little impact on fisheries interests, however, during the construction phase there is a risk of surface water becoming contaminated with various pollutants and high levels of suspended solids, which may drain into nearby watercourses to the detriment of fisheries interests.</p> <p>They also stated that special consideration should be given to the placing of towers, construction access roads and associated works so that impacts to watercourses are minimised. Towers should be placed as far from watercourses as is feasible. Finally, DCAL noted that it is an offence under Section 47 of the Fisheries Act (Northern Ireland) 1966 to cause pollution, which is subsequently shown to have a deleterious effect on fish stocks.</p>
DOE NIEA	Historic Monuments Unit (HMU)	NIEA HMU stated the study area addressed their concerns and that archaeological mitigation at construction will be necessary.
DOE NIEA	Land and Resource Management Unit	NIEA LRM noted that baseline data had been sent to the applicant and outlined what was expected from the applicant should any of the development sites associated with the proposed development intersect with the already highlighted contaminated land sites.
DOE NIEA	Listed Buildings	NIEA Listed Buildings stated that the Monuments and Building Record provided a starting point for archaeological or built heritage research or impact assessment and stated the developers' obligations, should new remains be found during construction.

Organisation	Department	Comment
DOE NIEA	Natural Heritage	NIEA Natural Heritage noted the receipt of draft Chapters for assessment and that bat surveys for the project were ongoing. NIEA Natural Heritage was deferring comment until the report detailing the 2009 bat surveys had been submitted.
DOE NIEA	Protecting Historic Buildings	NIEA/HBU responded that they had not been issued with the relevant Chapter to assess the impact to historic buildings. This was re-issued to them. No response was received as of the time of finalisation of the ES.
DOE NIEA		Advised that the impact on local hydrology should be considered. This included potential effects on rivers, streams and wetland habitats as well as peatlands.
DOE Planning Service	Armagh Area Plan Team	The development plan team responded with information regarding zoning within the plan area and planning policies which should be adhered to. It also stated that NIEA Built Heritage should be consulted for information on built heritage in the area.
DOE Planning Service	Dungannon Area Plan Team	The Development Plan Team confirmed that some of the proposed development was within the Dungannon District and identified a number of constraints. They had no objections providing the development complies with the requirements of the Area Plan, and Policy PUS11 of "A Planning Strategy for Rural Northern Ireland."
DOE Planning Service	Landscape Architect Branch	Landscape Architect Branch were satisfied with the methodology used and conclusion reached. LAB noted that the landscape assessment indicated there will be significant adverse impacts upon the landscape in certain areas and that the towers and overhead lines will remain as significant visual elements in the landscape despite mitigation.
DOE Planning Service	Special Studies Unit	Consultation has been on going from 2008 to 2009 through the PAD process.
DRD Roads Service	Development Control	Roads Service had no objection on the provision that the stated conditions are met.
Northern Ireland Bat Group		The NI Bat Group provided the most recent bat activity records for the study area.
PSNI	Information and Communication Services	The PSNI confirmed that they held no objection to the scheme.
Public Health Agency (formally the Department of Health, Social Services and Public Health)		The Public Health Agency stated that the draft EMF Chapter submitted by NIE was balanced and that it was important for NIE to comply with guidance issued from the Health Protection Agency (HPA).
Southern Group Environmental Health Committee		The Southern Group Environmental Health Committee submitted comments in relation to the draft EMF and Noise Chapters.
Southern Health and Social Services Board		The board's comments were submitted by the Public Health Agency.
Spectrum Planning (Buildings and Wind Farms)	Arqiva	Arqiva have merged with National Grid Wireless UK Ltd, and had no objection to the project.

Summary of Planning Application Statutory and Stakeholder Responses from 2010

Organisation	Department	Comment
An Bord Pleanala		An Bord Pleanala stated they would like to take part in the decision making process and required additional copies of the ES.
Armagh City and District Council		The Council requested that the following information be attached to any planning permission granted: - Employ best practice and a precautionary approach to ensure EMF are kept to a minimum, support measures for the protection of water, support measures which consider contamination issues, no objection on the basis of noise.
Armagh City and District Council		The Council welcomed the Article 31 status which has been placed on the Interconnector planning and application, and encouraged the Department to hold a public local inquiry.
Arqiva		No objections.
Civil Aviation Authority (CAA)		No specific comments were made by CAA but they stated that the MoD had expressed concerns associated with overhead power lines and that CAA would wish to support MoDs recommendation concerning enhancement to wire conspicuity.
CNCC		CNCC did not receive any paperwork nor was it consulted on the application. An Bord Pleanala received an email from CNCC asking for explanation on the consultation procedure. This email was forwarded on to Planning Service.
DARD	Quality Assurance Branch	DARD stated that the proposal will encroach upon several areas invested with Potato Wart Disease and Potato Cyst Nematode. They stated that the movement of soil or other material from these lands is prohibited except under license.
DARD	Countryside Management Branch	DARD stated they were concerned with the lack of mitigation/reinstatement measures in the ES in relation to soil damage, concerns about the impact of trafficking on agricultural land - high risk of soil damage or compaction.
DARD	Countryside Management Branch	<p><u>Rivers Agency</u> Advised that their Planning Advisory Unit has been in consultation with NIE's consultants AECOM regarding the location of the proposed substation and they have appraised and are satisfied with their flood risk assessment.</p> <p><u>Quality Assurance Branch</u> Stated that none of the lands outlined in the map are subject to the terms of a notice served relating to Potato Cyst Nematode or Potato Wart Disease. Therefore there are no restrictions in so far as the Plant Health Order NI 2006.</p> <p><u>Veterinary Service</u> Confirmed that unless there have been substantial changes; there are no animal health and welfare implications.</p>
DARD	Rivers Agency	Rivers Agency advised that the proposal crosses numerous designated and undesignated watercourses. They advised that the applicant must submit to Rivers Agency for its consents to carry out work which might affect watercourses.

Organisation	Department	Comment
		Rivers Agency responded to DARD in the next month to state no objections had been received.
DARD	Fisheries Division	No comments.
DARD	Forest Service	Forest Service identified one private woodland which falls within the route.
DARD	Veterinary Service	Veterinary Service stated that there were no animal health or welfare implications.
DCAL	Fisheries Operations	Fisheries Operations referred to issues raised in their initial response regarding mitigation measures have which should adequately be addressed.
DETI	Energy Division	No comments.
DOE Planning Service	Landscape Architects Branch	DOE Landscape Architects Branch considered the proposed development acceptable in principle. They advised that when individual tower micro-siting has been determined the applicant is required to submit detailed information on existing vegetation to be retained / removed.
DOE Planning Service	Landscape Architects Branch	DOE Landscape Architects responded on issues raised concerning undergrounding, impact to ASSIs and Archaeology.
DOE	Land and Resource Management	Land and Resource Management required evidence of what has been considered in the risk assessment in relation to contaminated land sites). Technical Note issued by AECOM on 10.03.2010 clarifying this issue.
DOE	Land and Resource Management	Land and Resource Management referred to Chapter 9 in the ES Geology and Soils. Stated they would require some evidence of what has been considered in the risk assessment. They stated it is not apparent from the text which sites are potentially contaminated and there is no discussion of the topographical setting of these sites.
DOE	Natural Heritage	Natural Heritage had no objection subject to the following conditions; any removal of hedgerow trees, cuttings of hedgerows and woodland clearances shall take place outside bird breeding season, deflectors shall be inserted on lines that cross Blackwater River Valley, works will avoid contact with watercourse surface and bed, any potential roost sites shall be inspected for presence bats and if present work shall cease immediately. NIEA Natural heritage referred to the Conservation (Natural Habitats) 1995 (as amended) Regulation.
DOE	Natural Heritage	Natural Heritage acknowledged receipt of submission by Michael Burrows Associates. Highlights the request made under the Environmental Information Regulations (NI) Order 2004 for details of formal/informal advice during ecological surveys carried out by the applicant and as a result has submitted a copy of an email providing bat methodology for the proposal; draft bat survey methodology; letter detailing bat survey methodology which detailed at a meeting with NIEA and AECOM; and a letter from NIEA to PS which

Organisation	Department	Comment
		was not present in Appendix A of the ES.
DOE	Natural Heritage	Natural Heritage requested additional ecological information raised in objection letters which was omitted from ES in 2009. Information requests related to ecological Target Notes and a badger survey map.
DOE NIEA	Historic Monuments	Historic Monuments stated that the proposal passes near archaeologically sensitive location - Navan Area of Significant Archaeological Interest. HMU refer to the Historic Monuments and Archaeological Objects Order 1995 and Policy BH1 of PPS 6. They state that this protection extends to visual protection. They state that an archaeological watching brief will be required during all ground work. HMU stated that all archaeological works to identify and record any archaeological remains in advance of construction should be undertaken as per Policy BH 4 of PPS 6.
DOE NIEA	Historic Monuments	Historic Monuments reviewed objections letter received.
DOE NIEA	Historic Buildings Unit	The Historic Buildings Unit required more information on proposed tower locations. They included a list of buildings, which could be impacted upon by the development: 164 Trew Mount Road, 166 Trew Mount Road, 142 Moy Road, Gate lodge Tullydowney House, Tullydowney House and Gardens and Mullyloughan House.
DOE NIEA	Historic Buildings Unit	Acknowledged receipt of the letter of objection and reiterates previous responses dated 01/10/09 and 09/12/09 (PAD responses).
DOE NIEA	Historic Buildings Unit	HBU acknowledged receipt of a further letter of objection and reiterates previous responses. HBU requested a copy of the document detailing the location of each tower including Trewmount. This information was sent back to Planning Service following early responses.
DOE NIEA	Historic Buildings Unit	HBU stated in an additional response their concerns under BH11 of PPS 6 regarding the setting of the listed buildings and the effect of the substation and the proposed towers on their setting.
DOE NIEA	Water Management unit	The Water Management Unit referred to the discharge consent under the Water (NI) Order 1999.
DRD Road Service	Armagh Section Office	No Objections.
DRD Road Service		A response was issued in relation to an objector.
Department of the Environment, Heritage and Local Government (DEHLG)		Response forwarded to Monaghan and Cavan County Councils.
Department of Health, Social Services and Public Safety (DHSSPS)		DHSSPS noted that policy developments relating to consideration of public exposure to EMF had been reflected in the ES.
Dungannon & South Tyrone Borough and Armagh City & District	Joint Response	Councils stated they were opposed to Overhead cabling and called for Article 31 Inquiry. Councils outlined concerns regarding Conservation and Habitats, Scenic Quality, Archaeology, Consultation with Local People and EMF and Health Issues (See Appendix 6A)

Organisation	Department	Comment
Dungannon & South Tyrone Borough and Armagh City & District	Joint Response	<p>The Council stated they are not opposed to North South Interconnection but are opposed to overhead provision and called for an Article 31 Inquiry on the application.</p> <p>Council were concerned about health and safety implications and level of information provided. Requested economic appraisal of need and options.</p> <p>The Councils queried if EMF levels stated in ES are relevant to single circuit line.</p> <p>The Councils stated the proximity to area of scenic quality (200m) and thus contravenes planning policy.</p> <p>The Councils had concerns about the Landscape section of ES.</p> <p>The Councils suggested areas for undergrounding.</p> <p>The Councils requested further information on bird surveys, new surveys, badgers, hedgerow removal, noise impacts on wildlife, more consideration of conservation, biodiversity, areas of special interest and archaeological and cultural heritage.</p> <p>The Councils suggested that some archaeological sites have not been noted in the ES.</p> <p>The Councils queried process of monitoring planning applications.</p> <p>The Councils referred to impacts to tourism, businesses, property devaluation are of importance and council were not content with level of impact.</p> <p>The Councils referred to impacts to agriculture require further consideration.</p> <p>The Councils questioned source of community assessment and if local groups were consulted.</p>
HSC Public Health Agency		No issues.
HSC Public Health Agency		HSC issued 3 responses and stated they have considered these findings and advise that evidence to date suggests in general there are no adverse effects on the health of the population caused by exposure to extremely low frequency EMF.
Monaghan County Council		Monaghan County Council responded by stating they wished to be included in the consultation process.
Monaghan County Council		Monaghan County Council issued a response referring to Landscape, Views and Prospects, Photomontages, Landscape Character Assessment and Impact upon Archaeology.
National Air Traffic Control (NATS)		No objections.
Northern Ireland Assembly		The Northern Ireland Assembly welcomed the decision to hold a Public Inquiry.
Northern Ireland Tourist Board (NITB)		NITB summary of comments included: NITB stated they did not have a policy on placement and positioning of overhead electric power lines.

Organisation	Department	Comment
		NITB referred to the potential tourism impacts of the proposed development have been addressed by the local authorities but note that Armagh City and District Council and Dungannon and South Tyrone Borough Council have a greater familiarity with the locality and are in a better position to comment.
Northern Ireland Water (NIW)	Developer Services	NI Water refers to another contact within NI Water.
Royal Society for The Protection of Birds (RSPB)		RSPB provided comments on Barn Owls, Breeding Bird Season, Whooper Swans Crossing Points and Post Construction Monitoring.
Southern Group Environmental Health Committee (SGEHC)		A series of responses were issued by SGEHC as outlined in Appendix 6A.
Utility Regulator	Networks	Issued 4 responses including a statement supporting and backing to the need for the Interconnector.
Ulster Society for the Protection of the Countryside		The Society appreciated the necessity for an improved interconnection but noted that overhead cables and the associated pylons are detrimental to the visual amenity of the countryside and there may be problems in relation to bird strikes. They preferred cabling placed underground.
Ulster Unionist Assembly Party (UUP)	Newry & Armagh Constituency	Issued objection to the Interconnector due to potential adverse effect on landowners and rural dwellers who live on proposed route corridor. The UUP had concerns about the economic, welfare, health and environmental risks. They stated the cable if necessary, should be buried underground.

Summary of ES First Addendum Responses 2011

Organisation	Department	Comment
Armagh City and District Council		The Council indicated that they supported the response which had been made by SEAT (Safe Electricity Armagh Tyrone) to the application.
Armagh City Council and Dungannon Borough Council	Environmental Health	Satisfied that the risk assessment submitted are adequate.
DARD Fisheries and Climate Change	Aquaculture and Fish Health	The Fisheries Division stated they had no further comments to make in relation to the proposal.
DARD Rivers Agency	Planning Advisory Unit	DARD Rivers Agency Planning Advisory Unit advised against granting planning approval without due consideration being given to drainage and flood defence issues.
DARD Rivers Agency	Planning Advisory Unit	In a further response DARD Rivers Agency Planning Advisory Unit advised that many watercourses could be affected.
DARD	Countryside Management Branch	DARD Countryside Management Branch had no additional comments to make.
DARD	Forest Service	The Forest service stated they had no interest in the proposal.
DARD	Veterinary Division	DARD Veterinary Division did not know of any animal health or welfare implications that would effect this proposal provided certain conditions as outlined in their response were met.
NIEA	Natural Heritage	NIEA Natural Heritage in their first response recommended a newt survey be carried out before they could make further comment.
NIEA	Natural Heritage	NIEA, Natural Heritage considered that a newt survey is not required for this proposal as it is unlikely that there are waterbodies which are suitable as breeding ponds for newts within 200 metres of the proposed line route. They advised that they would have no objection to the proposal provided certain conditions were met.
NIEA	Historic Building Unit	NIEA Historic Buildings Unit objected to the proposal as they considered it is contrary to Policy BH11 of the Department's Planning Policy Statement 6: Planning, Archaeology and the Built Heritage in that the proposed structures would, if permitted, adversely affect the setting of Tullydowney House and Gate Lodge, which are buildings listed under Article 42 of the Planning (NI) Order 1991 by reason of their scale and proximity.
NIEA	Historic Monuments Unit	NIEA Historic Monuments Unit commented on the addendum submitted with the Environmental Statement, and agreed with section 1.5 of Addendum A2 "Transboundary Cultural Heritage Assessment" titled "Interrelationship of Impacts" that no further impacts have been identified. Consequentially they stated the application should be approved with certain conditions.
NIEA	Historic Monuments Unit	Issued a response in relation to Archaeology. <i>"No site works of any nature or development shall take place until a programme of archaeological work, has been implemented, in accordance with a written scheme and programme prepared by a qualified archaeologist, submitted by the applicant and approved by the Department"</i>

Organisation	Department	Comment
NIEA	Land and Resource Management	NIEA Land and Resource Management had no objection subject to certain conditions.
Northern Ireland Planning Service HQ	Landscape Architects Branch	<p>Landscape Architects Branch recognised that the proposals would have significant visual impacts on local environments and receptors but were satisfied that the route selected had been determined by an Environmental Impact Assessment that addressed the need to avoid direct impacts on designated areas, avoids large settlements, avoids areas with major environmental constraints and attempts to minimise impacts on individual dwellings and on the wider environment.</p> <p>Furthermore they agreed with the conclusion of the Environmental Statement Addendum that <i>“no additional significant adverse landscape and visual impacts were identified as a result of the increased study area, additional viewpoints, or from further consideration of the landscape character”</i>.</p>
Public Health Agency		Refers to previous correspondence. Views remain unchanged.
Roads Service	Development Control	Roads Service required clarification of pylon locations in vicinity of roads.
Roads Service	Development Control	Roads Service had no objections to this proposal subject to a number of considerations being met.
Southern Group Environmental Health Committee (SGEHC)	Environmental Health	<p>SGEHC referred to their previous comments and to the informatives requested for electromagnetic fields and noise.</p> <p>SGEHC stated they examined the risk assessments related to the proposed development in the vicinity of land which may have contaminated due to its former use. Based upon the proposed end-use and nature of construction involved SGEHC were satisfied that the risk assessments submitted were adequate and that no further information is required in relation to this aspect of the application.</p> <p>SGEHC also requested that the previously requested informatives in relation to electromagnetic fields and noise are attached to any planning permission granted.</p>

Summary of Second ES Addendum Responses 2011

Organisation	Department	Comment
Arquiva		Arquiva had no objection to the application.
DARD	Fisheries and Climate Change	The Fisheries Division had no comments to make at the time of consultation.
DARD	Quality Assurance Branch	Quality Assurance Branch confirmed no lands as outlined in the map provided, are subject to the terms of a notice relating to Potato Cyst Nematode (PCN) or Potato Wart Disease (PWD). Therefore there were no restrictions in terms of the Plant Health Order (Northern Ireland) 2006.
DARD	Rivers Agency	Rivers Agency noted that the flood risk assessment was appropriate to the development and the risks involved and has been carried out by a competent professional. Also they noted the flood risk assessment demonstrates that the proposal is not a flood risk and will not cause / add flood risk to others. Rivers Agency also stated that under the terms of Article 6 of the Drainage (Northern Ireland) Order 1973 the applicant must submit to Rivers Agency for its consent any proposal to carry out works which affect a watercourse.
DARD	Roads Service Western	Roads service has no objections to the content of the Second ES Addendum to the Environmental Statement.
DARD	Veterinary Service	Veterinary Service did not know of any animal health or welfare implications that would effect this proposal provided the following a list of stipulations were adhered to including: Boundary fences, livestock not having access to construction materials, no contamination of surrounding agricultural land and livestock have not having access to electricity cables. DARD stated the proposal should not compromise any of the five essential welfare freedoms of livestock in the vicinity i.e. freedom from hunger, thirst or malnutrition, provision of shelter, freedom from injury or disease, freedom from fear, and freedom to express their normal behaviour; and DARD also stated that proper cleaning and disinfection of humans and vehicles/equipment/tools carried out prior to entry and exit from farmlands accessed during construction / erection.
DARD	Veterinary Service	DARD Veterinary Service also responded in relation to the designation of part of the Benburb - Milltown area as an area of special scientific interest. They stated the purpose of the ASSI is to preserve rather than develop thus DARD did not foresee any animal health or welfare implications with the proposal.
DOE	Landscape Architects Branch	Landscape Architects Section advised that, <i>"if excessive economic cost and technical constraints preclude undergrounding as a viable option and while recognising that the proposals will have significant visual impacts on local environments and receptors, we are satisfied that the route selected for the overhead power line has been determined by an environmental impact assessment that addresses the need to avoid direct impacts on designated areas, avoids large settlements, avoids areas with</i>

Organisation	Department	Comment
		<p><i>major environmental constraints and attempts to minimise impacts on individual dwellings and on the wider environment”.</i></p> <p>LAB considered the proposed development acceptable in principle.</p>
DOE Planning	Armagh Area Plan Team	<p>The Armagh Area Team stated there are no prematurity issues with regard to the application.</p> <p>The Development Plan comments that the proposal should accord with the plans and policies contained in the Armagh Area Plan 2004, Armagh Area Plan 2004: Alteration No. 1 – Armagh Countryside Proposals, the Regional Development Strategy, and any other associated planning policy guidance.</p>
DOE NIEA	Natural Heritage	DOE NIEA Natural Heritage stated they had no objections to the proposal provided a number of conditions were met. These included comments relating to Bat surveys, Badger and Otter surveys, Whooper swan surveys and Breeding bird surveys.
DOE NIEA	Water Management Unit	<p>WMU were satisfied with the additional information provided; all comments in the original response remain valid.</p> <p>WMU note the intension to carry out well surveys for those pylon locations where dewatering will prove necessary and would had no further comments to make at the time.</p>
DRD Roads Service	Development Control	<p>Roads Service had no objections to the proposal subject to the following informatives:</p> <p><i>“A meeting with Roads Service Traffic and Transportation Section and Roads Service Section Office shall be planned well in advance of commencement of works on site to address all traffic management issues, management of construction traffic and associated haulage routes, proposed location of site depots and associated accesses, and proposed accesses to the construction site;</i></p> <p><i>Provision shall be made to the satisfaction of Roads Service, to ensure that surface water does not flow from the site onto the public road;</i></p> <p><i>Provision shall be made to the satisfaction of Roads Service, to accommodate the existing roadside drainage and to ensure that surface water does not flow from the public road onto the site; and</i></p> <p><i>Precautions shall be taken to prevent the deposit of mud and other debris on the adjacent road by vehicles travelling to and from the construction site. Any mud, refuse, etc, deposited on the road as a result of a development, must be removed immediately by the operator/contractor”.</i></p>
DRD Road Service	Roads Service Western	Roads service had no objections to the content of the Second ES Addendum to the Environmental Statement.
Ministry of Defence (MOD)	Defence Infrastructure Organisation	The Defence Infrastructure Organisation did not have any objections.
Monaghan County Council		Monaghan County Council acknowledged receipt of letter.
National Trust		The National Trust responded outlining their

Organisation	Department	Comment
		<p>concerns with the proposal given their land ownership and surrounding area of the Priory. They stated their concerns regarding impact on ASSIs, priority wetland habitats and the River Blackwater tributaries.</p> <p>The Trust also stated residual and visual impact as an issue they were concerned with. They advised that the proposal may be contrary to Planning Policy 6 and outlined these concerns in detail.</p> <p>The Trust went on to detail concerns regarding views of the proposed development, impacts on the Historic Built Environment and the Natural Environment.</p>
<p>National Air Traffic Services (NATS)</p>	<p>NERL Safeguarding</p>	<p>NATS commented that they had examined the proposal from a technical safeguarding aspect and concluded that it did not conflict with their safeguarding criteria. Accordingly, NATS (En Route) Limited had no safeguarding objections to the proposal.</p> <p>NATS requested they be consulted prior to planning permission being granted.</p>

Consultation Responses from Armagh City and District Council (2009 - 2006)

File Ref

Doc Ref

31EY02

25 August 2009

Mr Alan Moore
Department of the Environment
Planning Service Headquarters
Millennium House
17-25 Great Victoria Street
BELFAST
BT2 7BN

26 AUG 2009

Dear Mr Moore

RE: O/2008/0822/Q - TYRONE-CAVAN 400KV INTERCONNECTOR PRE-APPLICATION DISCUSSION RESPONSE


Please find attached Environmental Health response in relation to the above matter.

I would advise that Armagh City and District Council is opposed to the current proposals and strongly supports undergrounding of cables.

It is important that the Council's corporate position is included in any Planning Service consideration of this matter.

The Council looks forward to full engagement on this matter in due course.

Yours sincerely



John Briggs
Clerk and Chief Executive



Tyrone-Cavan 400kV Interconnector Pre-Application Discussion Response**Background**

The Planning Service has sent out a 2nd consultation on the Pre-Application Discussion (PAD) for the Tyrone Cavan 400 kV Interconnector. This includes a section on Electro-Magnetic Fields (EMFs).

The Planning Officer has confirmed the arrangement for PADs. Consultation is not sought from the Council itself at PAD stage, letters are only sent to Environmental Health, Roads Service etc. At full planning stage, the opinion of all consultees (including the Council) will be sought as normal.

Paul McCullough, Principal EHO (Environmental Protection) at Southern Group Environmental Health Committee has prepared a response which considers the Environmental Health impacts of the Interconnector. His response is as follows:

Proposed Response:

O/2008/0822/Q

I refer to my previous correspondence. I have now examined the detail submitted in "Tyrone Cavan 400 kV Interconnector Environmental Statement – Chapters 2, 3 & 7 April & May 2009". I would make the following additional comments:

Electro-magnetic fields (EMFs)

I have previously commented that it will be necessary to demonstrate that the proposed development will not give rise to public exposure at relevant locations in excess of the limit values published by the International Commission for Non-Ionising Radiation Protection which have been adopted by the UK Government for the protection of health.

It is noted from Chapter 11 – 11.3.16(i) that the majority of properties along the route are at least 100m from the line with some properties located closer than 100m. It is understood that no properties are located less than 60m from the proposed line.

I have examined the calculations of electric and magnetic field exposure presented in Chapter 7. Referring to the results of these calculations chapter 7 – 7.3.1(g) advises that, "The EMFs produced by the Tyrone – Cavan 400kV overhead transmission line at the closest habitable dwelling are both well within the ICNIRP Reference Level." I understand that the closest habitable dwelling has been put forward as a worst-case assessment and that dwellings located further away will therefore be less exposed to EMF

I understand that some public concern exists in relation to exposure to EMF from the proposed development. The applicant should be encouraged to take a precautionary approach where possible and should give due consideration to technical aspects such as optimal phasing, the position of the lines and other relevant matters which could be incorporated into the proposed development for the purpose of minimising EMF exposure.

In view of the details submitted, I would have no further environmental health objections in relation to EMFs associated with this application.

I would point out that should any existing uninhabitable dwellings within proximity of the proposed transmission line be intended to be brought back into residential use or should a new dwelling be proposed, it will be necessary for Planning Service to give due consideration to EMF exposure at these locations.

Recommendation

That the above response be sent as an Environmental Health response to the Pre-Application Discussion.



Our Ref

Planning Ref O/08/0822Q

Our Ref:

Date: 12 June 2009

Your Ref:

John Briggs,

Clerk and Chief Executive

Comments on Planning Application

LOCATION Lands within Armagh District Council and Dungannon Borough Council

PROPOSAL PAD for proposed North-South Electricity Interconnector

COMMENTS

This department would concur with those comments as made by Paul McCullough, Principal Environmental Health Officer (Environmental Protection), Southern Group Environmental Health Committee, dated 12 January 2009.

Paul M Swift
Environmental Health Officer
paul.swift@armagh.gov.uk

Our Ref: 31EY02
Your Ref: 45457 IBLE 00 300 07

Victor Brownlees,
Clerk and Chief Executive

11 December 2007

Ms Carey Doyle
Senior Environmental Scientist
Faber Maunsell
1st Floor
24 Linenhall Street
BELFAST BT2 8BG

Dear Ms Doyle

PROPOSED TYRONE TO CAVAN ELECTRICITY INTERCONNECTOR

I refer to your letter dated 1 November 2007 in connection with the above seeking any comments the Council has regarding the preferred routing of the Interconnector to inform the Environmental Statement.

Your correspondence was considered at a meeting of the Council's Public Services Scrutiny Committee held on Monday 12 November 2007.

I would also confirm a telephone conversation with your office that a response would be acceptable after the closing date of 21 November 2007, given the short response time provided.

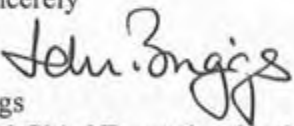
While the Council has previously had the following concerns regarding the proposed interconnector further research, which is not yet complete, is currently being undertaken:

- various health implications
- the impact on the value of lands on which pylons would be erected, surrounding properties and adjacent lands
- the impact of pylons on the environment - the Council has heavily invested in promoting the area as a tourist destination and the pylons would be counter-productive to this strategy and would create a blot on the landscape

I would also point out that undergrounding is the Council's preferred option. Please find enclosed the Council's Notice of Motion in respect of this matter.

The Council would also appreciate a copy of the completed Environmental Statement when available.

Yours sincerely


W J Briggs
Clerk and Chief Executive (Acting)

Job No.	45457 IBLE
Faber Maunsell Belfast	
Reviewed by	WJ
Date	17 DEC 2007
Action	
Date	
Copy to	
Filing Location	

Council Offices, The Palace Demesne,
Armagh, BT60 4EL, Northern Ireland.
t: +44 [0] 28 3752 9600 f: +44 [0] 28 3752 9601
textphone users: 18001 028 3752 9600
e: info@armagh.gov.uk w: www.armagh.gov.uk

Consultation Responses from BBC Reception Advice (2009 - 2006)



BBC Information

Mr Carey Doyle
Faber Maunsell Ltd
24 Linenhall Street
Belfast
BT2 8BG

Our Ref 14834026

8 November 2007

Your ref 45457 IBLE 00 300 07

Dear Mr Doyle

Proposed Tyrone to Cavan interconnector – 400kV overhead line and substation

Thank you for your letter of 1 November about the above plans.

The contents of our previous letter of 17 July 2006 still apply and the correct people to ask about any transmitter related issues potentially affecting BBC services are still:

National Grid Wireless Limited
Wireless House
Warwick Technology Park
Heathcote Lane
Warwick
CV34 6DD

To help matters along, I have duly sent them the originals and should they have any comments, you'll hear from them in due course.

I hope this is of help.

Yours sincerely

Martyn J Culling
Technical Communications Coordinator
BBC Information

Job No:	45457 IBLE
Office:	Belfast
File:	CO
Date:	12 NOV 2007
Action:	
Date:	
Copy to:	
Filing Location:	



BBC Information

Ms Julie McDowell
Faber Maunsell Ltd
24 Linenhall Street
Belfast
BT2 8BG

Our Ref 13142398

17 July 2006

Dear Ms McDowell

Job No:	ASH57 1BLE
	Faber Maunsell-Belfast
Reviewed by:	Paul JND
	DC Jc
Date:	21 JUL 2006
Actioned by:	
Date:	
Copy id:	
Filing Location:	00 301

Thank you for your letter of 10 July regarding BBC Television that was recently in this department for response on 12 July.

The BBC's interest in any planning application is confined to being satisfied that the interests of viewers and listeners are taken into account. As the BBC along with Ofcom are frequently asked such questions by planners and do not have the resources to check these aspects, a joint report was prepared and has been sent separately. Further copies may be freely downloaded from our website at:

http://www.bbc.co.uk/reception/factsheets/pdfs/buildings_factsheet.pdf

One of our engineers has looked at the letter, and offers the following additional advice: 'Unless the pylons for the 400kV line are close to habitations, I rather suspect the effects will be minimal, as although a pylon is of necessity a tall structure, the lattice construction means the impact is generally much less than a solid structure of the same size. Additionally as it is just possible a television or radio transmitter could be near the proposed route, if you have not already done so, you should also contact our transmission provider, National Grid Wireless whose address is below'.

Spectrum Planning (Buildings and Wind Farms),
National Grid Wireless UK Ltd.,
Wireless House,
Warwick Technology Park,
Heathcote Lane,
Warwick
CV34 6DD

I hope that this information is of interest and helpful to you. Thank you once again for taking the time and trouble to write to the HBC with your inquiry.

Yours sincerely,

A handwritten signature in black ink, appearing to read "Richard Cadey". The signature is written in a cursive style with a large initial "R" and a long, sweeping tail.

Richard Cadey
HBC Information

The Impact of Large Buildings and
Structures (including Wind Farms)
on Terrestrial Television Reception



The Impact of Large Buildings and Structures (Including Wind-Farms) on Terrestrial Television Reception

Preface

It is well known that large buildings and other structures such as wind farms can adversely affect terrestrial television reception. The broadcasters, the BBC and Ofcom, are keen to ensure that disruption to both analogue and digital terrestrial television distribution and reception is kept to a minimum.

To achieve this, the broadcasters wish to bring to the attention of architects, building developers and planning authorities the potential for problems. Typically, the type of buildings that cause reception problems are those with a sizeable side elevation over 15 metres high. Mechanical constructions such as wind turbines, cranes, non-domestic satellite ground stations, etc., can also cause difficulties. There are two services the broadcasters wish to protect; permanent broadcast links and domestic reception.

• Permanent broadcast links

In the UK, television programme distribution links are provided to more than 1300 transmitters by means of land-lines, microwave links and 'UHF In-Band' re-broadcast links (RBLs). It is the latter that form the major part of the distribution system. Both microwave and re-broadcast links, between sites which can be up to 70 km apart, may be affected. The map in Appendix I illustrates the density of transmitters and RBL paths only. The transmission network within the UK is provided and operated on behalf of the broadcasters by National Grid Wireless and Arqiva.

• Domestic television reception

Domestic television may be affected at distances up to 20 km from the large buildings causing the problem. Wind turbines affect reception up to a maximum distance of 5 km.

Terrestrial analogue television within the UK is the joint responsibility of the BBC and Ofcom. The UK is sub-divided into areas for which one or other organisation is responsible. The map in Appendix II shows the two areas. The responsibility for digital terrestrial television is shared equally between the BBC and Ofcom.

Contact details for the BBC Reception Advice, Ofcom, Arqiva and National Grid Wireless are given in Appendix III.

This document discusses the measures that can be taken to minimise the effects of large buildings and other structures, and what can be done to restore viewers' reception.

The Impact of Large Buildings and Structures (Including Wind-Farms) on Terrestrial Television Reception

1.0 FOREWORD

The development of large buildings and other structures can cause television reception difficulties - a matter of concern to viewers, broadcasters and developers alike. Whilst it is often impossible to avoid such problems completely, the following text aims to provide a source of general guidance to help minimise the adverse impact of such developments on broadcast services.

2.0 INTRODUCTION

Both theory and practical experience have shown that large developments can have a disruptive effect on television reception. Reports of picture degradation linked with the construction of masts, towers, wind-turbines, and of domestic, commercial or industrial buildings¹, are unfortunately not uncommon.

This document contains a general consideration of how such problems can arise, and how, with care, they can be minimised. Both analogue and digital terrestrial reception can be affected.

A full analysis of any case requires detailed information about the design and dimensions of the structure, along with knowledge of the local terrain. If this information is available, computer modelling by experts will, in most cases, enable an assessment to be made of whether a given structure is likely to cause problems. It will also be possible to predict the areas where reception difficulties are likely to occur, and to estimate the number of households that could be affected. It will also be possible in most cases to offer suggestions on how potential problems could be minimised.

There are some complex circumstances however where even modern computing techniques do not give the whole answer. When this is the case, local measurements might be needed to help assess the impact of a development and the possible steps necessary to reduce any problems which might arise.

In some very complex cases, accurate prediction, by any method, is extremely difficult; in such cases careful judgement made by those experienced in this field can however still be helpful.

Wind farms, with their added complexity of moving blades, require additional consideration to static structures and this specific type of development is dealt with in Section 7.

3.0 MECHANISMS THAT CREATE TELEVISION RECEPTION PROBLEMS

Any structure will produce two zones of potential disruption to television reception. One zone is where the development creates a 'shadow' and the other where it gives rise

¹ For the purpose of this document, the contents of this list will be generally referred to as 'structures'.

to a 'reflection'. At the frequencies used for broadcasting, the processes of creating a 'shadow' or a 'reflection' are somewhat more complicated than with visible light, but thinking of the problem in these terms is still a helpful way of approaching the matter.

3.1 'SHADOWING' EFFECTS

In an area behind the structure, the television transmitter is effectively screened from the viewer and the strength of the signal is reduced; see Figs. 1 and 2.

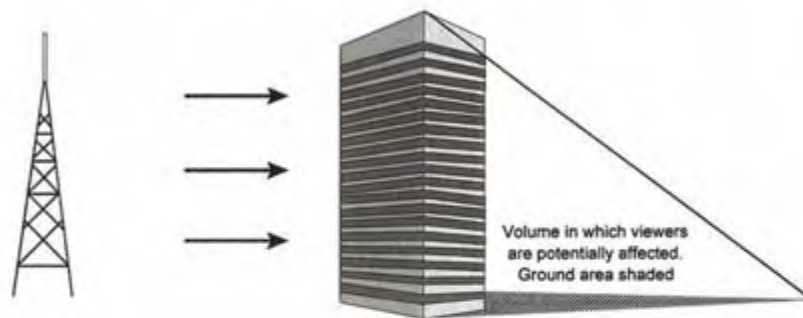


Fig. 1: Affected area in the 'shadow' zone behind the structure

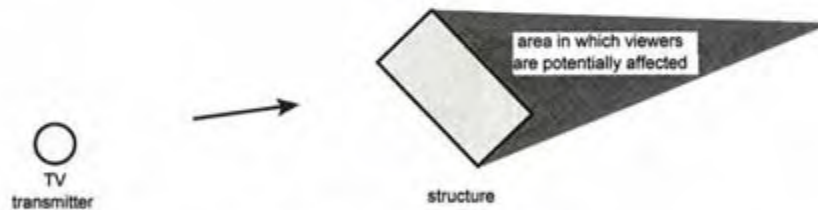


Fig. 2: Plan view of the 'shadow' zone

Television signals do not create such a 'hard' shadow as visible light, and for the purposes of explanation, a 'shadow' zone must be considered which is divided into three sub-zones.

- i. Within a few tens of metres from a solid structure, over the region where optical view of the transmitter is lost, the reduction in signal strength is critically dependent on the specific design and composition of the structure. For most brick and concrete buildings the reduction is severe and in some cases almost total. For non-solid structures such as metallic

lattice towers, the signal reduction is dependent on the density of the lattice and the wavelength of the signal.

ii. Further away from the structure (say beyond 250 m, but this varies depending on its size) the limit of the 'shadow' zone and the signal reduction are determined by diffraction at the edges of the structure and reflection off surrounding structures. The simple condition of whether or not a location has an optical view of the transmitter is not enough to classify the potential interference zone adequately. In general, the effect is that the signal appears to bend around the sides of the structure; the shadow zone reduces in size and the signal strength is reduced by much less than simple ray optics would suggest.

iii. Even further away from the structure (say 5 km) complex multiple reflections and diffraction, caused by structures in the locality, may result in the 'shadow' zone becoming almost non-existent.

3.2 'REFLECTION' EFFECTS

The second zone of potential interference is produced by 'reflection' or 'scattering' of the incident signal, see Fig. 3. Analogue reception is more likely to be affected than digital terrestrial reception, which is more robust.

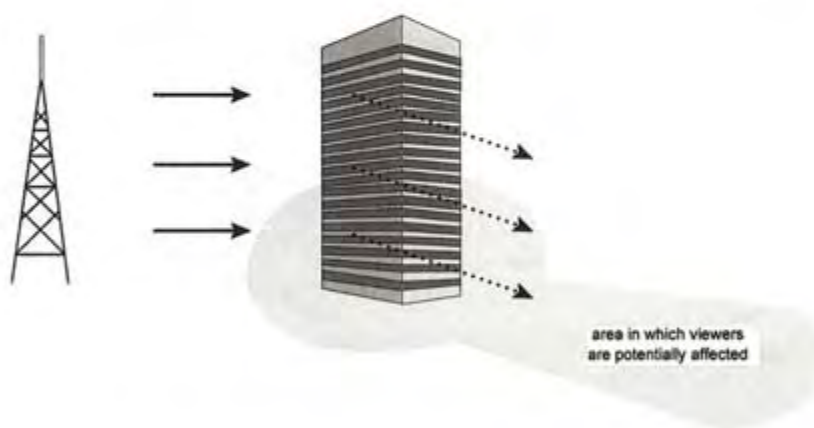


Fig. 3: Affected areas in the 'reflected' zone of the structure

As can be seen in Fig. 4, (shown on the following page) the direct signal travels a distance D_1 to the viewer, whilst the signal reflected from the structure travels slightly further, a distance $D_2 + D_3$. Even though television signals travel at the speed of light, the different path lengths can mean that one signal arrives with a significant delay relative to the other. This results in a second image appearing on the viewer's screen,

displaced from the first. This type of interference is known as 'delayed image' or, 'ghosting'. If the reflecting signal is complex, several such ghost images can result. Photograph 1 shows the 'ghost' image produced as a direct consequence of a building development in London.

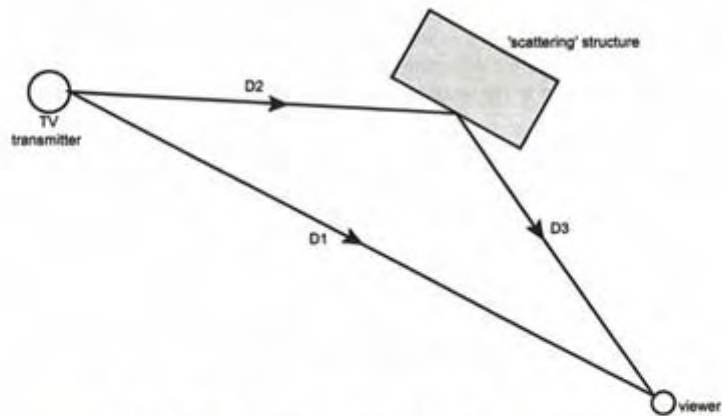


Fig. 4: Plan view showing how delayed images (ghosts) are produced on a television picture



Photograph 1: An example of severe delayed image interference or 'ghosting' affecting analogue television reception.

The general location of the 'reflection' zone depends on the angle of the incoming signal and the orientation of the structure. The extent of the zone and the degree of interference within the zone depend on the relative strengths of the direct signal and the reflected signal, determined by the radio-frequency reflectivity of the structure, and also on the delay between the two signals.

The greater the relative strength of the reflected signal, and the longer the delay, the more subjectively intrusive this problem becomes. Appendix IV indicates the levels of impairment introduced for different amounts of delay and different strengths of reflected signal relative to the wanted signal, within the range of impairments which is generally acceptable.

Another factor which significantly affects the size and shape of the 'scattered' or 'reflected' interference zone is the radiation pattern of the viewer's receiving aerial. Consider a location where the delayed signal has a relative amplitude and delay consistent with unacceptable interference. If the angle between the source of the direct signal and the source of the delayed signal is greater than about 45° , an aerial whose pointing is optimised to receive the direct signal will discriminate against the delayed signal. For critical applications, a very narrow beamwidth aerial may be used to reduce the strengths of delayed images to acceptable levels. The internationally-recommended minimum performance for receiving aerials is reproduced in Fig. 5.

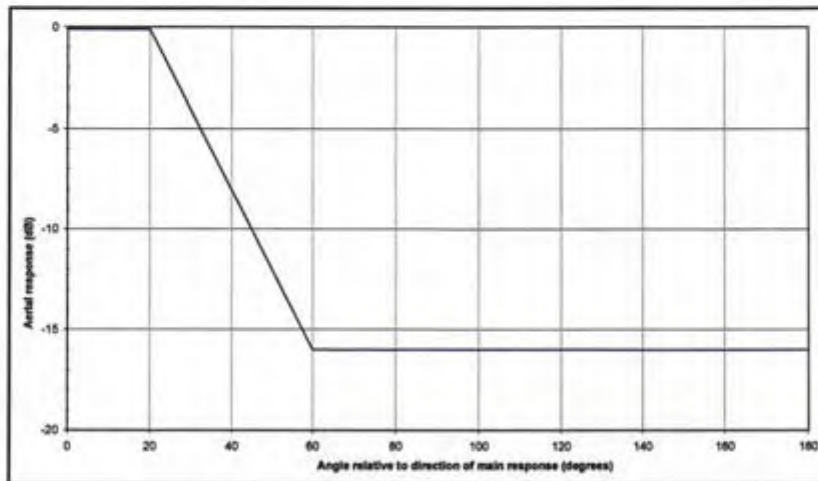


Fig. 5: Discrimination obtained by use of directional receiving aerials in broadcasting.

In practice, domestic receiving aerials have performances similar to those shown in Figs. 6 and 7. The radiation patterns indicate the aerial response (dB) on the radial axis versus the azimuth. In the case of the narrow beam-width aerial there is an arc about 20 degrees wide over which the response is at a maximum, and in the case of the wide beam-width aerial this is about 40 degrees wide. The smaller peaks in aerial response away from the main beam are known as side-lobes. These are unwanted, and in order to reject reception of the reflecting signal (as shown in Fig. 4) they should be as small as possible.



Fig. 6: Typical Narrow Beam-Width Aerial Radiation Pattern

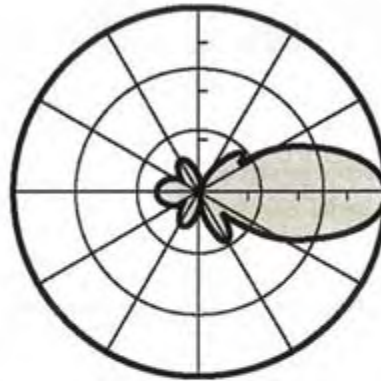


Fig. 7: Typical Wide Beam-Width Aerial Radiation Pattern

4.0 ASSESSING IMPACT

One useful 'rule of thumb' to judge the likelihood of a problem is the 'sky-line check'. If, from a given location, the proposed structure significantly modifies the sky-line, then there is the possibility that it may cause television reception difficulties at that location. This is equally true in a dense urban environment where the sky-line already consists of large structures which themselves might already create some reception difficulties, but for which viewers have already made attempts to cope.

5.0 REDUCTION OF IMPACT

The 'shadow' region, of any solid structure is mainly determined by its size. Very little can be done, either at the design stage or after development, to reduce these effects themselves, but the damage done can sometimes be 'made-good' by providing those affected with an alternative means of receiving television. More information on this is offered in Section 6.2.

The 'reflected' interference region is entirely dependent on the structure design. If the face of a structure is shaped so that it distributes its reflected signal over a large region,

the resulting reflected signal strength is less than if it were concentrated over a small region.

A large area of structure presenting a single flat face will concentrate signals over a small region. The same area consisting of several smaller flat faces at differing angles will distribute the signals over as many geographical regions. A convex reflecting surface will disperse signals equally over an arc.

It may also be possible to arrange the structure's face(s) to direct the reflected signal(s) away from large areas of population, or to direct the reflected signals such that the receiving aerials can adequately discriminate against them.

The choice of building materials will also affect the strength of the reflected signal. For materials such as bricks, concrete, etc., the reflection coefficient is low; the reflectivity of the total structure being determined more by the metallic content, steel joists, steel reinforcing members, window frames, etc. In modern constructions, the density of metal, throughout the structure, may be sufficiently high to increase the reflection coefficient dramatically.

Metallic cladding in conjunction with metallised windows has been known to produce the worst reflections, with nearly the whole incident signal being reflected.

In practice, the avoidance of large flat areas is the best overall approach. The deliberate dispersion of signals by non-flat services, or the direction of reflected signals away from populated areas, are the best ways of avoiding significant 'ghosting' problems.

6.0 REDUCTION OF RECEPTION PROBLEMS AFTER DEVELOPMENT

Remedial action can either be taken at the structure, or at the homes affected. Usually the former is of limited value and the latter offers the only practical way forward.

6.1 ON THE STRUCTURE ITSELF

Whilst changes at the structure seldom offer the most practical way of minimising problems once they have occurred, it is nonetheless useful to assess this option first, because, if practical, it addresses the problem at source. The possibilities are shown below, and their applicability to specific structures should be addressed on a case-by-case basis. They only address the problem caused by reflections, and offer no solution to those in the shadow of a new development.

- **Use a radio absorbing coating**

This technique has been considered prohibitively expensive. However, we are aware of isolated instances of large buildings utilising radio absorbing coatings to reduce the level of reflected signals.

- **Construct 'irregularities' on flat walls**

Provided that the irregularities are of an appropriate size, this would tend to scatter the incident signal. If the wall were a truly irregular structure, the signal would be scattered over much of the hemisphere containing the direction of the incident

signal. The strength of the reflected signal, in any direction, should then be below the value expected to cause interference. In view of the size of the walls of typical structures of concern, and the wavelengths of the incident signals, this is not really a practical option.

- **Angled cladding**

Fig. 4 shows the geometry of a location affected by a signal reflected from the face of a building. It might be thought that the reflected signals could be re-directed to a less critical area or even upwards by applying, to the face of the building, a large number of individual strips or panels, at an angle different from that of the overall angle of the face of the building. Such measures should be treated with some caution; the angle at which the signals are actually reflected from the building is not dependent solely on the angle of the cladding, but also on the size and position of elements of cladding, and also the wavelength of the signal. Whilst in some circumstances this may indeed change the angle of reflection and the area affected, it is unlikely to result in the angle of reflection or the area of interference expected and it is entirely possible to end up with angled cladding making absolutely no difference.

- **Pebbledash**

This is an often-quoted solution which, practically, is unlikely to show any benefit whatsoever.

6.2. IN THE LOCATION OF THE AFFECTED VIEWERS

- **Replace receiving aerials for affected households**

Receiving aerials with superior performance to the discrimination template shown in Fig. 5 are available. These can produce a narrower receiving beam-width (so they will discriminate better against unwanted signals arriving from other directions) and also a higher gain (so the receiver can be made to work in areas of lower signal strength). Log-periodic aerials, which have the ability to reject signals arriving from the sides and rear of the transmission path, are also known to be effective in combating reflections. Clearly, these measures will not work if the reflected signal is coming from the same direction as the transmitter.

- **Re-tuning television receivers at affected households**

If the affected area is served adequately by transmissions from an alternative transmitter, receivers can simply be re-tuned to the unaffected service. This will also require changing the direction in which the receiving aerials are pointing, and maybe even replacement of the receiving aerial as most aerials will not cover the entire range of broadcast frequencies.

• **Construction of a new 'analogue' television transmitter station.**

This solution has been used in the past but now, apart from in rural areas, offers few opportunities. The channels used for any proposed new station must avoid mutual interference with existing services. Throughout the UK, all television channels are re-used many times, and therefore meeting this requirement is, in many instances not possible. Only in exceptional circumstances would the broadcasters consider this solution.

• **Construction of a new 'digital' television transmitter station.**

Coverage of Digital Terrestrial Television (DTT) is not yet complete across the UK, and the final roll-out of digital transmitters can only happen when analogue TV services are switched off in a particular region. Therefore it will only be possible for the broadcasters to consider the provision of new low powered 'self-help television' transmitting stations (to be constructed by developers or small communities) after the roll-out of DTT in their region is complete.

• **Replacement of terrestrial television reception by 'digital satellite' or 'cable television' services.**

Digital satellite offers near-universal geographic coverage of the UK, and is not subject to many of the reception problems which can affect terrestrial television. Satellite reception offers the main 'public-service' TV channels on a subscription-free basis, although a charge is made for a 'viewing card' to enable reception of 'Channel 4' and 'Five' as their transmissions are encrypted. Each affected household would need a properly installed satellite dish, cabling and receiver(s). If affected households are served by an commercial cable TV company, this may also offer an alternative, though a monthly subscription is likely to be required.

• **Provision of a 'self-help' cable system'**

Self-help cable systems, also known as CATV systems, are ideally suited for compact groups of houses. A single 'master-receiving aerial' able to receive a signal that is free of interference, feeds an RF signal, by way of a cable and series of amplifiers, to each of the properties affected.

If any of these solutions are chosen, the developer may be required to fund, construct, and where appropriate maintain, the remedial measures. This may be required as part of an agreement between the planning authority and the developer, and enforceable under Section 106 of the Town and Country Planning Act 1990 (England and Wales) or Section 75 of the Town and Country Planning Act 1997 (Scotland).

7.0 WIND TURBINES AND WIND-FARMS

Photograph 2 shows the type of wind turbine referred to in this section. Virtually all commercially available machines, currently in operation, are of this general type having a horizontal axis of rotation with two or three blades.

Generally, turbines have a number of common characteristics. These are:

1. rarely sited closer than 250 metres away from domestic properties
2. the nacelle (the generator housing at the centre of blade rotation) and the blades are typically mounted on a narrow, cylindrical, concrete tower
3. normally, the blades are constructed of non-metallic material such as GRP, although they invariably contain metallic components such as a strengthening member, lightning conductor and balancing weights
4. the orientation of the blades corresponds to the wind direction
5. the usual speed of blade rotation is between 15 and 30 RPM

In practice rarely does the tower or nacelle have any effect on reception; the impact on reception is solely on account of the rotating turbine blades. As the blades are moving objects, in terms of both their rotational speed and orientation, their effect is variable and hard to predict. When the combined effects of a number of turbines that comprise a wind farm are considered, the result is considerably more difficult to predict.



Photograph 2: Typical wind turbines in a wind-farm

7.1 SHADOWING AND REFLECTION EFFECTS

The two mechanisms responsible for the interference, as with buildings, are 'shadowing' effects and 'reflection' effects, as described in sections 3.1 and 3.2, respectively.

The size of the 'shadow' zone is dependent on the orientation of the blades and is at a maximum when the axis of the rotor is in line with the direction of the transmitted signal. The received signal strength varies in a cyclic manner, in time with the blades' rotation.

'Reflection' effects vary with the rotation of the blades and the orientation of the nacelle. To complicate matters further, the strength of the reflected signal is dependent on the length and area of the metallic components inside the blade.

7.2 THE AREA AFFECTED

Interference to analogue television reception is shown as a characteristic flickering of the picture. The affected area around the turbine, a combination of the 'shadow' zone, and the 'reflection' zone, is roughly shaped like a keyhole (like that shown in Fig. 3). The actual shape and size of this is dependent on the type of turbine and the topography between: the broadcasters' transmitter and the turbine; the broadcasters' transmitter and the viewers' receiving aerials; and the turbine and the viewers' receiving aerials. Nevertheless, for the purposes of assessing the likelihood of interference, the 'shadow' zone may be considered to be a sector with a radius up to about 5 km, and the 'reflection' zone a circle of radius of about 500 m.

7.3 REDUCTION OF INTERFERENCE

The siting of the turbine or turbines can reduce the severity of interference. If possible, turbines should be at least 500 metres from any viewer. Interference caused by wind farms with more than one turbine may be reduced if one turbine could be placed within the 'shadow' area of another. The measures to reduce interference at the location of the affected viewers, outlined in Section 6.2, are also relevant to interference from wind turbines. Appendix V illustrates the reflection effect, and explains in which situations a more directional receiving aerial can be used to reduce the level of delayed image interference.

7.4 ASSESSMENT OF INTERFERENCE

The potential impact on television reception of one or more wind turbines can be predicted using the BBC's web-based wind-farm assessment tool. The BBC no longer carries out manual assessments for developers but provision of this online tool enables developers to carry out evaluations for themselves.

The wind-farm assessment tool can be found at <http://windfarms.kw.bbc.co.uk>

After entering the turbine locations, the user is sent, by e-mail, an estimate of populations that may suffer interference from the proposed wind-farm. The tool is not

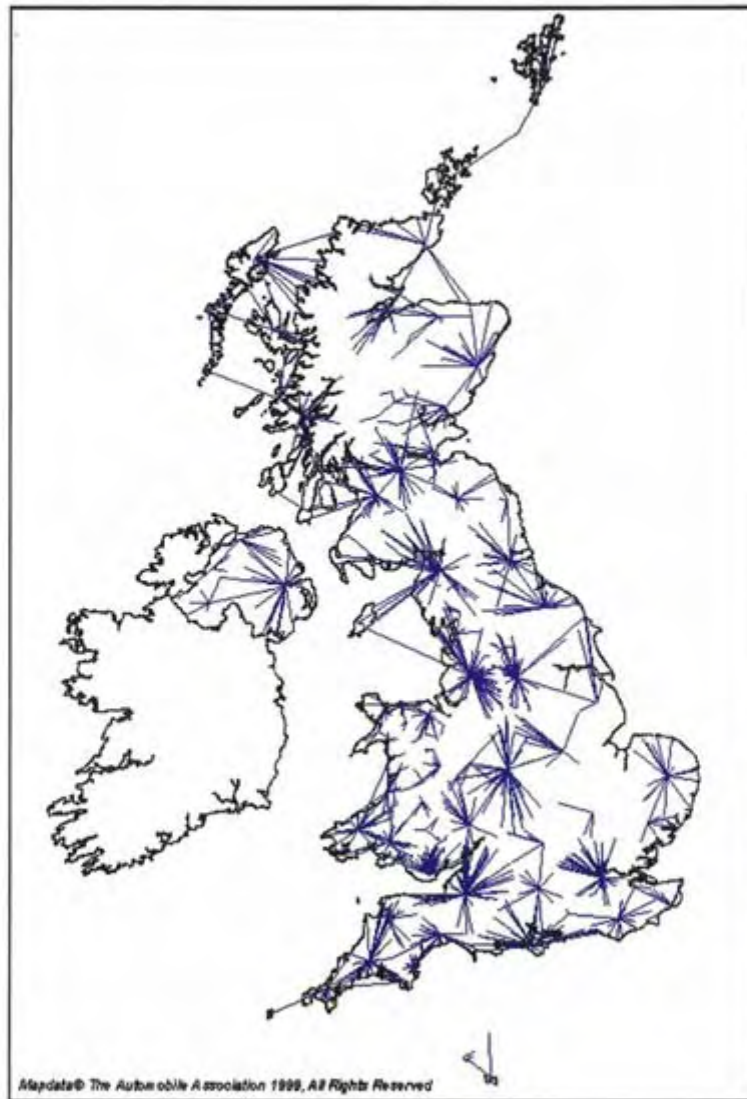
intended to be a substitute for an on-site survey, commissioned by the developer, by which the potential for disruption to television services may more accurately be assessed.

If there is potential for interference to television reception (predicted or measured) then local authorities will usually expect wind farm developers to take remedial action. This will typically require an on-site survey to determine appropriate remedial measures, the options are the same as those given in Section 6.2 of this document.

¹ Version date: June 2006.

APPENDIX I

UHF TELEVISION - TRANSMITTER SITES AND RE-BROADCAST LINKS



This map is indicative of the RBL network and is subject to change.

APPENDIX III

CONTACT DETAILS

For BBC Reception Advice, Ofcom, Arqiva and National Grid Wireless these are:

BBC Reception Advice,
PO Box 1922,
Glasgow
G2 3WT
e-mail: reception@bbc.co.uk

Ofcom,
Broadcast Technical Policy,
Riverside House,
2a Southwark Bridge Road,
London
SE1 9HA
e-mail: broadcast.technical@ofcom.org.uk

Spectrum Planning (Buildings and Wind Farms),
National Grid Wireless UK Ltd.,
Wireless House,
Warwick Technology Park,
Heathcote Lane,
Warwick
CV34 6DD

Spectrum Planning Department (Buildings and Wind Farms),
Arqiva,
Crawley Court,
Winchester,
Hants
SO21 2QA

Please note that Arqiva is the new name for ntl broadcast and National Grid Wireless is the new name for Crown Castle UK Ltd.

APPENDIX IV

'SUBJECTIVE IMPACT OF GHOSTING'

For an acceptable picture, the maximum permissible strength of the 'reflected' signal relative to the direct signal (known as the 'protection ratio') varies according to the length of the delay. The International Telecommunication Union is the organisation responsible for world radio standards, and ITU-R Report 478-1 contains the following results obtained experimentally.

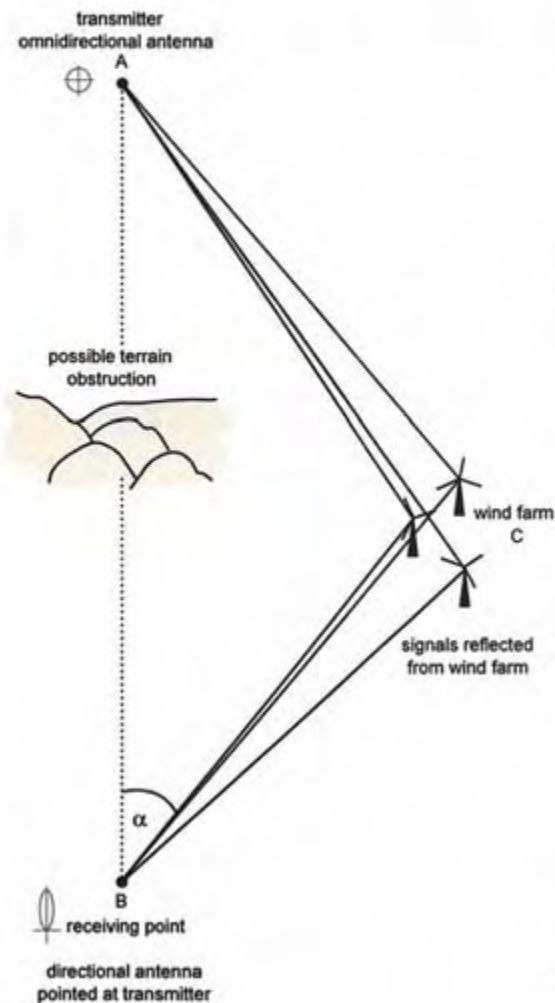
<i>Impairment Grade ITU-R (Rec. 500)</i>	<i>Protection ratio (dB) for delay*</i>		
	<i>0.4 μs*</i>	<i>0.8 μs*</i>	<i>1.4 μs*</i>
<i>3 (immediately)</i>	<i>18</i>	<i>26</i>	<i>30</i>
<i>4 (immediately)</i>	<i>12</i>	<i>18</i>	<i>20</i>

* Note that 0.4 μ s, 0.8 μ s and 1.4 μ s correspond approximately to the 'ghost' being offset to the right from the main picture by 3 mm, 7 mm and 12 mm on a screen of a television set which is 50 cm (20 inches) wide.

APPENDIX V

REFLECTION EFFECTS FROM A WIND-FARM

The figure and text below shows the geometry associated with reflected signals from a wind-farm, and how directional receiving aerials provide rejection of the unwanted signal.



- The problem will be worse if path AB is more obstructed by terrain than paths AC and CB.

- The spacing of the delayed image (ghost) is dependent on the path difference $(AC+CB)-AB$. A path difference of 2 km gives a delayed image of one eighth of the picture width.

- If α is greater than 60° a standard aerial will normally provide sufficient discrimination against the reflected signals. For α between 15° and 60° , a more directional receiving aerial can be used to reduce the level of reflected signals 'seen' by the receiver. For α less than 15° even changing to the best available aerial will not help.

Consultation Responses from British Trust for Ornithology (2009 - 2006)

Craig, Amy

From: Doyle, Carey
Sent: 02 November 2007 15:26
To: Mackin, Anne-Marie
Subject: FW: Tyrone - Cavan
Attachments: policy & conditions.doc; BTO Data.doc

-----Original Message-----

From: Su Gough [mailto:su.gough@bto.org]
Sent: 02 November 2007 15:26
To: Doyle, Carey
Subject: Tyrone - Cavan

Dear Carey

Thank you for your recent letter e-mail regarding the above study. As an independent scientific research charity, the BTO does not offer views on planning issues, but we are pleased to provide professional ornithological expertise.

The BTO holds a number of ornithological data sets that may provide data relevant to your study. We do, however, have to charge an initial search fee of £25+VAT per site, to cover the staff time involved in looking through the databases. This amount will be waived should you subsequently purchase data as a result of the search (subject to a minimum charge of £75+VAT). If you would like me to carry out a search, please would you let me know - an e-mail or phone call will suffice.

For your information I have attached a sheet outlining some of our major datasets and a copy of our policy and conditions of use of our data.

Thank you for the maps, these will facilitate a search.

Please do not hesitate to contact me if I can be of any further help.

Yours sincerely,

Su

Su Gough
Research Ecologist - Terrestrial Ecology Unit BTO Training Officer Data Request Officer

British Trust for Ornithology
The Nunnery
Thetford
Norfolk
IP24 2PU

Telephone 01842 750050
Fax 01842 750030

Visit our Website www.bto.org

Charity No 216652 (England and Wales)
Company Limited by Guarantee No 357284 (England and Wales) Registered Office The Nunnery, Thetford, Norfolk IP24 2PU



BTO STANDARD POLICY AND CONDITIONS FOR DATA REQUESTS

PLEASE READ THIS FORM CAREFULLY BEFORE SIGNING DATA REQUEST FORM

Thank you for your request to access data held by the British Trust for Ornithology (BTO). Please complete and sign the attached form in order to clarify the nature of the data you require and the purposes to which it will be put. The BTO wishes to encourage maximum use of its ornithological datasets. Your request will be considered by staff and, if necessary, by one of the Trust's scientific committees. The release of data will normally be agreed unless one of the following situations occurs:-

1. BTO research staff are actively working in the same area or are seeking funds to work in that area. In cases where collaborative studies are appropriate, this will be encouraged.
2. The amount of data released to external researchers will normally be limited in relation to the size of the dataset. In the case of research projects, where data have already been supplied to an external researcher, further copies of the data will not normally be released for similar studies without their agreement. Both researchers will be advised of their joint interest.
3. The data have been submitted to the BTO 'in confidence' and the donor is unwilling to release them, or the data are particularly sensitive from a conservation standpoint.
4. A significant proportion of the data has been collected by one researcher or team, who intend to carry out the same analyses themselves.
5. The researcher cannot agree to the conditions listed below, has not adhered to the conditions on a previous occasion, and/or is not prepared to pay the charge levied.

CONDITIONS

Data can be released only after you have completed and signed the attached form, agreeing to the following conditions:-

1. The data are not to be passed to a third party, without written permission from the BTO.
2. Permission must be obtained in writing from the BTO before analyses that are additional to those described on the attached form are carried out.
3. The data must not be entered on a permanent computerised databank without written permission from the BTO.
4. The BTO, all principal sponsors of the project and the name of the survey in question shall be acknowledged in all material relating to the data including scientific papers, adverts, talks, slides etc.
5. Any publications produced will be supplied, free of charge, to the BTO's Development Department. In the event of confidential reports, please negotiate this condition with the Development Department.
6. Brief progress reports will be submitted, on request, to the BTO.
7. Permission to use the data expires 12 months after approval. If the client wishes to continue to use the data after 12 months a new data request form must be completed and a new charge may be levied.
8. All raw data supplied by the BTO, including computer files, must be destroyed or returned to the BTO at the end of the study or 12 months after the data are supplied, whichever is sooner, unless a new data request form has been completed (see 7.).
9. All sources of outside funding for a project must be referred to on the Data Request Form before BTO data can be supplied.

British Trust for Ornithology
The Nunnery, Thetford, Norfolk IP24 2PU
Tel: 01842 750050; Fax: 01842 750030
Email: su.gough@bto.org



BTO DATA SOURCES

INTRODUCTION

The British Trust for Ornithology (BTO) is a registered charity that was established in 1933. We perform a number of roles, one of which is the organisation of nationwide surveys to monitor the status of Britain's birds. We are widely respected for our independence and sound science, consequently our survey results are frequently used by conservation groups such as RSPB, the Government, environmental consultants and scientific researchers. The BTO encourages the use of its data whenever conservation, environmental education or biological research will benefit as a result.

Information on our surveys and examples of the types of data that are available from them are detailed in the rest of this information sheet. Searching these databases for information on a specific site involves a large amount of staff time and consequently we have to charge £25 +VAT to conduct a search. If data are subsequently purchased the search fee is deducted from the cost of the data. The cost of the data reflects the amount of time and money spent in collecting them, no profit is made from selling the information. To enquire about the costs of specific data, or to authorise a search or to purchase data please contact us at the address above.

New Atlas of Breeding Birds in Britain and Ireland: 1988-1991

Most 10-km squares in the UK were covered by the survey, and at least eight tetrads were covered in each square. Summary lists detailing which species definitely bred and which possibly bred in each 10-km square are available. Similar data at the tetrad level are available but these also list the number of pairs recorded for each species in each tetrad and for the 10-km square as a whole. The data are only fully comprehensive at the 10-km square level and not at the tetrad level.

Atlas of Wintering Birds in Britain and Ireland: 1981/82 - 1983/84

This survey covered most of the 10-km squares in the UK. For each square, the maximum count recorded for each species during the survey period is available. There are no data available at a finer resolution than 10-km squares.

Common Birds Census: 1961-2000

Data are available on a site or species basis. For each site, annual summary sheets can be supplied providing a list of the species recorded and numbers of territories for each survey year. There are corresponding habitat folders for each plot containing site maps and vegetation details which can be consulted at the BTO. For each species, indices of population change are available.

Waterways Bird Survey: 1974 onwards

Data are available in the same format as the Common Birds Census.

Breeding Bird Survey: 1994 onwards

This survey monitors the breeding birds of 2,000 randomly selected 1-km squares throughout the UK. Species lists and an estimation of population size are available for each of these squares.

Wetland Bird Survey: 1992 onwards "Core" and "Low Tide" Counts

(Low Tide Count data are supplied by BTO; Core data are supplied by WWT tel: 01453 890333)

This survey is carried out in conjunction with RSPB, WWT and JNCC and is an extension of the Birds of Estuaries Enquiry which started in 1969. The "Core" survey covers over 2,500 diverse wetland sites throughout the UK, including inland sites. Counts of all wildfowl and waders are made every month throughout the winter period, and frequently throughout the year. Counts on estuaries are usually made at high tide when birds are most easily counted. At some sites, gulls and terns are also counted. Data are available in one of two standard formats:

- Monthly tabulations - raw data from monthly counts for one year
- Summary tabulations - average and peak monthly counts, seasonal maxima and the proportion of national/international populations, calculated for a number of years

Low Tide Counts are conducted at most large estuaries in at least one winter every seven years, with up to four counts being made. The exposed substrate at low tide is divided into small count areas enabling the distribution of feeding birds to be determined in fine detail. Data are available at either the count section or whole estuary level. At the count area level, for each species noted information is given on the peak number, peak density, mean number and mean density section for the winter in question.

Heronries Census: 1928 onwards

Over 75% of UK heronries are visited each year and the number of occupied nests is recorded. Nest counts are available for each year that the colony was visited.

Ringling Recoveries: 1909 onwards

The BTO, with support from the Joint Nature Conservation Committee, operates a nationwide ringing scheme involving specially trained volunteers. Subsequent reports (recoveries) of ringed birds are recorded by the BTO. Data are available on bird movements to and from a specific site and in some cases more specialised information e.g. moult record cards are also obtainable.

Nest Record Scheme: 1939 onwards

This scheme records the breeding success rates of many species of British breeding birds. Data are available on clutch size, brood size etc.

EXAMPLES OF SPECIAL SURVEYS

Breeding Waders of Wet Meadows: 1982, 1989 & 2002?

These surveys were run in conjunction with RSPB. Areas of damp floodplain and coastal grazing marsh in England and Wales were visited and the numbers of breeding waders and habitat details were recorded. The 1989 survey re-visited a sample of sites from the 1982 survey using similar methods.

Nightjar Surveys: 1981, 1992 & 2004

This survey was carried out jointly with the RSPB. For each site data are available on the number of birds, their sex, their breeding status, their location and the broad habitat type of their territory.

Woodlark Survey 1986, 1997 & 2006

For each site data are available on the number of birds, their breeding status, their location and the surrounding habitat type.

Dartford Warbler Survey 1994 & 2006

For each site data are available on the number of birds, their breeding status, their location and the surrounding habitat type.

Breeding Skylarks 1997

Data available as for Woodlarks

Lapwing 1998

For each site data are available on the number of breeding pairs per tetrad (and 1-km square within the tetrad) plus total number per tetrad from the 1987 survey.

Consultation Responses from Civil Aviation Authority (2009 - 2006)

Directorate of Airspace Policy



Mr A Moore
The Planning Service HQ
Millennium House
17-25 Great Victoria Street
Belfast
BT2 7BN



5 January 2009

Reference: ERM/DAP/Planning/MoyPowerLine

Dear Mr Moore

North – South Electricity Interconnector

Thank you for your recent correspondence relating to the proposed a proposed 'North – South Electricity Interconnector', a development which I gather comprises the construction and operation of a substation and in excess of 100 towers that would support the overhead power line itself. Whilst I am not familiar with the PAD process (Pre-Application Discussion?), I trust the following comment is useful.

The documentation provided indicates that the maximum height of the proposed substation and various towers would not exceed 50m. On that basis, I have few observations beyond highlighting the need for the relevant planning authority to check any safeguarding maps lodged with the authority to identify any aerodrome specific safeguarding issues; I would not anticipate any aerodrome related issues. Moreover, the overhead line and supporting towers would not, for civil aviation purposes, constitute an en-route obstruction. However, I am aware that, in respect of military aviation operations, the Ministry of Defence (MoD) have expressed generic concerns associated with overhead power lines. It is consequently possible that the MoD would make recommendation related to the lighting of the towers and marking of the wires. Accordingly, it is important that the Planning Service establishes the MoD viewpoint related to the subject proposal. The Service should be aware that in general the CAA would wish to support MoD recommendation concerning enhancement to wire conspicuity. As an aside, it may be of interest to know that routinely only those power lines that have a height of 200 feet or more are marked on CAA produced aviation charts.

I hope these few comments match your requirements. Should you require any further civil aviation regulatory input, do not hesitate to get in touch.

Yours sincerely,

A handwritten signature in black ink, appearing to read 'Mark Smailes'.

Mark Smailes
ORA5



Directorate of Airspace Policy



Ms Carey Doyle
Faber Maunsell
1st Floor
24 Linenhall Street
Belfast
BT2 8BG

5 November 2007
Ref 8AP/31/05/01
Your Reference 45457 IBLE 00 300 07 dated 1 November 2007

Dear Ms Doyle

Proposed Tyrone / Caven Overhead Power Line

The Director of Airspace Policy, Mr John Arscott, has asked me to thank you for your recent correspondence relating to the titled proposed development. You sought comment related to an associated Environmental Statement; I trust the following is useful. By and large the following brief input mirrors comment previously provided (8AP/31/05/01 dated 12 July 2006).

Given that the supporting towers will not exceed 37m high, I not believe that the proposed transmission line and associated towers would constitute an aviation en-route obstruction. I have therefore no associated observations. This will not, of course negate the future need for the relevant planning authority to check any safeguarding maps lodged with the council to identify any aerodrome specific safeguarding issues. Given the maximum height of the towers, I do not believe there are any associated aviation charting issues.

As previously mentioned, to complete the aviation picture, it is important to establish a NATS and Ministry of Defence perspective in relationship to the proposed overhead power line.

Please do not hesitate to get in touch should you require further comment or clarification of any point.

Yours sincerely

Mark Smailes
Off Route Airspace 5

Job No:	45457-IBLE
Faber Maunsell-Belfast	
Rev:	CO 01
Date:	06 NOV 2007
Author:	
Date:	
Copy to:	
Filing Location:	



Directorate of Airspace Policy



Ms Julie McDowell
Faber Maunsell
1st Floor
24 Linenhall Street
Belfast
BT2 8BG

12 July 2006
Ref 8AP/31/05/01
Your Reference 454571BLE 00 300 06 dated 10 July 2006

Job No:	454571BLE
Faber Maunsell-Belfast	
Name:	Smc. J. McD
DC:	dc
Date:	14 JUL 2006
Accepted by:	
Date:	
Copy to:	
Filing Location:	00 300

Dear Ms McDowell

Proposed Tyrone / Caven Overhead Power Line

Thank you for your recent correspondence relating to the titled proposed development. I hope the following comments are useful.

Whilst the limited information provided gives no indication of the expected height of the cables and support structures, I do not believe that the proposed transmission line and associated towers would constitute an aviation en-route obstruction. I have therefore no associated observations. This will not, of course negate the future need for the relevant planning authority to check any safeguarding maps lodged with the council to identify any aerodrome specific safeguarding issues.

I note that you intend consultation with NATS. I would suggest, however, that it would be reasonable to establish a military aviation perspective on the proposal at an early stage. Accordingly, the proposed work should be brought to the attention of the Head of Safeguarding, Ministry of Defence Estate Organisation, Blakemore Drive, Sutton Coldfield B75 7RL.

From a potential civil aviation charting perspective, you should be aware that there is a requirement in the UK for all structures over 300 feet high to be charted on aviation maps. I understand that military charts plot structures of a height of 200 feet or more. Should this proposed development progress and the 200 feet height be breached, to achieve this charting requirement, developers will need to provide details of the development to:

Defence Geographic Centre
AIS Information Centre
Jervis Building
Elmwood Avenue
Feltham
Middlesex
TW13 7AH

Telephone: 0208 818 2708

Civil Aviation Authority
CAA House 45-59 Kingsway London WC2B 6TE www.caa.co.uk
Telephone 0207 453 6545 Fax 0207 453 6565 marks.smailes@dap.caa.co.uk



FS 24005



INVESTOR IN PEOPLE

**Consultation Responses from the Council for Nature Conservation and the
Countryside (2009 - 2006)**

**COUNCIL FOR NATURE CONSERVATION
AND THE COUNTRYSIDE**
An Advisory Council to the Department of the Environment

Waterman House 5-33 Hill Street, Belfast, BT1 2LA

Tel: 028 9054 3076 Fax: 028 9054 3047

secretariat-hillst@doeni.gov.uk

www.cnccni.gov.uk

5th November 2007

Ms Carey Doyle
Senior Environmental Scientist
Faber Maunsell
1st Floor
24 Linenhall Street
BELFAST
BT2 8BG


Dear Ms Doyle

Ref: 45457 IBLE 00 300 07

Proposed Tyrone to Cavan Interconnector – 400kV Overhead Line and Substation

I refer to your letter of the 1st November 2007 regarding the above application and would advise you that neither CNCC nor HBC (Historic Monuments Council) does not hold any relevant information but would welcome a copy of the EIA in due course.

Yours sincerely



Dorothy Taylor
Statutory Advisory Council Secretariat

Job No:	45457 IBLE
Faber Maunsell-Belfast	
Reviewed by:	CO/CO
Date:	06 NOV 2007
Action:	
Date:	
Copy to:	
Filing Location:	

**COUNCIL FOR NATURE CONSERVATION
AND THE COUNTRYSIDE**
An Advisory Council to the Department of the Environment
Waterman House 5-33 Hill Street, Belfast, BT1 2LA
Tel: 028 9054 3076/050 Fax: 028 9054 3047
secretariat-hillst@doeni.gov.uk

1 August 2006

Faber Maunsell
1st Floor
24 Linenhall Street
Belfast
BT2 8BG

Dear Sir

PROPOSED TYRONE/CAVAN INTERCONNECTOR - OVERHEAD LINE

I refer to your letter of the 10th July, in connection with the above.

Council holds no relevant information nor has it any comments to offer at this stage, but will await sight of the EIA in due course.

Yours sincerely

Lucinda Blakiston Houston

**DR LUCINDA BLAKISTON HOUSTON
CHAIRMAN**

Job No:	4565718C-
Faber Maunsell-Belfast	
Reviewed by:	Jacob J.M.C.
DC de	
Date:	04 AUG 2006
Project No:	
Date:	
Comments:	

**Consultation Responses from the Department of Agriculture and Rural Development
(2009 - 2006)**

1) Agri – Environment Scheme Management Branch

From: Moore, Alan [Alan.Moore@dohi.gov.uk]
Sent: 03 February 2009 12:01
To: Doyle, Carey
Subject: FW: EIA 815/09 - PAD for proposed North-South Electricity Interconnector

Follow Up Flag: CO reviewed
Flag Status: Completed

Doyle,

Please see attached comments (yellow) received from Environmental History, HSE, and a number of other stakeholders submitted comments, not to be confused, I am assuming these comments to go with the EIA and the EIS. I would like to request the matters raised by the consultation and ensure that they are appropriately addressed within the final draft of the Environmental Statement that is subject to the planning application.

Please see the second column in the attached and all the comments regarding the draft EIS. I am assuming that the EIS will be submitted with any application. The planning reports that will accompany the EIS will address the application in a comprehensive manner as part of the validation.

It is noted that the planning will be done with some degree of EIS of the planning and EIS.

The EIS will be done with the EIS and the EIS will be done with the EIS. I am assuming that the EIS will be done with the EIS and the EIS will be done with the EIS.

Please note that a full EIS is a complex and costly process. It may not be possible to include all the EIS at the early stage. Following public consultation with all interested parties and formal consultation with the local authority, it is important to ensure that all the EIS is done in a timely manner. It is important to ensure that all the EIS is done in a timely manner. It is important to ensure that all the EIS is done in a timely manner. It is important to ensure that all the EIS is done in a timely manner.

I trust that these comments are sufficient and should you wish to discuss the matter further please do not hesitate to contact me at any time.

Alan Moore
 General Manager

From: O'Neill, Gillian [mailto:Gillian.O'Neill@dohi.gov.uk]
Sent: 03 February 2009 11:57
To: Moore, Alan
Cc: Arbuthnot, Angela; O'Hagan, Helen
Subject: EIA 815/09 - PAD for proposed North-South Electricity Interconnector

Alan

Your ref: O/2008/8822/Q - PAD for proposed North-South Electricity Interconnector

I have consulted with colleagues within the Department in relation to the Environmental Statement and I wish to forward the following comments:

Countryside Management Branch

Information relating to the proposed development was provided to the consultants in August 2009 (Referral no. EIA539/06) and subsequently at a meeting with the Minister of Agriculture, Michelle Gildermew MP MLA, on 26 November 2007.

Reference is made on page 61 to the EIA (uncultivated and semi-natural areas) Regulations 2001. It should be noted that this legislation has now been superseded by Environmental Impact Assessment (Agriculture) Regulations (Northern Ireland) 2007. These limit the circumstances in which you can bring uncultivated land or semi-natural areas into intensive agricultural use. Further information can be found at <http://www.dardni.gov.uk/index/countryside/impact-on-the-environment.htm>

Forest Service

Nil response.

Fisheries Division

Nil response.

If I receive any further comments I will forward them to you.

Regards

Gillian O'Neill
Department of Agriculture and Rural Development
Agri-environment Scheme Management Branch
Lindesay Hall
Loughry Campus
76 Dungannon Road
Cookstown
BT80 9AA
Tel: 028 86757550 (x36550)
Fax: 028 86757511 (x36511)

Craig, Amy

From: Doyle, Carey
Sent: 27 February 2008 09:50
To: Mackin, Anne-Marie; Sutton, Brian
Subject: FW: EIA 539 06 Proposed Tyrone/Cavan Interconnector
Attachments: EIA 539 06 Proposed North-South Electricity Interconnector .doc

From: O'Neill, Gillian [mailto:Gillian.O'Neill@dardni.gov.uk]
Sent: 18 February 2008 16:01
To: Doyle, Carey
Subject: EIA 539 06 Proposed Tyrone/Cavan Interconnector

Carey

Further to Maureen Emerson's response to your letter of 01 November 2007, regarding the above application, I wish to forward the attached comments.

<<EIA 539 06 Proposed North-South Electricity Interconnector .doc>>
Regards

Gillian O'Neill
Agri-Environment Schemes Management Branch
Countryside Management Branch
Loughry Campus
Cookstown
BT80 9AA

Responses made for EIA 539/06 – Proposed North-South Electricity Interconnector:

Veterinary Service

There are no apparent animal health or welfare implications.

Forest Service

There are areas of privately owned/grant aided woodland affected by this proposal and shown on the enclosed map with earlier comments (15/08/06).

In line with our published strategy, FS are opposed to the removal of these woodlands and request that the line is routed to avoid any deforestation.

Please keep us informed of future developments.

Quality Assurance Branch

An examination of the Departments records show that this proposal will encroach upon several areas infested with Potato Wart Disease (PWD), specifically four fields infested in the Tullygoney and Tullylearn area outside Benburb and five fields infested in the Bernagh area off the River Rhone. These lands are subject to notices served relating to PWD under the Plant Health Order (Northern Ireland) 2006. The movement of soil or other material from the lands is prohibited except under license.

It is the responsibility of the applicant to contact the inspector for this area, Mr Dominic McArdle, Newcastle Office (028) 4372 3068 regarding the safe disposal or replacing of soil. The Inspector will advise on the selection of suitable dumping sites and agree proposals prior to the issue of the necessary movement licence stipulating the conditions to be observed to prevent the spread of the pest.

Even if soil is not moved off the infested area, the applicant will still be responsible for ensuring that the contractors or sub-contractors appointed to do the work are made aware of the necessity to take:-

1. extreme care to avoid spillage of infested soil on public roads; and
2. any other reasonable precautions such as the cleansing of all tools and earth-moving equipment after use in the infested land to avoid carrying infested soil to clean agricultural land.

An examination of the Department's records also show that none of the lands as outlined in the map, which accompanied your request, are subject to the terms of a notice served relating to Potato Cyst Nematode (PCN). Therefore there are no restrictions in so far as the Plant Health Order (Northern Ireland) 2006 is concerned on the movement of soil or other material from these lands with regard to PCN.

Craig, Amy

From: Doyle, Carey
Sent: 06 December 2007 15:05
To: Sutton, Brian; Mackin, Anne-Marie
Subject: FW: Proposed Tyrone/Cavan Interconnector

From: Emerson, Maureen [<mailto:Maureen.Emerson@dardni.gov.uk>]
Sent: 06 December 2007 15:03
To: Doyle, Carey
Subject: Proposed Tyrone/Cavan Interconnector

Carey

I refer to your letter of 1 November 2007. I have consulted with colleagues and have the following comments.



Forest Service - There are areas of privately owned/grant aided woodland affected by this proposal and shown on the enclosed map with earlier comments (15/08/06). In line with our published strategy, Forest Service are opposed to the removal of these woodlands and request that the line is routed to avoid any deforestation. Please keep us informed of future developments. Any queries contact Ben Searle 02890525476.

With reference to your query on Potato Wart Disease please contact Mr George Ferguson 028 9054 7186

Maureen Emerson

2) Environmental Policy

Ms Julie McDowell
Faber Maunsell
1st Floor
24 Linenhall St
Belfast
BT2 8BG

Job No.	45457 IBLE	
Fac.	Belfast	
Review	M.D.	J.M.D.
BS		
DC		
Date:	21 AUG 2006	
Action:		
Date:		
Copy to:		
Filing:		

*David, please copy
for Brian's info ✓*

The EIA Team
Environmental Policy
Room 651
Dundonald House
Upper Newtownards Road
Belfast
BT4 3SB

Our Ref: EIA 539/06
Your ref: 45457IBLE 00 300 07 (19.07.06) Letter
Planning Service Ref: O/2006/0572
16 August 2006

Dear Ms McDowell

Proposed Tyrone / Cavan Interconnector - 400kV Overhead Line & Substation

I refer to your letter dated 19th July 2006.

I have consulted with colleagues within the Department and forward the following comments.

Quality Assurance Branch

An examination of the Department's records show that this proposal will encroach upon several areas infested with Potato Wart Disease (PWD). These lands are subject to notices served relating to PWD. The movement of soil or other material from these lands is prohibited except under licence.

It is the responsibility of the applicant to contact the inspector for this area, Mr George Ferguson (028) 80547186 regarding the safe disposal or replacing of soil. The inspector will advise on the selection of suitable dumping sites and agree proposals prior to the issue of the necessary movement licence stipulating the conditions to be observed to prevent the spread of the pest.

Even if soil is not moved off the infested area, the applicant will still be responsible for ensuring that the contractors or sub-contractors appointed to do the work are made aware of the necessity to take:

1. Extreme care to avoid spillage of infested soil on public roads;
2. Any other reasonable precautions such as the cleaning of all tools and earth moving equipment after use in the infested land to avoid carrying infested soil to clean agricultural land.

An examination of the Department's records also show that some of the lands as outlined in the map, which accompanied your request, are subject to the terms of a notice served relating to *Phoma Cyst Nematode (PCN)*. Therefore there are no restrictions in so far as the Plant Health Order (Northern Ireland) 1993 is concerned on the movement of soil or other material from these lands.

Veterinary

I can see no animal health or welfare implications provided that

1. Fencing is adequate;
2. If farmland borders both sides of the road that there should be adequate thought given to possible need to move animals across the road.

Fisheries

Fisheries Division do not hold any information relevant to this proposal and have no comments to make.

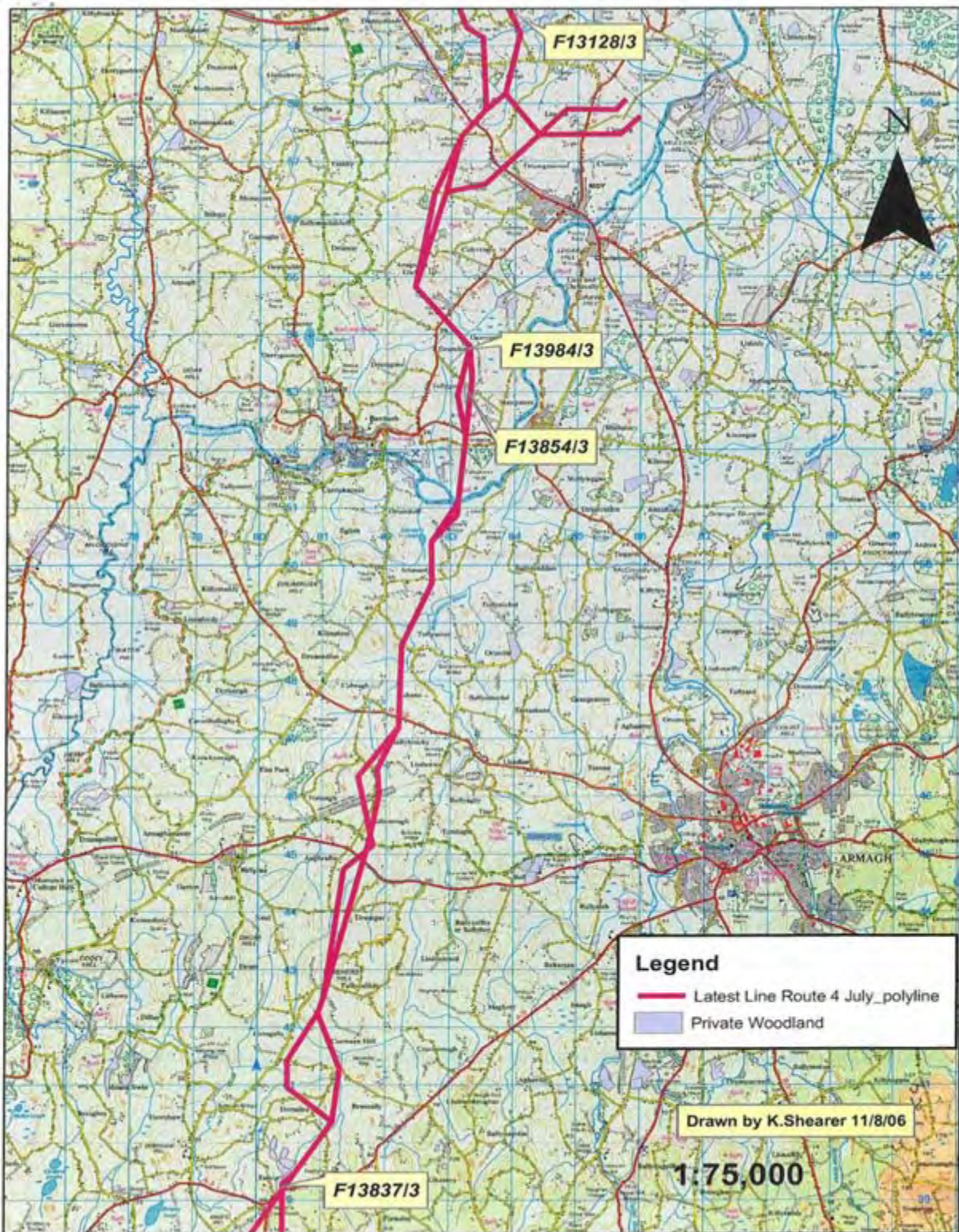
Forest Service

There is no Forest Service land within the above proposal, however there are private woodlands as outlined on the attached map.

I trust that this information will be of assistance.
Any further information will be passed on to you.

Yours sincerely


Mairead Dunne
The EA Team
☎ 028 90524326



CROWN COPYRIGHT RESERVED

Ms Julie McDowell
Faber Maunsell
1st Floor
24 Linenhall St
Belfast
BT2 8BG

Job No:	45457 IBLE
Faber Maunsell-Belfast	
Handled by:	Jm O'Jm'D
DC:dk	
MM:MM	
Date:	24 AUG 2006
Actioned by:	
Date:	
Copy to:	
Filing Location:	



The EIA Team
Environmental Policy
Room 651
Dundonald House
Upper Newtownards Road
Belfast
BT4 3SB

Our Ref: EIA 539/06
Your ref: 45457IBLE 00 300 07 (19.07.06) Letter
Planning Service Ref: O/2006/0572
22 August 2006

Dear Ms McDowell

Proposed Tyrone / Cavan Interconnector – 400kV Overhead Line & Substation

I refer to your letter dated 19th July 2006.

I have consulted with colleagues within the Department and forward the following comments.

Countryside Management

Northern Ireland soil maps indicate that the major part of the proposed route is outside the Best and Most Versatile (BMV) category, with approximately 40% within the Best and Most Versatile (BMV) category.

Landowners should be consulted with regard to the inclusion of the land in an agri-environment scheme. If the landowner, or lessee, holds an agri-environment scheme agreement he should notify DARD prior to any developments on the land.

Field boundaries and heritage features are an important component of the farmed landscape. Specific measures may be required to ensure

minimum disturbance or suitable mitigation measures provided following disturbance.

Greatest care is to be taken to minimise soil compaction and damage, especially when transporting materials on to the site.

Particular care must be paid to the disposal of spoil from excavations etc. This may not be dumped on farmland without prior permission from relevant government organisations (DOE/DARD). This site could be subject to EIA Regulations (Uncultivated land & semi-natural areas regulations (Northern Ireland) 2001) land. The EIA contact for DARD is 02890524326.

I trust that this information will be of assistance.

Any further information will be passed on to you.

Yours sincerely



Maureen Emerson
The EIA Team
☎ 028 90524326

3) Quality Assurance

Quality Assurance Branch
Plant Health Section



Department of
**Agriculture and
Rural Development**

www.dardni.gov.uk

Carey Doyle
Faber Maunsell
1st Floor
24 Linenhall Street
Belfast
BT2 8BG

45457 IBLE
CO CD JFD JMD
25 FEB 2008
NIE

Room 1019, Dundonald House
Upper Newtownards Road
Belfast BT4 3SB
Telephone: 028 9052 4168
Fax: 028 9052 4671

Your reference: 45457IBLE
Our reference: OS 08/08
21 February 2008

Dear Carey Doyle,

Plant Health Order (Northern Ireland) 2006

Re: North/South Interconnector Tower Locations

Your letter dated 25 January 2008 refers. I have been asked to reply regarding potential restrictions on the movement of soil.

An examination of the Department's records shows that the above-mentioned proposal submitted by you is within close proximity to an area which is infested with Potato Wart Disease (PWD). These areas are the subject of a Notice served relating to PWD, which prohibits the movement of soil or other material from these lands except under license.

The Department's records on Potato Cyst Nematode (PCN) have also been examined. There are no outbreaks in the area covered by this proposal. There are therefore no restrictions so far as the Order is concerned on the movement of soil or other material from these lands.

It is the responsibility of the applicant to contact the inspector for these areas, Mr. George Ferguson on (028) 8775 4855 regarding the safe disposal or replacing of soil. The inspector will advise on the selection of suitable dumping sites and agree proposals prior to the issue of the necessary movement license stipulating the conditions to be observed to prevent the spread of the pest.

Even if soil is not moved off the infested area, the applicant will still be responsible for ensuring that the contractors or sub-contractors appointed to do the work are made aware of the necessity to take:-



INVESTOR IN PEOPLE

If you have hearing difficulty you can contact
the Department via the textphone on 028 9052 4420

An Roinn Talmhaíochta agus Forbartha Tuaithe
Máinnstríe o Fairs an Kintra Fordéirín

1. extreme care to avoid spillage of infested soil on public roads; and
2. any other reasonable precautions such as the cleaning of all tools and earth-moving equipment after use in the infested land to avoid carrying infested soil to clean agricultural land.

Yours sincerely



Jan Davidson
Administrative Support
Plant Health Section
028 9052 4168

RESULTS FOR:

PCN SECTION

Map Ref/Sheet No: PCN Present Yes No

Area Inspected/Comments:

HO
Inspector

Checked by: Date:

Inspector Details:

Date issued: Date returned:

WART SECTION

Map Ref/Sheet No: PWD Present Yes No

Area Inspected/Comments:

HO 2 adjacent to CES To be seen the boundary of the boundary of the field which is subject to local notice. To be seen to be field Inspector To be seen the boundary of the field which is also the subject of a local notice.
--

Checked by: Date:

Inspector Details:

Date issued: Date returned:

4) Rivers Agency

From: Moore, Alan [Alan.Moore@doeni.gov.uk]
Sent: 26 February 2009 14:34
To: Doyle, Carey
Subject: FW: TRIM: EIA 815/09 - PAD for proposed North-South Electricity Interconnector

Follow Up Flag: Follow up
Flag Status: Completed

Carey,

please see attached comments recently received from DARD Rivers Agency. This is one of the few outstanding consultee responses yet to be received. I am forwarding these comments to you now to allow you the time to address the matters raised by the consultee and ensure that they are appropriately addressed within the final draft of the Environmental Statement when submitted with the planning application.

Provided all the points raised in our meetings and all the consultation responses are dealt with satisfactorily in the details submitted with any application, the Strategic Projects Team will endeavour to progress the application to a recommendation within 6 months of its validation.

It is likely that any application will be dealt with under Article 31 of the Planning (NI) Order 1991.

You will recall from our meetings and our related guidance documentation that if our advice is not followed the result will almost certainly be that your application will not be progressed quickly or it may be refused.

Please note that a PAD is a separate and distinct advisory process. It does not bind us in making our formal decision at the regulatory stage, following public consultation with all interested parties and formal consultation with the local Councils. It is important to stress therefore that all our PAD advice is given without prejudice to the formal consideration of your planning application. This is because other information may arise from consultations, including with Council, third party representations or policy changes during the regulatory determination process. However, it is expected that any variations from the general advice offered at the PAD would be unusual.

I trust that this clarifies the situation and should you wish to discuss the matter further please do not hesitate to contact me at 02890 416 886.

Alan Moore
Special Studies

From: O'Neill, Gillian [mailto:Gillian.O'Neill@dardni.gov.uk]
Sent: 26 February 2009 14:31
To: Moore, Alan
Subject: FW: TRIM: EIA 815/09 - PAD for proposed North-South Electricity Interconnector

Alan

Further to below, I have received the following response from [Rivers Agency](#):

Rivers Agency would have no objections from the drainage aspect to the proposed interconnector.

The Agency would advise that there are numerous watercourses both designated and undesignated over which the proposed overhead line will cross.

Under the terms of Schedule 6 of the Drainage (Northern Ireland) Order 1973 the applicant must submit to Rivers Agency for its consent any proposal to carry out works which might affect a watercourse.

Regards
Gillian

From: O'Neill, Gillian
Sent: 03 February 2009 11:57
To: 'alan.moore@doeni.gov.uk'
Cc: Arbuthnot, Angela; O'Hagan, Helen
Subject: TRIM: EIA 815/09 - PAD for proposed North-South Electricity Interconnector

Alan

Your ref: O/2008/0822/Q - PAD for proposed North-South Electricity Interconnector

I have consulted with colleagues within the Department in relation to the abovementioned application and I wish to forward the following comments:

Countryside Management Branch

Information relating to the proposed development was provided to the consultants in August 2009 (Referral no. EIA539/06) and subsequently at a meeting with the Minister of Agriculture, Michelle Gildernew MP MLA, on 26 November 2007.

Reference is made on page 61 to the EIA (uncultivated and semi-natural areas) Regulations 2001. It should be noted that this legislation has now been superseded by Environmental Impact Assessment (Agriculture) Regulations (Northern Ireland) 2007. These limit the circumstances in which you can bring uncultivated land or semi-natural areas into intensive agricultural use. Further information can be found at <http://www.dardni.gov.uk/index/countryside/impact-on-the-environment.htm>

Forest Service

Nil response.

Fisheries Division

Nil response.

If I receive any further comments I will forward them to you.

Regards

Gillian O'Neill
Department of Agriculture and Rural Development
Agri-environment Scheme Management Branch
Lindesay Hall
Loughry Campus
76 Dungannon Road
Cookstown
BT80 9AA



Rivers Agency
Armagh Office
44 Seagoe Industrial Estate
Craigavon
BT63 5QE
Telephone: 028 3838 9111
Fax: 028 3839 9113

Carey Doyle
Faber Maunsell
1st Floor
24 Linenhall Street
Belfast
BT2 8BG

Your Ref: 45457IBL0030007

Our Ref: DA2-07-30522
Doc No: 94946

21 November 2007

Dear Sir/Madam

Proposed Tyrone to Cavan interconnector – 400 kv Overhead Line and Substation – Environmental Statement

Reference your letter of 1 November 2007. Rivers Agency would advise that it has no comment to make for inclusion in your Environmental Statement.

Yours faithfully

W Milligan

Job No:	45457IBL0030007
Fabric:	Faber Maunsell-Belfast
Revised:	CO10
Author:	Amn Amn
Date:	22 NOV 2007
Checked:	Amn
Drawn:	22/11/07
Copied to:	/
Filing Location:	CO600





Carey Doyle
Faber Maunsell
1st Floor
24 Linenhall Street
Belfast
BT2 8BG

Armagh Office
44 Seagoe Industrial Estate
CRAIGAVON
Co. Armagh
BT63 5QE

Telephone: 028 3839 9111
Fax: 028 3839 9113
Web: www.riversagencyni.gov.uk

Your Ref: 45457 IBLE 00 300 07

Our Ref: DA2-07-30522

5th November 2007

Dear Sirs

RE: Proposed Tyrone to Cavan Interconnector

Thank you for your letter of 1st November 2007 regarding the above.

We are considering your request and will reply as soon as possible.

Yours faithfully

LYDIA McCANN

Job No:	45457 IBLE
Faber Maunsell-Belfast	
Reviewed by:	[Signature]
Date:	08 NOV 2007
Action:	
Date:	
Copy:	
Filing:	



Armagh Office
44 Seagoe Industrial Estate
CRAIGAVON
Co. Armagh
BT63 5QE

Telephone: 028 3839 9111
Fax: 028 3839 9113
Web: www.riversagency.cymru.gov.uk

Julia McDowell
Faber Maunsell
1st Floor
24 Linenhall Street
Belfast
BT2 8BG

Your Ref: 454571BLE0030001(06.10.04) Ltr

Our Ref: ADV/ARM/1037
Doc No: 33350

17 November 2006

Dear Madam

REQUEST FOR FLOODPLAIN INFORMATION AT MOY, DUNGANNON

Reference your letter of 4 October 2006. Rivers Agency would inform you that the estimated 1 in 100 year flood levels for your proposed sites 1 and 2 are as follows:-

Potential Sub Station Site 1 – estimated Q100 level = 15.85 m OD

Potential Sub Station Site 2 – estimated Q100 level = 16.01 m OD

The Agency recommends that a minimum freeboard of 600mm should be added to these levels for design purposes (including roads and paths).

I trust you find the foregoing information helpful but should you require any further information or clarification, please contact me at the above address quoting the above reference numbers.

Yours faithfully

W Milligan

45457 BLE

File No	45457 BLE
Date	20 NOV 2006
By	JM
Checked	JM
Tracing Location	



Armagh Office
44 Seagoe Industrial Estate
CRAIGAVON
Co. Armagh
BT63 5QE
Telephone: 028 3839 9111
Fax: 028 3839 9113
Web: www.riversagency.ni.gov.uk

Juliet McDowell
Principal Environmental Scientist
Faber Maunsell/Aecom
1st Floor
24 Linenhall Street
Belfast
BT2 8BG

Your Ref: 454571BLE-00-300-06

Our Ref: ADV/ARM/1007
Doc No: 32749

29 July 2006

Dear Sir/Madam

PROPOSED TYRONE/CAVAN INTER-CONNECTOR – 400 KV OVERHEAD LINE AND SUB STATION

Reference your letter of 10 July 2006, Rivers Agency would inform you that there are numerous designated and undesignated watercourses along the route of your proposed inter-connector and under the terms of Schedule 6 of the Drainage (NI) Order 1973, the applicant must submit to Rivers Agency for its consent, any proposals to carry out works which might affect a watercourse.

Should you require any further information, please do not hesitate to contact me at the above address quoting the above reference number.

Yours faithfully


W Milligan

Job No:	454571BLE
Faber Maunsell-Belfast	
Rev:	JM'D JML'D
DC'd:	
Date:	31 JUL 2006
Area:	
Dist:	
Obj. No:	
File No:	00301



Armagh Office
44 Seagoe Industrial Estate
CRAIGAVON
Co. Armagh
BT63 5QE

Telephone: 028 3839 9111
Fax: 028 3839 9113
Web: www.riversagency.cymru.gov.uk

Julie McDowell
Faber Maunsell
1st floor
24 Linenhall Street
Belfast BT2 8BG

Your Ref:
Our Ref: 32789
ADV/ARM/1010 1
Locator: EASTERN-ARM
Date: 25/07/2006

Dear Sir/Madam,

RE: **Tandragee - Louth Interconnector**

Thank you for your letter of **19 July 2006** regarding the above.

We are considering your letter and will reply as soon as possible.

Yours faithfully,

Johnathan McKee (Mr)
Area Engineer (acting)

Job No:	AS4571BLE
Faber Maunsell-Belfast	
From:	Smc. J.McK
To:	Dc de
Date:	27 JUL 2006
Action:	
Copy to:	
Filing Location:	00 301



Armagh Office
44 Seagoe Industrial Estate
CRAIGAVON
Co. Armagh
BT63 5QE

Telephone: 028 3839 9111
Fax: 028 3839 9113
Web: www.riversagency.cymru.gov.uk

Julie McDowell
Faber Maunsell
1st Floor 24 Linenhall Street
Belfast BT2 8BG

Your Ref: 45457IBLE00 300 06 (10.0
Our Ref: 32749
ADV/ARM/1007 1
Locator: EASTERN-ARM
Date: 19/07/2006

Dear Sir/Madam,

RE: **Proposed Tyrone - Cavan interconnector**

Thank you for your letter of **10 July 2006** regarding the above.

We are considering your letter and will reply as soon as possible.

Yours faithfully,

Johnathan McKee (Mr)
Area Engineer (acting)

Job No:	45457	IBLE
Faber Mtn:		30006
Reviewed by:	John Judd	
DC:	de	
Date:	21 JUL 2006	
Reviewed by:		
File:	00 301	

**Consultation Responses from the Department of Enterprise, Trade and Investment
(2009 - 2006)**

Our Ref: E1/07/529
Our Prev: E1/06/409
Your Ref: 454571BLE 00300 07

Carey Doyle
Senior Environmental Scientist
Faber Maunsell
1st Floor
24 Linenhall Street
Belfast
BT2 8BG

12 November 2007

Dear Carey

RE: PROPOSED TYRONE/ CAVAN INTERCONNECTOR- 400Kv OVERHEAD LINE & SUBSTATION

Your letter dated 1 November 2007 and my previous scoping response letter (July 2006) refer.

I would remind you that as part of the planning consultation process, the Geological Survey of Northern Ireland (GSNI) will normally be asked to comment on the geological and hydrogeological content of your Environmental Statement (ES). It is your responsibility, in preparing the ES, to identify, assess and propose mitigation measures for any environmental impacts that may arise as a result of a particular development.

GSNI will seek to ensure that the ES contains sufficient information regarding the geological context of the development and the nature and structure of the bedrock and superficial deposits (drift). The GSNI, in conjunction with the Water Management Unit (Environment and Heritage Service, DoE (NI)) may also consider potential impacts on local groundwater.

In respect of this development, particular attention should be paid to any geological actors (e.g. landslips, cambering, compressible ground, dissolution (karst) etc) likely to affect the overall stability of the development or surrounding areas. The ES should include details of the thickness and extent of any peat deposits present at the proposed sites for pylons and other major infrastructure elements. If, in the course of the development, peat is to be disturbed or removed especially in upland or steeply sloping terrain, the ES should also include a peat stability assessment together with details of mitigation measures to avoid induced peat slides.

The GSNI is an appropriate starting point for geological and hydrogeological research when you are carrying out your environmental assessment and preparing the ES. The Survey's archives contain a comprehensive range of geological maps and databases with information relating to bedrock and drift geology throughout Northern Ireland.

Please do not hesitate contact me if you wish to check the availability of geological maps and information or discuss your development in more detail.

Yours Sincerely

Terence P Johnston C. Geol.



**Geological Survey
of Northern Ireland**

Colby House
Stranmillis Court
Malone Lower
Belfast
BT9 5BF
Phone: 028 9038 8462
Fax: 028 9038 8461
E-mail: gsni@detini.gov.uk

Job No:	454571BLE
Faber Maunsell-Belfast	
Reviewed by:	CD CD
Date:	15 NOV 2007
Actioned by:	
Date:	
Copy to:	
Filing Location:	

Our Ref: E1/06/409
Your Ref: 45457IBL 00 300 06 (10.07.06) Letter



Geological Survey of Northern Ireland

Colby House
Stranmillis Court
Malone Lower
Belfast
BT9 5BF
Phone: 028 9038 8462
Fax: 028 9038 8461
E-mail: gsni@detini.gov.uk

Ms Julie McDowell
Principal Environmental Scientist
Faber Maunsell
1st Floor
24 Linenhall Street
Belfast
BT2 8BG

Dear Ms McDowell

RE: PROPOSED TYRONE/ CAVAN INTERCONNECTOR- 400kV OVERHEAD LINE & SUBSTATION

Your letter dated 10th July 2006 refers.

As part of the planning consultation process, the Geological Survey of Northern Ireland (GSNI) will normally be asked to comment on the geological and hydrogeological content of your Environmental Statement (ES). It is your responsibility, in preparing the ES, to identify, assess and propose mitigation measures for any environmental impacts that may arise as a result of a particular development.

GSNI will seek to ensure that the ES contains sufficient information regarding the geological context of the development and the nature and structure of the bedrock and superficial deposits (drift). The GSNI, in conjunction with the Water Management Unit (Environment and Heritage Service, DoE (NI)) may also consider potential impacts on local groundwater.

Particular attention should be paid to any geological factors (e.g. landslips, cambering, compressible ground, dissolution (karst) etc) likely to affect the overall stability of the development or surrounding areas. The ES should also include details of the thickness and extent of any peat deposits present at the proposed sites for pylons and other major infrastructure elements. If, in the course of the development, peat is to be disturbed or removed the ES should include a peat stability assessment together with details of mitigation measures to avoid induced peat slides.

The GSNI is an appropriate starting point for geological and hydrogeological research when you are carrying out your environmental assessment and preparing the ES. The Survey's archives contain a comprehensive range of geological maps and databases with information relating to bedrock and drift geology throughout Northern Ireland.

Please do not hesitate contact me if you wish to check the availability of geological maps and information or discuss your development in more detail.

Yours Sincerely



Terence P Johnston C. Geol.

Consultation Responses from the Department of Culture, Arts and Leisure (2009 – 2006)

From: Moore, Alan [Alan.Moore@doeni.gov.uk]
Sent: 19 January 2009 14:28
To: Doyle, Carey
Subject: FW: Planning application O/2008/0822/Q - Lands within Armagh and Dungannon District Councils - North South electricity connector

Follow Up Flag: Follow up
Flag Status: Red

Carey,

please see attached comments recently received from DCAL - Inland Fisheries. This is one of many outstanding consultee responses yet to be received. I am forwarding these comments to you now to allow you the time to address the matters raised by the consultee and ensure that they are appropriately addressed within the final draft of the Environmental Statement when submitted with the planning application.

Provided all the points raised in our meetings and all the consultation responses are dealt with satisfactorily in the details submitted with any application, the Strategic Projects Team will endeavour to progress the application to a recommendation within 6 months of its validation.

It is likely that any application will be dealt with under Article 31 of the Planning (NI) Order 1991.

You will recall from our meetings and our related guidance documentation that if our advice is not followed the result will almost certainly be that your application will not be progressed quickly or it may be refused.

Please note that a PAD is a separate and distinct advisory process. It does not bind us in making our formal decision at the regulatory stage, following public consultation with all interested parties and formal consultation with the local Councils. It is important to stress therefore that all our PAD advice is given without prejudice to the formal consideration of your planning application. This is because other information may arise from consultations, including with Council, third party representations or policy changes during the regulatory determination process. However, it is expected that any variations from the general advice offered at the PAD would be unusual.

I trust that this clarifies the situation and should you wish to discuss the matter further please do not hesitate to contact me at 02890 416 886.

Alan Moore
Special Studies

From: Hayes, Jim
Sent: 19 January 2009 12:22
To: Moore, Alan
Cc: 'seamus@fcbni.org'
Subject: Planning application O/2008/0822/Q - Lands within Armagh and Dungannon District Councils - North South electricity connector

Alan

Re: Planning application O/2008/0822/Q - Lands within Armagh and Dungannon District Councils - North South electricity connector

The nature and location of the proposed development are noted. DCAL is content that the Environmental Statement properly identifies the hydrological features in the footprint of the proposed interconnector route and that the fisheries designations of these watercourses have been correctly assigned as salmonid and is satisfied that the economic and environmental value of the fisheries interests has been recognised. The three main watercourses, the River Blackwater, River Rhone and the Ballymartrim River support populations of juvenile and adult salmonids (brown trout and Atlantic salmon) and cyprinid fish species as well as eels, lamprey and crayfish. It should be noted that the small tributaries of these watercourses will also hold small populations of these species where habitat is suitable.

The Department is also satisfied that the Environmental Statement has considered the main risks of the construction and operational phases and that the suggested site specific mitigation measures in line with the Environmental Management Plan are appropriate and should minimise risk to the aquatic environment provided that all recommendations are carried out in full. The developer should ensure that there is sufficient initial land take to provide adequate area for the installation of pollution mitigation systems. DCAL would advise that regular monitoring of the effectiveness of the mitigation measures is included as part of the EMP and that water quality testing is frequently carried out on stretches of watercourses downstream of works and compared against the baseline data collected pre works. If monitoring shows that construction operations are impacting on water quality, works should cease at the polluting point until mitigation measures have been reviewed and enhanced.

The applicant should be made aware that it is an offence under section 47 of the Fisheries Act (Northern Ireland) 1966 to cause pollution which is subsequently shown to have a deleterious effect on fish stocks.

Faithfully,

J Hayes
Fisheries Operations and Technical Support
DCAL



Department of
**Culture, Arts
and Leisure**

www.dcalni.gov.uk

Your reference: 45475 IBLE 00 300 07
Our reference
Date: 15 November 2007

AN ROINN
Cultúr, Ealaíon
Agus Fóillíochta
MÁNNYSTRIE O
Fowkgates, Airts
An Aisedom

Carey Doyle
Faber Maunsell
1st Floor
24 Linenhall Street
Belfast
BT2 8BG

Interpoint
20-24 York Street
Belfast BT15 1AQ
Tel: + 44 (0) 28 9025 8825
Fax: + 44 (0) 28 9025 8906
Email: dcal@dcalni.gov.uk

Dear Carey

Re: Proposed Tyrone to Cavan Interconnector – 400kV Line and Substation

DCAL has a statutory remit for the conservation and protection of salmonid and inland fisheries within Northern Ireland under the Fisheries Act (NI) 1966. Consequently, the Department welcomes the opportunity to comment on this proposal.

The nature of the proposed works and the preferred route are noted. The works have the potential to impact on tributaries of the Blackwater River catchment, namely the Ballymortrim Water and Tynan Water. These watercourses support populations of juvenile and adult salmonids which hold a considerable nature conservation and biodiversity value and provide an important recreational resource in the form of angling opportunities. The developer should be aware that the Blackwater River system is currently one of several index catchments for the Departments Salmon Management Plan, a programme with the aim of enhancing and sustainably managing populations of Atlantic salmon, a List II species under the Habitats Directive, which are currently in decline through a variety of environmental pressures.

The operational phase of the proposed development should have little impact on fisheries interests in the area however there is a risk during the construction phase of surface water becoming contaminated with various pollutants and high levels of suspended solids, which may drain into nearby watercourses to the detriment of fisheries interests. Fish populations are sensitive to reductions in water quality and salmonid habitat in particular is susceptible to siltation. Special consideration should be given to the placing of towers, construction access roads and associated works so that impacts to watercourses are minimised. Towers should be placed as far from watercourses as is feasible. It will be necessary to incorporate appropriate mitigation measures to reduce risks of pollution and suspended solid release. It should be recognised that construction operations can impact not only on stretches of watercourses within the immediate area but also significant distances downstream. Where crossing of watercourses for construction access is unavoidable possible pollution problems and impacts to fish passage and timings of works should also be assessed. DCAL can advise with regard to these issues. Dewatering of any

excavations will most likely require a discharge consent from the Water Management Unit of EHS

With regard to addressing impacts to fisheries interests the EIA process for the above scheme should contain:

- A clear description of the project, including physical characteristics of the project, land use requirements, materials to be used and residues and emissions.
- Details of the environment – in particular the fisheries environment in nearby watercourses and associated water bodies likely to be impacted by the works.
- Identification and evaluation of the possible effects of the project on fish stocks or fisheries habitat, and angling activity, whether these are direct, indirect, secondary or cumulative. The time scale of these effects and the source of any likely impacts from the project or emissions, nuisances or wastes.
- A description of the mitigatory measures proposed to prevent, reduce or offset adverse impacts on fisheries and angling.

It is worth noting that it is an offence under section 47 of the Fisheries Act (Northern Ireland) 1966 to cause pollution which is subsequently shown to have a deleterious effect on fish stocks.

I hope that this is of use. If you require any further information please do not hesitate to contact DCAL.

Faithfully,

J Hayes

Fisheries Operations and Technical Support

Craig, Amy

From: Hayes, Jim [Jim.Hayes@dcalni.gov.uk]
Sent: 14 August 2006 15:12
To: McDowell, Julie
Subject: Proposed Tyrone/Cavan interconnector - ref 45457IBLE 00 300 06 (10/07/06) Lette

Dear Julie

Re: Proposed Tyrone/Cavan interconnector

The nature and scope of the proposal are noted. The proposed routes cross several important river catchments. Most of the waterways within the route will support populations of salmonid and or cyprinid fish species, all of which provide and recreational and economic resource in the form of recreational angling opportunities.

DCAL is content that the operational phase of the development should have little impact on fisheries interests. The main area of concern is that during construction operations, particularly those near surface water bodies, pollutants including high levels of suspended solids may enter watercourses to the detriment of fisheries interests. Fish are sensitive to reductions in water quality and salmonid habitat is particularly susceptible to siltation. Consequently DCAL would advise the inclusion of mitigation measures to reduce this risk within the ES.

The applicant should be made aware that it is an offence under section 47 of the Fisheries Act (Northern Ireland) 1966 to cause pollution which is subsequently shown to have a deleterious effect on fish stocks.

Faithfully,

J Hayes
Inland Waterways and Inland Fisheries
DCAL

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Consultation Responses from the Department of Health, Social Services and Public Safety (2009 - 2006)



Department of

**Health, Social Services
and Public Safety**

An Roinn

**Sláinte, Seirbhísí Sóisialta
agus Sábháilteachta Poiblí**

www.dhsspsni.gov.uk

Mr A Moore
Special Studies Unit
Planning Service
Millennium House
17 – 25 Great Victoria Street
BELFAST
BT2 7BN

Room C3.19
Castle Buildings
Stormont
BELFAST BT4 3SQ

Tel: 028 9052 0552
Fax: 028 9052 0725
Email: nigel.mcmahon@dhsspsni.gov.uk

Your Ref: 0/2008/0822/Q
Our Ref:
Date: 27 August 2009

Mr Moore

PROPOSED NORTH-SOUTH ELECTRICITY INTERCONNECTOR

Thank you for your correspondence dated 15 July to Dr Elizabeth Mitchell concerning the above planning application. I have been asked to reply.

Any local population health related issues should be considered by referral to the relevant public health bodies, in this case, the Public Health Agency and the Environmental Health Departments of the relevant district councils. I understand that these agencies have been consulted in relation to the proposed application.

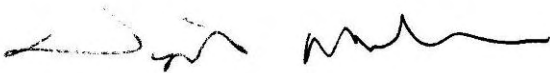
The UK Stakeholder Advisory Group on extremely low frequency electromagnetic fields (SAGE) was established in 2004 in response to the National Radiological Protection Board's (now the Health Protection Agency's Radiation Protection Division) advice, with the remit to consider possible further precautionary measures in addition to its electromagnetic field (EMF) guidelines.

SAGE is sponsored by the Department of Health (London) with funding contributions from the charity 'Children with Leukaemia' and National Grid plc. SAGE has brought together stakeholders "to identify and explore the implications for a precautionary approach to ELF EMF and make practical recommendations for precautionary measures." Stakeholders include representatives from government departments, industry, independent academics, regulators, public concern groups and associated professional groups. Further information on the terms of reference and the work of the Group are described on the SAGE web site (<http://www.rkpartnership.co.uk/sage>).

The applicant would be advised to consider the SAGE first interim assessment report, which was published in April 2007 (<http://www.rkpartnership.co.uk/sage/Public/SAGE%20first%20interim%20assessment.pdf>),

and the Health Protection Agency's advice on the report, provided to the Minister of State for Public Health in October 2007
(http://www.hpa.org.uk/webw/HPAweb&HPAwebStandard/HPAweb_C/1204276682532?p=1207897920036).

Yours sincerely

A handwritten signature in black ink, appearing to read 'Nigel McMahon', written in a cursive style.

MR NIGEL McMAHON
Chief Environmental Health Officer

cc Dr Elizabeth Mitchell
Mr Seamus Camplisson

Consultation Responses from the Department for Regional Development (2009 - 2006)

ROADS SERVICE CONSULTATION

Planning Application No: O/2008/0822/Q

Location : Lands within Armagh District Council and Dungannon Borough Council

Proposal : PAD for proposed North-South Electricity Interconnector

Applicant : NIE

(Armagh District Council)

NO OBJECTIONS subject to the following:-

Conditions: Provision shall be made to the satisfaction of Roads Service, to ensure that surface water does not flow from the site onto the public road.

REASON: In the interest of public safety and traffic management.

Provision shall be made to the satisfaction of Roads Service, to accommodate the existing roadside drainage and to ensure that surface water does not flow from the public road onto the site.

REASON: In the interest of public safety and traffic management.

A meeting with Roads Service Traffic and Transportation Section and Roads Service Section Office shall be planned well in advance of commencement of works on site to address all traffic management issues, management of construction traffic and associated haulage routes, proposed location of site depots and associated accesses and proposed accesses to construction site.

REASON: In the interest of public safety and traffic management.

Informatives: Precautions shall be taken to prevent the deposit of mud and other debris on the adjacent roads by vehicles travelling to and from the construction site. Any mud, refuse, etc. deposited on the road as a result of the development, must be removed by the operator/contractor.

All construction plant and materials shall be stored within the curtilage of the site.

SIGNED:



DATE: 22 January 2009



Craig, Amy

From: Doyle, Carey
Sent: 13 November 2007 16:17
To: Mackin, Anne-Marie
Subject: FW: PROPOSED TYRONE TO CAVAN INTERCONNECTOR- 400KV O/H

From: McGuigan, Harold [mailto:Harold.McGuigan@drdni.gov.uk]
Sent: 13 November 2007 16:15
To: Doyle, Carey
Cc: King, Paul; Hall, John
Subject: PROPOSED TYRONE TO CAVAN INTERCONNECTOR- 400KV O/H

YOUR REF 45457 IBLE 00 300 07
YOUR LETTER TO DEREK QUINTON DATED 1 NOVEMBER 2007

My response from Armagh Section Office Roads Service concerns the area of the route over the A3 Monaghan Road / Long Nancys/ Mortons Crossroads junction.

I would appreciate a more detailed position of the pylons as long term there **just may be** plans to reroute the road.

Please also send your reply to Paul King, Roads Service Forward Planning Section Marlborough House, Central Way, Craigavon as this team would have the input to any Trunk Road Network Design.

Harold McGuigan
Tel 028 3752 9503

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Craig, Amy

From: Doyle, Carey
Sent: 02 November 2007 15:18
To: Mackin, Anne-Marie
Subject: FW: Proposed Tyrone to Canan Interconnector - Your Ref 45457 IBLE 00 300 07

From: Quinton, Derek [mailto:Derek.Quinton@drdni.gov.uk]
Sent: 02 November 2007 15:14
To: Doyle, Carey
Cc: Black, James
Subject: Proposed Tyrone to Canan Interconnector - Your Ref 45457 IBLE 00 300 07

Dear Sir

I refer to your letter and enclosures of 1st November 2007.

The locations referred to do not lie within the area for which I am responsible.

My colleague who cover the Dungannon area in this Division is

Mr James Black
Dungannon Section Office
Main Street
Moygashel
Dungannon
Co. Tyrone
BT71 1QR

The remainder of the area is covered by the Southern Division of the Roads Service at
Marlborough House
Central Way
Craigavon
BT64 1AD

I have copied your correspondence to both offices.

Derek Quinton
Section Engineer
Roads Service
Arvalee Depot
32 Deverney Road
Omagh
BT79 0ND

Phone 8225 4600

Craig, Amy

From: Doyle, Carey
Sent: 02 November 2007 15:57
To: Mackin, Anne-Marie
Subject: FW: Proposed Tyrone to Canan Interconnector - Your Ref 45457 IBLE 00 300 07

From: Black, James [mailto:James.Black@drdni.gov.uk]
Sent: 02 November 2007 15:54
To: Doyle, Carey
Subject: FW: Proposed Tyrone to Canan Interconnector - Your Ref 45457 IBLE 00 300 07

Dear Sir/Madam

I have received your letter of 1/11/2007 with attached map showing the proposed line of the Tyrone to Cavan Interconnector.

There is a relatively short length of the interconnector in the Dungannon Borough Council area. I do not believe there are any road maintenance issues within the Dungannon Borough Council area which are relevant to this matter. It will probably be necessary to use some minor roads during the construction phase to gain access to your construction site but this would be the case no matter what route is chosen, and such minor matters would be dealt with during the construction phase.

Yours faithfully

James Black
Dungannon Roads Service Section.

From: Quinton, Derek
Sent: 02 November 2007 15:14
To: 'carey.doyle@fabermaunsell.com'
Cc: Black, James
Subject: Proposed Tyrone to Canan Interconnector - Your Ref 45457 IBLE 00 300 07

Dear Sir

I refer to your letter and enclosures of 1st November 2007.

The locations referred to do not lie within the area for which I am responsible.

My colleague who cover the Dungannon area in this Division is

Mr James Black
Dungannon Section Office
Main Street
Moygashel
Dungannon
Co. Tyrone
BT71 1QR

The remainder of the area is covered by the Southern Division of the Roads Service at
Marlborough House
Central Way
Craigavon
BT64 1AD

I have copied your correspondence to both offices.

Derek Quinton
Section Engineer
Roads Service
Arvalee Depot
32 Deverney Road
Omagh
BT79 0ND

Phone 8225 4600

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Craig, Amy

From: Crothers, David M
Sent: 07 August 2006 12:43
To: andrew.beasley@drdhi.gov.uk
Subject: Tyrone / Cavan Interconnector - Consultations

Andrew Beasley

In relation to our telephone conversation earlier this morning, please find attached a copy of the consultation letter issued to Roads Service Development Control on 10th July 2006. I was contacted by Derek Quinton (Omagh Office), on 25th July, who had received the letter from RS Southern Division. Derek thought there had perhaps been some confusion arising from the project title and suggested I forward the information onto James Black (Dungannon Depot) who would comment on the northern extreme of the proposal.

I have also posted hard copies to you. Please contact me on the number listed below if you would like further clarification on any of the above. Thank you for your help with this.

Best regards,
David

David Crothers
Graduate Environmental Scientist
Faber Maunsell Ltd
1st Floor
24 Linenhall Street
Belfast
BT2 8BG

T +44 (0)28 90434900
F +44 (0)28 90434909
www.fabermaunsell.com



45457IBLE 00 300
06 (10.07.06)_...



45457IBLE 00 300
06 (10.7.06)_...



Consultation Figure
1.PG

McDowell, Julie

From: Quinton, Derek [Derek.Quinton@drdni.gov.uk]
Sent: 25 July 2006 12:48
To: McDowell, Julie
Subject: Your Ref: 45457|BLE 00 300 07 (19.07.06) Letter

Subject: Proposed Tyrone / Cavan Interconnector - 400kV Overhead Line & Substation

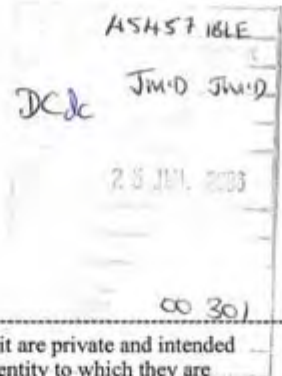
I refer to your letter of 19th July 2006 which in turn referred to your letter of 10th July.

Your letter was sent to The Roads Service in Craigavon.

However Co Tyrone is dealt with by this division.

As we are not aware of the background to this matter, can I suggest that you restart the correspondence by sending me copies of previous correspondence which I can forward to the relevant office in this Division

Derek Quinton
Section Engineer
Omagh Section Office
Roads Service
32 Deverney Road
Omagh
BT79 0ND



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Consultation Responses from the Department of the Environment (2009 - 2006)

- 1. Northern Ireland Environment Agency (NIEA) (formally the Environment and Heritage Service (EHS))**

a) Air and Environmental Quality

Carey Doyle
Faber Maunsell
1st Floor
24 Linenhall Street
Belfast
BT2 8BG

Environmental Policy Division
20-24 Donegall Street
BELFAST BT2 1GP

Telephone: 028 9054 4586

Email: barry.mcauley@doeni.gov.uk

Your reference: 45457 IBLE 00 300 07

Our reference: TP/017/3

07-Nov-2007

Dear Carey,

**RE – PROPOSED TYRONE TO CAVAN INTERCONNECTOR – 400KV
OVERHEAD LINE AND SUBSTATION**

Thank you for your letter dated 1st November to Mr Ivan Gregg, outlining your intention to submit an Environmental Statement for the above proposed scheme.

It is assumed that any such assessment will include relevant assessments and evaluations of the impact of the proposals on local air quality and ambient noise levels, for example during construction phase of the scheme.

Comments regarding any likely impacts in relation to noise, potential nuisance and air quality should be sought from the relevant district councils in which the proposed scheme is to be situated. You may also wish to contact these councils in relation to their recent Reviews and Assessments of local air quality.

For information I would advise that all historical air quality data collected on the Department's monitoring networks can be accessed via the Internet at The Northern Ireland Air Quality website at: www.airqualityni.co.uk. Additional air quality data may be available from the relevant district councils.

If I can be of any further assistance do not hesitate to contact me.

Yours sincerely

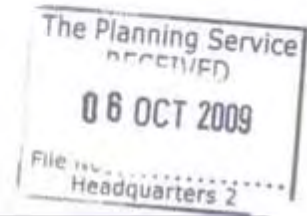
DR BARRY MCAULEY
Air and Environmental Quality
Planning and Environmental Policy Group

b) Built Heritage

Northern Ireland Environment Agency
Historic Buildings Unit
Planning response

to: The Planning Service

Planning Ref: O/2008/0222
HBU Ref: HB15/12/013




subject: PAD for proposed North South Electricity Corridor

NIEA:HBU request further information

164 Trew Mount Rd (HB13/08/070A)
166 Trew Mount Rd (HB13/08/070B)
142 Moy Rd (HB13/08/077)
Gate Lodge For Tullydowey House (HB13/11/039)
Tullydowey House & Gardens (HB13/11/040)
Mullyloughan House/ Glenaul House Tullydowey House (HB15/12/012)

The development proposal has the potential of affecting the setting of the above listed buildings and we would request further information regarding proximity of the proposed line and exact position of the proposed towers in relation to the existing Listed Buildings


Anne Menary
NIEA:HBU

Date: 01/10/2009

CHECKED BY	Initials	Date
HMH		1-10-09

Northern Ireland Environment Agency
Historic Buildings Unit
Planning response

to: The Planning Service

Planning Ref: **O/2008/0822**
HBU Ref: **HB15/12/013**

subject: **Lands within Armagh District council and Dungannon District Council PAD
for proposed North South Electricity Corridor**

NIEA:HBU would request further information.

In Chapter 3 **Planning and Development context** page 3 states that the impact of the proposals are fully addressed in chapter 12 Archaeology and Cultural heritage. We would be grateful to receive this chapter and also a list of listed historical buildings whose setting may be affected by the electricity corridor.

WE DID NOT RECEIVE CH. 12, PLEASE FORWARD
TO HBU.

.....
Anne Menary
NIEA:HBU

Date: 18/08/09

01 SEP 2009

CHECKED BY	Initials	Date
✓ Hm14		18-08-09



The Divisional Planning Office has received the above planning application. Please enter your comments below and return this form as soon as possible but not later than 20th January 2009. All drawings should be returned with your reply. If the application goes to appeal then a copy of your reply will be made available, if requested by the appellant or his agent.

T.
C.

Yours sincerely

For Divisional Planning Officer

COMMENTS (Continue overleaf if necessary)



Signed: *Colin Kelly*

Dated: 21/12/08

NIEA/HBU COMMENT

In order to be able to comment properly on these proposals, NIEA/HBU require :-

- [1] A map and site plan showing the physical relationship of any proposed construction of substations etc. to any Listed Building.
- [2] Also HBU need to know the critical positioning of any pylons etc. in relationship to any listed buildings. The drawings and maps submitted so far do not give this information.
- [3] It is the responsibility of the Applicants Agent to locate any listed Building which might be affected by the proposals.

R.D. Buchanan
(Conservation Architect)

12th February 2009

DC5010/MW



**ENVIRONMENT
AND HERITAGE
SERVICE**

www.ehseri.gov.uk

Julie McDowell
Faber Maunsell/Aecom
1st Floor
24 Linenhall Street
Belfast
BT2 8BG

Job Ref:	ASH57 18LE
Payor Mo:	Belfast
Received by:	Jmcj JMD
DC/dc	
KH	
Date:	28 JUL 2006
Accepted by:	
Date:	
Copy to:	
Filing Location:	00 301

The Built Heritage
Waterman House
5-33 Hill Street
BELFAST
BT1 2LA
Tel: 028 9023 5000
Fax: 028 9054 3111

26 July 2006

Dear Ms McDowell

**RE. PROPOSED TYRONE/CAVAN INTERCONNECTOR – 400KV OVERHEAD
LINE & SUBSTATION**

Your letter of 14 July 2006 to Michael Coulter has been passed to me for reply.

This department has been consulted on this matter by Planning Service HQ on 20 July 2006, ref. O/06/0572, therefore any archaeological issues raised by this application will be sent via Planning Service Headquarters.

EHS: Built Heritage expects the archaeological section of an Environmental Statement to be prepared by a professional archaeologist and to conform to policies contained within PPS 6 and established archaeological practices and procedures.

A properly prepared EIS should identify known remains and provide a strategy for confirming the presence, or absence, of previously unrecognised archaeological remains within the application site. It should assess the impact of development on these remains and propose a mitigation strategy in line with Policies BH 1 – 4 of PPS 6.

The EIS should acknowledge that such mitigation can, and will, only be undertaken by a properly qualified and licensed archaeologist as part of a programme of works agreed with EHS: Built Heritage. In particular it must be recognised that monitoring of topsoil removal alone does not constitute mitigation, but is only an initial stage in the process of investigation and recording or preservation of remains.



An Agency within the Department of the
Environment
www.ehseri.gov.uk

The Environmental Statement should present the archaeological issues so that they may be understood by those who do not have specialist knowledge. Much of the information needed is available free of charge by consulting the N. I. Monuments and Buildings Record, at Built Heritage: EHS, Waterman House, 5-33 Hill Street, Belfast (see attached leaflet). Where Planning approval is granted, which is conditional on the implementation of an agreed programme of archaeological works, the EIS can provide a cost-effective basis for preparing and commissioning such works.

Yours sincerely



Brian Williams (Dr)

Cc M Coulter
J O'Neill

We have today received your letter + enclosures of 19 July.
Brian



**ENVIRONMENT
AND HERITAGE
SERVICE**
www.ehfsni.gov.uk

Ms Julie McDowell
Principal Environmental Scientist
Faber Maunsell
1st Floor
24 Linenhall Street
BELFAST
BT2 8BG

The Built Heritage
Waterman House
5-33 Hill Street
BELFAST
BT1 2LA
Tel: 028 9023 5000
Fax: 028 9054 3111

19 July 2006

Dear Ms McDowell

**PROPOSED TYRONE/CAVAN INTERCONNECTOR – 400 kV OVERHEAD LINE
AND SUBSTATION**

Thank you for your 10 July 2006 to our Director, Mr Michael Coulter, regarding the above.

I would advise that your letter has been passed to Brian Williams who will respond in due course.

Yours sincerely

L. Conroy

PS/MICHAEL COULTER

Job No:	LS457 18LE
Faber Maunsell-Belfast	
Reviewed by:	Jmd JMD
DC dc	
Date:	24 JUL 2006
Actioned by:	
Date:	
Copy to:	
Filing Location:	00 301

T022_LMC.doc



Planning Ref: O / 2008 / 0822 / Q
NIEA: HMU Ref: SM 11 / 1 Arm 7,11,12,15,16,19. Tyr 61,62
Site: PAD for proposed North-South Electricity Interconnector. Lands within Armagh District Council and Dungannon Borough Council.
Date: 16/10/2009

The proposed development passes through an archaeologically sensitive location, where there are several archaeological sites and monuments in proximity. These include the Navan Area of Significant Archaeological Interest which is c. 1km to the east of the application site along with several Scheduled Monuments, all of which are afforded protection under the Historic Monuments and Archaeological Objects Order (Northern Ireland) 1995 and also under the provisions of **Policy BH 1 of PPS 6**. The protection afforded to these monuments under Policy BH 1 of PPS 6 also extends to their setting. Any proposed development which would have an adverse visual and/or physical impact on the setting or views of the monument would provide the basis for refusal of planning permission.

NIEA: Historic Monuments Unit have reviewed the additional information within the cultural heritage section of the Environmental Statement submitted with this application. The amended study area of 5km satisfies our concerns, additionally NIEA: HMU would agree with section 12.6 of the report titled "Mitigation" that further archaeological mitigation will be necessary, in particular, that an archaeological watching brief during all ground works would be required.

Consequently, if a full or outline application should be made for this site, it is likely that NIEA: Historic Monuments Unit would recommend that it should be conditional on the agreement and implementation of a developer-funded programme of archaeological works, to identify and record any archaeological remains in advance of new construction, or provide for their preservation *in situ*, as per **Policy BH 4 of PPS 6**.

If further discussion is required please contact me on 028 90543107.

Gail Howell
Casework Officer

Planning Ref: O / 2008 / 0822 / Q
NIEA: HMU Ref: SM 11 / 1 Arm 7,11,12,15,16,19. Tyr 61,62
Site: PAD for proposed North-South Electricity Interconnector. Lands
within Armagh District Council and Dungannon Borough Council.
Date: 23/01/2009

Before making a final response to this consultation, NIEA: Historic Monuments Unit, requires additional information from the developer to permit an informed and reasonable planning decision to be taken. An archaeological assessment is therefore requested as per Policy BH 3 of PPS 6. Please note that, where this information is requested but not made available to the Department Policy BH 3 would provide a basis for the refusal of planning permission.

The proposed development passes through an archaeologically sensitive area, where there are several archaeological sites and monuments in proximity. These include the Navan Area of Significant Archaeological Interest which is c. 1km to the east of the application site along with eight scheduled monuments, all of which are afforded protection under the Historic Monuments Unit and Archaeological Objects Order (Northern Ireland) 1995 and also under the provisions of **Policy BH 1 of PPS 6**.

NIEA: Historic Monuments Unit would have concerns as to the adverse visual impact of the proposed development upon the setting and integrity of monuments within proximity and also the potential impact upon previously unrecorded below ground archaeological remains associated with these sites and monuments. Greater certainty, as to the potential adverse impact would be provided with the results of an archaeological assessment (carried out by a qualified archaeologist), to include a section on visual impact, and is requested as per **Policy BH 3 of PPS 6**. Please note that, where such information is requested but not made available Policy BH 3 would provide for the Department a basis for the refusal of planning permission.

In determining the visual impact of the development, the study area of 500m, as referred to in Section 12.2.1 b of the Environmental Impact Statement submitted, would prove inadequate to ascertain the full impact upon the landscape and historical context of monuments in the vicinity of the development. A scaled map indicating the positioning of the proposed electrical pylons in relation to the archaeological sites and monuments, included with the visual impact assessment, would assist in determining this impact, with the known monuments referenced using the Monuments and Buildings Records reference numbers.

If further discussion is required please contact me on 028 90543107.

Gail Howell

Gail Howell
Casework Officer

27 JAN 2009

c) Countryside and Coast

Faber Maunsell
1st Floor
24 Linenhall Street
Belfast BT2 8BG

Job No	LS45718E
Faber Maunsell Belfast	
Reviewed by	CO D
Date	08 NOV 2007
Approved by	
Date	
Copy to	
Filing Location	

Your ref:
Our ref: C271
5/11/07

Dear Sir/Madam,

Re: Proposed Tyrone to Cavan Interconnector – 400 kV Overhead Line and Substation.

Thank you for your letter of 1/11/2007 which was received in this office on 5/11/2007.

The content of your correspondence has been noted and any follow up action which may be required will be carried out as soon as possible.

Yours sincerely *E. McAuley*

E. McAuley
Countryside and Coast

Countryside and Coast

Ms J Mc Dowell
Faber Maunsell
1st Floor
24 Linenhall Street
Belfast
BT2 8BG



Commonwealth House
35 Castle Street
BELFAST
BT1 1GU
Tel: 028 9054 1477
Fax: 028 9054 6660

Del No: 45457 1BLE
Deliver Maunsell Belfast
Delivered by: JMS JMS
BSBS
17 JUL 2006
00301

Your ref: 45457IBLE 00 300
06 (10.07.06) letter

Our ref: C271

Date 17th July 2006

Dear Ms Mc Dowell

RE: Proposed Tyrone / Cavan Interconnector 400 kV Overhead line & Substation

Thank you for your letter dated 10th July 2006.

Environment and Heritage Service, Natural Heritage (EHS), does hold some site specific information at this time – please see below.

However, I would advise that you carry out a search for information on the recommended websites, details attached. These may contain relevant information.

I have also enclosed advice on the scope of work that EHS considers necessary for Environmental Impact Assessment.



Protect Conserve and Promote the Natural and Built Environment



On completion of the scoping report I would recommend that you contact EHS to discuss the definition and methodologies of the baseline surveys required. Specifications for surveys can be provided on request.

If you have any queries or would like to discuss any of this advice please contact me directly. Please quote the EHS reference number with your enquiry.

Yours sincerely



A. Warwick
Higher Scientific Officer

Results of EHS Search – Ref C271

Date 17th July 2006

Site specific information

From the data EHS holds at this time for the proposed route corridors, on a north to south direction, the nearest designated areas are:

- Drumcrow, Peatlands, Benbulbin, Annacramph Meadow, Killatinnit Loughs, Straghans Lough, Crossbane and Druncarn Areas of Special Scientific Interest
- Argory Mosses and Benbulbin/Milltown Sites of Local Nature Conservation Importance
- with numerous recorder sites throughout

Additional sources of information which may be relevant

1. Environment and Heritage Service website www.ehs.gov.uk includes:
 - Details of all regional, national and international designated sites in Northern Ireland
 - Northern Ireland Biodiversity Strategy
 - Northern Ireland Biodiversity Action Plans
 - Areas of Outstanding Natural Beauty
 - Landscape Character Areas
 - Environmental Legislation
2. Details of important geological and geomorphological features throughout Northern Ireland are available through CEDaR on the Habitas website at <http://www.habitas.org.uk/esr/>

General Scoping Guidance

This information is **illustrative** and is not intended to be a definitive statement of the environmental information to be included in the Environmental Statement (ES). It is recommended that the developer remain in contact with EHS throughout the process of Environmental Impact Assessment (EIA) and production of the ES.

General Points:

- The scoping study phase of the EIA should identify the **key topic areas** where the proposal has the potential to cause either adverse or beneficial effects on the environment.
- The range and extent of direct and indirect impacts on flora and fauna must be considered, both during and post construction, and in the short and long term.
- The EIA should consider direct effects on landscape and public perception of change.
- A combination of landscape assessment and visual assessment should be used.
- Cumulative impacts on flora, fauna and landscape of proposed and existing structures.

Flora and Fauna

The EIA should cover both habitats and species of flora and fauna (especially protected species). It should include both the proposed site and its surroundings.

- The extent of the ecological baseline must be established and the nature of further survey work must be established. A habitat survey (i.e. JNCC phase 1) to permit identification of areas which are likely to be of high

nature conservation value or particularly vulnerable to impact from the proposal. The survey must cover flora and fauna present in all seasons.

- Following from this, the extent and nature of any further survey work that may be needed should be identified. Areas thus identified should be subject to more detailed survey i.e. JNCC Phase 2. In case of flora, this should identify species from all plant groups, which form a significant part of the vegetation, not just higher plants. Survey must cover flora and fauna in all seasons. Fauna surveys should include a full bird survey. The timing of surveys is critical and must be carried out at appropriate times of year.
- Baseline surveys conducted over a short period may not identify long term trends and reference should be made to previous records.

Landscape

Landscape is a fundamental component of the wider environment and is not just associated with a limited number of designated areas of particular scenic value such as Areas of Outstanding Natural Beauty.

General points:

- Establish the current landscape designation and policies covering the site and its surroundings.
- Details of local landscape character of the site and its surroundings.
- Establish where the potential zone of influence for the development and its associated infrastructure will extend to, including combination effect with established development.
- In combination the information should establish the potential landscape key issues and the areas requiring further investigation during the baseline studies. (See *Guidelines for Landscape and Visual Impact Assessment*, The Landscape Institute and the Institute of Environmental Management and Assessment. Spon Press, London 2002).

5

Impact on Local Hydrology

The consequences of changes to the hydrogeological system on peatland, rivers, streams and wetland habitats should be established.

Mitigation Measures

Opportunities for reducing identified negative environmental impacts of the proposal by mitigation should be established.

d) Land and Resource Management

Your Ref. O/2008/0822/Q
Our Ref. PLAN 1/2319

Mr A Moore
Headquarters
Millennium House
17-25 Great Victoria Street
Belfast
BT2 7BN

27 August 2009

01 SEP 2009

Dear Mr Moore

RE: PAD FOR PROPOSED NORTH-SOUTH ELECTRICITY INTERCONNECTOR ON LANDS WITHIN ARMAGH DISTRICT COUNCIL AND DUNGANNON BOROUGH COUNCIL

Thank you for consulting with the Land & Resource Management (LRM) Unit in regard to the proposed planning application for an electricity interconnector at the above site.

The priorities of the LRM Unit in assessing this proposed planning application are to consider the potential for contamination to be present at the site that could impact on environmentally sensitive receptors including groundwater, surface water, and health. However, it should be noted that the Councils are the authoritative bodies with respect to environmental health matters and we would ask that you ensure they have an opportunity to comment on all relevant information.

It is noted that the applicants have already received the results of a Land Use Database search from NIEA and are aware that there are current and former industrial uses in the vicinity of the interconnector route. Based on available information, these current and former activities may have caused land to be affected by contamination. It is recommended that it is highlighted to the applicant during any pre application discussion that if the work area for the interconnector intercepts any of these sites, or any other potential contamination is encountered, that NIEA would expect to receive the following information for consultation on any planning application submitted for this site:

- (i) A suitable desk study that details the site's history and a conceptual site model that identifies all possible pollutant linkages. This investigation should provide sufficient information to identify the former land-uses of the site, the potential sources of contamination, all receptors, geology and hydrogeology, etc;
- (ii) Depending on the outcome from (i) above, the applicant should consider the need for further work including intrusive site investigations / monitoring, and risk assessment at the application stage that details how the risks will be managed in the development of this site. (It is noted that the Environmental Statement

submitted by the applicants makes reference to the possible need for intrusive site investigations if potential contamination is encountered in the work area.)

- (iii) In the event of unacceptable risks being identified in (ii) above, then a suitable remediation strategy will need to be submitted at the application stage.

Further details on the contaminants that may be associated with different types of land use can be found in the DOE Industrial profiles available from <http://www.environment-agency.gov.uk/research/planning/33708.aspx>. Also, it is recommended that all further risk assessment and risk management work follows the UK technical framework as described in the Model Procedures for the Management of Land Contamination (CLR11) (www.environment-agency.gov.uk/modelprocedures/). As with all potentially contaminated sites, it is imperative that a comprehensive risk assessment is completed with the application that identifies all unacceptable risks given the proposed development plans for the site and if required, a remediation strategy is agreed at the application stage to mitigate these risks.

Should you wish to discuss these comments, or require further clarification, please do not hesitate to contact me.

Yours sincerely



FIONA WILSON
LAND AND RESOURCE MANAGEMENT

Water Pollution

For information related to the protection of waters and records of water pollution incidents please contact the Water Management Unit on 028 92623100.

Industrial Activities

The Industrial Pollution and Radiochemical Inspectorate regulates Part A and B processes. Details of registered premises are listed on the EHS website at <http://www.ehsni.gov.uk/pollution/ipc.htm>. For further details please contact Industrial Pollution and Radiochemical Inspectorate on: 028 9056 9296
Part C processes are regulated by the local council, and it is recommended you contact them for further information.

Natural Heritage

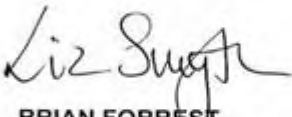
For enquiries related to the Natural Heritage Directorate (including ecology, nature conservation and designated sites) in EHS, please contact 028 9056 9566

Built Heritage

For enquiries related to the Built Heritage Directorate (including archaeology, historic monuments and listed buildings) in EHS please contact 028 90543095.

I hope this information is of use, and should you require further assistance on this matter, please do not hesitate to get in touch.

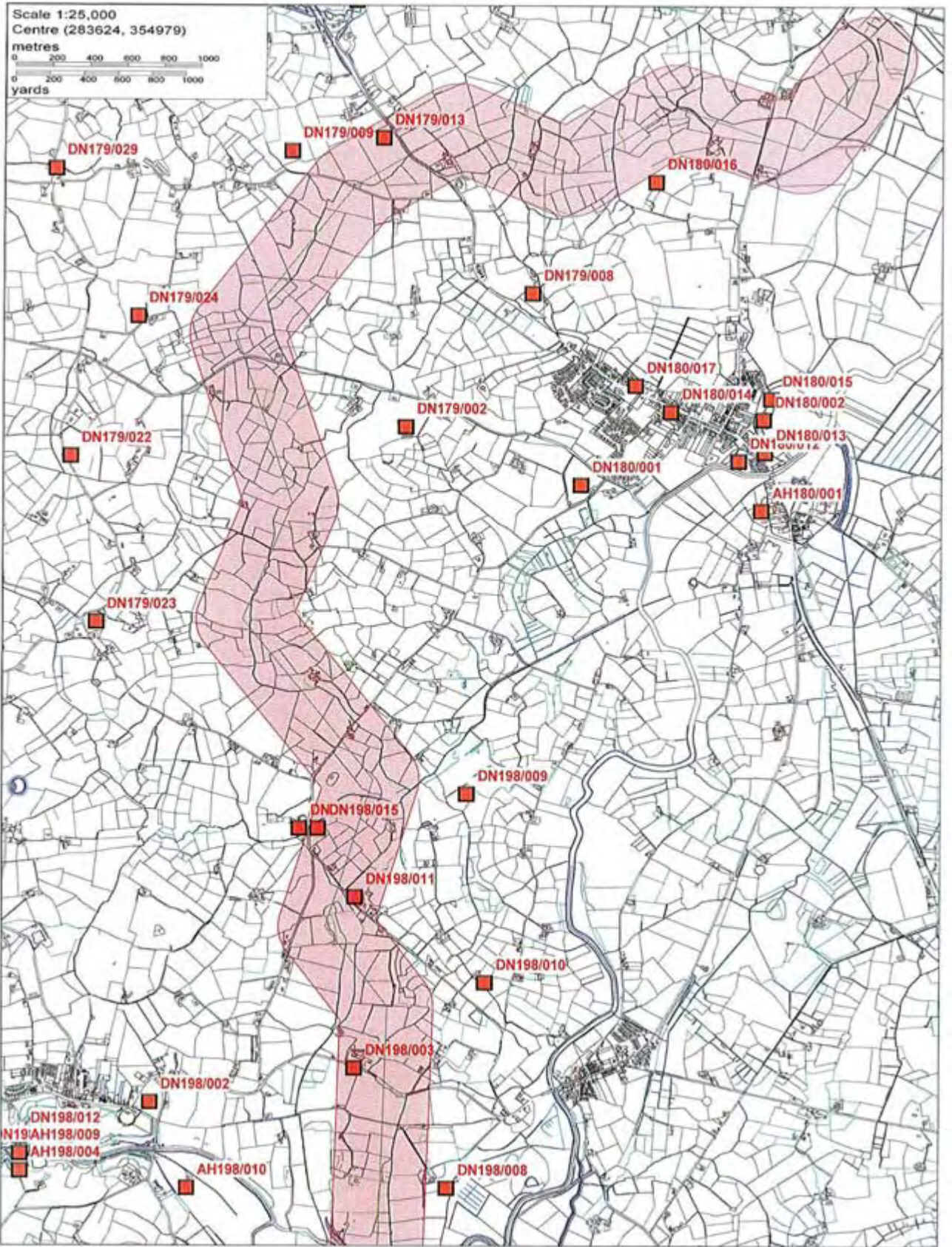
Yours sincerely

PP 

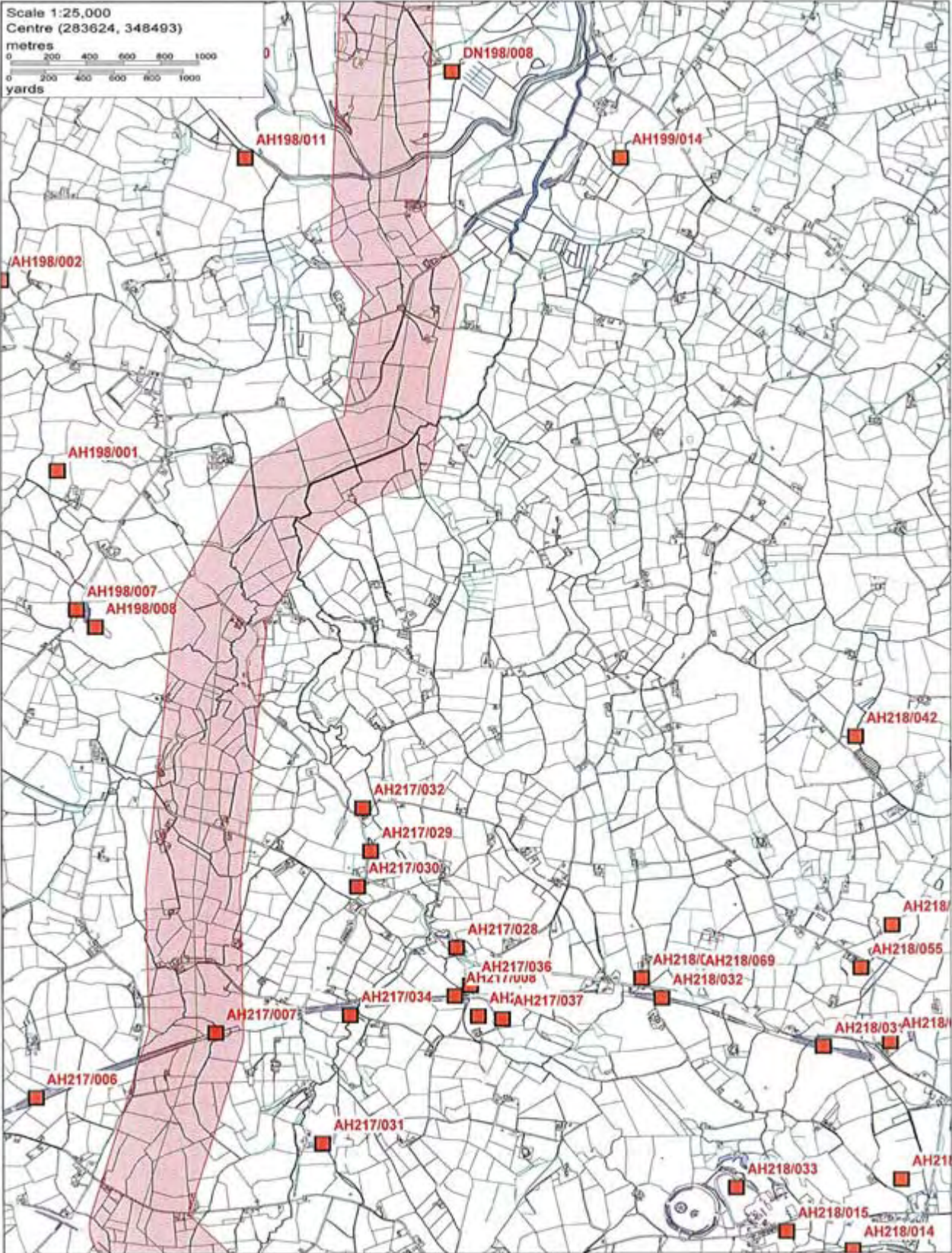
BRIAN FORREST
Land and Resource Management

Direct dial 028 905 69348
Direct fax 028 905 69376

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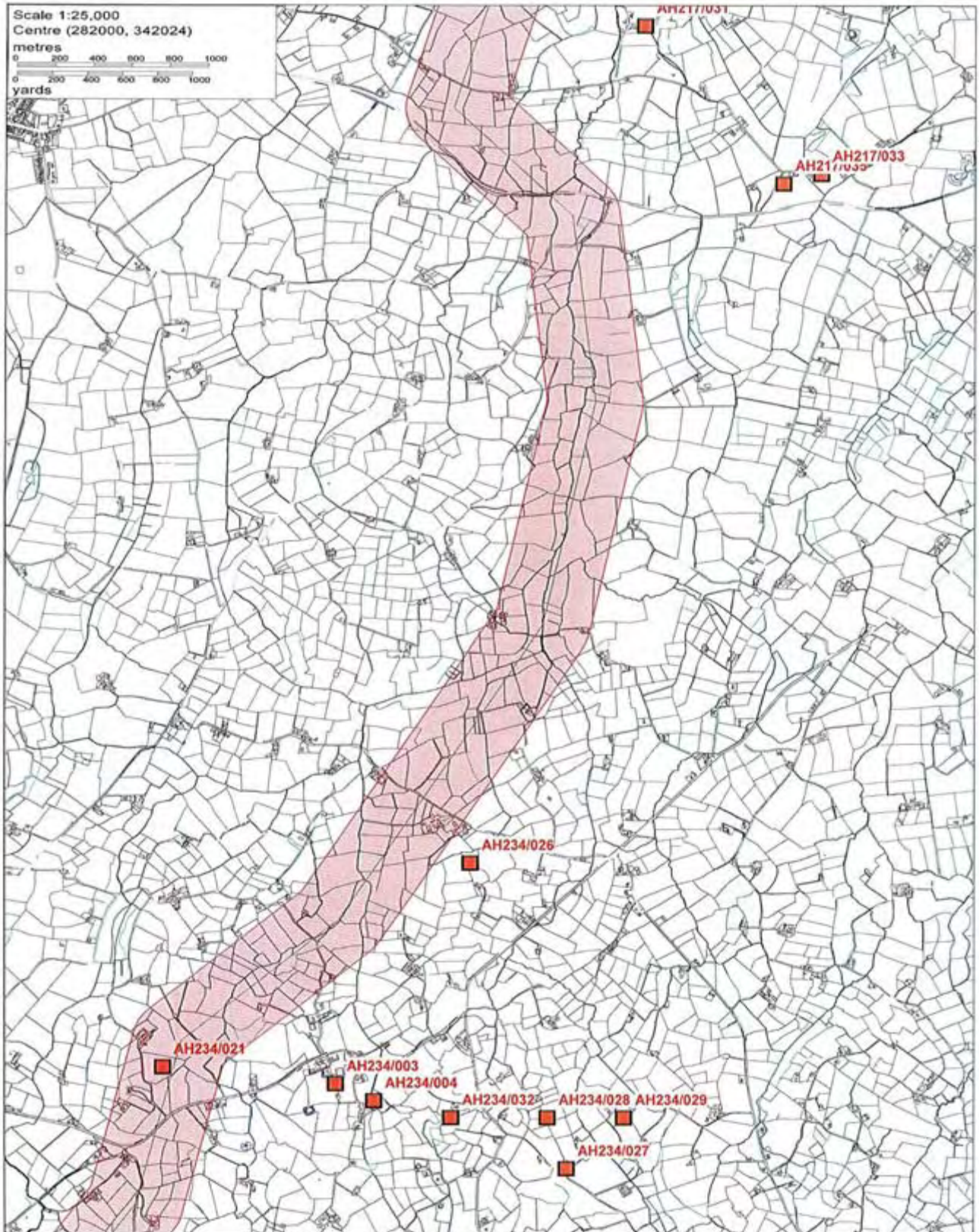


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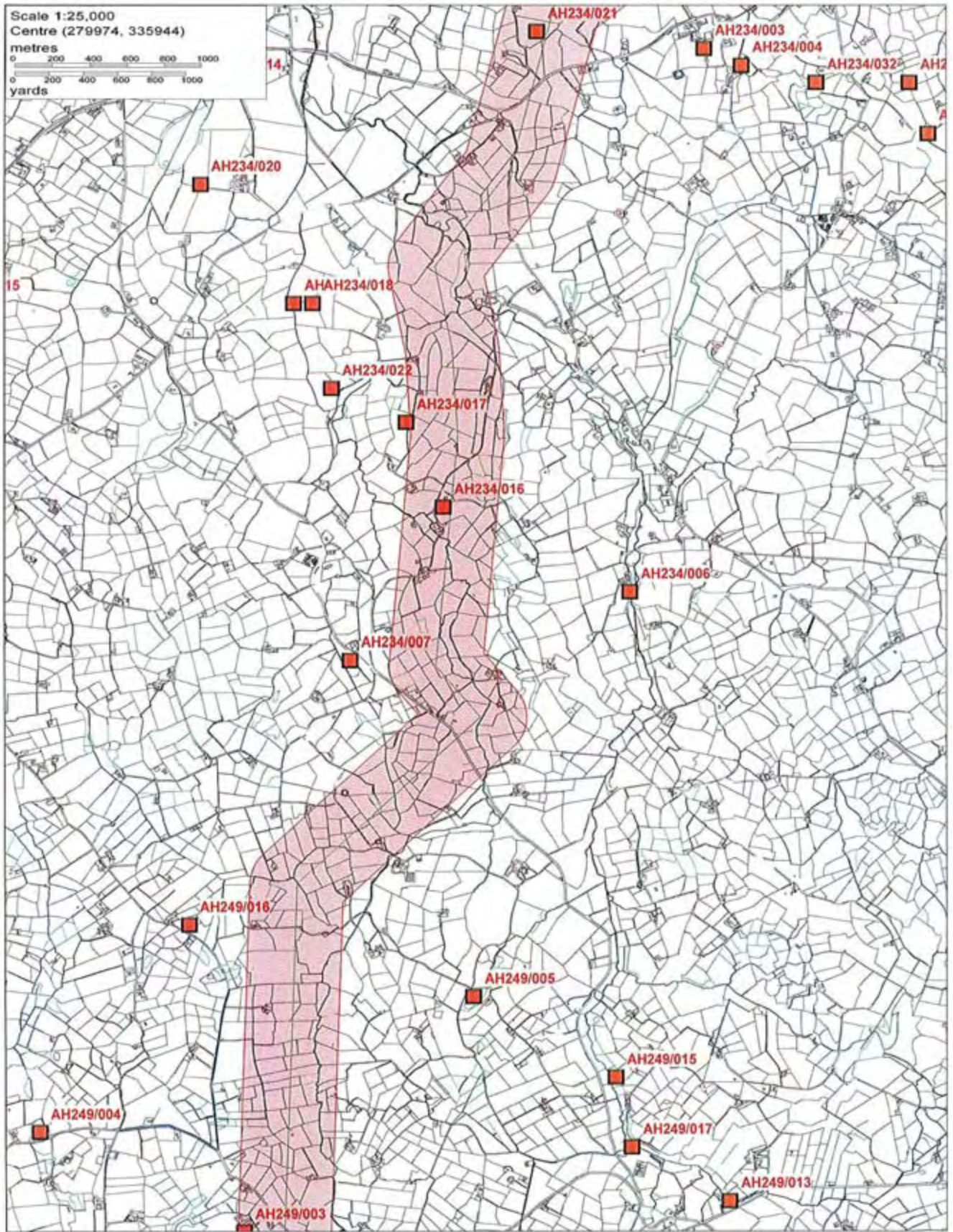


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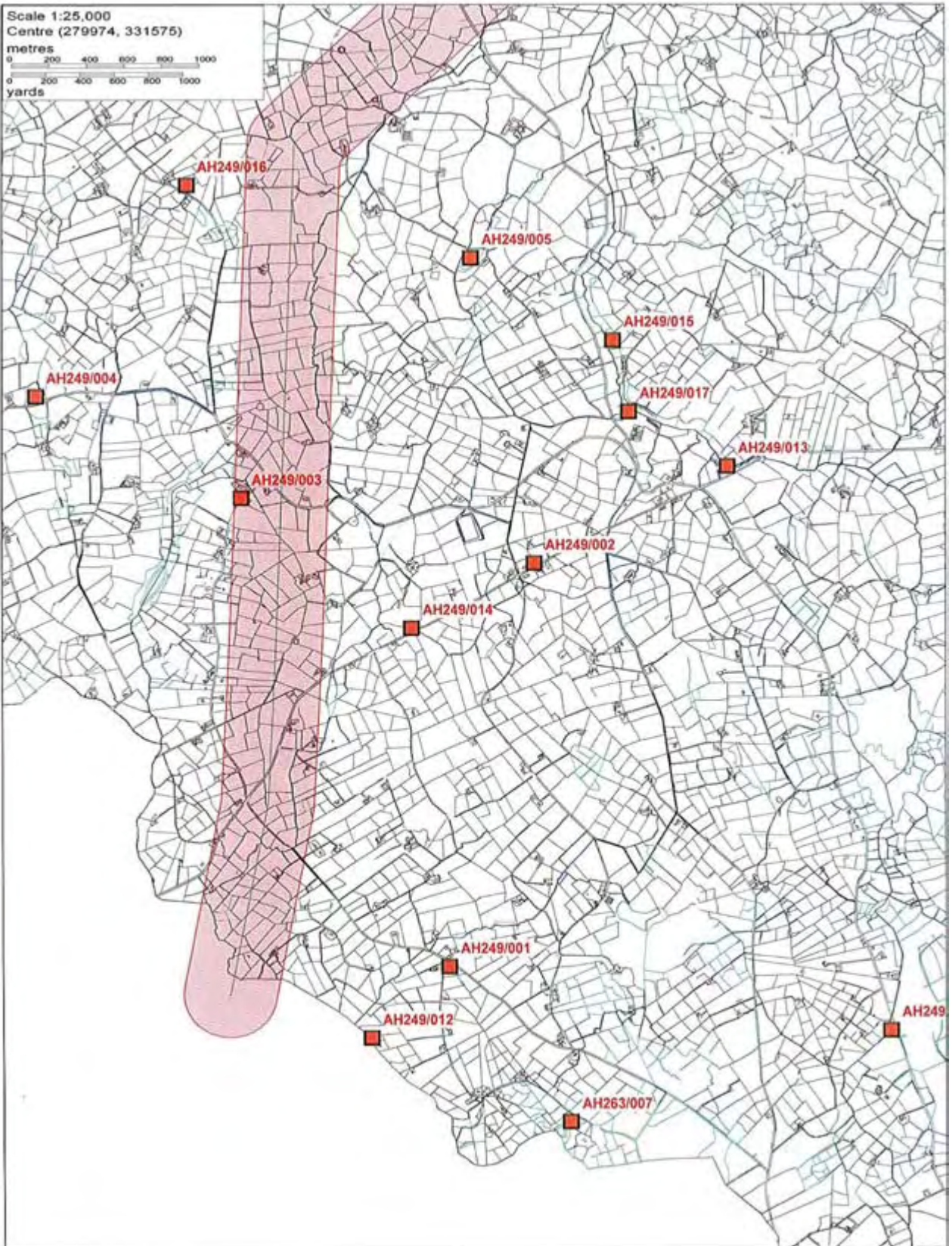


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Site Number	Borough	Grid Ref	Address	Description	History	1830 Land Use	1856 Land Use	1884 Land Use
AH249/003	Armagh	787.323	Listalkait Road	Petrol Station/Fuel Storage	1983 Filling Station	Unspecified Building	Unspecified Building	Agriculture
AH234/016	Armagh	798.366	Drummond TD	Teatiles	Unspecified Buildings	Flax Mill	Flax Mill	Agriculture
AH234/021	Armagh	803.394	Ugguynn TD	Reclaimed Land	Agriculture	Quarry	Quarry	Agriculture
AH217/007	Armagh	822.461	Lisdown TD	Railway Land	Railway line (Disused)	Railway Line	Railway Line	Agriculture
DN198/003	Dungannon	830.424	Confeacle Road	Mineral Workings	1977 Concrete Works	Agriculture	Unavailable	Agriculture
DN198/015	Dungannon	828.638	Dumilee TD	Teatiles	1977 Agriculture	Agriculture	Flax Mill	Agriculture
DN198/011	Dungannon	830.534	Dumilee TD	Reclaimed Land	1977 Unspecified	Gravel Pits	Unavailable	Agriculture
DN178/013	Dungannon	831.578	Drumgodd TD	Reclaimed Land	Agriculture	Agriculture	Agriculture	Gravel Pit

Our ref: LQ 34-1
Your ref:45457IBLE 00 300 06 (10.07.06) Letter

Date: 27 July 2006

Ms Julie McDowell
Faber Maunsell
1st Floor
24 Linenhall Street
Belfast
BT2 8BG

Job No: 45457 IRLE
Faber Maunsell-Belfast
Reviewed by: J.McD. (J.McD.)
Date: 31 JUL 2006
Actions by:
Date:
Copy to:
Filing Location: 00 301

Commonwealth House
5 Castle Street
Belfast BT1 1GU
Email: info@doeni.gov.uk

It may be beneficial to contact those noted @ encl.

Dear Ms McDowell,

LAND USE DATABASE – TYRONE-CAVAN INTERCONNECTOR

Thank you for your letter of 10th July 2006 requesting available information on land at various locations relevant to the proposed Tyrone Cavan Interconnector- 400kv overhead line and substation.

Enclosed are details of the current and previous industrial uses for these parcels of land and the surrounding areas that are available on the Environment Heritage Service' (EHS) Land Use Database.

This EHS Database was developed in 1997 and contains details on approximately 12,000 sites within Northern Ireland. However this information has not been fully validated, and details are provided on a "without prejudice" basis. A programme of work is being initiated to update the information currently held within the EHS Land Use Database with a longer-term view of transferring this data to a GIS based system.

Further information on the industrial processes and materials for these site classifications that may cause the land to be affected by contamination are available in the relevant DoE Industrial Profiles (see listing attached - copies are available from www.environment-agency.gov.uk/subjects/landquality/).

In assessing potential risks to health and/or the environment, it is recommended that the UK technical framework for risk management published by Defra and the Environment Agency in the Model Procedures for the Management of Land Contamination is adopted - available in PDF format, free of charge from <http://www.environment-agency.gov.uk/modelprocedures/>.

To ensure future consultations of this type can be dealt with efficiently and promptly it may be beneficial to amend your list of consultees to include the separate sections of Environmental Protection ie Water Management Unit (Contact Mark Carswell) and Land and Resource Management (Contact Liz Smyth) and also the DoE (NI) Environmental Policy Group, Air and Environmental Quality Unit (Contact Ivan Gregg).

I hope this information is of use, and should you require further assistance on this matter please do not hesitate to get in touch.

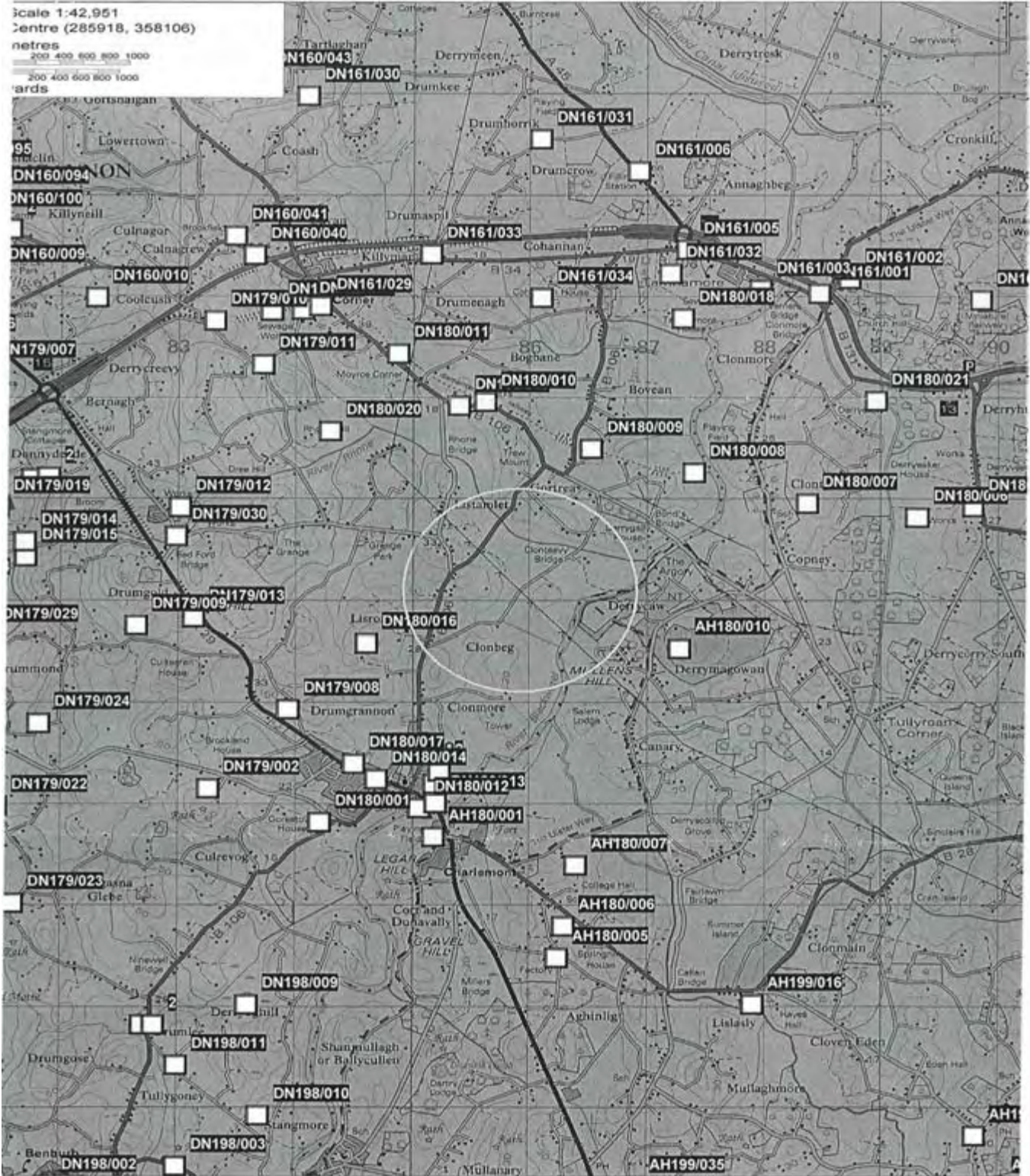
Yours sincerely,



BRIAN FORREST
Land and Resource Management

Direct dial: 028 9054 6748
Direct fax: 028 9054 6480

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e) Natural Heritage

Mr A Moore
Planning Service
Planning Service Headquarters
Millennium House
17-25 Great Victoria Street
Belfast
BT2 7BN

Date: 2 September 2009
Telephone: 028 905 69615
Your Ref: O/08/0822
Our Ref: 16506-3

PAD

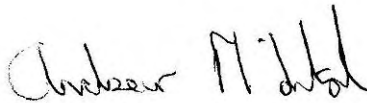
RE: PAD for proposed North South Electricity Interconnector
Location: Lands within Armagh District Council and Dungannon Borough Council

Dear Mr Moore

I refer to your consultation letter for the above planning application which was received in this office on 19 August 2009. We acknowledge receipt of the following chapters of the Draft Environmental Statement: 2, 3, 4, 7 and 13.

Following meetings with the applicant we are aware that Bat surveys, which were requested in our response dated 27 January 2009, are currently on-going. We understand that because of the scale of the proposal, it will only be possible to complete the bat surveys by 2010. However we understand that bat surveys of the most suitable habitat for bats, and potential roosts are nearing completion, and will be submitted in the form of a report in October 2009.

We would like to defer comment at this stage, until we formally receive a report detailing the 2009 bat surveys through Planning Service.



Andrew Mc Intosh
On behalf of NIEA: Natural Heritage

Faber Maunsell
1st Floor
24 Linenhall Street
Belfast
BT2 8BG

Job No	45457 1BLE
Project	Faber Maunsell-Belfast
Issued by	J.M.D. J.M.D.
CD	CD
CL	CL
Date	02 JUN 2008
	Am
	02/06/08
	00600

29th May 2008

Dear Ms Doyle,

RE: PROPOSED TYRONE TO CAVN INTERCONNECTOR – 400Kv OVERHEAD LINE SUBSTATION

Thank you for your letter on the 1st November 2007 to the Environment and Heritage Service which was received on 5th November 2007.

Environment and Heritage Service, Natural Heritage (EHS), does hold some site specific information at this time (see below). The scheme includes and may have an adverse impact designated Areas of Special Scientific Interest and priority wetland habitats. Please see attached maps. We are concerned that the scheme may impact the hydrology of the area and this will in turn impact on priority fen habitat. These potential impacts should be included in the EIA. The River Black water is also included in the scheme. This River and its tributaries contain Species of Conservation Concern (SOCC) and Priority Species. Potential impacts on the River Blackwater should also be included in the EIA.

I would advise that you carry out a search for additional information on the recommended websites, details attached. These may contain relevant information.

I have also enclosed advice on the scope of work that EHS considers necessary for Environmental Impact Assessment in respect of development sites

It is recommended that you contact EHS to discuss the definition and methodologies of the baseline surveys required. Specifications for surveys can be provided on request.

If you have any queries or would like to discuss any of this advice, please contact me directly. Please quote the EHS reference number with your enquiry.

These maps are included with this letter.



Jennifer Firth
On behalf of EHS, Natural Heritage

Results of EHS Search – Ref CB 14478

Date 29th May 2008

Site specific information

The scheme includes area of high nature conservation value and is also near to Areas of Special Scientific Interest (ASSI). Please see maps included with this letter.

Additional sources of information which may be relevant

1. Environment and Heritage Service website www.ehnsi.gov.uk includes:
 - Details of all regional, national and international designated sites in Northern Ireland
 - Northern Ireland Biodiversity Strategy
 - Northern Ireland Biodiversity Action Plans
 - Areas of Outstanding Natural Beauty
 - Landscape Character Areas
 - Environmental Legislation
2. Details of important geological and geomorphological features throughout Northern Ireland are available through CEDaR on the Habitas website at: <http://www.habitas.org.uk/escr/>
3. Details of Recorder sites can be obtained from CEDaR, these can be accessed by contacting the Ulster Museum, 12 Malone Road, Belfast BT9 5BN. Envelopes should be marked 'Info request' to CEDAR.

General Scoping Guidance

This information is **illustrative** and is not intended to be a definitive statement of the environmental information to be included in the Environmental Statement (ES). It is recommended that the developer remain in contact with EHS throughout the process of Environmental Impact Assessment (EIA) and production of the ES.

General Points:

- The scoping study phase of the EIA should identify the **key topic areas** where the proposed development has the potential to cause either adverse or beneficial effects on the environment.
- The range and extent of direct and indirect impacts on flora and fauna must be considered, both during and post construction, and in the short and long term.
- The EIA should consider direct effects on landscape and public perception of change.
- A combination of landscape assessment and visual assessment should be used.
- Cumulative impacts on flora, fauna and landscape of proposed and existing structures.

Flora and Fauna

The EIA should cover both habitats and species of flora and fauna (especially protected species). It should include both the proposed site and its surroundings.

- The extent of the ecological baseline must be established and the nature of further survey work must be established. A habitat survey (i.e. JNCC phase 1) to permit identification of areas which are likely to be of high nature conservation value or particularly vulnerable to impact from the proposed development. The survey must cover flora and fauna present in all seasons.
- Following from this, the extent and nature of any further survey work that may be needed should be identified. Areas thus identified should be subject to more detailed survey i.e. JNCC Phase 2. In case of flora, this should identify species from all plant groups, which form a significant part of the vegetation, not just higher plants. Survey must cover flora and fauna

115 2011-01-01 10:00:00
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in all seasons. Fauna surveys should include a full bird survey. The timing of surveys is critical and must be carried out at appropriate times of year.

- Baseline surveys conducted over a short period may not identify long term trends and reference should be made to previous records.

Landscape

Landscape is a fundamental component of the wider environment and is not just associated with a limited number of designated areas of particular scenic value such as Areas of Outstanding Natural Beauty.

General points:

- Establish the current landscape designation and policies covering the site and its surroundings.
- Details of local landscape character of the site and its surroundings.
- Establish where the potential zone of influence for the development and its associated infrastructure will extend to, including combination effect with established development.
- In combination the information should establish the potential landscape key issues and the areas requiring further investigation during the baseline studies. (See *Guidelines for Landscape and Visual Impact Assessment*, The Landscape Institute and the Institute of Environmental Management and Assessment. Spon Press, London 2002).

Impact on Local Hydrology

The consequences of changes to the hydrogeological system on peatland, rivers, streams and wetland habitats should be established.

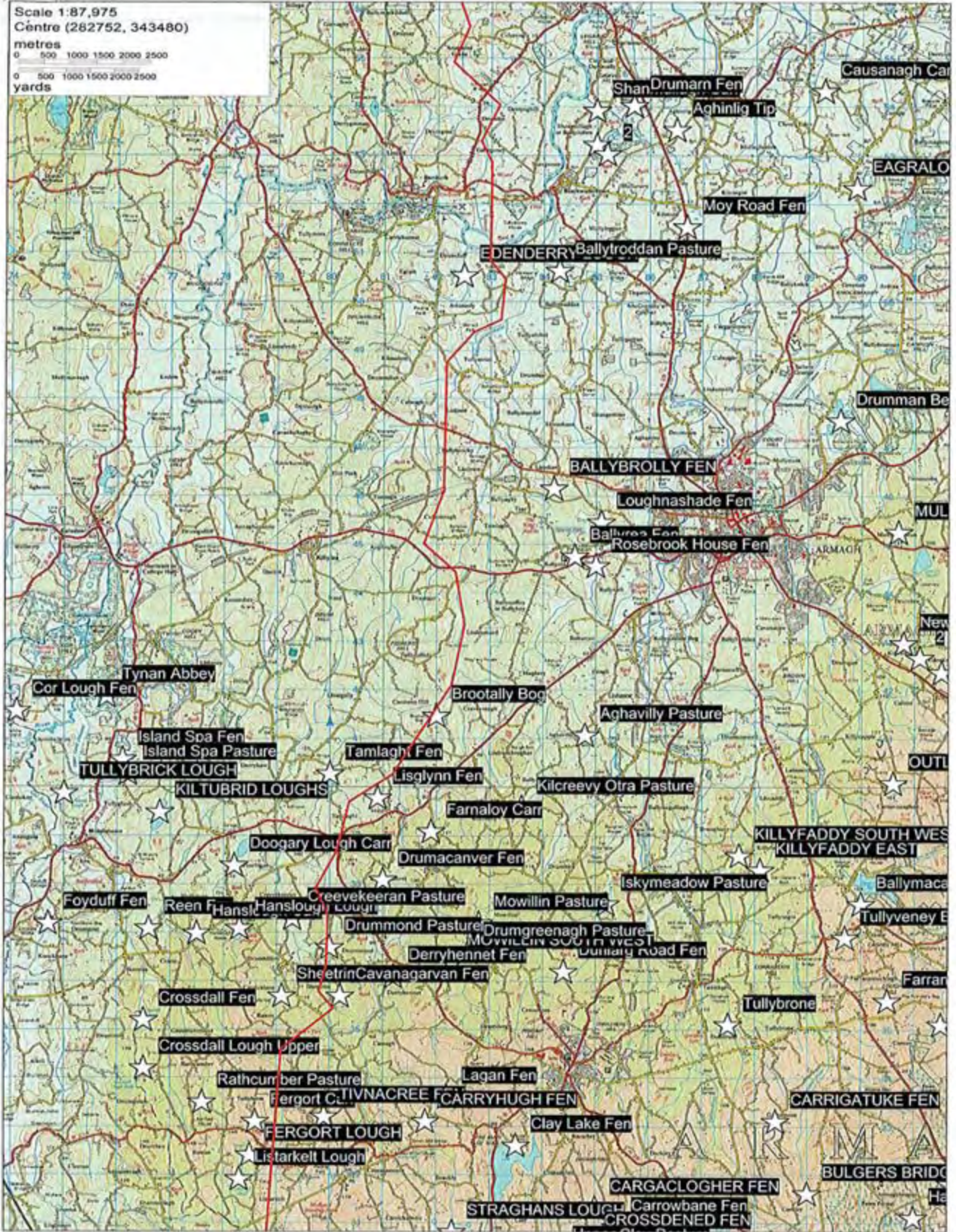
Production of an Environmental Management Plan

An environmental management plan detailing the construction phase should be included. This plan can then be utilized to control the implementation of the development so as to avoid or limit damage to fauna and flora, and should include: a record of pre-construction site conditions, details of how to minimise the environmental impacts of construction activities and the outlining of working practices – see Mitigation Measures below. Method of construction would be specified and provisions for monitoring environmental effects during operation detailed.

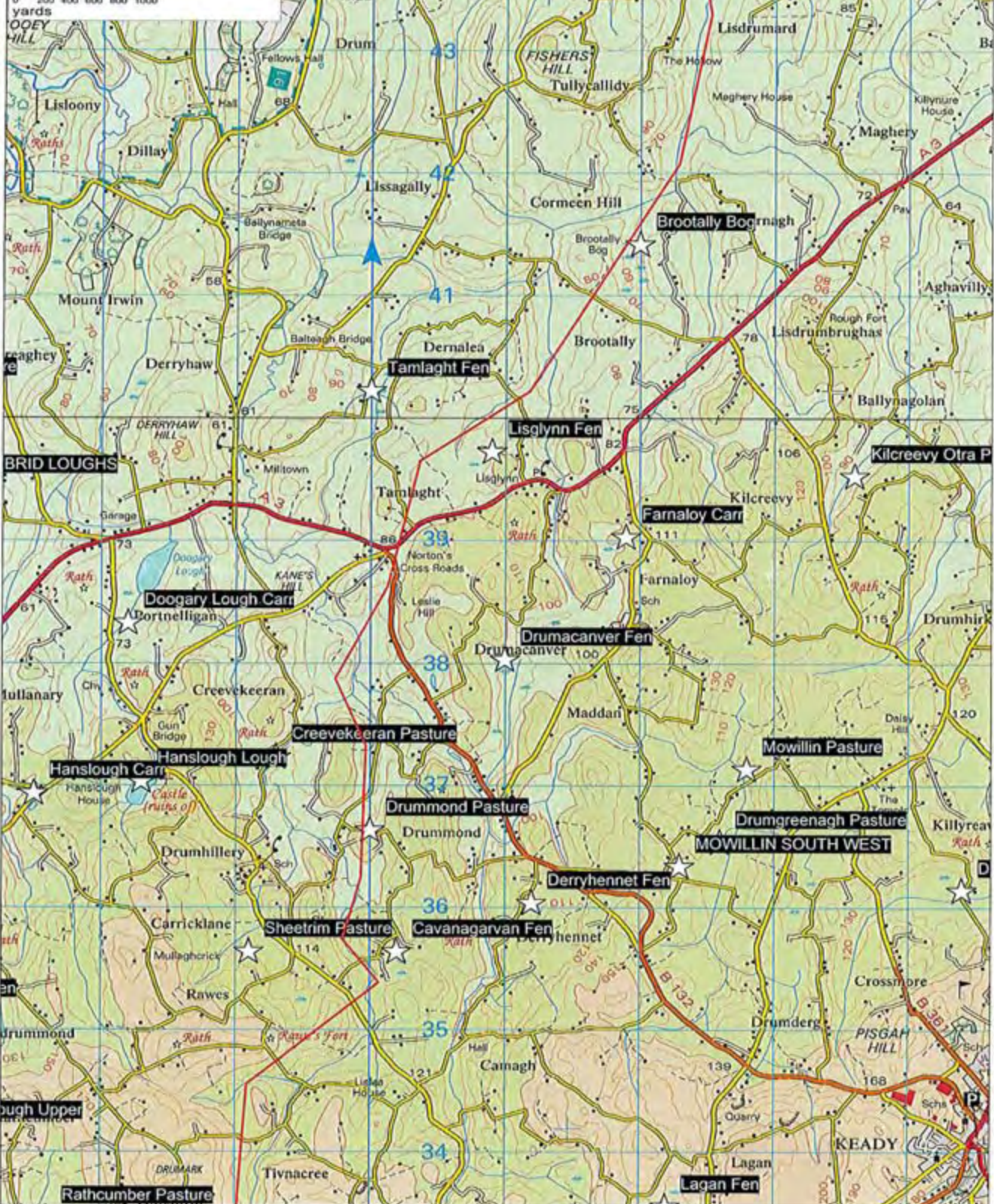
Mitigation Measures

Opportunities for reducing identified negative environmental impacts of the proposal by mitigation should be established.

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**AREAS OF SPECIEAL SCIENTIFIC INTEREST
(ASSI)**

**BENBURB ASSI
CROSSBANE LOUGH
STRAGHANS LOUGH ASSI**

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REHAGHY WOOD ASSI

Knocknacloy

BENBURB ASSI

ANNACRAMPH MEADOW ASSI

Caledon and Tynan

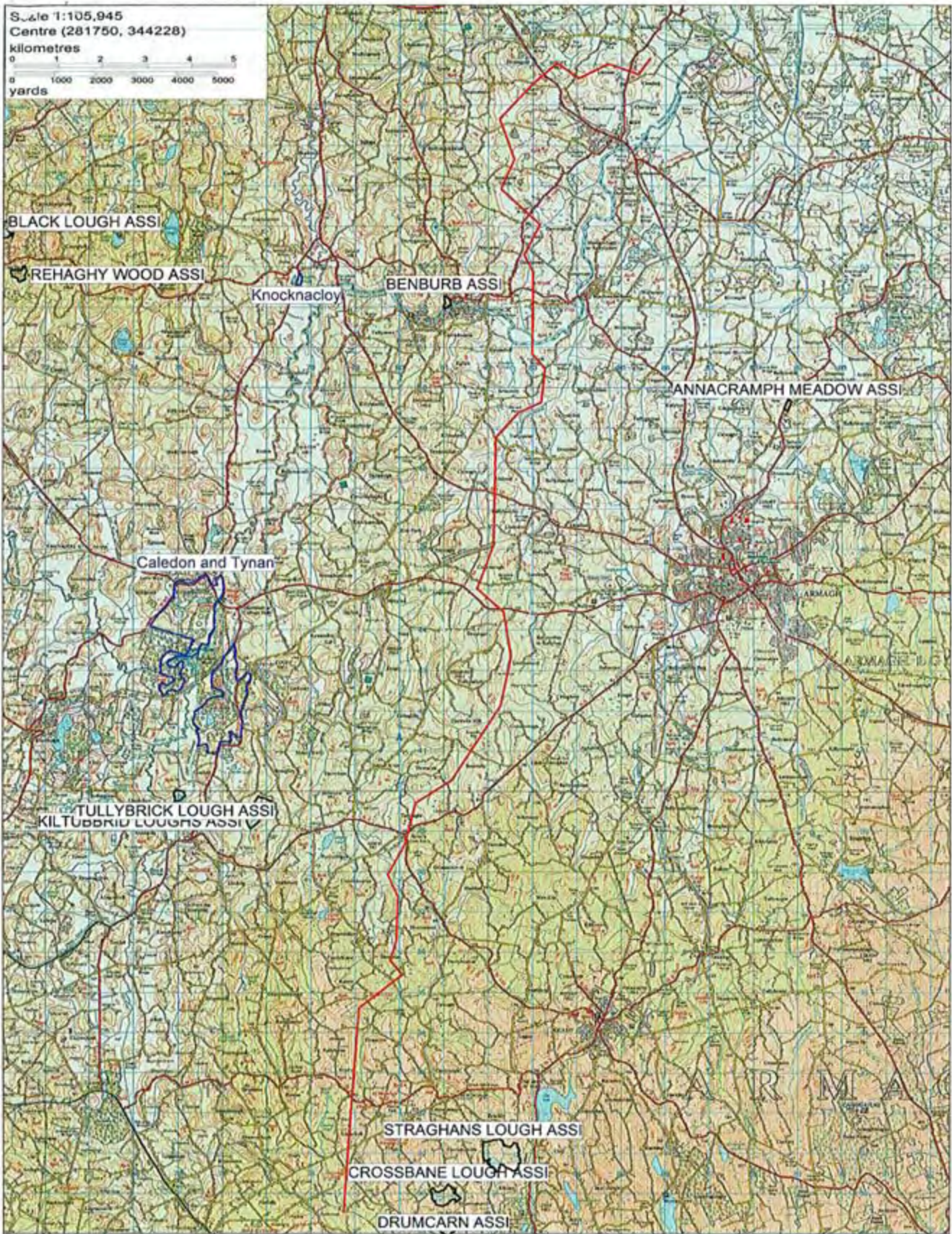
TULLYBRICK LOUGH ASSI

KILTUBRID LOUGHS ASSI

STRAGHANS LOUGH ASSI

CROSSBANE LOUGH ASSI

DRUMCARN ASSI



f) Water Management Unit

Ms Carey Doyle
Faber Maunsell
1st Floor
24 Linenhall Street
BELFAST



Water Management Unit
17 Antrim Road
Lisburn
BT28 3AL

Our Ref: WQU04010

26 November 2007

Dear Ms Doyle

Re: Proposed Tyrone to Cavan Interconnector – 400 kV Overhead Line and Substation

Thank you, for your letter dated 01 November 2007 received by Water Management Unit (WMU) on 05 November 2007 requesting any comments which we may have regarding the proposal detailed above.

As the area covered by the enquiry is so large, WMU has produced 2 maps – see attached;

- **WQU04010 gwwvln.pdf (357 KB)**
- **WQU04010 aquifer.pdf (328 KB)**

If more detailed information is required, you should contact Geological Survey of Northern Ireland (Geological Survey of Northern Ireland (GSNI)), where borehole records and site investigation reports are held.

Further environmental information may be obtained from our website, www.ehsni.gov.uk/environment/waterManage/quality/quality.shtml this includes maps, tables and summaries of data held.

I hope you find this information useful and if you have any queries relating to any aspect of this letter, please do not hesitate to email me at InformationManagement@doeni.gov.uk

Yours Sincerely

Jo Campbell
Water Management Unit



An Agency within the Department of the
Environment
www.doeni.gov.uk

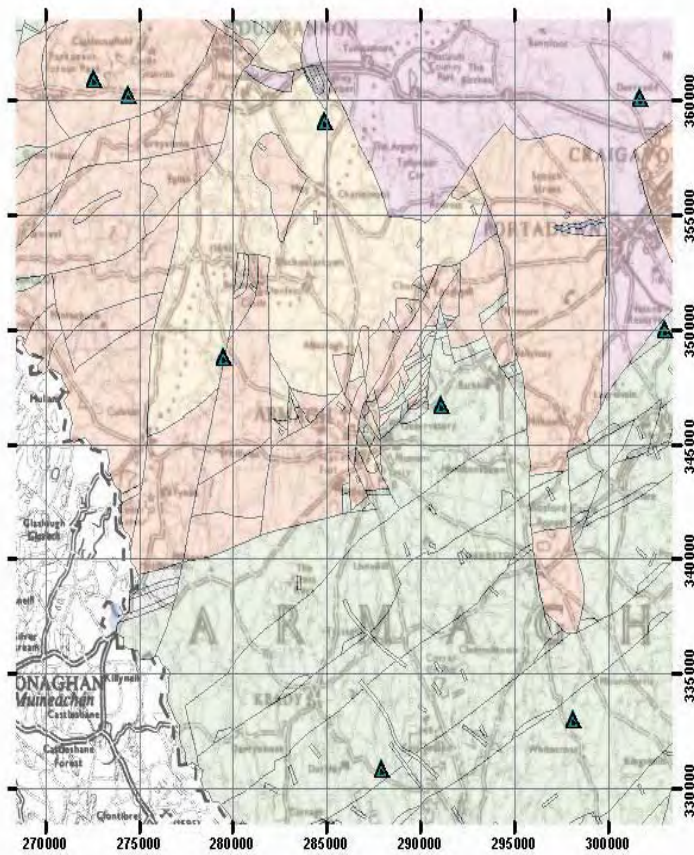


INVESTOR IN PEOPLE

Proposed Tyrone to Cavan interconnector



**Geological Survey
of Northern Ireland**



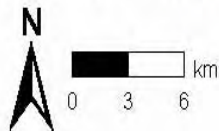
Legend

Bedrock aquifer classification

potential productivity (dominant mode of flow)

- high (fracture)
- high (intergranular-fracture)
- high (fracture-karstic)
- moderate (fracture)
- limited (fracture)
- poor (fracture)
- groundwater quality monitoring wells

This map assists with your site assessment. Please note that it provides regional information only, based on 1:250,000 maps and more detailed geological information is available for consultation at the Geological Survey of Northern Ireland. Conditions can vary locally and you might wish to confirm the conditions at your site during a site investigation.



Crown copyright and database rights DMOU205.

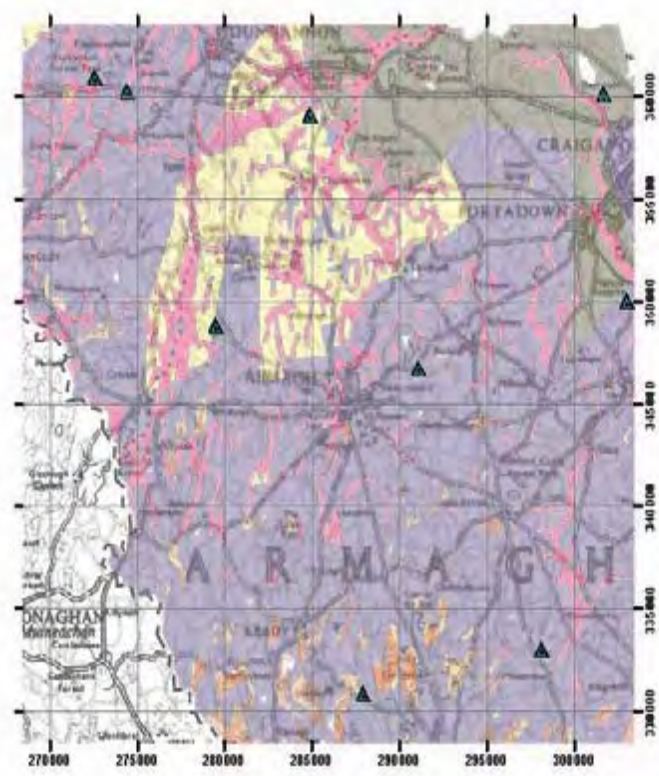


This work was commissioned by the Environment & Heritage Service.

Proposed Tyrone to Cavan interconnector



Geological Survey of Northern Ireland

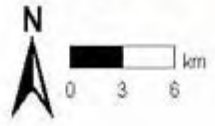


Legend

- groundwater vulnerability**
- 1 - low
 - 2
 - 3
 - 4a - high permeability superficial deposit
 - 4b - moderate permeability, but thin superficial deposit
 - 4c - low permeability, but thin superficial deposit
 - 4d - thin soil cover
 - 4e - superficial aquifer
 - 5 - high
- ▲ groundwater quality monitoring wells

This map assists with your site assessment. Please note that it provides regional information only, based on 1:250,000 maps and more detailed geological information is available for consultation at the Geological Survey of Northern Ireland. Conditions can vary locally and you might wish to confirm the conditions at your site during a site investigation.

Exact vulnerability at your site cannot be assessed without site specific investigation due to the natural variability of geological conditions. Please note that where superficial deposits have been removed due to building, construction work or similar and bedrock is now close or at the surface the groundwater vulnerability increases to class 5.



Crown copyright and database rights DMOU205.



This work was commissioned by the Environment & Heritage Service

2) Planning Service

Armagh Area Plan Team

Consultation Response from Armagh Area Plan Team

Application Reference: O/2008/0822/Q **Reconsultation?** NO

Location: Lands within Armagh District Council and Dungannon Borough Council

Proposal: PAD for proposed North-South Electricity Interconnector

Planning History: O/2001/1368/O - Site for dwelling – approval - 24/05/2002 and O/2005/0452/O - Site for dwelling – approval - 08/10/2007 – same location

This response is confined to the provisions of the Armagh Area Plan 2004/Alteration No. 1 Armagh Countryside Proposals which are material considerations to be taken into account along with all other material considerations, in the determination of the planning applications that are within the Armagh City and District Council Area

Armagh Area Plan 2004: Alteration No. 1 – Armagh Countryside Proposals

The Plan Policies, which are in particular relevant to the site, are as follows:

- None

Designations and Zonings:

The location lies inside the following designations and zonings:

- The location is on rural lands within the Armagh City and District Council Area/Armagh Area Plan 2004: Alteration No. 1 – Armagh Countryside Proposals

Planning Strategy for Rural Northern Ireland:

- Policy PSU 11 Overhead Cables

Planning Policy Statements:

The relevant Planning Policy Statements are:

- Planning Policies PPS1 General Principles, PPS2 Planning and Nature Conservation, PPS3 Access, Movement and Car Parking, PPS13 Transportation and Land Use, Draft PPS18 Renewable Energy and draft PPS21 Sustainable Development in the Countryside

Supplementary Planning Guidance:

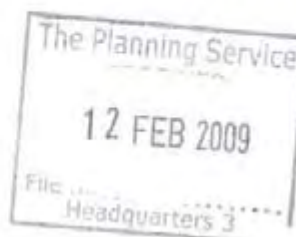
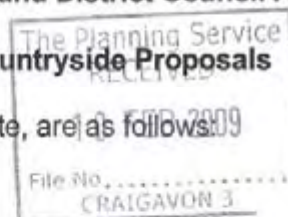
- DCAN 15 Vehicular Access Standards

Regional Policy Context:

The Regional Development Strategy: - Chapter 8 Rural Northern Ireland and Chapter 12 Caring for the Environment

Summary:

The proposal is for "PAD for proposed North-South Electricity Interconnector" on rural lands within the Armagh City and District Council Area.





There are a number of approvals for single dwellings within/abutting the application as plotted and also sites of archaeological interest, specifically on Sheets 6 and 12 i.e., ARM 008:026 and ARM019:005.

Development Control should consult NIEA Built Heritage regarding the archaeological sites.

Development Plan comments that the proposal should accord with the plans and policies contained in the Armagh Area Plan 2004: Alteration No. 1 – Armagh Countryside Proposals, the Regional Development Strategy, and any other associated planning policy guidance.

Signed:  Date 05/02/2009CASE OFFICER

Signed:  Date  COUNTERSIGNING OFFICER

Dungannon Area Plan Team



Development Plan Team Consultation Response

Proposal	:	PAD for proposed North-South Electricity Interconnector
Address	:	Lands within Armagh District Council and Dungannon Borough Council
Reference No.	:	O/2008/0822/Q
Case Officer	:	Mr A Moore
Response Date	:	20 th February 2009

Development Plan Team comments are only applicable to the area of the NIE Proposed Overhead Line Route within the Dungannon District.

1. Dungannon and South Tyrone Area Plan 2010:

An area of the proposed NIE Overhead Line Route lies within the limits of the Dungannon District.

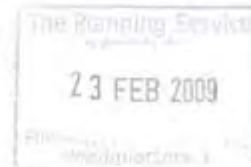
2. Issues / Consideration:

The proposed NIE Overhead Line Route crosses the A29 to the Northwest of Moy. The A29 is identified as a Protected Route within the Dungannon and South Tyrone Area Plan 2010.

The proposed NIE route will also travel through two areas of Monument Heritage, reference numbers TYR 061:026 (Crannog- Tobermasson), and TYR 062: 002 (Designed Landscape Feature).

The 250m buffer surrounding the proposed route also intersects a number of designations, including Listed Buildings and areas of Monument Heritage. These are listed as follows:

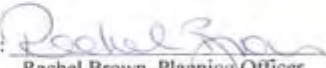
- CHB13/08/070 B 174 Trew Mount Road
- CHB13/08/077 Stable block, gates, and piers - 142 Moy Road
- CHN13/11/040 Tullydowey House
- TYR 061:008 Holywell - Tobermasson
- TYR 061: 001 Mound - Drumderg
- PLA2/6/005/095 Tree Woodlands - Lands at Tullydowey

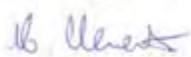


Northern Ireland Environment Agency (NIEA) will provide additional information regarding these designations.

3. Conclusion:

Development Plan has no objections in principle to this proposal, so long as the visual impact is not detrimental to the surrounding area, and the development adheres to the requirements of the Area Plan, and Policy PSU11 of 'A Planning Strategy for Rural Northern Ireland'.

Signed: 
Rachel Brown, Planning Officer

Counter-Signed: 
Hilda Clements, Senior Planning Officer

Date: 20-02-09

Craigavon Divisional Planning Office

Our Ref: AAP/Gen
O/2006/0572

Your Ref: 45457 IBLE 00 300 07

Being dealt with by: K Somerville

Date: 23 November 2007



Divisional Planning Office

Marlborough House
Central Way
Craigavon
BT64 1AD

F.A.O. Carey Doyle
Senior Environmental Scientist
Faber Maunsell
1st Floor, 24 Linenhall Street
Belfast, BT2 8BG

Dear Madam,

Re: Tyrone – Cavan Interconnector

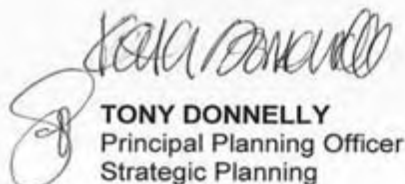
I refer to your letter of 1 November 2007 addressed to Ms Heslip, Divisional Planning Manager, in connection with the above and apologise for the delay in responding.

The preferred route indicated on the submitted plan passes within the vicinity of a number of Unscheduled Historic Monuments, the references and general locations of which are as follows:

Reference	Location
Armagh 012:082	Tawlaghboe;
Armagh 019:005	South of Drumhillery; and
Armagh 019:011	West of Derrynoose.

It is recommended that you contact the Department's Environment & Heritage Service for further details, if required.

Yours faithfully


TONY DONNELLY
Principal Planning Officer
Strategic Planning

Job No:	45457 IBLE
Faber Maunsell-Belfast	
Reviewed by:	mm
mm	mm
Date:	26 NOV 2007
Action:	mm
Date:	27/11/07
Copy to:	H McClellan
Filing Location:	00600



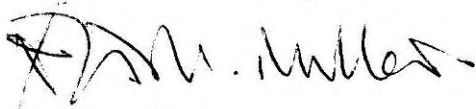
Landscape Architects Branch

Alan Moore
Planning Service HQ
Special Studies

15th September 2009

**SUBJECT: PLANNING APPLICATION O/2008/0822/Q – LANDSCAPE
ARCHITECTS BRANCH (LAB) CONSULTATION RESPONSE**

LAB have no comment on the consultation dated 4 August 2009 concerning Project Need, Planning & Development Context and EMF. However LAB have reviewed the draft Chapter 13 of the ES; Landscape and Visual Amenity dated July 2009 by Karen Clifford Landscape Architect (consultation dated 18 August 2009). LAB is satisfied with the methodology used and conclusions reached. In particular LAB notes that the landscape assessment indicates there will be significant adverse impacts upon the landscape in certain areas and especially the towers and transmission lines will remain as significant visual elements in the landscape despite mitigation.



Mansil Miller
Principle Landscape Architect
Planning Service HQ



Carey Doyle
Senior Environmental Scientist
Faber Maunsell Ltd
1st Floor
24 Linenhall Street
Belfast
BT2 8BG

Job No	45457IBLW
Project Name	
Client	CD CD
Author	Amr Amr
Date	22 NOV 2007
Version	CD
Drawn	22 Nov 07
Checked	D. CLARKE
Scale	CD 600

Landscape Architects Branch,
DOE Planning Service,
2nd floor,
Millennium House,
17-25 Great Victoria Street,
Belfast BT2 7BN

Tel: 028 9041 6811

Your ref: NA

Our ref: NA

Date: 21 November 2007

**PLANNING (ASSESSMENT OF ENVIRONMENTAL EFFECTS) REGULATIONS (NI) 1999
(THE "EIA REGULATIONS").**

**Planning Application:- Proposed Tyrone to Cavan interconnector – 400 kV Overhead
Line and Substation**

Landscape Architects Branch does not hold any specific information on the site nor have we visited the site. Below however, is a general check list of the landscape and visual issues which we feel should be considered for inclusion in the Statement. The methodology should be based on the "Guidelines for Landscape and Visual Impact Assessment: 2nd Edition 2002" published by the Landscape Institute and Institute of Environmental Management and Assessment".

1. The Baseline Studies.

The Baseline Studies should record and analyse the existing character, quality and sensitivity of the landscape and visual resource.

(a) The studies, which should take the form of desk top studies and field survey should include;

- the elements of the landscape, the landform and the landcover including the vegetation, the slopes, the drainage, etc
- the landscape character (an appropriate method should be used)
- any special designations
- the visibility of the site including short, medium and long internal and external views.

(b) This should be followed by an analysis of the findings and include comment on

- the scale and character, the condition and importance of the landscape, the sensitivity to change and the enhancement potential.

- a visual analysis, illustrated on photographs, describing any important characteristics which may be of relevance to the impact of the design and to the method of mitigation.

2. A Description of the Development.

This should include sufficient detail on the proposal during the construction period and on completion of the works. It should also include detail of any phasing arrangements.

3. The Impact of the Development on the Landscape and Visual resource.

- (a) The potential landscape and visual impacts should be identified at the different stages of the life cycle of the development.
- landscape impacts include the direct and indirect impacts of the development on the landscape of the site as well as the effect upon the surrounding area.
 - visual impacts include the extent of the potential visibility, the views and viewers affected, the degree of visual intrusion, the distance of the views and resultant impacts upon the character and quality of the views (photomontages are usually the most effective way of demonstrating these impacts).
- (b) The significance of the landscape and visual impacts should be assessed in terms of the sensitivity of the affected landscape and visual resource, including the magnitude of the impact, whether the impacts are beneficial or adverse and with reference to professional judgement and views expressed during consultation.

4. The Mitigation of the Impact on the Landscape.

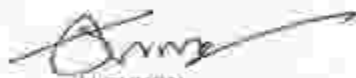
- (a) Mitigation should be effective, appropriate and feasible. It should follow the principles listed below:
- mitigation should be designed to suit the existing landscape character
 - all significant adverse impacts should be considered for mitigation
 - the development should demonstrate a commitment to the implementation of mitigation measures.
 - care should be taken to mitigate significant impacts occurring at all stages in the project life cycle.
 - it should be recognised that many mitigation measures, especially planting, are not immediately effective.
 - performance criteria should be proposed by the developer for the maintenance, long term management and monitoring of new landscape features.
 - a programme of monitoring should be agreed so that compliance and effectiveness can be easily monitored.
- (b) Mitigation can take place at a number of levels:

- avoidance of the impact through careful siting, planning and design
- reduction of the impact through attention to location, layout, siting and site levels, ground modelling, materials, planting etc.
- compensation for the impacts by off-setting unavoidable impacts by related environmental improvements.

These should be considered in the Statement.

I trust the above is helpful.

Should you have any further queries, please do not hesitate to contact this office.



J LENNON
for
MANSIL MILLER
Principal Landscape Architect

Special Studies Unit

Date: 26th November 2008
Your Ref: 60032220
Our Ref: O/2008/0822/Q
(Please quote at all times)

C Doyle
Faber Maunsell
1st Floor
24 Linenhall Street
Belfast
BT2 8BG

No:	60032220
Faber Maunsell-Belfast	
Reviewed by:	ICD/CD
Date:	28 NOV 2008



Headquarters

Millennium House
17-25 Great Victoria Street
Belfast
BT2 7BN

Please contact: Mr A Moore
Direct Line: 028 90416886

Dear Sir/Madam

Location: Lands within Armagh District Council and Dungannon Borough Council
Armagh District Council

Proposal: PAD for proposed North-South Electricity Interconnector

I refer to your letter of 21st November 2008 in relation to the above PAD proposal and our discussions at the meeting on 17th November 2008. I would confirm that the Department would request that you submit a total of 28 copies of the draft Environmental Statement, as discussed, in order to further progress your PAD enquiry. You are advised to submit 16 hard copies and 12 in CD ROM format.

I hope you find the above information helpful.

Yours faithfully

for Special Studies



An Agency within the Department of the
Environment
www.doen.gov.uk

Tel. (028) 9041 6700 Fax. (028) 9041 6983
Email. planning.service.hq@nics.gov.uk
Web. www.planningni.gov.uk



INVESTOR IN PEOPLE

Date: 21st November 2008
Your Ref: 60032220
Our Ref: O/2008/0822/Q
(Please quote at all times)

C Doyle
Faber Maunsell
1st Floor
24 Linenhall Street
Belfast
BT2 8BG

Job No:	60032220
Client:	Faber Maunsell - Belfast
Reviewed by:	CO CO
Date:	26 NOV 2008
File:	
Date:	
Project:	
File:	



Headquarters

Millennium House
17-25 Great Victoria Street
Belfast
BT2 7BN

Please contact: HQ Admin Team
Direct Line: 028 90416856

Dear Sir/Madam

Location: Lands within Armagh District Council and Dungannon Borough Council
Armagh District Council

Proposal: PAD for proposed North-South Electricity Interconnector

Thank you for your letter in relation the pre-application discussion (PAD) received on 21st November 2008 which is receiving attention.

*Please note that all future correspondence in relation the **PAD** should be submitted with the reference number indicated above.*

Yours faithfully

Natalie McNally

for Planning Service Headquarters



Date: 10th November 2008
Your Ref:
Our Ref: FOI/7225
(Please quote at all times)

Headquarters

Millennium House
17-25 Great Victoria Street
Belfast
BT2 7BN

Ms Carey Doyle
Faber Maunsell
24 Linenhall Street
Belfast
BT2 8BG

60032220	
Faber Maunsell-Belfast	
CO	JMP
12 NOV 2008	
JM	

Please contact: Mr Anthony McKay
Direct Line: 028 9041 6904

Dear Ms Doyle

Proposed Tyrone to Cavan Interconnector

I write with reference to the above proposal and further to your correspondence dated 20th October 2008.

I wish to confirm that the Planning Service have agreed to your request to progress this proposal within the Pre-Application Discussions (PADs) process.

A meeting has already been arranged for 17th November 2008 and I would propose to use that as an opportunity to discuss future arrangements.

Should you require further information please do not hesitate to contact me on the telephone number given above.

Yours sincerely

Anthony McKay
Principal Planning Officer
Special Studies Unit



Date: 7th September 2006

Your Ref:

Our Ref: O/2006/0572
(Please quote at all times)

Julie McDowell
Faber Maunsell
24 Linenhall Street
Belfast
BT2 8BG

No:	45457 IBLC
Faber Maunsell-Belfast	
Reviewed by:	JMDJMD
Date:	11 SEP 2006
Actioned by:	
Date:	
Copy to:	
Filing Location:	00 301

Headquarters

Millennium House
17-25 Great Victoria Street
Belfast
BT2 7BN

Please contact: Alan Moore
Direct Line: 02890 416886

Dear Sir/Madam

**THE PLANNING (ENVIRONMENTAL IMPACT ASSESSMENT) REGULATIONS
(Northern Ireland) 1999 (The "EIA Regulations")**

Location: Lands within Armagh District Council and Dungannon Borough Council

Proposal: Proposed North-South Electricity Interconnector

I refer to your letters of 10th and 19th July 2006, and accompanying plans and information requesting an opinion under Regulation 6 (1) (b) of the EIA Regulations as to the information to be provided in the environmental statement (ES) to be submitted with an EIA application. I would advise you that the Department has consulted widely and would request that the following issues be addressed within the ES:

(i) Landscape Architects Branch - does not hold any specific information on the site nor have we visited the site. Below however, is a general check list of the landscape and visual issues which we feel should be considered for inclusion in the statement. The methodology is based on the 'Guidelines for landscape and Visual Impact Assessment: 2nd Edition 2002' published by the Landscape Institute and Institute of Environmental Management and Assessment.

The Baseline Studies.

The Baseline Studies should record and analyse the existing character, quality and sensitivity of the landscape and visual resource.

The studies; which should take the form of desk top studies and field survey should include;

- (a)
 - the elements of the landscape, the landform and the land cover including the vegetation, the slopes, the drainage. Etc
 - the landscape character (an appropriate method should be used)
 - and special designations
 - the visibility of the site including short, medium and long internal and external views.

(b)

- the scale and character, the condition and importance of the landscape, the sensitivity to change and the enhancement potential.
- A visual analysis, illustrated on photographs, describing and important characteristics which may be of relevance to the impact of the design and to the method of mitigation.

A Description of the Development.

This should include sufficient detail on the proposal during the construction period and on completion of the works. It should also include detail of any phasing arrangements.

The Impact of the Development on the Landscape and Visual Resource:

The potential landscape and visual impacts should be identified at the different stages of the life cycle of the development.

- landscape impacts include the direct and indirect impacts of the development on the landscape of the site as well as the effect upon the surrounding area.
- visual impacts include the extent of the potential visibility, the views and viewers affected, the degree of visual intrusion, the distance of the views and resultant impacts upon the character and quality of the views (photomontages are usually the most effective way of demonstrating these impacts).

The significance of the landscape and visual impacts should be assessed in terms of the sensitivity of the affected landscape and visual resource, including the magnitude of the impact, whether the impacts are beneficial or adverse and with reference to professional judgement and views expressed during consultation.

The Mitigation of the Impact on the Landscape:

Mitigation should be effective, appropriate and feasible. It should follow the principles listed below:

- mitigation should be designed to suit the existing landscape character
- all significant adverse impacts should be considered for mitigation.
- the development should demonstrate a commitment to the implementation of mitigation measures.
- care should be taken to mitigate significant impacts occurring at all stages in the project life cycle.
- it should be recognised that many mitigation measures, especially planting, are not immediately effective.
- performance criteria should be proposed by the developer for the maintenance, long term management and monitoring of new landscape features
- a programme of monitoring should be agreed so that compliance and effectiveness can be easily monitored.

Mitigation can take place at a number of levels:

- avoidance of the impact through careful siting, planning and design
- reduction of the impact through attention to location, layout, siting and site levels, ground modelling, materials, planting etc.
- compensation for the impacts by offsetting unavoidable impacts by related environmental improvements.

(iii) EHS – Natural Heritage

Site specific information:

From the data EHS holds at this time for the proposed route corridors, on a north to south direction, the nearest designated areas are:

Drumcrow, Peatlands, Bóibúrbh, Annacrumph Meadow, Killybegh Loughs, Straghan Lough, Crossbane and Drumcann Areas of Scientific Interest.

Argory Mosses and Brabuth/Millicosa Sites of Local Nature Conservation Importance.

With numerous recorder sites throughout.

Additional sources of information which may be relevant:

- Environment and Heritage Service website www.ehant.gov.uk includes:
- Details of all regional, national and international designated sites in Northern Ireland.
- Northern Ireland Biodiversity Strategy
- Northern Ireland Biodiversity Action Plans
- Areas of Outstanding Natural Beauty
- Landscape Character Areas
- Environmental Legislation
- Details of important geological and geomorphologic features throughout Northern Ireland are available through CRD&R on the Habitat website at: <http://www.habitat.org.uk/essr/>

General Scoping Guidance

This information is illustrative and is not intended to be a definitive statement of the environmental information to be included in the Environmental Statement (ES). It is recommended that the developer remains in contact with EHS throughout the process of Environmental Impact Assessment (EIA) and production of the ES.

General Points:

The scoping study phase of the EIA should identify the key topic areas where the proposal has the potential to cause either adverse or beneficial effects on the environment.

The range and extent of direct and indirect impacts on flora and fauna must be considered, both during and post construction, and in the short and long term.

The EIA should consider direct effects on landscape and public perception of change.

A combination of landscape assessment and visual assessment should be used.

Cumulative impacts on flora, fauna and landscape of proposed and existing structures.

Flora and Fauna

The EIA should cover both habitats and species of flora and fauna (especially protected species). It should include both the proposed site and its surroundings.

The extent of the ecological baseline must be established and the nature of further survey work must be established. A habitat survey (i.e. JNCC phase 1) to permit identification of areas which are likely to be of high nature conservation value or particularly vulnerable to impact from the proposal. The survey must cover flora and fauna present in all seasons.

Following from this, the extent and nature of any further survey work that may be needed should be identified. Areas thus identified should be subject to more detailed survey i.e. JNCC Phase 2. In case of flora, this should identify species from all plant groups, which form a significant part of the vegetation, not just higher plants. Survey must cover flora and fauna in all seasons. Fauna surveys should include a full bird survey. The timing of surveys is critical and must be carried out at appropriate times of year.

Baseline surveys conducted over a short period may not identify long term trends and reference should be made to previous records.

Landscape

Landscape is a fundamental component of the wider environment and is not just associated with a limited number of designated areas of particular scenic value such as Areas of Outstanding Natural Beauty.

General Points:

Establish the current landscape designation and policies covering the site and its surroundings.

Details of local landscape character of the site and its surroundings.

Establish where the potential zone of influence for the development and its associated infrastructure will extend to, including combination effect with established development.

In combination the information should establish the potential landscape key issues and the areas requiring further investigation during the baseline studies. (See Guidelines for Landscape and Visual Impact Assessment, the Landscape Institute and the Institute of Environmental Management and Assessment. Spon Press, London 2002).

Impact on Local Hydrology

The consequences of changes to the hydrogeological system on peatland, rivers, streams and wetland habitats should be established.

Mitigation Measures

Opportunities for reducing identified negative environmental impacts of the proposal by mitigation should be established.

(iii) Directorate of Airspace Policy

Whilst the limited information provided gives no indication of the expected height of the cables and support structures, I do not believe that the proposed transmission line and associated towers would constitute an aviation en-route obstruction. I have therefore no associated observations. This will not,

of course negate the future need for the relevant planning authority to check any safeguarding maps lodged with the council to identify any aerodrome specific safeguarding issues.

I note that you intend consultation with NATS. I would suggest, however, that it would be reasonable to establish a military aviation perspective on the proposal at an early stage. Accordingly, the proposed work should be brought to the attention of the Head of Safeguarding, Ministry of Defence Estate Organisation, Blakenhoe Drive, Sutton Coldfield B75 7RL.

From a potential civil aviation charting perspective, you should be aware that there is a requirement in the UK for all structures over 300 feet high to be charted on aviation maps. I understand that military charts plot structures of a height of 200 feet or more. Should this proposed development progress and the 200 feet height be breached, to achieve this charting requirement, developers will need to provide details of the development to:

Defence Geographic Centre
AIS Information Centre
Jervis Building
Elmwood Avenue
Belturbet
Middlesex
TW13 7AH

Telephone: 0208 818 2708

(iv) EBS – Protecting Historic Monuments

Production of the Cultural Heritage section of this Environmental Impact Assessment must contain the information and recommendations listed below.

The CH section of this EIA must be produced using information retrieved during consultation of:

Northern Ireland Sites and Monuments Records (NISMR)
Public Records Office Northern Ireland (PRONI)
Ordnance Survey of Northern Ireland (OSNI)
Local Museum

Identifying the known cultural heritage sites, which lie close to and on the proposed route of the interconnector. These may include:

- Prehistoric or historical period archaeological sites and monuments
- Listed buildings
- Both 'registered' and 'supplementary list' Parks, Gardens and Domeries
- Battlefields sites
- Industrial heritage sites
- Defence heritage sites
- Vernacular structures

The Cultural Heritage section must also:

Identify the potential impact of the proposed interconnector on the known cultural heritage sites.

Production of the Cultural Heritage section of the EIA must also involve a walkover survey of the route and any areas where ground disturbance is proposed, in order to identify any previously unrecorded cultural heritage sites.

Identify and adverse visual impacts the proposed interconnector may have on known or previously unknown cultural heritage sites

Identify sites where pre-construction archaeological evaluation may help clarify the precise nature of possible cultural heritage sites encountered during the aerial photographic or walkover surveys. Early identification of such sites can help avert the requirement for later archaeological investigations and avoid delays/save money.

Based on the findings of the above-mentioned research, the Cultural Heritage section of the EIA must: Propose mitigation measures for physical or visual impacts on known cultural heritage sites within the direct or indirect zone of influence around the interconnector route.

Propose mitigation measures of physical impacts on previously unknown cultural heritage sites discovered during the site preparation phase of the interconnector works.

(v) EHS – Protecting Historic Buildings

There is insufficient information for PHB to comment at this time. It is likely that this scheme will affect some listed Buildings. PHB will require the locations of associated structures/ equipment to be identified. We advise that these must not affect any LB and/ or its settings.

(vi) Department of Health, Social Services and Public Safety

Local population health issues relevant to development proposals are a matter for the relevant Health and Social Services Board. If it is not already the case, I recommend that the Southern Health and Social Services Board be consulted in relation to the application.

At a policy level, the applicant would be advised to consider the current deliberations of the UK Stakeholder Advisory Group on extremely low frequency electromagnetic fields (SAGE). The SAGE was set up in response to the National Radiological Protection Board's (now the Health Protection Agency's Radiation Protection Division) advice with the remit to consider the possible need for further precautionary measures in addition to its electromagnetic field (EMF) guidelines.

SAGE is sponsored by the Department of Health (London) with funding contributions from the charity 'Children with Leukaemia' and National Grid plc. SAGE has brought together stakeholders "to identify and explore the implications for a precautionary approach to ELF EMF and make practical recommendations for precautionary measures." Stakeholders include representatives from government departments, industry, independent academics, regulators, public concern groups and associated professional groups.

SAGE has been running since 2004 and is expected to produce its first report to government this autumn. The report is likely to suggest practical ways in which people's exposure to electric and magnetic fields could be reduced.

The power lines and Property working group of SAGE has been looking at issues covering new homes near existing power lines, existing homes near new power lines and existing homes near existing power lines.

The Electrical Installations and Equipment working group has considered new buildings, refurbishment of existing buildings and electrical equipment. Two further proposed working groups will look into other sources of EMF exposure, building on experience from the work carried out so far.

Further information on the terms of reference and the work of the Group are described on the SAGE web site (www.rkpartnership.co.uk)

(vi) Southern Health and Social Services Board

NIE/ESB Interconnector scheme

I am writing with regard to your letter dated 19 July 2006 and follow-up correspondence dated 21 July 2006 in which you seek advice regarding what information the developer (NIE/ESB) should provide within the Environmental Impact Assessment associated with the proposed scheme.

You will appreciate that given the short timescale and relatively limited information provided regarding the interconnector, it is not possible to provide a detailed response in terms of any specific element of the proposed scheme.

From a Public Health perspective the main issue that should be explored is the potential of adverse effects upon human health that may be associated with high voltage power sources. I would therefore advise that it would be appropriate to seek from the developer information regarding their existing policies and guidance, e.g. siting of cables in proximity to private dwellings or public facilities. It is presumed that such policies/guidance will take account of current available evidence. In this respect recent reviews from the Health Protection Agency (HPA) have not identified any significant evidence of specific adverse/nuisance effects. The further information I suggest that you review the HPA website, as follows:

http://www.hpa.org.uk/radiation/understand/radiation_topics/over/index.htm
<http://www.hpa.org.uk/radiation/faq/over/index.htm>
<http://www.hpa.org.uk/radiation/publications/>

(vii) Southern Group Environmental Health Committee

Any Environmental Assessment produced for this proposal development should include a Noise Impact Assessment.

(ix) National Grid Wireless Group

Proposed Cavan/Tyrone Interconnector

Thank you for your letter referring to the above development. National Grid Wireless is responsible for providing the BBC's transmission network and is responsible for ensuring the integrity of Re-Broadcast Links (RBLs) within particular areas. We have considered whether this development is likely to have an adverse effect on our operations and have concluded that we have no objection to this application.

Jack Finlayson
Project Engineer, Spectrum Planning
National Grid Wireless Group
Email: jack.finlayson@ngridwireless.com
Phone: +44 (0) 1926 416 257
Fax: +44 (0) 1926 416 275

(x) Ofcom

Our Engineers advise you that OFCOM has an responsibility for the Planning of Electricity Interconnectors, and that Broadcast Planning is now outside OFCOM's remit.

However, they recommend that you consult the BBC Online Tool at <http://windfarm.kw.bbc.co.uk/> in respect of broadcast planning issues.

(xi) DARD Department of Agriculture and Rural Development

Countryside Management

Northern Ireland soil maps indicate that the major part of the proposed route is outside the Best and Most Versatile (BMV) category, with approximately 40% within the Best and Most Versatile (BMV) category.

Landowners should be consulted with regard to the inclusion of the land in an agri- environment scheme. If the landowner, or lessee, holds an agri- environment scheme agreement he should notify DARD prior to any developments on the land.

Field boundaries and heritage features are an important component of the farmed landscape. Specific measures may be required to ensure minimum disturbance or suitable mitigation measures provided following disturbance.

Utmost care is to be taken to minimise soil compaction and damage, especially when transporting materials on to the site.

Particular care must be paid to the disposal of spoil from excavations etc. This may not be dumped on farmland without prior permission from relevant government organizations (DOE/DARD). This site could be subject to EIA Regulations (Uncultivated land & semi- natural areas regulations (Northern Ireland) 2001) land. The EIA contact for DARD is 02890524326.

I hope you find the above information helpful but I would also advise you that the following bodies have not yet responded to our consultation: Dungannon District Council (Environmental Health), NIAER, NTL, NIE and PSNI. I have issued reminders seeking urgent responses.

As previously discussed a separate application for each Council District will be required. The ES should cover all the proposed route through both Council Districts. A total of 60 copies of the ES should accompany the applications (12 of which can be CD ROM). Details of the address (in the general locality) at which the ES may be inspected by the general public as well as the purchase price must also be submitted with the application. In addition, a shape file format disk is also required indicating the route of the interconnector (for plotting purposes).

Should you wish to discuss the above matters further do not hesitate to contact Mr Moore at the above contact number.

Yours faithfully



Authorised Officer

Date: 22nd August 2006
Your Ref:
Our Ref: O/2006/0572
(Please quote at all times)

Julie McDowell
Principal Environmental Scientist
Faber Maunsell
1st Floor, 24 Linenhall Street
Belfast
BT2 7BN



Headquarters

Millennium House
17-25 Great Victoria Street
Belfast
BT2 7BN

Please contact: Mr Alan Moore
Direct Line: 028 90416886

Dear Sir/Madam

**THE PLANNING (ENVIRONMENTAL IMPACT ASSESSMENT) REGULATIONS
(Northern Ireland) 1999 (The "EIA Regulations")**

Location: Lands within Armagh District Council and Dungannon Borough Council
Armagh District Council

Proposal: Proposed North-South Electricity Interconnector

I refer to the above pre-application scoping enquiry and would advise that, Under Article 6(6) of the Regulations, the Department is required to inform the applicant in writing of its opinion as to the information to be provided in the environmental statement within 6 weeks from the date of receipt of the application or within such extended period as may be agreed in writing between the Department and the applicant.

In relation to the above application a scoping opinion cannot be completed within the 6-week period and the Department would request that you agree in writing to an extension to the 8th September 2006.

I would apologise for any inconvenience this may cause and should you wish to discuss this matter further do not hesitate to contact Mr Moore at the above address/contact number.

Yours faithfully


Authorised Officer

Job No:	L 5457 1366
	Faber Maunsell-Belfast
Reviewed by:	J.M.O. J.M.D.
DCLG	
Date:	25 AUG 2006
Actioned by:	
Date:	
Copy to:	
Filing Location:	



Tel. (028) 9041 6700 Fax (028) 9041 6983
Email. planning.service.hq@nics.gov.uk
Web. www.planningni.gov.uk



**Consultation Responses from the Department of Environment, Heritage and Local
Government (2009 - 2006)**

Telephone Record

Call To:	David Crothers	Date:	15 August 2006
Taken by:	David Crothers	Time:	3.40pm
Copies:		Reply by:	N/A
Subject:	Stage 1 Consultation	Job No/Ref:	45457IBLE 00 301

Project Title:	Tyrone / Cavan Interconnector		
Call From:	Michael Hackett (DEHLG)	Telephone No	

Message:

DC received a phone call from MH querying the stage 1 consultation letter for the Tyrone / Cavan Interconnector. MH had received the letter via the Department of the Environment, Heritage and Local Governments HQ in Dublin. MH was somewhat confused as the scheme as illustrated appeared to have no impact on his particular geographical area. DC explained the consultation at this stage was mainly intended to collate opinions / objections in principle to the proposed scheme.

DC is to re-consult MH in the future when additional details on the project are available.

Mr Michael Hackett
 District Officer
 Department of the Environment, Heritage and Local Government
 Moyne
 Longford

Message read by Project Manager <small>(Sign here only if not the originator of the Message)</small>		Date:	
--	--	-------	--

Craig, Amy

From: Aoife O'Shea [aoife_o'shea@environ.ie]
Sent: 03 August 2006 16:19
To: McDowell, Julie
Subject: Proposed Tyrone/Cavan Interconnector - 400kV Overhead Line & Substation

Our ref: G2006/536

Julie,

I'm emailing to confirm receipt of your letters of 10 and 19 July 2006 and related documents re the above-proposed development.

Your query has been circulated to a number of individuals within the Department and we will revert to you in due course with our recommendations.

Regards, Aoife O'Shea

Aoife O'Shea,
Development Applications Unit,
Dept of Environment, Heritage & Local Government, Dún Scéine, Harcourt Lane, Dublin 2
Ph: (01) 8883190
Fax: (01) 4780721
Email: aoife.o'shea@environ.ie

Is faoi rún agus chun úsáide an té nó an aonán atá luaite leis, a sheoltar an ríomhphost seo agus aon comhad atá nasctha leis. Má bhfuair tú an ríomhphost seo trí earráid, déan teagmháil le bhainisteoir an chórais.

Deimhnítear leis an bhfo-nóta seo freisin go bhfuil an teachtaireacht ríomhphoist seo scuabtha le bogearraí frithvíorais chun víorais ríomhaire a aimsiú.

This email and any files transmitted with it are confidential and intended solely for the use of the individual or entity to whom they are addressed. If you have received this email in error please notify the system manager.

This footnote also confirms that this email message has been swept by anti-virus software for the presence of computer viruses.

Consultation Responses from Dungannon and South Tyrone Borough Council (2009 - 2006)

ALAN MOORE
HA



**DUNGANNON
& SOUTH TYRONE**

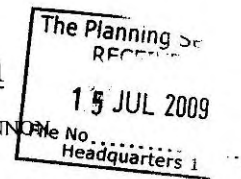
Borough Council

Our Ref

Planning Ref O/08/0822Q

Date: 07 July 2009

Comments on Planning Application



LOCATION LANDS WITHIN ARMAGH DISTRICT COUNCIL & DUNGANNON BOROUGH COUNCIL
PROPOSAL PAD FOR PROPOSED NORTH SOUTH ELECTRICITY INTERCONNECTOR

COMMENTS

05/12/09

I have examined the detail submitted in "Tyrone Cavan 400 kV Interconnector Environmental Statement - Volumes 1 and 2 - Draft for PAD, DOE Planning Service" dated November 2008.

I would make the following comments on behalf of Environmental Health, Armagh City and District Council:

EMFs

I note that the section on EMF has yet to be prepared. When this section is submitted for assessment, the applicant should ensure that reference is made to the most relevant and recent guidance issued by the Health Protection Agency and other authoritative UK Government sources. As the proposed development will introduce an EMF source to a wide area of mixed residential, commercial, agricultural and other uses, it would be expected that the applicant shall demonstrate that all areas of public exposure associated with the proposal shall not exceed relevant reference levels.

In October 2008 I advised Faber Maunsell directly in this regard.

Noise

I note the noise impact assessment prepared in relation to the proposed development. I note the proposed use of best practice techniques to minimise disturbance during the construction phase.

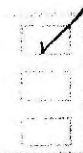
From the Environmental Statement - Draft, I understand that noise will be emitted

Page 1 of 3
Council Offices, 15 Circular Road, Dungannon, Co. Tyrone, BT17 1 6DT

Tel: 028 87 720300 Fax: 028 87 720368 Text Phone: 028 87 720332

Comhairle Dhuin Geannainn agus Thír Eoghain Theas

Rathannon Soith Ówenslann Burgh Cooncil





**DUNGANNON
& SOUTH TYRONE**

during the operational phase from both the power-lines themselves and the substation
to be located at Turleenan, Moy, Co. Tyrone.

Borough Council

I am concerned that noise emitted from both the power lines and the substation may give rise to noise disturbance to occupiers of nearby residential premises. This will particularly be the cause during night-time hours with calm weather conditions when the background noise will be lower and the potential for residents to have open bedroom windows is higher.

I have examined the noise assessments submitted and understand that the predicted broadband noise levels will fall within the targets suggested by the applicant. However, the applicant has acknowledged that the noise associated with electricity transmission infrastructure is tonal in nature, typically at 50 and 100Hz. Where noise is tonal in nature (and particularly with low-frequency noise of this type) it is possible that an assessment of the broadband noise may not adequately reflect the potential noise that may be experienced by human receptors.

Therefore, I would request that the applicant provide additional detail on the frequency specific nature of the noise associated with the power-lines and the substation. The applicant should also assess the potential impact of these frequencies upon the existing noise climate and should advise on the potential effect of these noises at residential premises. It is acknowledged that masking and attenuation are likely to be factors that will reduce adverse effects due to noise, however in the absence of further frequency specific data I cannot determine the likelihood of noise disturbance associated with the proposed development.

Contaminated Land

I would support the applicant's undertaking to conduct an assessment of the potential effects of the development upon any suspected contaminated land during construction.

Air Quality

I note that applicant's assertion that there will be no air quality impacts beyond the construction phase.

Paul McCullough, Principal EHO

12/01/09

Please note that my original comments also apply to Environmental Health -
Dungannon and South Tyrone Borough Council.

Paul McCullough, Principal EHO

RECONSULTATION - 05/06/2009

Refer to comments of Southern Group Environmental Health Committee



Kieran Donnelly
07/07/2009





**DUNGANNON
& SOUTH TYRONE**

Borough Council

Comhairle Dúin Geannainn agus Thír Eoghain Theas

Rathgannon Sooth Ovenslann Burgh Council

Our ref: AB/JH

12 December 2007

Mr Carey Doyle
Faber Maunsell
1st Floor
24 Linenhall Street
Belfast
BT2 8BG

Job No:	45457 JBLE
F:	
R:	CD P
	Amm Amm
Date:	13 DEC 2007
Action:	Amm
Date:	13/12/07
Copy to:	NIE
Filing Location:	00 600

Dear Carey Doyle

Re: **Proposed Tyrone to Cavan Interconnector - 400 kv line and substation**

You forwarded correspondence dated 1 November 2007 to Council seeking responses in order to complete your Environmental statement. The closing date was identified as 21 November 2007. At a special Public Services Committee meeting held on 6 November in the Council Offices, NIE representatives agreed to extend this submission date in order to allow the matter to be considered at the Public Services Committee on 27 November 2007.

The Committee have now considered the issue and have summarised their concerns as follows:

The Council would like to have underground cabling options pursued where possible with indicative costs to be provided

It was also considered that in order to further reduce impact on amenity that the Towers should be sited 100 m from housing instead of the 60 m as contained in the proposals.



December 12, 2007

I trust that you will take these observations into account when preparing the Environmental statement.

Yours sincerely

A handwritten signature in blue ink, appearing to read "Alan Burke". The signature is written in a cursive style with a large initial "A".

Alan Burke
Acting Chief Executive

Consultation Responses from Fisheries Conservancy Board (2009 - 2006)



Faber Maunsell
1st Floor,
24 Linenhall Street
Belfast
BT2 8BG

30 November 2007

Your ref: 45457 IBLE 00 300 07

Dear Sir

Re: Proposed Tyrone to Cavan Interconnector – 400 kV Overhead Line and Substation

I refer to your letter of 1 November concerning the above.

The Board has no objection to the proposal as outlined as the overhead cables will cross the River Blackwater on high ground downstream of Benburb and should not impact upon any fishery interests.

Yours faithfully

K A Simpson (Mrs)
Chief Executive

Job No:	45457 IBLE
Faber Maunsell-Belfast	
Reviewed:	AMM / ED
By:	AMM
Date:	03 DEC 2007
Action:	AMM
Date:	
Copy to:	D. Richie / B. Satten.
Filing Location:	00600



Faber Maunsell
1st Floor
24 Linenhall Street
Belfast
BT2 8BG

28 July 2006

Ref 45471BLE 00 300 07

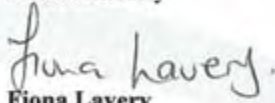
Proposed Tyrone/Cavan Interconnector –400kV Overhead Line & Substation

Dear Sir

In relation to the above application, the Fisheries Conservancy Board are of the opinion that there is no threat to the Fisheries interests in the area.

FCB have no objection to this application.

Yours sincerely


Fiona Lavery
Support Manager

Job No:	45471 BLE
Faber Maunsell-Belfast	
Reviewed by:	Jmcl Jm-D
DC de	
Date:	31 JUL 2006
Actioned by:	
Date:	
Copy to:	
Filing Location:	00301

Consultation Responses from Historic Monuments Council (2009 - 2006)

**COUNCIL FOR NATURE CONSERVATION
AND THE COUNTRYSIDE**
An Advisory Council to the Department of the Environment

Waterman House 5-33 Hill Street, Belfast, BT1 2LA

Tel: 028 9054 3076 Fax: 028 9054 3047

secretariat-hillst@doeni.gov.uk

www.cnccni.gov.uk

5th November 2007

Ms Carey Doyle
Senior Environmental Scientist
Faber Maunsell
1st Floor
24 Linenhall Street
BELFAST
BT2 8BG

Dear Ms Doyle

Ref: 45457 IBLE 00 300 07

Proposed Tyrone to Cavan Interconnector – 400kV Overhead Line and Substation

I refer to your letter of the 1st November 2007 regarding the above application and would advise you that neither CNCC nor HBC (Historic Monuments Council) does not hold any relevant information but would welcome a copy of the EIA in due course.

Yours sincerely



Dorothy Taylor
Statutory Advisory Council Secretariat

Job No:	45457 IBLE
Faber Maunsell-Belfast	
Reviewed by:	CO/CO
Date:	06 NOV 2007
Action:	
Date:	
Copy to:	
Filing Location:	

Consultation Responses from Health Protection Agency (2009 - 2006)

09.01.15 HPA additional info.txt
From: Moore, Alan [Alan.Moore@doeni.gov.uk]
Sent: 15 January 2009 14:46
To: Doyle, Carey
Subject: FW: N S Interconnector
Attachments: N_S_Inte.pdf
Follow Up Flag: CD reviewed
Flag Status: Completed

Carey,

please see attached comments recently received from the Department of Health & Social Services and Public Safety. This is one of many outstanding consultee responses yet to be received. I am forwarding these comments to you now to allow you the time to address the matters raised by the consultee and ensure that they are appropriately addressed within the final draft of the Environmental Statement when submitted with the planning application.

As the scanned document is particularly difficult to read I have reproduced the comments as follows:

"The Health Protection Agency (HPA) provides advice to DHSSPS in relation to policy on radiation protection matters. Current advice is available at www.hpa.org.uk The as yet not completed sections of the ES on Electromagnetic Fields may wish to reference the home of the Stakeholder Advisory Group on Extremely Low Frequency EMF (SAGE) (See www.rkpartnership.co.uk) and the deliberations of the Cross-Party Inquiry into Childhood Leukaemia and EMF (See www.epolitix.com). If not already the case the bodies with responsibility for local population health/public health i.e. the Southern Health and Social Services Board and the Environmental Health Departments of the relevant District Councils should also be consulted."

Provided all the points raised in our meetings and all the consultation responses are dealt with satisfactorily in the details submitted with any application, the Strategic Projects Team will endeavour to progress the application to a recommendation within 6 months of its validation.

It is likely that any application will be dealt with under Article 31 of the Planning (NI) Order 1991.

You will recall from our meetings and our related guidance documentation that if our advice is not followed the result will almost certainly be that your application will not be progressed quickly or it may be refused.

Please note that a PAD is a separate and distinct advisory process. It does not bind us in making our formal decision at the regulatory stage, following public consultation with all interested parties and formal consultation with the local Councils. It is important to stress therefore that all our PAD advice is given without prejudice to the formal consideration of your planning application. This is because other information may arise from consultations, including with Council, third party representations or policy changes during the regulatory determination process. However, it is expected that any variations from the general advice offered at the PAD would be unusual.

I trust that this clarifies the situation and should you wish to discuss the matter further please do not hesitate to contact me at 02890 416 886.

Alan Moore
Special Studies
-----Original Message-----
From: user@planning.gov.uk [mailto:user@planning.gov.uk]
Sent: 15 January 2009 14:13
To: Moore, Alan
Subject: N S Interconnector

09.01.15 HPA additional info.txt

Please open the attached document.
This document was sent to you using an HP Digital Sender.

Sent by:	<user@planning.gov.uk>
Number of pages:	1
Document type:	B/W Document
Attachment File Format:	Adobe PDF

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<http://www.adobe.com>

For more information on the HP Digital Sender please visit:

<http://www.digitalsender.hp.com>



Date: 30th December 2008
Planning Application Number: O/2008/0822/Q
(Please quote at all times)

Headquarters

Dr. E Mitchell
Department Of Health, Social Services And Public
Safety
Room C.5.17
Castle Buildings
Stormont
Belfast
BT4 3SQ

Millennium House
17-25 Great Victoria Street
Belfast
BT2 7BN

Please contact: Mr A Moore
Direct Line: 028 90416886

Dear Dr. Mitchell

Location:	Lands within Armagh District Council and Dungannon Borough Council	Date of Application:	21st November 2008
Proposal:	PAD for proposed North-South Electricity Interconnector	OS Sheet No.:	
Applicant:	NIE	Grid Reference:	
Agent:	C Doyle, Faber Maunsell	Application Type:	Pre App Preliminary Enquiry
Consultation Reason:	PAD proposal received	Grid Square:	

SITE HISTORY:

The Special Studies Unit of Planning Service HQ has received the above PAD proposal. Please enter your comments below and return this form as soon as possible but not later than 20th January 2009. All drawings should be returned with your reply. If the application goes to appeal then a copy of your reply will be made available, if requested by the appellant or his agent.

Yours sincerely
Natalie McNally

For Planning Service Headquarters

EM/0603/2009
RECEIVED

COMMENTS (Continue overleaf if necessary)

EMD'S OFFICE DISSEPS IN ALLOCATION
 THE SPECIAL STUDIES UNIT OF PLANNING SERVICE HQ HAS RECEIVED THE ABOVE PAD PROPOSAL. PLEASE ENTER
 YOUR COMMENTS BELOW AND RETURN THIS FORM AS SOON AS POSSIBLE BUT NOT LATER THAN 20TH JANUARY 2009.
 ALL DRAWINGS SHOULD BE RETURNED WITH YOUR REPLY. IF THE APPLICATION GOES TO APPEAL THEN A COPY OF YOUR
 REPLY WILL BE MADE AVAILABLE, IF REQUESTED BY THE APPELLANT OR HIS AGENT.

Signed: _____

Dated: _____



Environment

Tel. (028) 9041 6700 Fax. (028) 9041 6983
Email. planning.service.hq@nics.gov.uk
Web. www.planningni.gov.uk



13/1/09

Consultation Responses from Invest NI (2009 - 2006)

Craig, Amy

From: Doyle, Carey
Sent: 05 November 2007 11:54
To: Mackin, Anne-Marie
Subject: FW: Proposed Tyrone to Cavan Interconnector

From: Catriona O'Donnell [mailto:catriona.odonnell@investni.com]
Sent: 05 November 2007 11:52
To: Doyle, Carey
Cc: Graham Cardwell; Mark Latimer
Subject: Proposed Tyrone to Cavan Interconnector

Your Ref: 45457 IBLE

00 300 07

Carey,

Many thanks for your letter dated 1st November 2007. I would just like to inform you that Invest Northern Ireland has no comment to make.

Kind regards

Catriona


**Invest
Northern
Ireland**
Building Locally
Competing Globally

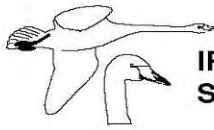
Catriona O'Donnell

Property
Invest Northern Ireland
HQ - 2nd Floor
Bedford House
Bedford Street
BT2 7ES

Direct T: 02890698342
T: +44 (0)28 9023 9090
F: +44 (0)28 9043 6536
Ext: 8342
E: catriona.odonnell@investni.com
W: www.investni.com
www.nbusinessinfo.co.uk

If you are not the intended recipient, or person responsible for delivering it to the intended recipient, you are not authorised to and must not disclose, copy, distribute or retain this message or any part of it. The opinions / views / comments on this e-mail are mine and do not necessarily reflect any views or policies of Invest Northern Ireland. This footnote also confirms that this email message has been swept by MIME sweeper for the presence of computer viruses.

Consultation Responses from Irish Whooper Swan Study Group (2009 - 2006)



**IRISH WHOOPER
SWAN STUDY GROUP**

**Graham McElwaine,
100, Strangford Road,
Downpatrick,
Co. Down
BT30 7JD
N. Ireland.**

☎ (028) 44 612915 (Home)

Email: graham.mcelwaine@virgin.net

*Julie McDowell,
Principal Environmental Scientist,
Faber Maunsell,
1st. Floor,
24, Linenhall Street,
Belfast BT2 8BG*

09 August 2006

Your Ref: 45457IBLE 00 300 06 (03.08.06) Letter

Dear Julie,

PROPOSED TYRONE/CAVAN INTERCONNECTOR – 400KV OVERHEAD LINE & SUBSTATION

Thank you for your letter of 03 August 2006 regarding the above.

You will be aware that line strikes are a major cause of death to swans, and it is therefore important that every possible precaution is taken to ensure that the choice of route and detailed design of your line seeks to minimize the risk of this happening.

Irish Whooper Swan Study Group (IWSSG) has relatively little information regarding possible movements of swans within the area traversed by the route of the proposed overhead line. The area is, however, used by various flocks of whooper swans, and it is recommended that two locations in particular should be the subject of further research in advance of installation of the line: -

River Blackwater Corridor

The River Blackwater valley is used by a number of flocks:

1. Most regular sites are located where the river is oriented north/south to the north of Caledon. IWSSG hold irregular count data from these sites.
2. A flock used to occasionally use fields immediately to the west of your proposed line at Benburb, but this site is now part of a golf course and appears to be abandoned.
3. A large flock can accumulate near Moy/Charlemont at Derryscollops Grove (H873559) during flood conditions. During such conditions this site is also particularly important for Bewick's Swan, which are now becoming rare in Northern Ireland. It is thought that many, if not most, of these birds emanate from Lough Neagh. IWSSG hold irregular count data from this site, which is visited opportunistically when thought likely to be in flood.

It is considered possible/likely that the river acts as a flight line for birds moving from site to site or from feeding site to roost.

Lakes south of Keady

The cluster of lakes to the south of Keady, to the east of route B32, regularly holds flocks of whooper swans in the wintertime. IWSSG hold considerable count data from these sites. Rather less is known about whether swans at these sites may be interacting with other sites across the proposed route.

It is noted that the title of your project is the Tyrone/Cavan Interconnector. IWSSG would also have an interest in the route of this project to the south of the border (particularly as it appears to connect to Monaghan!), and I would be grateful if you could arrange for details to be passed on to us.

I am copying this response to the Royal Society for the Protection of Birds, Wildfowl & Wetlands Trust and BirdWatch Ireland for information.

Yours sincerely,

Graham McElwaine

cc. Claire Ferry, RSPB
James Orr, WWT
Olivia Crowe, BirdWatch Ireland

Consultation Responses from MOD Defence Estates (2009 - 2006)

Safeguarding

Defence Estates, Kingston Road, Sutton Coldfield, West Midlands B75 7RL

Telephone: Direct Dialling: 0121 311 2010/2274
DCSA DFTS: (9) 4421 2010/2274
Facsimile: 0121 311 2218
E-mail: safeguarding@de.mod.uk
Internet Site: www.defence-estates.mod.uk



Mr A Moore
The Planning Service
Millennium House
17-25 Great Victoria Street
Belfast
BT2 7BN

Your reference: 0/2008/0822/Q

Our reference: D/DE 2 (09)

Date: 13/02/2009

Dear Mr Moore

MOD SAFEGUARDING – NORTHERN IRELAND

Proposal: PAD FOR PROPOSED NORTH-SOUTH ELECTRICITY INTERCONNECTOR

Location: LAND WITHIN ARMAGH DISTRICT COUNCIL AND DUNGANNON BOROUGH COUNCIL

Grid Refs: 8571158181

Planning Ref: O/2008/0822/Q

Thank you for consulting Defence Estates Safeguarding on the above proposed development. We can confirm that the Ministry of Defence has no safeguarding objections to this proposal.

Yours sincerely

R. S. Harper

Rachel Harper
DE OPS NORTH
Defence Estates Safeguarding

Safeguarding Solutions to Defence Needs

Safeguarding

Defence Estates, Kingston Road, Sutton Coldfield, West Midlands B75 7RL

Telephone: Direct Dialling: 0121 311 2010/2274
DCSA DFTS: (9) 4421 2010/2274
Facsimile: 0121 311 2218
E-mail: safeguarding@de.mod.uk
Internet Site: www.defence-estates.mod.uk



Faber Maunsell
1st Floor
24 Linenhall Street
Belfast
BT2 8BG

Your reference:

Our reference: D/DE 94

Date: 07/02/2008

Dear Sir/Madam

MOD SAFEGUARDING – NORTHERN IRELAND

Proposal: Proposed tyrone to cavan interconnector-400kv overhead line and substation

Thank you for consulting Defence Estates Safeguarding on the above proposed development. We can confirm that the Ministry of Defence has no safeguarding objections to this proposal.

Yours sincerely

Vicky Lyons
DE Central-Estates
Defence Estates Safeguarding

Safeguarding Solutions to Defence Needs

Consultation Responses from National Grid Wireless (2009 - 2006)

Mrs Carey Doyle
Senior Environmental Scientist
Faber Maunsell
1st Floor
24 Linenhall Street
Belfast
BT2 8BG

Job No:	Faber Maunsell-Belfast	
Received:	CO	CO
Date:	20 NOV 2007	
Action:		
Date:	20 NOV 07	
Copy to:		
Filing Location:		

Peter Hayne MRTPI
Town and Country Planning Manager

peter.hayne@ngridwireless.com
Direct tel +44 (0)1698 871012
Direct fax +44 (0)1698 870923
Mobile +44 (0)7734272010

www.nationalgrid.com/wireless

RECORDED DELIVERY

19 November 2007

Our ref: Tyrone Interconnector/NGW/PH

Dear Mrs. Doyle

NATIONAL GRID WIRELESS

SUBJECT: PROPOSED TYRONE TO CAVAN INTERCONNECTOR – 400 KV OVERHEAD LINE AND SUBSTATION

I refer to the above matter and your letter sent to the BBC on the 1 November 2007.

Your letter has been forwarded to National Grid Wireless (NGW) who currently operates the BBC's UK analogue transmission network. I can advise that due consideration has been given to the details you have provided. We are currently satisfied that there will be no adverse impact on analogue broadcasting transmission by the Tyrone to Cavan interconnector scheme as currently planned.

Additionally, National Grid Wireless also owns and operates the outsourced T-Mobile second generation (2G) mobile phone transmission service in Northern Ireland. This too has been assessed, particularly any impact on critical 'line of sight' transmission links. Assessment has shown that current transmission links should be unaffected by the interconnector and associated overhead pylons based on the details provided.

However, notwithstanding the above, Paragraph C26 of Annex C of PPS10 advises that in the consideration of modern electronic communications:

"The construction of new buildings or other structures, such as windfarms [or tall electricity pylons as another example], can interfere with broadcast and other telecommunications services, and the possibility of such interference can be a material planning consideration."

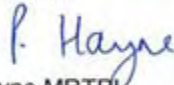
We can appreciate that the final details of the interconnector route may still be fluid and subject to change. Alternatively the size of the overhead pylons and associated apparatus may change. Accordingly we urge that National Grid Wireless is kept fully up to date with any further changes to the interconnector scheme.

Should any subsequent changes be found to threaten current broadcast and radio link networks, we would expect Northern Ireland Electricity to meet all NGW's costs in fully assessing such an event and whether a technical solution can be found to address any issues identified.

This might involve, for example, relocating apparatus, providing a new site or sites for the mobile phone operator and/or re-broadcast links. Should such a scenario occur, we consider that all costs associated with the finding and implementation of an alternative technical solution(s) to address impact on broadcasting or mobile communication links should be fully met by the developer. We would expect this to be secured in the planning process through an appropriately worded Planning Agreement pursuant to Article 40 of The Planning (Northern Ireland) Order 1991 as amended.

I trust this is of assistance. Please do not hesitate to contact me should you require any further explanation.

Yours sincerely

A handwritten signature in blue ink that reads "P. Hayne". The signature is written in a cursive style with a large initial "P".

Peter Hayne MRTPI
Town and Country Planning Manager
National Grid Wireless

ACCEPTED FOR RFI

McDowell, Julie

From: McDowell, Julie
Sent: 22 August 2006 12:59 *Wed 22/08/06*
To: Fitzsimons, Jack - UK
Subject: RE: Proposed Cavan/Tyrone Interconnector - Q/2006/0572

Jack,
Many thanks for your comments.
With kind regards,
Julie

Julie (Ferre) McDowell
Principal Environmental Scientist

Faber Maunsell Ltd.
1st Floor
24 Linerhall Street
Belfast
BT2 8BG

T: +44 (0)28 9043 4900
F: +44 (0)28 9043 4909
E: julie.mcdowell@fabermaunsell.com
W: www.fabermaunsell.com

From: Fitzsimons, Jack - UK [mailto:Jack.Fitzsimons@ngidwireless.com]
Sent: 21 August 2006 10:37
To: McDowell, Julie; planning_service_hq@nics.gov.uk
Cc: tim.shergold@erqa.com
Subject: Proposed Cavan/Tyrone Interconnector - Q/2006/0572

PROPOSED Cavan/Tyrone Interconnector

Thank you for your letter referring to the above development. National Grid Wireless is responsible for providing the BBC's transmission network and is responsible for ensuring the integrity of Re-Broadcast Links (RBLs) within particular areas. We have considered whether this development is likely to have an adverse affect on our operations and have concluded that we have no objection to this application.

Regards,

Jack FitzSimons
Project Engineer, Spectrum Planning
National Grid Wireless Group
Email: jack.fitzsimons@ngidwireless.com
Phone: +44 (0) 1928 416 257

22/08/2006

McDowell, Julie

From: Fitzsimons, Jack - UK [jack.fitzsimons@ngriwireless.com]
Sent: 21 July 2006 11:11
To: McDowell, Julie
Subject: Proposed Tyrone/Cavan Interconnector

Hi Julie,

Thanks for the additional information on the interconnector. However I have not received your original letter of 10th July to which you refer. I note that you are still using our old address although mail sent to is getting to us. Perhaps you could update your records. Our new name and postal address is as follows:

Spectrum Planning
National Grid Wireless
Wireless House
Warwick Technology Park
Heathcote Lane
WARWICK
CV34 6DD

NOT RECORDED
21/07/06
00:30

Regards,

Jack Fitzsimons
Project Engineer, Spectrum Planning
National Grid Wireless Group
Email: jack.fitzsimons@ngriwireless.com
Phone: +44 (0) 1926 416 257
Fax: +44 (0) 1926 416 275

In line with the change of name to our former Crown Castle UK and Gratecom group company names - we are now collectively trading as National Grid Wireless - my e-mail address is now jack.fitzsimons@ngriwireless.com. Please update your records accordingly.

National Grid Wireless Limited registered office: 1-3 Strand, London, WC2N 5EH

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24/07/2006

McDowell, Julia

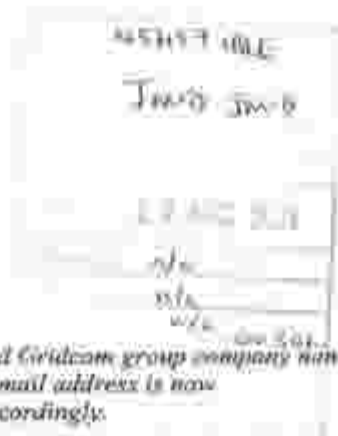
From: Fitzsimons, Jack - UK [Jack.Fitzsimons@ngridwireless.com]
Sent: 21 August 2006 10:37
To: McDowell, Julia; planning.service.hq@nics.gov.uk
Cc: tim.shergold@arqiva.com
Subject: Proposed Cavan/Tyrone Interconnector - O/2006/0572

PROPOSED Cavan/Tyrone Interconnector

Thank you for your letter referring to the above development. National Grid Wireless is responsible for providing the BBC's transmission network and is responsible for ensuring the integrity of Re-Broadcast Links (RBLs) within particular areas. We have considered whether this development is likely to have an adverse affect on our operations and have concluded that we have no objection to the application.

Regards,

Jack FitzSimons
 Project Engineer, Spectrum Planning
 National Grid Wireless Group
 Email: jack.fitzsimons@ngridwireless.com
 Phone: +44 (0) 1926 416 257
 Fax: +44 (0) 1926 416 275



In line with the change of name to our former Crown Castle UK and Gridcom group company names - we are now collectively trading as National Grid Wireless - my e-mail address is now jack.fitzsimons@ngridwireless.com. Please update your records accordingly.

National Grid Wireless Limited registered office: 1-3 Strand, London, WC2N 5EH

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21/08/2006

McDowell, Julie

From: Timothy Shergold [tim.shergold@arqiva.com]
Sent: 13 July 2006 16:15
To: McDowell, Julie
Subject: Potential overhead Line: Tyrone / Cavan

Hi Julie

Potential overhead Line: Tyrone / Cavan

Thank you for providing us with the opportunity to comment on the above proposed developments.

Based on the information that you provided, our analysis shows the proposed developments are unlikely to affect any of our UHF Re-Broadcast feeds and hence we would not wish to object.

Regards,

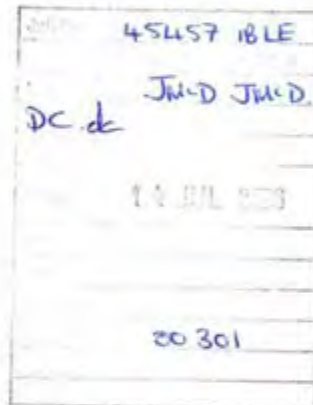
Tim Shergold
Spectrum Planning Group
Arqiva

Direct 01962 822326
Crawley Court, Winchester, Hampshire SO21 2QA

This email is from Arqiva, the new name for NTL Broadcast
www.arqiva.com

Arqiva Ltd

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14/07/2006

Consultation Responses from National Trust (2009 - 2006)



THE NATIONAL TRUST

for Places of Historic Interest or Natural Beauty

NORTHERN IRELAND REGION · ROWALLANE HOUSE · SAINTFIELD ·
BALLYNAHINCH · COUNTY DOWN BT24 7LH

Telephone +44 (0)28 9751 0721 · Facsimile +44 (0)28 9751 1242 · Website www.nationaltrust.org.uk

Carey Doyle
Faber Maunsell Aecom
1st Floor 24 Linenhall Street
Belfast
BT2 8BG

E-mail helen.kirk@nationaltrust.org.uk
Your ref
Our ref
Tel No 028 9751 2367

21 November 2007

Dear Carey Doyle

Re: Proposed Tyrone to Cavan Interconnector – 400kV Overhead Line and Substation.

Thank you for your letter dated 1st November 2007 regarding the above.

The proposed area does not directly affect any National Trust property or land holdings so I have therefore no specific comment to make at this time.

On behalf of the Trust I would like to express my appreciation for the updates on the progress of the scheme and would request that you keep me informed at the later stages of the EIA when the Trust may be in a position to comment on specific issues

Yours sincerely

Helen Kirk

Helen Kirk
Land Use Planning Advisor (N.I.)

Job No	L15457 IBLE
For the attention of	
Received by	AMM JMM
Date	22 NOV 2007
Time	AMM
Copy to	22/11/07
File No	00600



THE NATIONAL TRUST
for Places of Historic Interest or Natural Beauty

Telephone +44 (0) - Facsimile +44 (0) - Website www.nationaltrust.org.uk

Ms Julie McDowell
Principal Environment Scientist
Faber Maunsell
1st Floor
24 Linnen Hall Street
Belfast
BT2 8BG

Direct tel 028 9751 2367
Direct fax 028 9751 9279
E-mail helen.kirk@nationaltrust.org.uk
Your ref 45457IBLE 00 300 06
(16.08.06) Letter
Our ref DP/LUP/A20

23 August 2006

Dear Ms McDowell

Re: Proposed Tyrone/Cavan Interconnector – 400kV Overhead Line & Substation

Thank you for your recent correspondence and for the opportunity to comment, regarding the EIA for above proposal.

While the National Trust fully supports the undertaking of such an EIA, we do not feel that the Trust can contribute to your baseline studies in relation to the areas highlighted on your accompanying maps, as the National Trust does not have property nor other landholdings in the areas specified.

I hope this information will be helpful. Should you require any further assistance, please do not hesitate to contact our office.

Yours Faithfully

ff Helen Kirk
Land Use Planning Adviser for NI

Job No:	45457IBLE
Faber Maunsell-Belfast	
Reviewed by:	JMD JMD
DC	dc
Date:	29 AUG 2006
Actioned by:	
Date:	
Copy to:	
Filing Location:	

Consultation Responses from NATS Safeguarding Office (2009 - 2006)



NATS

NERL Safeguarding

NATS – CTC
Mailbox 27
4000 Parkway
Solent Business Park
Whiteley
Hampshire
PO15 7FL

T: 01489 444687
F: 01489 444013
E: natssafeguarding@nats.co.uk

The Planning Service
Millennium House
17-25 Great Victoria Street
Belfast
BT2 7BN

6th January 2009

Your Ref: O/2008/0822/Q
Our Ref: N/SFG/NS/2736

Dear Sir/Madam

Proposal: PAD for proposed North-South Electricity Interconnector
Location: Lands within Armagh District Council & Dungannon Borough Council

The proposed development has been examined from a technical safeguarding aspect and does not conflict with our safeguarding criteria. Accordingly, NATS (En Route) Limited has no safeguarding objections to this proposal.

However, please be aware that this response applies specifically to the above consultation based on the information supplied at the time of this application. If any changes are proposed to the information supplied to NERL in regard to this application which become the basis of a revised, amended or further application for approval, then as a statutory consultee NERL requires that it be further consulted on any such changes prior to any planning permission or any consent being granted.

Yours faithfully,

Amanda Woulfe
Technical Administrator
for & on Behalf of NATS (En Route) Ltd

Consultation Responses from Newry and Mourne District Council (2009 - 2006)

Telephone Record

Call To:	C Doyle	Date:	21 November 2007
Taken by:	Carey Doyle	Time:	
Subject:	NS Int. Consultations	Job No/Ref:	45457 IBLE

Project Title:	NS interconnector		
Call From:	John Farrell at Newry and Mourne DC	Telephone No	

Message:

He was contacted as part of the NS consultations and wanted to confirm that none of the proposed development was in their DC area. I confirmed this with him, and he asked if we had contacted Armagh DC, which I also confirmed.

They will provide comments if they have them on the proposed development.

Message read by Project Manager <small>(Sign here only if not the originator of the Message)</small>		Date:	
--	--	-------	--

File: Treat as correspondence

Direct Tel: 028 9043 4900
 T +44 (0)28 9043 4900
 F +44 (0)28 9043 4909
 E carey.doyle@fabermaunsell.com
 www.fabermaunsell.com

1st Floor
 24 Linenhall Street
 Belfast BT2 6BG

Consultation Responses from Northern Ireland Tourist Board (2009 - 2006)



Northern Ireland
Tourist Board

17th July 2006

Your Ref: 455477IBLE 00 300 06

Julie McDowell
Principal Environmental Scientist
Faber Maunsel Aecom
1st Floor
24 Linenhall Street
BELFAST
BT2 8BG

Dear Ms McDowell

Job No:	45457 IBLE
Faber Maunsel-Belfast	
Reviewed by:	md JMD
DC id:	
Date:	20 JUL 2006
Actioned by:	
Date:	
Copy to:	
Filing Location:	00 301

PROPOSED TYRONE/CAVAN INTERCONNECTOR – 400kV OVERHEAD LINE & SUBSTATION

I refer to your letter of 10th July 2006 regarding the above proposal and addressed to my colleague Stephen Bill.

NITB does not have a policy on the placement and positioning of overhead electricity lines, but as the strategic body for tourism in Northern Ireland we would make the following comments on the proposal: -

- NITB would urge caution on the siting of commercial developments in rural areas, in particular those which will have negative impacts on the visual amenity of the region.
- With regard to infrastructure relating to power generation such as windfarms and/or associated infrastructure, we oppose the development of large scale infrastructure within areas of primary designation (AONBs, ASSIs, National Nature Reserves)
- Overhead cables present a challenge to those involved in landscape protection and depending on the scale of the development can be a potential major threat to the natural beauty of the countryside – which is often the main resource of an area
- We would therefore advise that you take account of the economic impact of the proposal, particularly given the importance of tourism for the economy of our rural areas

St Anne's Court, 59 North Street,
Belfast BT1 1NB.
Email: info@nitb.com
Industry website: www.nitb.com

Telephone: (028) 9023 1221
Textphone: (028) 9044 1522
Fax: (028) 9024 0960

Consumer website: www.discovernorthernireland.com

Chairman: Tom McGrath OBE
Chief Executive: Alan Clarke

NITB is an Equal Opportunities Employer



I trust that you find these points helpful, but please contact me if you require any further clarification.

Yours sincerely



Fergal P. Kearney
Senior Development Officer
Regions and Signature Projects

Direct Line 028 90 441666

**Consultation Responses from Northern Ireland Water (2009 – 2006) (Formally DRD
Water Service)**

D.S.C.T.
Infrastructure Management
Northern Ireland Water
Academy House
121a Brookfield Lane Street
Ballymena
BT43 6BA

Tel: 028 25 65 8505
Fax: 028 25 421111
www.niwater.com



Please complete enclosed app
form and return to this office
with a fee of £3300 as per
attached list of charges.

with compliments

Records Request Form

Please complete all sections of this form and write clearly in **BLOCK CAPITALS**

TYPE OF PLANS REQUIRED (Tick Box)

Watermains Sewers Both

Number of copies required Inspection only

* Please note that the applicant is required to submit a copy of an Ordnance Survey based map showing the location where information is required.

1. Location Where Information Required

House No/Description
 Street/Road
 Locality
 Town
 Postcode
 OS Grid Ref (6 fig)

2. Applicant's Details

Name
 (company name where appropriate)
 Address
 Postcode
 Tel Number
 Mobile Number
 Fax Number
 Email

3. Current Fees (Routine Requests)

One paper copy of both Water/Sewerage
 One paper copy of either Water/Sewerage
 Each additional paper copy when supplied at the same time
Charges as stipulated in current Scheme of Charges – Miscellaneous Standard Charges

4. Method of Payment

- By cheque - Payable to Northern Ireland Water Ltd
- Please do not send cash through the postal system

5. General Information

Plans may be inspected free of charge by prior appointment at designated offices. Appointments can be made Monday-Friday 10.00 am to 4.00 pm by Contacting Northern Ireland Water on (028) 9024 4711.

Please find herewith my payment in respect of £.....by cheque*

Signed.....

Date.....

Job No:	
Reviewed by:	MM
Date:	22 NOV 2007
Checked by:	
Date:	
Copy no.:	
Filing Location:	

REQUISITIONS www.nhwater.com/business/servicetodevelop/forms	CHARGES	SCHEME OF CHARGES	APPLICATION FORM REF.
Water connections up to 25mm	£190	18.4	WC1-A079
Sewer connection inspection	£100	18.6	SC2-A163
Re-inspection of sewer connection	£100	18.6	SC2-A163
* Service mark-up	£28.08 + vat (E33)	18.1.1	RR1-A257/A258
Inspection of record by appointment	Free	18.1	
Written request for separate water / sewer details	£20 per copy	18.1.1	
Additional paper copies	£3.40	18.1.1	
Additional request for search of records	£10	18.1.2	
Additional copies of documents	£5	18.1.2	
Application for adoption of existing sewers (A159)	£84**	18.10	ESA1-A159
Application for adoption of sewers NEW DEV (A161)	£84**	18.9	SA1-A161
Application to build over sewer <300mm	£84 + vat (E98.70)	18.11	BOS2-A236
Application to build over sewer >300mm	£117 + vat (E137.48)	18.11	BOS2-A236
Application to realign sewer <300mm	£84**	18.13	RS1-A247
Application to realign sewer >300mm	£117**	18.13	RS1-A247
Inspection of sewer realignment	£150 + vat (E167.27)	18.13	RS1-A247
Inspection of Build Over Sewer	£117 + vat (E137.48)	18.11	
Request mains to housing site (assessment fee)	£84	18.17	WR1-A076
Request mains extension rural (application fee)	£84**	18.6	FTW1-A076
Request sewer extension (application fee)	£84**	18.6	FTS1-A154
Pre-development enquiry (includes service mark-up)	£75**	18.17	PDE1
Network capacity check (Application fee)	£50**	18.17	PDE1
Network Capacity Check - Hydraulic (Flow and Capacity) assessment	Full Cost less £500 deposit in advance	18.17	PDE1
Development encroachment / odour assessment	£67**	18.17	DEOM1-PPS11
Infrastructure charges (water & sewerage)	£83.33	13.7	
Assessing a re-submission	£50		
Hydraulic flow check	£500 deposit	18.17	
Legal / Admin fees	£110	18.9	
Deposit for rechargeable mains diversion	£2,000 (min)	18.17	

* SEND BOTH FORMS TO CUSTOMER

** VAT ZERO RATED FOR NEW DEVELOPMENTS IF EXISTING SEWER SERVICE IS AVAILABLE

Consultation Responses from the Public Health Agency



**Public Health
Agency**

*Corridor E Health Estates
Stoney Road
Dundonald
BT16 1US*

*Tel : 028 90 523737
Email: eddie.rooney@hscni.net
Web Site : www.publichealth.hscni.net*

The Planning Service
Millenium House
Gt Victoria Street
Belfast
BT2 7BN

15 June 2009

Dear Mr Moore

NIE/ESB Interconnector scheme – Consultation process

I am writing with regard to your letter of the 3rd June 2009 regarding the proposed Interconnector and request for comments.

You may be aware that Health and Social Services Boards in N.Ireland were recently re-organised and that the Public Health Agency is now responsible for issuing the response to the consultation.

The response from Southern Health and Social Services Board to initial Planning Service's letter of the 21st Nov 2008 regarding this matter noted the omission of a key section from the consultation document, specifically regarding Electromagnetic fields (Chapter 7). The SHSSB did not therefore feel able to provide detailed comment regarding the Interconnector at that time. This Electromagnetic field section has, however, now been received along with your letter of the 3rd June 2009.

Upon review, the Electromagnetic field document does appear to provide a balanced review of the presently known information and evidence regarding electric fields.

Improving Your Health and Wellbeing

As you will be aware, it is be important that the developer, i.e. Northern Ireland Electricity complies with guidance issued from the Health Protection Agency (HPA), England.

I note that the proposed route will, at its closed point, be at least 75m from the nearest private dwelling. Assuming the Interconnector is appropriately maintained and serviced, field strength levels at these nearest dwellings should be considerably less than the internationally acknowledged Reference levels (i.e. less than 1%). Based upon the available information/evidence at our disposal this provides considerable reassurances in terms of safeguarding Public Health.

In terms of public reassurance and to bring some transparency to the advisory process it may be appropriate for the developer to seek external national level advice, i.e. from the Health Protection Agency.

I trust the above information will be of assistance in your appraisal of the interconnector scheme.

Yours sincerely

A handwritten signature in black ink, appearing to read 'E. Rooney', written in a cursive style.

Dr Eddie Rooney
CHIEF EXECUTIVE

Consultation Responses from OFCOM (2009 – 2006)

McDowell, Julie

From: Gerard Blaevoet [Gerard.Blaevoet@ofcom.org.uk]
Sent: 21 July 2006 15:45
To: McDowell, Julie
Subject: Re: Proposed Tyrone/Cavan Interconnector, your ref 454571ble 00 300 06

Julie McDowell,

Thank you for your letter of the 10th July regarding the proposed Tyrone/Cavan Interconnector.

Our Engineers advise me that OFCOM no longer carry out Television Impact Assessments, and recommend that you consult the BBC Online Tool at <http://windfarms.kw.bbc.co.uk/>

Regards

Gerry Blaevoet
UK Site Clearance & Windfarm Administration
Direct Tel: +44 (0)20 7981 3160
email: gerard.blaevoet@ofcom.org.uk

Ofcom
Riverside House
2a Southwark Bridge Road
London. SE1 9HA
020 7981 3000
www.ofcom.org.uk



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24/07/2006



Produced by Northern Ireland Electricity Limited
www.nie.co.uk

April 2013

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Registered in N. Ireland NI 26041

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