

WEST GALWAY 110/38 kV SUBSTATION

STAGE 1 LEAD CONSULTANT'S REPORT
IDENTIFICATION OF LEAST CONSTRAINED SITES



February 2012



West Galway 110/38 kV Substation

Stage 1 Lead Consultant's Report

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1 INTRODUCTION

1.1 Project Overview

EirGrid proposes to develop a new 110/38 kV electricity substation west of Moycullen, County Galway, at a location along the permitted Salthill – Screebe 110 kV overhead line (OHL). ESB International (ESBI) has been appointed by EirGrid as the Lead Consultant for this project.

The purpose of the substation is to facilitate the connection of renewable energy which will be generated from permitted and planned windfarms in the Uggool and Seecon areas, located west of the N59 between Moycullen and Oughterard, to the National electricity grid. The proposed substation will be located adjacent to, and will loop into, the permitted Salthill – Screebe 110 kV OHL (*An Bord Pleanála Ref. No. VA0004*). Pre-construction surveys and preparatory works in relation to the permitted line have commenced.

The connection method for generation in the Uggool and Seecon areas to the planned substation is being planned and developed separately by SSE Renewables (SSER). It consists of a permitted 110 kV substation at one of the generation sites, which is to be connected by circa 7km of new 110 kV circuit to the proposed substation being developed separately by EirGrid.

1.2 Need for the Development

Ireland has an abundant source of renewable energy potential, including that from wind in the West of Ireland. Current National Policy sets targets to achieve 15% of electricity consumption on a national basis from renewable energy resources by 2010, and 40% by 2020. To achieve these targets, significant numbers of new renewable generators (predominantly windfarms) have to be developed and connected to the National electricity transmission network (the Grid). This will require the development of significant new transmission infrastructure, including electricity lines and substations, which is outlined in EirGrid's Grid Development Strategy – Grid25.

To support national policy at a local level, planning authorities are required to produce Wind Energy Strategies which inter alia identify preferred areas for wind energy development within the relevant county.

Galway County Council produced a Wind Energy Strategy in September 2011, as a variation to the County Development Plan (CDP). Prior to this, the plan contained more generalised policies, objectives and maps facilitating wind energy development.

The variation to the CDP has identified the area around Uggool and Seecon as being "Strategic Areas" for wind development.

Within this area, planning permission has been granted for two separate windfarms as follows; Uggool Wind Farm (64 MW) and Seecon Wind Farm (105 MW).

The above wind farms have received connection offers from EirGrid as part of the Gate 3 Renewables Generation Offer Project. The Gate 3 Offer Project is a mechanism whereby renewable energy generators submitted applications for connection to the national grid. This Gate 3 Offer process is now closed to further applicants. The volume of applicants to the Gate 3 process has indicated that potentially up to 3,900 MW of renewable energy may be available for future connection to the national grid. The connection of the potential 3,900 MW of renewable energy included with the Gate 3 Offer process, will contribute significantly towards helping Ireland achieve its 40% renewable energy target by 2020.

An electricity substation functions in much the same way as a motorway junction by allowing a number of electricity circuits to meet and connect with each other, thereby allowing efficient bulk transport of electricity to supply different points in the network.

It is in this capacity that EirGrid is proposing the West Galway 110/38 kV electricity substation.

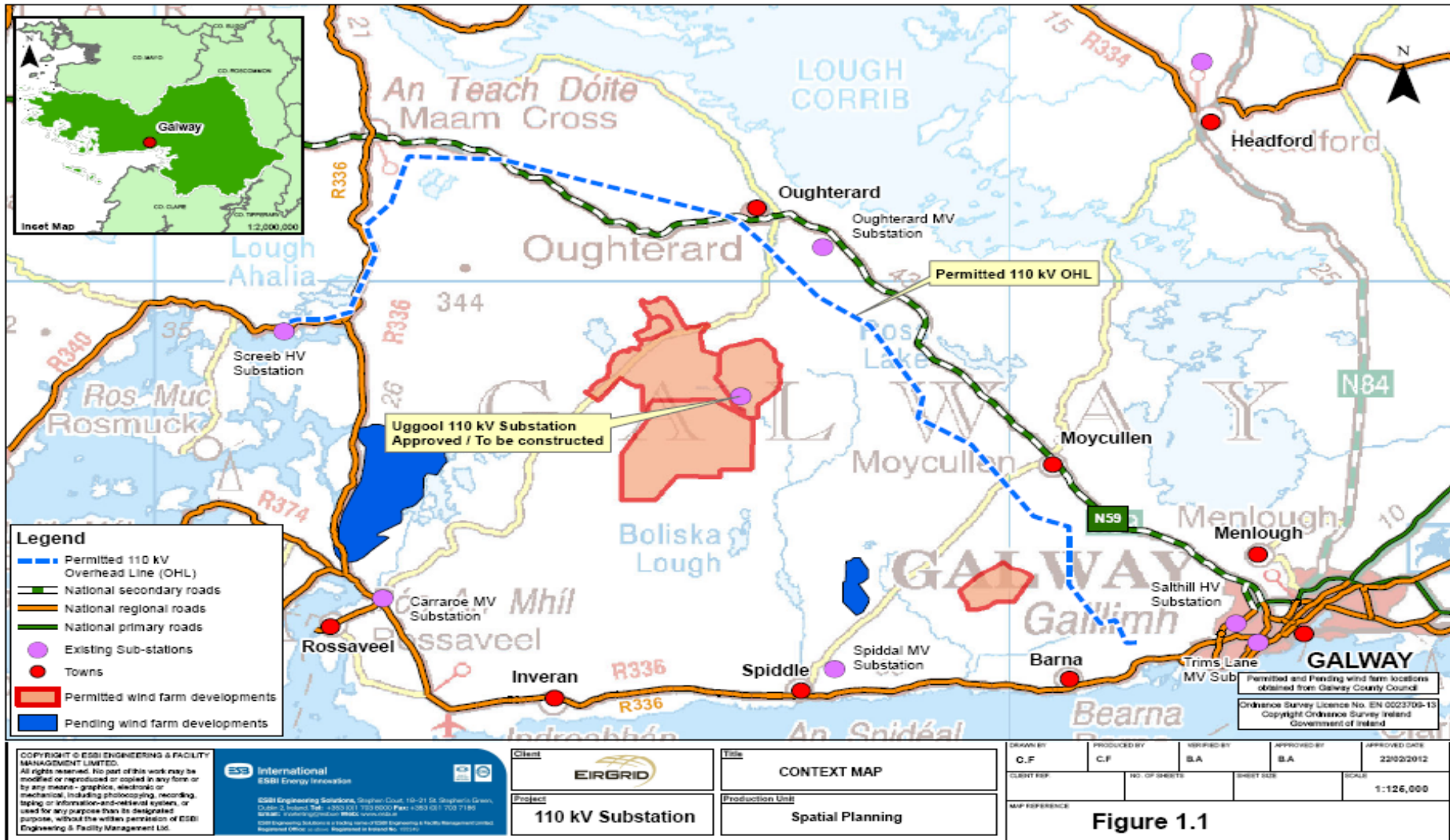


Figure 1.1: Project Context Map

1.3 Purpose of This Report

The purpose of this Stage 1 Lead Consultant's Report is to present what is considered by ESB International (ESBI) to be the least constrained site(s) for the proposed 110 kV substation.

It is the intention that the information contained herein will enable consultation between the project team and all interested parties. This is a continuation of the Stage 1 information gathering process that has occurred to date, and any feedback on the findings to date will be evaluated in the next stage (Stage 2), as per EirGrid's Project Development Roadmap (See section 1.4 below).

Upon publication of this Stage 1 report there will be a period during which stakeholders will be invited to provide feedback on the information in the report. This feedback will be evaluated and assessed by the Project Team, which may or may not result in modifications to the conclusions of the report.

This report therefore sets out to:

- Present the need for the project;
- Present the possible technical solutions;
- Establish a study area for the project;
- Identify any constraints within the defined study area;
- Identify possible substation site locations within the study area;
- Assess possible site locations having regard to environmental, cost and engineering constraints; and
- Identify the least constrained site(s) for the substation.

1.4 About EirGrid

EirGrid is the state owned independent Transmission System Operator (TSO) and Market Operator (MO) in Ireland.

It is EirGrid's role to deliver quality connection, transmission, and market services to electricity generators, suppliers and customers utilising the high voltage electricity transmission system.

The Transmission System (also known as the National Grid) is a meshed network of approximately 6,500km of high voltage overhead lines, (OHL) and underground cables, (UGC) and over 100 transmission stations.

The transmission system operates at voltages of 110 kV, 220 kV and 400 kV.

The system can be compared to Ireland's motorway network – delivering power from generators to over 100 bulk transfer points or "nodes" all over Ireland. Power is then carried onwards from these substation nodes to individual customers and households, via the low voltage distribution system.

EirGrid has several roles:

- To operate a safe, secure, reliable and efficient national electricity grid;
- To plan and develop the necessary grid infrastructure to support Ireland's economy;

- To schedule electricity generation with power generators to ensure that supply matches demand; and
- To operate the wholesale electricity trading system.

It is in this capacity that EirGrid is proposing the 110/38 kV substation.

1.5 EirGrid Project Development Roadmap

EirGrid has developed a Project Development Roadmap, which is applied in respect of all major transmission infrastructure development projects. This roadmap is intended to have a threefold purpose:-

- To ensure and demonstrate a consistency of approach by EirGrid and its consultants in the planning and development of all major projects which require statutory consent - whether linear (e.g. lines) or site based (e.g. stations and substations);
- To provide clarity to the public, stakeholders and the consenting authority about where a process or deliverable occurs at any point in time, relative to the overall project development; and
- To coordinate project deliverables and project progress with public and other consultation and engagement, and to ensure adequate opportunity for public and stakeholder input at all stages of the process of shaping the development proposal.



The Lead Consultant's Stage 1 Report is, as per the Project Development Roadmap, the culmination of the Stage 1 Information Gathering Process. The Report will form the basis for a process of structured public and other stakeholder consultation. This has the objective and benefit of deriving feedback upon which project options can be more fully evaluated, prior to moving into the decision making process of Stages 2 and 3, and ultimate preparation of an application for Statutory Approval of the proposed development in Stage 4.

1.6 Project Team

ESB International has been appointed by EirGrid as the Lead Consultant for this project. As lead consultant, ESBI has, where necessary, engaged specialist sub-consultants to assist in the preparation of environmental reports.

2 Planning Policy Context

2.1 Strategic Planning Context

The purpose of this section is to describe the strategic planning context for this project. This is set out in governmental, regional and local policies and objectives.

2.1.1 Grid25

GRID25 – *A Strategy for the Development of Ireland's Electricity Grid for a Sustainable and Competitive Future* (2008) outlines EirGrid's high level strategy for upgrading Ireland's electricity network up to the year 2025, in response to the government White Paper on Energy Policy, (see section 2.1.2.1 below).

It should be noted that while they are largely aligned, there is some overlap between the boundaries of the Grid 25 regions and the regions as defined by the regional authorities.

The section on the north western region (GRID25), where the proposed development is located, outlines the consequences of non action as follows:

- By the second half of the next decade, there will be no capacity in the network to cater for new customers and the reliability of supply to existing customers will fall below normal international standards; and
- There will be not be enough capacity in the network to connect further renewable generation; as the north-west is a renewable-rich region this will have severe consequences on the ability of Ireland to meet its renewable targets and its long-term sustainable energy supplies.

Benefits to the region include;

- Improvements will ensure security of supply to the region;
- Infrastructure to attract future industry; and
- Provision for the use of renewable energy in the region.

2.1.2 National Objectives

2.1.2.1 White Paper on Energy Policy Framework 2007-2020

The White Paper sets out the government's energy policy framework 2007-2020 to deliver a sustainable energy future for Ireland.

Strategic goals outlined in the White Paper in relation to security of energy supply include:

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

The Government's White Paper emphasises that *'the availability of reliable, secure and competitively priced electricity supply must be assured at all times'* and highlights the fact that electricity *'is a vital ingredient in the competitiveness of Irish industry and Ireland's long term economic and social development'*.

The White Paper also sets the target of 33% of electricity being produced from renewable generation by 2020. This target was subsequently increased to 40%.

2.1.2.2 National Development Plan 2007-2013

The National Development Plan 2007-2013 sets out to ensure that Ireland remains competitive in the global international marketplace. A strategic objective of the Energy Programme of the NDP is to ensure security of supply nationally and regionally. The NDP further states that the main focus of investment by EirGrid *'will entail improvement of the transmission network for electricity to accommodate increased usage and enhance security of supply, to allow increased connection of sustainable and renewable energy sources to the network and to support greater interconnection with Northern Ireland and Great Britain'*.

2.1.2.3 National Spatial Strategy 2002-2020

The NSS is a 20-year strategic vision for the spatial development of Ireland. It outlines how a strengthened network of cities and towns together with rural communities and their resources will be mobilised and complemented by appropriate social and physical infrastructure, to create more balanced development across the country.

In relation to key infrastructure projects, the NSS identifies that *'a feature of the most mature and successful economies is that they possess highly developed, well integrated infrastructure that supports movement, i.e. public and private transport, and energy and communications networks'*.

The NSS identifies strategically located gateways whose purpose is to promote national and regional development in their areas. Galway has been identified as one of these gateways. The Grid25 strategy endorses the NSS goal of developing gateways and achieving balanced regional development.

2.1.3 Regional Objectives

2.1.3.1 West Regional Authority, Regional Planning Guidelines 2010 – 2022

The Western Regional Planning Guidelines (RPGs) set out the planned direction for growth within the Western Region up to 2022 by giving regional effect to national planning policy under the National Spatial Strategy (NSS). These guidelines also have a crucial role in supporting regionally important infrastructure and the investment priorities of the National Development Plan.

Energy transmission networks are considered in section 5.5 of the RPGs. It is stated that for any region to develop economically and socially, it must have available a reliable, cost competitive and sustainable electricity service as there is a well-established correlation between economic growth and increasing electricity consumption.

The guidelines also recognise that the aggregate of renewable generation capacity in some areas is equivalent to large conventional generation stations and in many cases the existing network is not capable of carrying the power from these generation sources. Significant reinforcement of the Grid will therefore be required to cater for the new power flows from renewable generation.

The guidelines suggest that it is important that EirGrid engage in early consultation and discussion with planning authorities in the case of strategic infrastructure development or other relevant planned bulk transmission projects and relevant infrastructure projects.

One of the most relevant key requirements for the West Region can be summarised as follows: “*grid investment for the West Region must be guided by the need to remedy immediate deficiencies and also by an expected long-term moderate growth in population and economic development*”.

Objectives IO49 and 50 are quite specific in this regard:

IO49: Support the construction of new 110kV and higher lines across the region but particularly to the West Galway and North Mayo areas. Such proposals must take account of various EU designations and relevant environmental assessment in its design and construction and significant impacts on Natura 2000 sites must be avoided through the Habitats Directive ‘Appropriate Assessment’ process.

IO50: Support the GRID25 Proposals to upgrade approximately 700km of the existing transmission network and build new circuits across the region

2.1.4 Local Objectives

2.1.4.1 Galway County Development Plan 2009 – 2015

The Galway County Development Plan 2009 – 2015 (GCDP) sets out the planned direction for growth within the county up to 2015 by giving local effect to regional planning policies. In relation to energy, the CDP notes that in terms of alternative energy, Galway has huge potential for the development of wind, solar, biomass, geothermal, hydro and wave energy. The wave and wind resources are among the richest in Europe. Maximising the sustainable alternative resources shall be a priority.

Policies IS32, 33 and 34 are quite specific in this regard

Policy IS32: Support the infrastructural renewal and development of electricity networks in the County, including the overhead infrastructure required to provide the networks.

Policy IS33: Facilitate the strategic goal of effective balanced regional development through the implementation of policies that will deliver a reliable and effective electricity network for the West Region including County Galway.

Policy IS34: Support the infrastructure development of energy networks in the County so as to provide for the energy needs of the Community while avoiding environmental damage and the location of other developments along strategic routes.

Objective IS24 refers specifically to the area where the new substation is proposed as follows:

Objective IS24: The Planning Authority shall seek to reserve a strategic corridor free from conflicting or inappropriate development as shown on Map IS2 for the purposes of providing necessary overhead electrical supply and distribution infrastructure between Galway and Screebe and other strategic infrastructure elements of the Grid Development Strategy.

A variation to the County Development Plan was adopted in September 2011. The purpose of this variation was to include a Wind Energy Strategy as part of the plan. Whilst the strategy is largely focused on identifying development areas for wind energy it makes some reference to the transmission network which is required to support wind energy development. It notes that in order to facilitate the expansion of wind farms, the grid itself will require development and expansion. It also notes the approved 110 kV line extending from Galway City to Screebe in the west of the County. It concludes that it is important for

the future development of electricity and wind farms in the County that these strategic pieces of infrastructure are protected from inappropriate development in their immediate environs and that their scope for development is maintained. Such development would include the provision of new substations.

2.1.4.2 Gaeltacht Local Area Plan 2008 – 2014

The study area for this project falls within the Gaeltacht area as identified in the Gaeltacht Local Area Plan 2008 – 2014. This Gaeltacht area is extensive as it includes all areas where Irish is the predominant language spoken. The purpose of the plan is to facilitate in halting the decline in population and agree on a programme of infrastructural development and service delivery which will encourage the younger generation to remain in their native area, out of choice, and develop its economy in a way that is language and culture friendly.

There are no specific policies or objectives in relation to the proposed development but there are numerous policies which place protection of the environment as a priority when dealing with infrastructure proposals.

2.2 Conclusion

It can be concluded that the proposed development is consistent with planning policies and objectives at all levels.

3 Project Description

This section provides a description of what substations are, the different types of substation technology available for this project and the requirements for this particular substation.

3.1 Substation Description

A substation (also frequently referred to as an electricity station) acts as a point of common connection or node for several circuits. It is helpful to think of them like a roundabout or intersection within a road network. Power comes in on one circuit (road) and can be sent down another circuit. This is achieved by other equipment in the substation like switches and circuit breakers. All of this equipment together is known as a station, or substation.

A substation can also be a location where equipment is placed to safely change the electricity from higher transmission voltages to lower voltages that are appropriate for use by end-customers. It does this by using equipment known as transformers. They transform the electricity from one voltage to another and they represent the means through which electricity is drawn from the transmission system, onto the distribution system.

3.2 Substation Technology

As described in section 1, EirGrid, as the Transmission System Operator (TSO) have identified the following requirements in response to the summary outlined in section 1.1:

- A new 110/38 kV electricity substation west of Moycullen, County Galway, at a location along the permitted Salthill – Screebe 110 kV OHL.
- The permitted Salthill – Screebe 110 kV overhead line will connect (loop in) into this new substation.
- There are a number of factors to consider when deciding which type of substation, and the equipment within, to use on this project, including environmental factors, technical factors, and cost.

Irrespective of the final type, configuration and layout of the substation, there will be some local modifications required to the permitted Salthill – Screebe 110kV overhead line structures in the locality to facilitate its loop in. The substation will also need to be designed and located in such a manner so as to facilitate the connection of the planned circuit from the Uggool area.

3.3 Substation Requirements

The scope of works issued by EirGrid outlined the requirements for the substation as follows:

- Construction of a new 110/38 kV substation, adjacent to the planned Salthill-Screebe 110 kV circuit with inclusion of:
 - One 110 kV busbar,
 - One 110 kV coupler,
 - Three 110 kV line bays (to Galway, Salthill and Screebe 110 kV substations),

- An additional 110 kV line bay (Uggool) and 110 kV transformer bay (future Distribution system operator (DSO) customers),
- Potential second busbar and future bays,
- Possibly one 38 kV busbar (not confirmed yet), and
- Two new sections of 110 kV circuit to loop the new 110 kV substation into the Salthill-Screebe 110 kV circuit (length of circuits not finalised, however the proposed location of the substation is adjacent to the 110 kV circuit).

It is standard practice to allow spare capacity in substations in the form of spare bays, or space to develop spare bays. Not to do so would be extremely poor practice, operationally and financially and in the context of proper planning and sustainable development, so the proposed substation will be designed and built to facilitate future expansion should it ever be required.

Substation size however is only one consideration when deciding substation types. Technical performance including operational flexibility and maintenance as well as comparative costs must also be considered.

3.4 Emerging Substation Technology

Two types of station are possible using alternative station technologies, these are:

- Air Insulated Switchgear (AIS) – An AIS substation uses atmospheric air as the phase to ground insulation for the switchgear of an electrical substation and therefore the majority of it is sited outdoors.
- Gas Insulation Switchgear (GIS) – A GIS station uses gases to insulate the equipment and the majority of it is contained within a building.

The main advantage of the AIS substation is the scope of the substation for future offloading; for this reason AIS substations tend to be the most widely used substation type. The equipment of an AIS substation is easily sourced and has a short lead-time; this means that the required future offloading does not need to be built immediately, unlike GIS where it must be considered.

AIS substations have larger footprints than other substation technologies and require sensitive locating in any rural environment.

AIS is emerging as the preferred technology for this project as it meets all technical requirements, from the initial environmental appraisal it appears that the potential environmental impacts are within acceptable limits and it is the most cost effective technology. As previously stated, AIS technology is more flexible as it allows substations to be developed incrementally in response to system requirements. Other substation technologies generally require full build out (including all possible electrical equipment required in the future) at the time of initial construction, thereby increasing cost and building capacity which may not be used in the future.

Having considered the available substation technologies for this project, the emerging preferred technology is an Air Insulated Switchgear (AIS) substation.

4 Study Area

4.1 Study Area Identification

Stage 1 of the EirGrid Project Development Roadmap is referred to as “Information Gathering”. It involves identifying a study area, identifying environmental and other constraints within the study area and finally proceeding to identify possible sites for the substation.

4.2 Criteria for Identifying a Study Area

The general location of the proposed substation required to connect to the permitted 110 kV Sathill-Screebe OHL is informed by the following factors:

- Location of the permitted 110 kV OHL and the requirement to locate the substation adjacent to this line;
- Route options for the grid connection from the Uggool permitted substation; being separately developed by a wind farm developer;
- Likely environmental impacts;
- Engineering and technical design issues; and
- Availability of suitable site(s).

4.3 Study Area

Having regard to the above factors a study area was defined for the project. The study area is located east of the Uggool area at different points along the permitted 110kV Sathill - Screebe line between the area of Doon and Knockranny as illustrated in Figure 4.1.

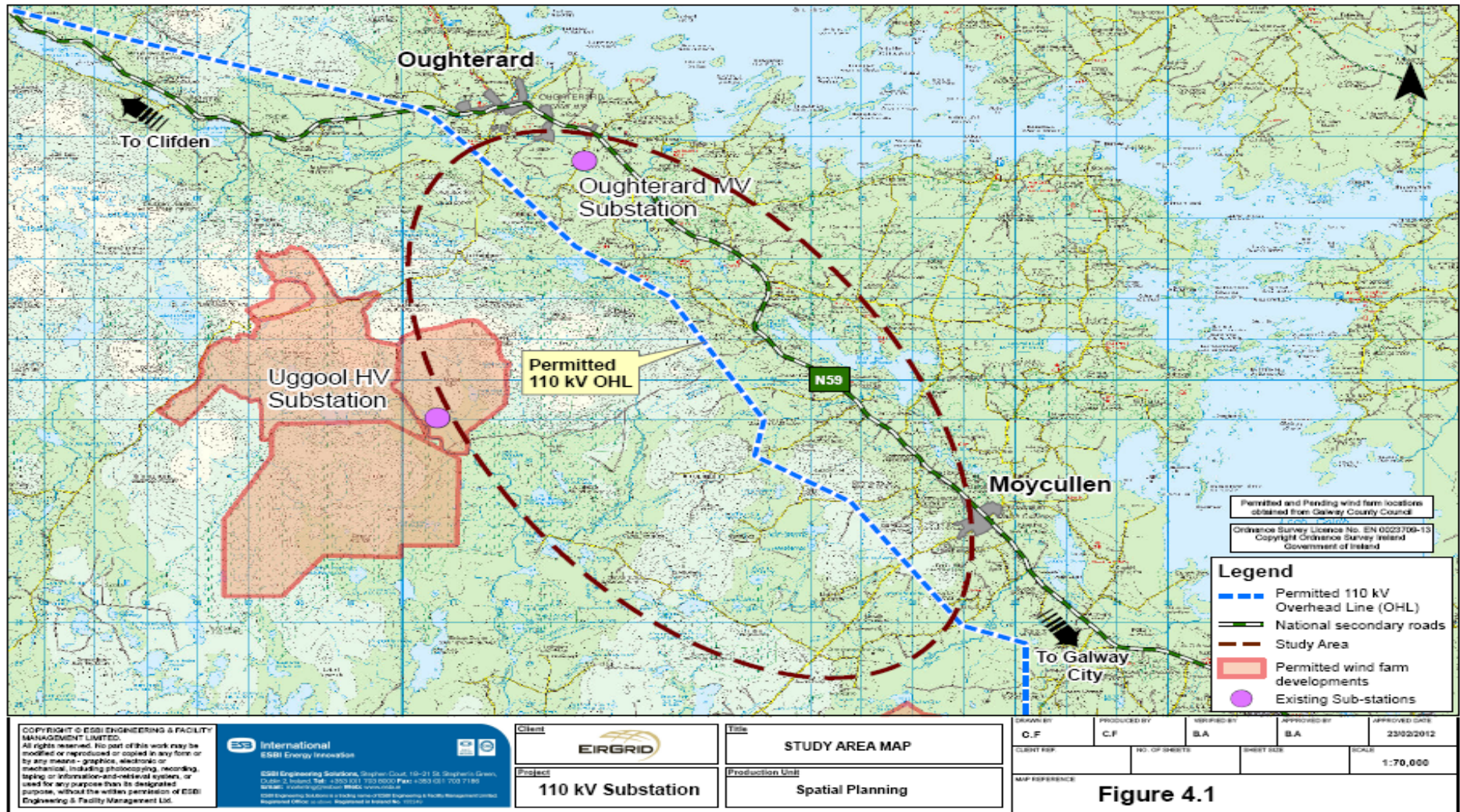


Figure 4.1: Map of Study Area

5 Identification of Possible Locations

5.1 Methodology

Initial desktop studies of the study area which utilised existing Ordnance Survey Ireland (OSI) mapping and aerial photography enabled constraints to be determined and arising from that, possible site locations were identified.

Following initial identification of possible site locations, site visits were undertaken to further investigate these locations.

Landholdings were not identified for this Stage 1 report.

In considering possible site locations, key issues were good access to public roads and sites under/or in close proximity to the permitted 110 kV OHL.

Whilst technology options have not been determined at this point, but having regard to AIS being the emerging preferred technology, consultants were provided with indicative footprints for an AIS type substation based on the following footprint:

- AIS indicative footprint 150m x 92m

As other types of substations have a smaller footprint the use of the AIS footprint allows consideration of sites based on a largest possible site footprint scenario.

5.2 Locations of Possible Sites

Possible sites lie principally in three locations as follows as illustrated on Figure 5.1:

- Northern – The northern location is located approximately 1km southwest of the townland of Doon, approximately 6km northeast of Moycullen, on the slopes of one of the small hills east of Knocknalee Hill in the immediate vicinity of the permitted 110 kV OHL.
- Middle – The middle location is also situated on one of the small hills east of Knocknalee Hill, northwest of the townland of Shanballyoghery, approximately 6km northwest of Moycullen, in close proximity of the permitted 110 kV OHL.
- Southern - The southern location is situated in the eastern part of the townland of Knockranny, approximately 4.8km northwest of Moycullen, in close proximity to the permitted 110 kV OHL.

Possible site locations are discussed in the environmental appraisal having regard to the naming convention above.

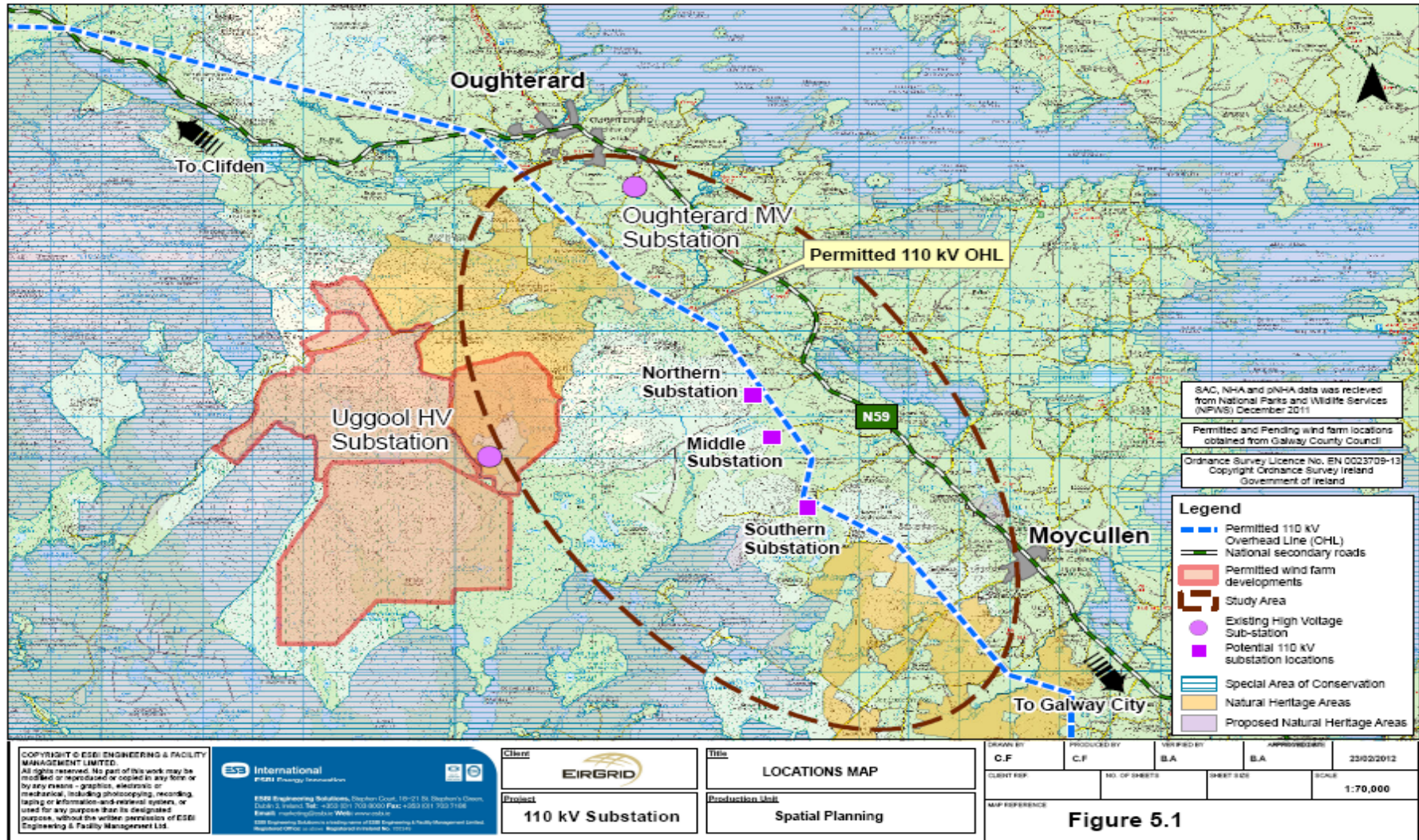


Figure 5.1: Map of Possible Site Locations

6 Environmental Appraisal

6.1 Methodology

Having identified potential site locations as set out in section 5, environmental appraisals were carried out on each of the identified locations.

Whilst environmental appraisals were undertaken in all three locations, it became apparent early in the information gathering process that the study area should direct its focus towards the southern location around Knockranny. Therefore the environmental appraisals are more detailed for those possible sites identified in the southern location. Section 7 discusses the southern sites in more detail.

The study area and the site locations therein were assessed under a variety of environmental headings including;

- Landscape and visual
- Ecology
- Geology
- Soils
- Peat
- Water
- Hydrogeology
- Cultural Heritage
- Transport
- Flood Risk

A full report on the environmental issues relating to the study area and sites identified therein has been prepared. The report, entitled, "*Site Selection - Review of Constraints*", was produced by ESBI Environmental Group in January 2012.

A summary of main findings is provided in this Stage 1 report.

This section draws from the information contained in Review of Constraints Report. In addition, regard has been given to technical and environmental studies of this area separately carried out on behalf of the wind farm developer in respect of the planned line to link the permitted wind farm substation to this proposed substation.

6.2 Landscape and Visual

The Galway County Development Plan indicates the area of the proposed development as having a high landscape value rating, on a scale running from low to medium to high and outstanding. It is noted that this landscape value rating applies to the south Connemara area as a whole, and does not present the level of detail required to assess the particulars of any identified sites. This rating is therefore considered applicable to the broader landscape in the vicinity of the proposed development, but perhaps not within the entirety of the sites themselves or their immediate surrounds. A landscape assessment was carried out by URS Consultants at all the site locations. Generalised views of the locations can be seen in the photographs in Appendix 1. It should be noted that the landscape (as shown in the photographs) will be altered when the permitted 110 kV OHL is constructed. This has been considered in the landscape and visual appraisal.

6.2.1 Northern Location

This area is located approximately 1km southwest of the townland of Doon, approximately 6km northeast of Moycullen, on the slopes of one of the small hills east of Knocknalee Hill in the immediate vicinity of the permitted 110 kV OHL.

This location is an exposed landscape on a hill slope with no vegetation of any significant height. The elevated position results in panoramic open views from the site of north-eastern, eastern and south-eastern lower lying areas. The absence of vegetation in this location would result in high visibility within 1km of the site, but the topography limits close range views from the west, north and south. In the wider landscape, the Zone of Theoretical Visibility (ZTV) indicates that views are potentially possible from a large area to the east, northeast and southeast. The site survey indicates that intervening vegetation would screen most of the potential views. Where views would be possible, the proposal would be seen against the hill range in the background, reducing the magnitude of visual effects.

6.2.2 Middle Location

The middle location is also situated on one of the small hills east of Knocknalee Hill, northwest of the townland of Shanballyoghery, approximately 6km northwest of Moycullen, in close proximity of the permitted 110 kV OHL. Due to flooding of the local access road, the site was inaccessible on the day of the site survey, but the surveyor was able to observe the site from a distance of 600m. Similar to the northern location, the middle location is situated in an exposed landscape on a hill slope with no vegetation of any significant height. The elevated position would also result in panoramic open views from the site of north-eastern, eastern, and south-eastern lower lying areas. The absence of significant vertical vegetation in this location would result in high visibility within 2km of the site, but the topography limits close range views from the west. In the wider landscape, views are potentially possible from a large area to the north, east and southeast. The site survey indicated that intervening vegetation would screen most of the potential views from lower lying areas. Where views would be possible, the proposal would be seen against the hill range in the background, reducing the magnitude of visual effects.

6.2.3 Southern Location

The southern location is situated in the eastern part of the townland of Knockranny, approximately 4.8km northwest of Moycullen, in close proximity to the permitted 110 kV OHL. This location is situated within an area enclosed by higher ground with screening provided by surrounding hills and hummocks. The southern location is partially located within a natural depression containing a small stream and rises steadily towards the south-west, north-west and north-east. Further screening of the location is provided by bands and pockets of low woodland, scrub and coniferous plantations. The topography and vegetation limits localised visibility to approximately 700m. In the wider landscape, views are potentially possible from a large area to the northeast and a smaller area to the southeast. The site survey indicated that intervening vegetation would screen most of these potential views. Where views would be possible, the upper parts of the proposal would be seen against the hill range in the background, reducing significantly the magnitude of visual effects.

6.2.4 Conclusion

The southern location is preferred due its topographical location and to the screening provided by surrounding topography and vegetation. It is considered that this location has the capacity to absorb the proposed development better than the northern and middle locations. The southern location would also be the least visible location in long distance views from lower lying areas to the northeast, east and southeast of the substation locations.

It is considered that the introduction of mitigation measures to partially screen the proposed development at the northern and middle location would itself create significant adverse visual effects and would most likely result in high landscape effects due to the absence of any existing high vegetation in the locality. Any such mitigation elements would be totally uncharacteristic when set within the attributes of the receiving environments of the northern and middle locations.

6.3 Ecology

The study area is located in a rural part of East Connemara. The Corine 2006 land use map indicates agriculture, woodland scrub and peat bogs as the land use types in this location. An ecological assessment was carried out by Biosphere Environmental Services at the site locations. A general ecological description is given for each site, along with a preliminary assessment of the conservation value of the site. It is noted that this appraisal does not constitute a full botanical assessment of the sites, as visits will be required within the period April to September for a more comprehensive assessment (the value of some sites could be upgraded following further survey in the appropriate seasons). Nevertheless, the ecology survey does provide a basis for preliminary assessment and comparison of the site locations and options. Some comments are then given on impacts by development of the site (it is assumed that large scale construction works would be carried out over much of the site area).

The evaluation of ecological interests is made following guidance in the NRA Guidelines for Assessment of Ecological Impacts of National Road Schemes (NRA 2009). Whilst the NRA guidelines were devised specifically for road schemes, they can be applied to general environmental impact assessment. The ecological valuation is based on the rating of sites at different geographical scales, as follows:

- International Importance
- National Importance
- County Importance
- Local Importance (higher value)
- Local Importance (lower value)

In addition, sites may be rated as having no significant ecological interests (i.e. below the level of local importance, lower value).

6.3.1 Northern Location

The general area for this proposed location is on blanket bog/wet heath just north of a mountain stream and west of a gravel road. It was confirmed by a site visit that the bog is relatively intact and is classified as upland blanket bog and/or wet heath.

Ecology Evaluation

The bog is dominated by such species as ling heather, deergrass, purple moorgrass, bog cotton (both *Eriophorum angustifolium* and *E. vaginatum*) and carnation sedge. Bog mosses and other bryophytes are well distributed. A small stream on the site flows to Lough Parkyflaherty, which is within the Ross Lake and Woods cSAC.

The habitats at this site location are dominated by blanket bog and wet heath. Both appear relatively intact and have linkages with the EU Habitats Directive (Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora – referred to as the Habitats Directive) Annex I habitats Blanket bog and Wet Heath.

This site is part of a larger peatland expanse that is likely to be at least of local importance, higher value or possibly of county importance.

Potential Impacts on Terrestrial Ecology

Development of a site in this area would likely require the removal of a substantial area of peat bog that supports blanket bog and/or wet heath vegetation (both listed on Annex I of EU Habitats Directive). Depending on the exact location and the quality of habitats at that location etc., this impact would certainly be of some significance.

A potential significant impact is the proximity of the site to a local stream which flows to Lough Parkyflaherty, which is within the Ross Lake and Woods cSAC. Strict measures would be required to ensure that water quality of the stream is maintained during both the construction and operation phases.

6.3.2 Middle Location

The middle location is also peat bog. It was confirmed by a site visit and in the ecology report that the bog is relatively intact (though cutting has occurred in the wider area) and is classified as upland blanket bog and/or wet heath.

Ecology Evaluation

The bog is dominated by such species as ling heather, deergrass, purple moorgrass, bog cotton (both *Eriophorum angustifolium* and *E. vaginatum*) and carnation sedge. Bog mosses and other bryophytes are well distributed. The habitats at this site location are dominated by blanket bog and wet heath. Both appear relatively intact and have linkages with the EU Habitats Directive Annex I habitats Blanket bog and Wet Heath. The site is part of a larger peat land expanse that is likely to be at least of local importance, higher value or possibly of county importance.

Potential Impacts on Terrestrial Ecology

Development of a site in this area would likely require the removal of a substantial area of peat bog that supports blanket bog and/or wet heath vegetation (both listed on Annex I of EU Habitats Directive). Depending on the exact location and the quality of habitats at that location etc., this impact would certainly be of some significance. While the site is not located in the immediate vicinity of the watercourse, measures would be required to ensure that water quality of local watercourses is maintained during both the construction and operation phases.

6.3.3 Southern Location

This area is characterised by a series of low hills which would originally have been covered with blanket bog and heath. Whilst peatland habitats (bog and heath) are still widespread in

the area, much of these have been cut and grazed to varying degrees. Agricultural land, mostly improved or semi-improved grassland, occurs in scattered pockets though becomes the dominant land use towards the N59. A further main land use in the area is forestry, with very extensive plantations further to the west. Small stands of native woodland and scrub, which includes oak and hazel, are a feature of the area. The wider landscape is studded with small lakes, while there are numerous rivers and streams which flow eastwards towards Ross Lake and Lough Corrib.

6.3.4 Conclusion

The northern and middle locations are dominated by blanket bog and contain habitats of ecological significance. Potential impacts are likely to be significant if development occurs at these sites. There are more options open for consideration at the southern location which have lower levels of ecological value.

6.4 Geology

Geology underlying all sites was obtained from GSI 1:100,000 scale bedrock geology map. The structural geology of the region is complex and has resulted in a number of phases of deformation; earlier mountain building events metamorphosed rocks that have been further deformed by the intrusion of granitic bodies. The geological mapping for the area indicates a westnorthwest – eastsoutheast fault in close proximity to the northern site; both the middle and southern site are within approximately 0.5 km of northeast-southwest trending faults.

6.4.1 Northern Location

The site lies on or close to the boundary between two formations, both of which comprise crystalline metamorphic rocks. In the south is orthogneiss, metamorphosed granitic rock and in the north Cashel Schist comprising paragneiss, migmatite and pebble beds; paragenisses derive from intense metamorphism of sedimentary rock and migmatites represent the melting of the parent rock due to metamorphic forces.

6.4.2 Middle Location

The site is underlain by crystalline metamorphic comprising orthogneiss.

6.4.3 Southern Location

The site is underlain by crystalline igneous rock comprising porphyritic megacrystic granite, a granite rock containing mainly large crystals that contains many xenoliths (thermally altered 'rafts' of country rock that have been entrained in the igneous intrusion).

6.4.4 Conclusion

The geology of the area is a factor influencing the location of the substation and will be further investigated as part of the technical design stage, but is not considered a constraint for any of the locations at this point.

6.5 Soils

The main soil associations within this part of Co. Galway belong to the “Mountain and Hill” broad physiographic division. The main Quaternary sediments identified in this area of Galway are peat deposits with some glacial till. The “General Soil Map of Ireland” is the reference source for description of the soil of the area. All three site locations are shown to be covered by low level blanket peat associated with the Rolling Lowland broad physiographic division.

6.6 Peat

Having regard to the peat deposits at all site locations ESBI carried out high level assessments of peat stability, excavation and consideration of disposal at all locations. As no specific sites have been identified at this stage, the site investigations and conclusions are based on a representative or notional site(s) identified in the general locations. This was necessary in order to allow the high level assessments to provide adequate information for this Stage 1 report. The size used for calculations is based on an AIS type substation. In addition to peat excavation, additional subsurface material needs to be excavated in order to provide a suitable base for civil works.

6.6.1 Northern Location

A possible site is located on sloping ground close to a watercourse. A peat probe taken by ESBI in the general area revealed a depth of peat of approximately 0.4m indicating an estimated peat volume of approximately 6,000m³ for excavation. Additional volumes of material other than peat would need to be excavated and disposed of offsite to cut the substation site into the topography. A bermed peat storage structure would need to be constructed on suitable level permanent peat storage in close proximity to the site to pursue this option. The size of the required peat storage site would be significant.

6.6.2 Middle Location

A possible site is located on sloping ground. A peat probe taken in the general area by ESBI revealed a depth of peat of approximately 1.1m indicating a peat volume of approximately 18,000m³ for excavation. A bermed peat storage structure would need to be constructed on a suitable level permanent peat storage site in close proximity to the site to pursue this option. The size of the required peat storage site would be significant.

6.6.3 Southern Location

As detailed in section 6.2, because this location appears to offer the greatest feasibility for suitable sites peat probes were carried out at a number of places in this area. Peat depths in this location ranged from 0m to over 3m. Two possible sites contain peat at these varying depths. One possible site did not show the presence of peat when probed. The estimated volumes of peat to be removed range from at most 11,000m³ (AIS substation on site with deepest peat depths) to 0m³ based on a possible site with no peat. In the event peat removal is required from a possible site the required size of the storage site would be significant.

6.6.4 Conclusion

Peat excavation, transport and storage as well as peat stability are significant factors influencing the location of the substation. Whilst adequate site investigations have been carried out for this Stage 1 report, more detailed investigations will be required when the project moves to a detailed design stage. Based on the site investigations carried out, the northern and middle locations appear more constrained in relation to peat than the southern location.

6.7 Water

The annual average rainfall in the area is approximately 1,448mm, which is above the average rainfall figure of 1,200 mm for Ireland.

6.7.1 Northern Location

This location is drained by small streams which flow into Lough Cait and subsequently to Lough Parkyflaherty and the northern part of Ross Lake.

6.7.2 Middle Location

There are no drainage streams identified in the EPA rivers database leading directly from the middle location. However, the general topography of the area suggests that any runoff from the area would drain directly to Louganmuckmore which outflows to the Sruthán Chnocán Raithní, a tributary of the Knockbane river which flows into the southern part of Ross Lake.

6.7.3 Southern Location

The southern location is located adjacent to the Knockbane river outflowing from Adereen Lough. A small stream flows through the southern location to join the Knockbane river. Several field drains drain directly to this small stream.

6.7.4 Surface Water Quality Status

All rivers in the catchments lead to Ross Lake, a designated cSAC and pNHA lake. The study area is located between two adjacent surface water bodies. Both of these water bodies have been classed as having Good Status by the EPA in 2010. The objective for these water bodies is to maintain status.

The water body status of Ross Lake has been assigned as moderate by the EPA (April 2011), indicating that improvement in water quality status of this lake is required.

6.7.5 Groundwater Body Status

The study area itself is located in one groundwater body, denoted Maam-Clonbur groundwater body. The EPA classed this water body as good status in 2009. The objective for this groundwater body is to maintain status.

Ross Lake is located in a different water body, denoted Ross Lake groundwater body. The EPA classed this water body as poor status in 2009 due to nutrient loading and chemical results. The objective for this groundwater body is to restore status to at least good.

6.7.6 Fisheries

A surveillance monitoring fish stock survey was carried out on Ross Lake (Co. Galway) from 31st August to 2nd September 2010 by staff from Inland Fisheries Ireland (http://www.wfdfish.ie/wp-content/uploads/2010/10/Ross_report_2010.pdf.) The lake is a coarse fishery and holds stocks of roach, bream, roach, pike and hybrids. The presence of zebra mussels was confirmed in Ross Lake in May 2007. Roach was the dominant species in terms of abundance and pike was the dominant species in terms of biomass identified in the survey. Ross Lake has been assigned an ecological status of Poor/Bad based on the fish populations present. The ecological status assigned to the lake based on the 2007 survey data was Moderate.

The EPA has assigned Ross Lake an overall ecological status of Moderate, based on all chemical and biological elements, including fish in 2009. This status classification will now be revised to reflect the latest fish status.

6.7.7 Potential Impacts on Water Quality

An assessment of potential impacts on water quality was made based on available data and a site visit on the 9th November 2011.

6.7.7.1 Northern Location

The location is adjacent to two small first order streams, which form the natural drainage of the area. These could potentially be impacted by site construction works from site excavation and excavated material storage. Sediment and silt released from the site construction works could impact on Lough Parkyflaherty and in a worst case scenario on Ross Lake. The potential for impact could be mitigated by well designed sediment control to prevent silt entering the small stream system.

6.7.7.2 Middle Location

There will be significant peat excavation and storage requirements associated with this location and runoff management will be critical to minimising potential impact to surface waters. There are no small streams in the area but the topography indicates that flow will enter the stream flowing to Lougaunmuckmore. There is a risk to water quality associated with construction at this location but the risk can be mitigated by good construction practice and silt control measures. The risk at this location would be lower than at the northern location.

6.7.7.3 Southern Location

Potential impacts at this location are somewhat different for those possible sites with underlying peat and those possible sites with no underlying peat.

Underlying Peat

There will be significant peat excavation and storage requirement associated with this option and runoff management will be critical to minimising potential impact to surface waters. The Knockbane River and associated tributaries are located in this area, this river in turn flows into Ross Lake, a designated cSAC and pNHA. Sediment and silt released from the site construction works could impact in a worst case scenario on Ross Lake. The

potential for impact could be mitigated by well designed sediment control to prevent silt entering the small stream system.

No Underlying Peat

Construction on this type of ground would require significant excavation of subsurface material and associated storage on site and/or removal off site of some material. Runoff has the potential to enter adjacent field boundary drains and streams and into the Knockbane River and in turn into Ross Lake. There is a risk to water quality associated with construction but the risk can be mitigated by good construction practice and silt control measures.

6.7.8 Conclusion

All locations carry risks in relation to the potential for adverse impacts on water quality and associated fisheries. The northern and middle locations have a higher risk than the southern location, given the extent of site works required, and resulting potential for silt and sediment release.

6.8 Hydrogeology

The groundwater section of the GSI website classifies the bedrock underlying the sites as a Poor Aquifer (PI) with bedrock which is generally unproductive except for localised zones. A regionally important aquifer lies to the east of the N59 main road within the Karstified carboniferous limestone.

There are four groundwater wells registered on the GSI website within the study area. Due to the local topography and drainage, the construction and operation of the substation should have no effect on these wells.

Groundwater vulnerability for the Knockranny area is classified as being 'high to extreme' due to the shallow nature of the bedrock in these areas.

The hydrogeology of the area is a factor influencing the location of the substation and will be further investigated as part of the technical design stage, but is not considered a constraint for any of the locations at this point.

6.9 Cultural Heritage

A preliminary assessment of the potential impact on archaeology was undertaken. This consisted of a review of the national database of the Record of Monuments and Places. There are no recorded monuments in the database within 1km of all the locations; therefore there is no differentiation between them.

6.10 Transport

All locations are currently accessed either by third class road, track, or both. All access routes are connected to the N59 national primary road.

The northern location is the closest to the N59 (1.5km) however most of the access route is accessed via a track of approximately 1km. From the N59, approximately 0.5km of the third class road L-53453-3 (Doon Road) leads onto a track (1km) to a possible site.

The middle location is approximately 2.6km from the N59. The N59 leads onto the third class road L-53471-0 for 2.2km and then continues via a track of 0.5km to a possible site.

The southern site is accessed via 2.8km of third class road L-5348-0 (Knockranny Road) from the N59.

The permitted and proposed windfarms in the area have submitted plans showing how the windfarms will be accessed. Some of the local roads will be improved to facilitate access, and some new additional roads internal to the windfarms will be developed. These proposals will improve access for constructing the substation, particularly in the southern location. Road improvements rely in some instances on third party agreements.

The transport network of the area is a factor influencing the location of the substation and will be further investigated as part of the technical design stage but having regard to the planned improvements there are only marginal differences between locations.

6.11 Flood Risk

In November 2009 the Dept of Environment, Heritage and Local Government issued a guideline document to Planning Authorities in relation to Flood Risk Management. The Guidelines classify developments into three vulnerability classes based on the effects of flooding (i) Highly vulnerable development, (ii) Less vulnerable development and (iii) Water compatible development. Essential infrastructure such as electricity substations are classed as highly vulnerable development and the Flood Guidelines state only lands in Flood Zone C are appropriate for such a development.

There are no historic incidents of flooding recorded within or near any of the potential substation locations. The northern and middle potential locations are not close to a fluvial event (potential flooding); the southern location is located approximately 100m away for the stated fluvial event.

A full Flood Risk Management Plan will be prepared when a substation site is identified.

6.12 Conclusions

Both the northern and middle locations are significantly constrained, having regard to visual impact, as they would be highly visible in the landscape for some distance. Mitigation measures for visual impact, such as planting for screening purposes, are not feasible, as they are not characteristic of the landscape at these locations. Screen planting would introduce additional impact to the existing landscape. The ecological value of these two areas is also very high, and construction at these locations would constitute significant impact. There is also a high risk to water quality at the northern location but this could be mitigated against by good design and well designed mitigation measures.

Within the southern location, it is considered that the area of greatest feasibility is the area around Knockranny, for a number of reasons:

- The Knockranny area is emerging as the most likely location where the circuit from Uggool being separately planned by a wind farm developer is likely to terminate;
- The area is served by a local road with some planned improvements;
- The area is in close proximity to the permitted 110 kV OHL.

The area of greatest feasibility within the southern location is illustrated in Figure 6.1.

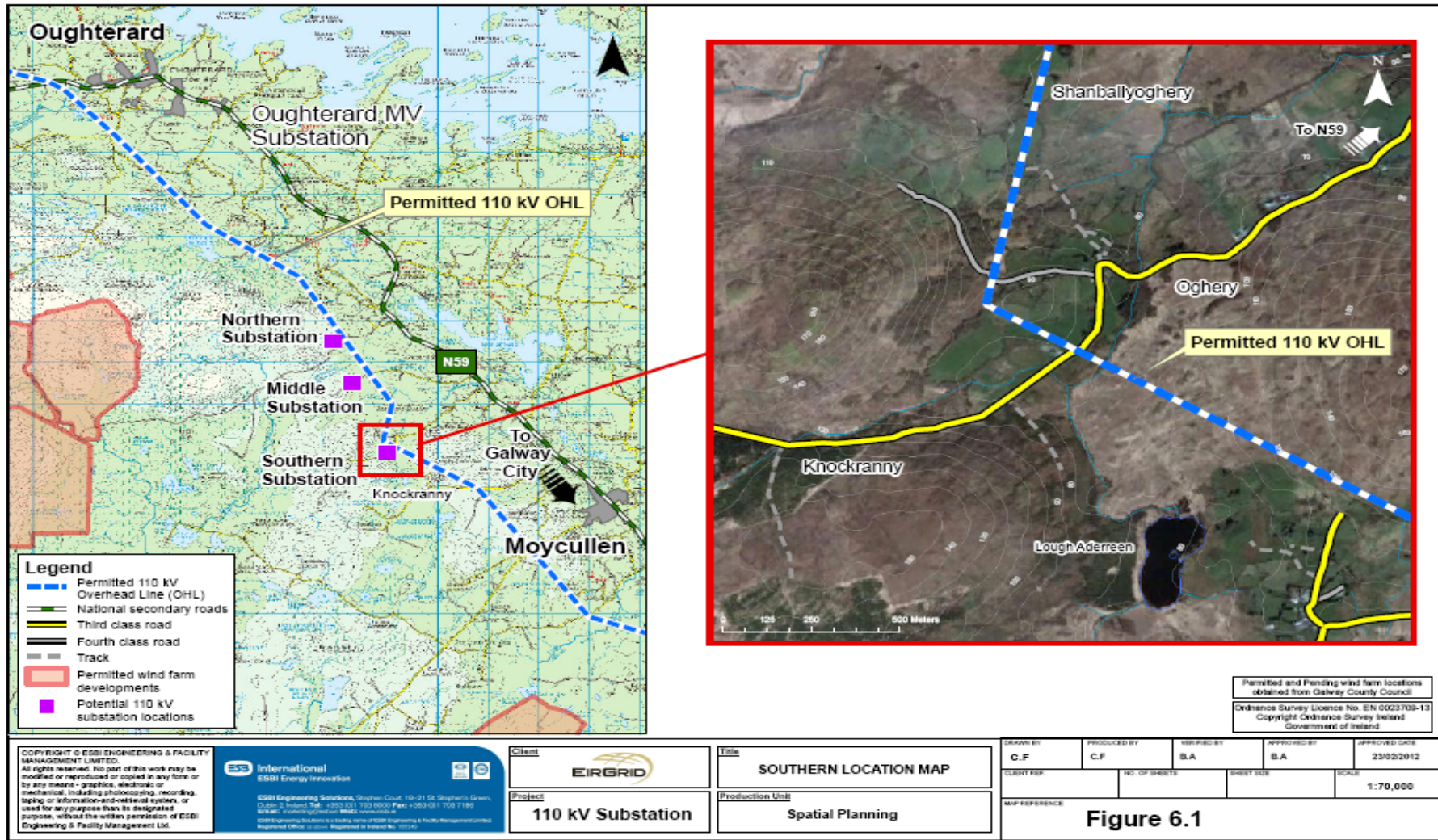


Figure 6.1: Southern Location Map

7 Assessment of Possible Sites at Southern Location

7.1 Identification of Possible Sites

Having emerged as, from a strategic level, the least constrained location from an environmental perspective, the next step was to identify possible sites within the identified southern location where the substation could potentially be situated. As previously stated in section 5, in considering potential site locations, key issues were good access to public roads and sites under / or in close proximity to the permitted 110 kV OHL.

The consideration of site locations is based on an AIS type substation which has the largest site area requirement (indicative footprint 150m x 92m) compared to other substation types, as outlined in section 5.1.

Five sites were considered in this location. Two sites were initially identified, either side of a minor road in Knockranny townland, and one site further to the north-west. Variations to the two sites were subsequently identified and considered as environmental appraisals continued.

The sites are named as follows and are illustrated in Figures 7.1 and 7.2:

- Site 1
- Site 1A
- Site 2
- Site 2A
- Site 3

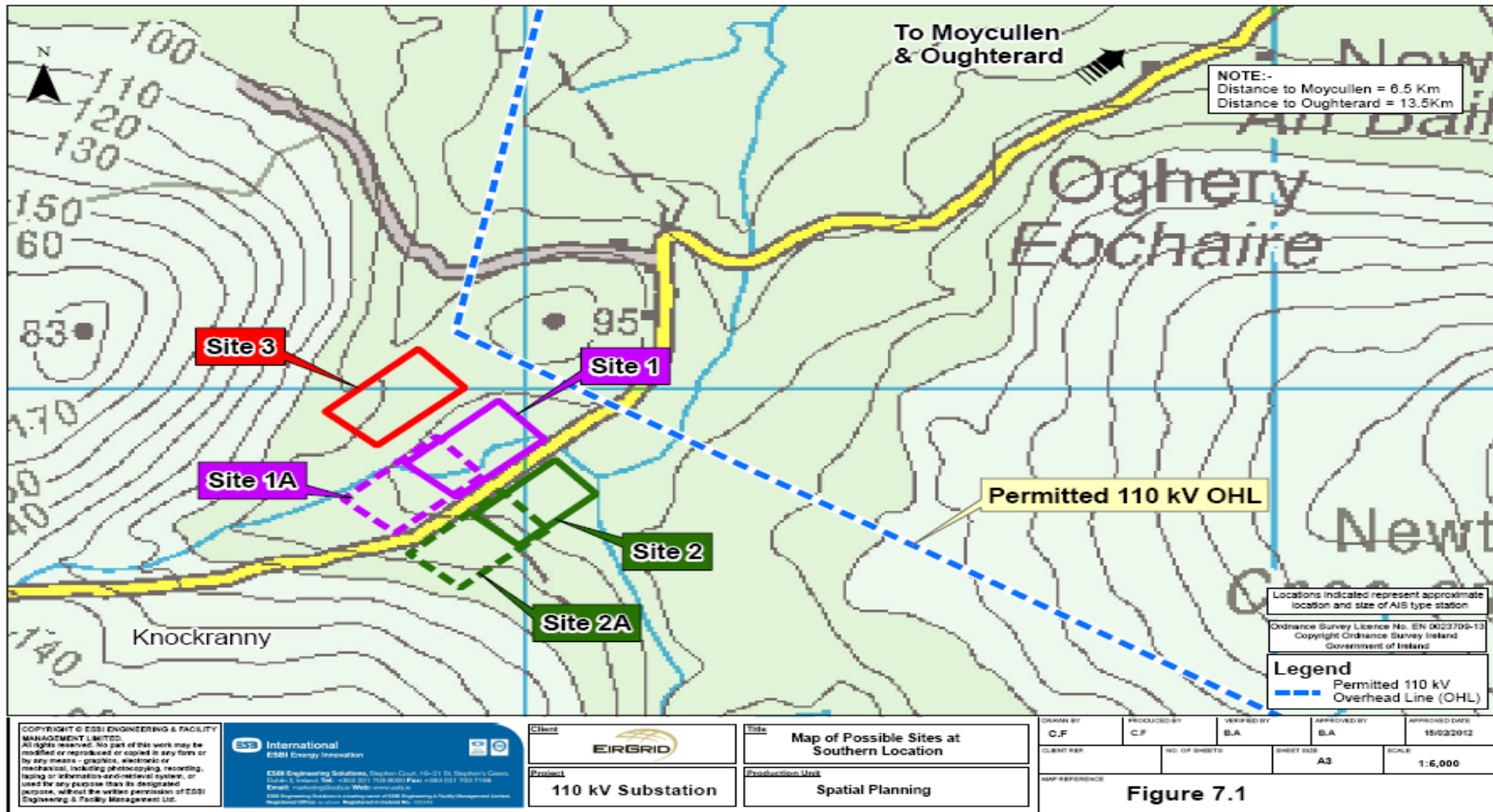


Figure 7.1: Map of Possible Sites at Southern Location

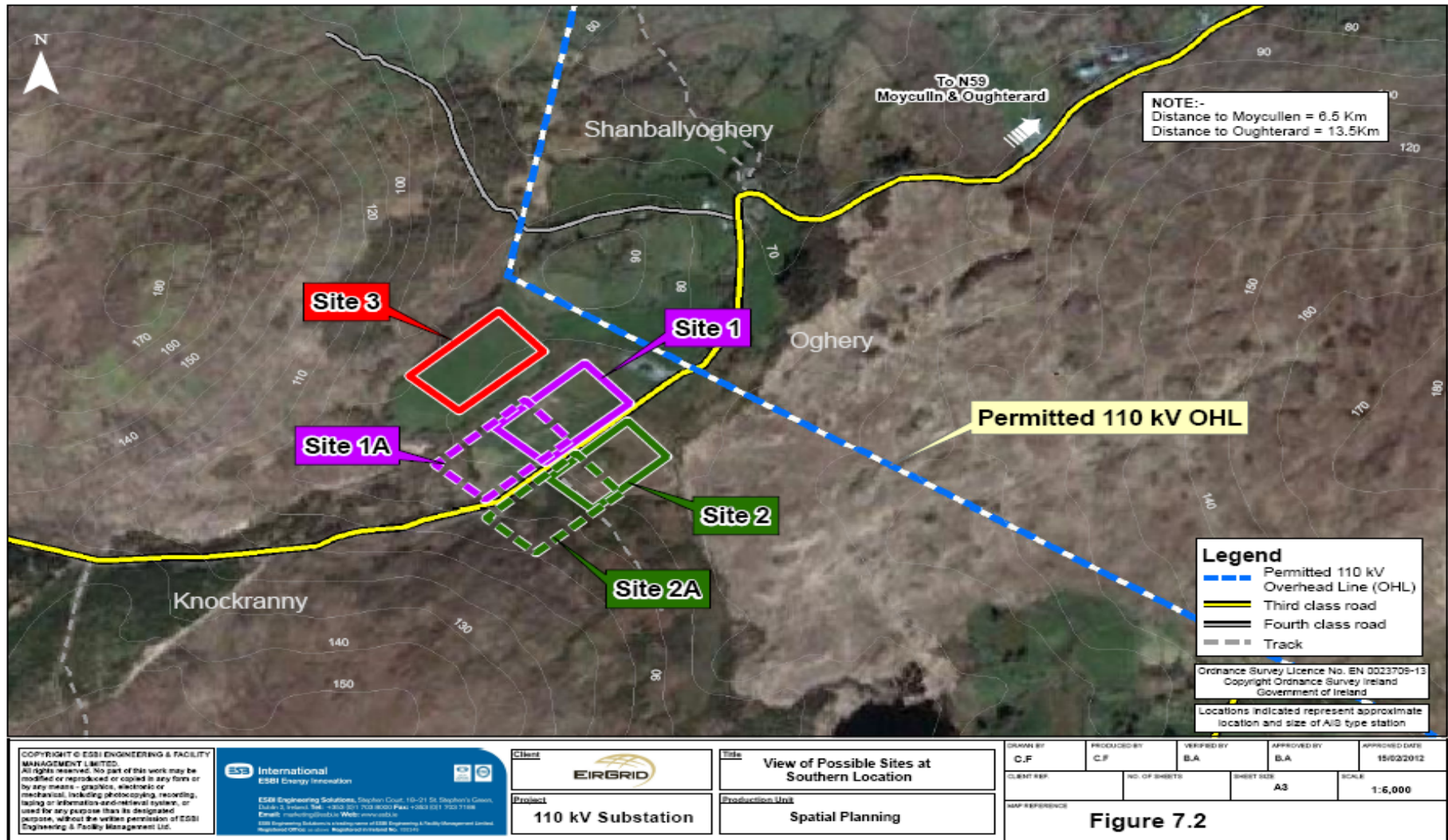


Figure 7.2: Aerial View of Possible Sites at Southern Location

7.2 Assessment of Possible Sites

This section provides detailed environmental appraisals of five possible sites in the Knockranny area of the southern location under the most relevant environmental headings of landscape, ecology, peat and water.

7.3 Landscape and Visual

7.3.1 Site 1

Location Characteristics

- Located within a mostly flat part of the southern location
- Majority of site is covered by drained and undrained grassland with small pockets of scrub and low woodland
- A small stream diagonally crosses the site
- Views to the site would be possible from within 200m of the site but not from areas at a greater distance
- It is unlikely that the proposed substation would break the skyline in long distance views from the east
- There is an existing small woodland planting within close proximity of the site boundary
- Existing surrounding vegetation would help to integrate proposed substation buildings
- Further mitigation planting would reduce visual impact

7.3.2 Site 1A

Location Characteristics

- North-eastern section of the site is located within a mostly flat area crossed by a small stream in the northern corner, the south-western section is located on gently rising ground
- Views to the site would be possible from within 200m of the site but not from areas at a greater distance
- It is unlikely that the proposed substation would break the skyline in long distance views from the east
- North-eastern part is covered by drained and undrained grassland with small pockets of scrub and low woodland while the south-western section extends into a coniferous plantation
- Existing surrounding vegetation would help to integrate proposed substation buildings
- Further mitigation planting would reduce visual impact

7.3.3 Site 2

Location Characteristics

- Located within a mostly flat area but the site gently rises towards its south-western boundary
- Views to the site would be possible from within 200m of the site but not from areas at a greater distance
- It is unlikely that the proposed substation would break the skyline in long distance views from the east
- Majority of site is covered by cutover blanket bog with rock outcropping in the centre. The south-western part is located adjacent to a coniferous plantation
- Existing bands of scrub and low trees along the north-western and north-eastern boundary would help to integrate proposed substation buildings
- Further mitigation planting would reduce visual impact

7.3.4 Site 2A

Location Characteristics

- Located on gently rising ground in the south-western part of the southern location
- Views to the site would be possible from within 200m of the site but not from areas at a greater distance, although the potential for visibility of the proposed structures increases, due to the slightly higher elevation of the site
- It is unlikely that the proposed substation would break the skyline in long distance views from the east
- Majority of site is covered scrub and coniferous forestry
- Existing vegetation could provide screening along the south-eastern, south-western and north-western boundaries
- Further mitigation planting would reduce visual impact

7.3.5 Site 3

Location Characteristics

- Located on the slopes of a small hill on higher ground than the other four sites
- Majority of site is covered by drained and undrained grassland and surrounded by bands of low scrub and woodland
- Views to the site would be possible from within 1km of the site, due to its location and elevation
- Distant views of proposed structures would be more likely due to the elevation of the site, however there are a very limited number of receptors, particularly from publicly accessible areas
- It is unlikely that the proposed substation would break the skyline in long distance views from the east
- Existing surrounding vegetation would be less effective in terms of screening due to its elevated location

- Further mitigation planting would reduce visual impact
- Distant views of proposed structures would be more likely due to the elevation of the site

7.3.6 Least Constrained Site(s)

Site 2 and Site 1A are the least constrained in terms of minimising landscape and visual effects. Careful siting of the substation to take advantage of the screening effects of existing vegetation, local topography and the establishment of additional screening vegetation can further reduce visual impact.

While Site 3 would require the minimum length of connection between the permitted 110 kV line and the proposed substation, the elevated location and lack of existing screen planting would result in higher landscape and visual effects when viewed from the vicinity and from a greater distance.

It should be noted that the landscape (as shown in the photographs) will be altered when the permitted 110 kV OHL is constructed and the proposed substation will be seen in the context of new wooden poleset and steel angle mast structures.

7.4 Ecology

7.4.1 Site 1

Land use Evaluation

This site is fairly evenly divided from east to west by a tributary stream of the Knockbane River. The stream was observed to be generally less than 1m in width, with a gravel bottom. At the time of survey water clarity was good.

The southern sector of the site (between the public road and the stream) is semi - improved or improved grassland. This has a wet character in places.

The sector north of the stream can be divided into three main habitats. The western part is further improved grassland, while the eastern sector is wet grassland, dominated heavily by rushes (mostly *Juncus effuses*).

Between the wet grassland and improved grassland, there is a small area of remnant peatland habitat that is dominated by poor fen or flush vegetation (considered as 'poor fen and flush'). This extends from the woodland strip just to the north of the site, across the site to the stream where it enters as two small channels. The area is extremely wet and supports a range of sedges and rushes and would undoubtedly be species rich during summer. The source of the wetness is not known but is likely to be a spring or seepage line.

The north and north-west boundary of the site is close to a field boundary that is composed of a strip of scrub dominated by blackthorn, hawthorn, hazel and willows.

Ecology Evaluation

The only part of this site that is of ecological interest is the poor fen/flush. This would have formerly been a component of the blanket bog landscape but is now surrounded by improved or semi-improved land. Nevertheless, it is of ecological interest though a survey in summer would be required to establish its full value.

Tentatively, this feature is rated as local importance (higher value) on the basis of it being a semi-natural habitat with expected high biodiversity in a local context.

The stream was not assessed in the study but it can be assumed to be of some local value and could potentially provide a corridor for the movement of otters across the landscape. An aquatic assessment will be required to establish its full value.

7.4.2 Site 1A

Land use Evaluation

The site is fairly evenly divided between grassland and a conifer forest. The grassland is divided by a drainage channel which flows north-east to the main stream. This channel originates within the adjoining forest.

The grassland is semi-improved but becomes wet as one moves west towards the forest edge. The north-west sector of the grassland is more heath in character (i.e. has not been improved as the rest) and is classified as wet grassland/wet heath. The conifer forest is separated from the grassland by a deep ditch. It is a mix of Sitka spruce and Lodgepole Pine and is at least 10 years planted.

Ecology Evaluation

Generally this site has no significant ecological interests. It is noted that the grassland fields to the south of the stream and associated drainage channel have long been improved (shown as fields on old OSI large scale maps).

The planting of conifers has destroyed the former bog or heath habitat that would presumably have occurred there.

The drainage channel and the small remnant of wet grassland/wet heath have minor local value (rate Local Importance, lower value).

7.4.3 Site 2

Landuse Evaluation

This site was formerly dominated by upland blanket bog and/or wet heath (similar vegetation but wet heath of shallow peats). However, the presence of cut peat banks (now well vegetated) to the east and south-east of the site suggests that most of it had been cut in the past and can probably now be best classified as cutover bog. Some uncut blanket bog still occurs on the higher ground in the southwest of the site (adjoining the forestry plantation) and some may extend into the north-east sector of the site. A rocky knoll with scrub occurs in the central area of the site.

Ecology Evaluation

There has been no peat cutting on site in recent times and the entire site is well vegetated (apart from some poaching and trails by cattle in vicinity of entrance gate). Generally the vegetation on site is dominated by species characteristic of blanket bog and wet heath, with ling heather (*Calluna vulgaris*), crossleaved heath (*Erica tetralix*), deer grass (*Trichophorum cespitosum*), common bog cotton (*Eriophorum angustifolium*), carnation sedge (*Carex panacea*), purple moorgrass (*Molinia caerulea*), bog asphodel (*Narthecium ossifragum*) and bog myrtle (*Myrica gale*) present. Devil's-bit scabious (*Succissa practensis*) appears common throughout much of the site. Rushes are dominant in the north-west of the site (a strip c.30 m wide parallel to road), with soft rush (*Juncus effusus*) the main species. This strip, while on peat, is more characteristic of wet grassland.

The site is generally wet and supports a good bryophyte flora. Bog mosses (*Sphagnum* spp.) occur in localised patches. Lichens (*Cladonia* spp.) are occasional. The rocky knoll is

dominated by scrub, with gorse (*Ulex europaeus*), blackthorn (*Prunus spinosa*), hawthorn (*Crataegus monogyna*), holly (*Ilex aquifolium*), willow (*Salix* spp.) and some rowan (*Sorbus aucuparia*). The extreme south-western strip extends into a conifer forest which is separated from the bog habitat by a stone wall. Some willow scrub occurs along the margin of the forest.

A drainage channel occurs along the north-west margin of the site (parallel to road) and flows northwards into the nearby stream.

Several snipe were flushed from the site. The site would almost certainly support the common frog and has some potential for the marsh fritillary butterfly (due to the frequency of its food plant, devil's-bit scabious).

Whilst this site is classified largely as cutover bog, the cutting is not recent and it is still dominated by vegetation typical of blanket bog and wet heath. The small uncut remnants of upland blanket bog and/or wet heath could loosely be associated with the Annex I habitats blanket bog and wet heath. The presence of a small patch of native scrub adds diversity to the site.

Overall, this site is rated as having a Local Importance (at least lower value, possibly close to higher value) on the basis of containing semi-natural habitats with high biodiversity in a local context.

As the food plant of the marsh fritillary butterfly is widespread within the site, there is some chance that this rare butterfly could occur on site (as it is known from Connemara – see www.butterflyireland.com/MarshFritillaryMap.htm). Confirmation of the use of the site by the Marsh Fritillary would increase the conservation value of the site significantly (as marsh fritillary is listed on Annex I of the EU Habitats Directive).

7.4.4 Site 2A

Landuse Evaluation

This site is centred on a commercial conifer plantation. This is Sitka spruce planted at least 10 years. The trees were planted on former blanket bog. This site overlaps slightly with Site 2 to include a sliver of blanket bog to the other side of a stone wall.

At the south-western end, the site extends slightly into a further area of blanket bog. However, the bog here is poorly developed as it is on steep ground with much exposed rock and there are trails from cattle usage.

Ecology Evaluation

The former ecological interest at this site has essentially been destroyed due to the planting of conifers. The sliver of bog at the north-eastern margin (within the site 2) has local ecological interest while that at the south-western margin is of poor quality.

Overall, apart from the sliver of bog at the north-eastern margin, this site is not of ecological interest.

7.4.5 Site 3

Landuse Evaluation

This site is located on higher ground to the north-west of Site 2 site. This is essentially a large field of improved grassland that is intensively managed (i.e. fertilised and reseeded). It is surrounded almost entirely by a strip of narrow woodland, with blackthorn, hawthorn, hazel and oak.

Ecology Evaluation

Improved grassland is not of any conservation value. The marginal woodland which surrounds the field is of Local Importance (at least lower value).

7.4.6 Least Constrained Site(s)

Having regard to the baseline information in relation to sites they have been ranked in ecological terms as follows:

Site 3 is the site of least ecological interest and no constraints on development here would be anticipated (though again attention is required in relation to the issue of run-off to local stream).

Site 1 is of little interest other than the presence of a wet flush to the north of the stream. This would be of some local ecological interest though it would require a summer survey to assess its full value. The stream itself was not assessed in the study (as the required surveys can only be carried out between April and September) but it can be assumed to be of local value as well as feeding into a cSAC and pNHA.

Site 1A and Site 2A are of relatively low ecological interest and development at either of these sites is unlikely to result in any significant adverse ecological impacts (though attention to the maintenance of water quality in the local stream is required).

Site 2 is dominated by bog habitats and has substantial local ecological interests. There is also some possibility that the rare marsh fritillary butterfly (Annex II listed) could occur as its food plant is widespread on the site.

7.5 Peat

Preliminary geotechnical assessments were carried out at various possible sites in the southern area. As part of this assessment peat probing was carried out. The primary purpose of peat probing was to establish the depths of peat on possible sites. Probing was limited on sites 1A and 2A due to the physical difficulty of accessing these sites. Whilst further probing can take place on all sites as required, the information collected from sites 1 and 2 and visual observations provide a good understanding of likely peat depths on sites 1A and 2A. Estimates of peat cover and volumes to be removed are based on depths found on site and on an AIS type substation.

In addition to peat removal, additional material underneath the peat will require removal in order to construct a base for the substation.

7.5.1 Site 1 and 1A

The estimated volume of peat to be excavated is approximately 5,000m³. It is likely that a similar quantity of fill material would be imported to raise site levels after the peat is excavated. In general it is impractical to store excavated peat in excess of 1m height. After excavation and preparation of the main substation compound, it is unlikely that there would be sufficient space left to store the peat on the remaining part of the field the site is located in. A possible solution would be to prepare an area in site 2 for peat disposal. A bermed peat storage structure would need to be constructed on a suitable level permanent peat storage site in close proximity to the site to pursue this solution. Assuming the small watercourse in the centre of the site could be diverted, this site would be less constrained than site 2 or 2A..

Due to the limitations of site access, probing was not possible on site 1A but based on observation and available information, it appears that peat volumes follow similar patterns to site 1. Whilst the volumes requiring excavation are likely to be lower than site 1 (subject to further investigation) they are still likely to be substantial and the same difficulties with disposal will arise.

7.5.2 Site 2 and 2A

The estimated volume of peat to be excavated is approximately 11,000m³. It is likely that a similar quantity of fill material would be required to be brought into the site to raise site levels after the peat is excavated. In general it is impractical to store excavated peat in excess of 1m height. After excavation and preparation of the main substation compound, there would not be sufficient space left to store the peat on the remaining part of the field the site is located in, unless the peat could be stacked several metres high. This is because the site is constrained by the adjacent watercourse, roadway and forestry. Also the remainder of the site has deep peat which is unsuitable for stockpiling peat on. A suitable level permanent peat storage site would have to be located in close proximity to the site to pursue this site. The size of the peat storage site would be significant. During the bulk peat excavation it is likely that significant dewatering would be required. Discharge of this water may be an issue given the proximity of a watercourse to the site.

Due to the limitations of site access, probing was not possible on site 2A; however, based on observation and available information, it appears that peat volumes follow similar patterns to site 2. Whilst the volumes requiring excavation are likely to be lower than site 2, (subject to further investigation) they are still likely to be substantial and the same difficulties with disposal will arise.

7.5.3 Site 3

Peat probes on this site did not indicate the presence of soft ground which would be typical of peat. Geology mapping indicated that the bedrock type is granite with the bedrock overburden as glacial till. Spot levels taken on this site reveal a fall of approximately 14m across the site varying from 78m to 92m Ordnance Datum (O.D.) The ground tends to fall away in all directions from the centre of the site which is more elevated.

Substantial groundworks will be required at this site to create a suitable site for the station. The type of material to be excavated is described above. Whilst volumes are likely to be large (estimated at 24,000m³), this type of material is significantly easier to dispose of or to reuse on site compared to peat.

7.5.4 Potential Peat Disposal Area

7.5.4.1 Peat Disposal Area Topographical Description

ESBI have not yet identified a specific peat disposal area for this project. In the event that a site with peat is considered in the further stages of this project, this will be necessary. As part of Stage 1 (the information gathering process), a potential peat disposal area located 1.2km to the west of the southern location was identified, see Figure 7.3. ESBI visited this site as part of the Stage 1 Report and details of the site are provided in this section.

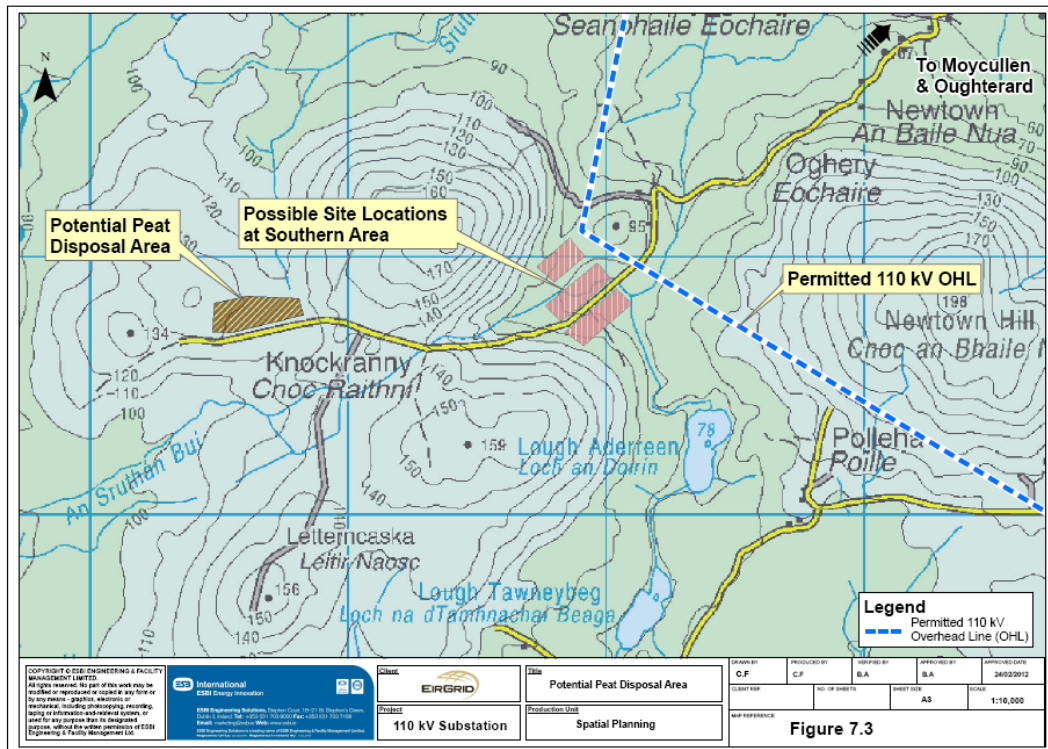


Figure 7.3: Potential Peat Disposal Area

The potential peat disposal area is a continuation of a peat disposal area located in an area of partially cutaway peat that may be developed as part of a proposed windfarm in the vicinity. Peat probe depths recorded by ESBI in this area indicated *in situ* peat depths of between 0.5m and 2m depth. Spot levels revealed the site elevation ranged from approximately 124 mO.D to 127 mO.D. The overall dimensions of the disposal area were estimated as 220m in length and between 55m and 70m in width.

7.5.4.2 Peat Disposal Area Earthworks

To store peat safely, it is recommended to build a bunded earth storage structure, similar to an earthworks dam. In the peat disposal area the underlying peat has to be removed to good formation stratum to build the bund around its perimeter. The removed peat and the footprint of the containment bund itself substantially reduces the storage capacity of the bund, particularly in this case due to the rectangular shape of the area. A preliminary volume calculation indicated that after the disposal area is developed (i.e. bunded) there is a remaining peat storage volume of less than 900m³ in the identified site. In this peat disposal area approximately 7,000m³ of peat would have to be removed and re-deposited to develop a containment bund merely to contain approximately 900m³ of peat. In summary, significant cost would be required to provide storage for a relatively small volume of peat, much less than the peat volume to be removed from site 2.

No site investigation has been carried out to date for the peat disposal area other than several peat probes taken by ESBI. Information was provided by SSER which was reviewed as part of this study. ESBI carried out a basic preliminary peat stability risk assessment based on the limited data available for this potential disposal area. In ESBI's experience, the storage of peat close to natural drainage features has been a contributory factor to peat movements. Full site investigation should be carried out before any decision to use the area is made.

7.5.5 Conclusions

Both Sites 1, 1A, 2 and 2A require significant excavation, storage and management of peat. It is unlikely that the peat could be economically transported and stored at a distance from any of the sites. A suitable peat storage area (if available) would have to be identified in the immediate vicinity for any of the sites to be feasible. Sites 1 and 1A would appear to be the best sites with regards to peat management, assuming it is feasible to divert the stream that runs through the site and identify a peat storage area. Site 3 does not appear to contain peat and, whilst volumes of mineral soil material to be excavated might ultimately be higher, given the sloping nature of the site, there are significantly less environmental risks associated with handling the type of mineral material believed to be on this site.

7.6 Water

7.6.1 Site 1

This site is located on a tributary of the Knockbane River. This river flows directly to Ross Lake, a designated cSAC area and pNHA (Site Code 001312) listed as a good example of a hard water lake. Ross Lake is also a managed coarse fishery by Inland Fisheries Ireland (IFI). The lake forms part of the Lough Corrib system a designated Salmonid Lake.

The site is relatively dry and appears to be situated largely on mineral soil. The stream running through the centre of the site appeared in good condition with clean gravel beds.

The following are the issues identified at this location:

- The proposed footprint of the substation at Site 1 indicates that the tributary stream of the Knockbane River that flows through the site would need to be re-aligned. A preliminary informal discussion with IFI indicated that this is not impossible but would require very significant justification. There have been precedents to alteration of stream courses beforehand. Under the Water Framework Directive significant justification would be required as it would constitute a morphological impact on the stream.
- Possible loss of fish habitat. The value of the stream in terms of fishery would need to be evaluated based on electrofishing and aquatic quality surveys. These surveys can only be carried out between April and September. The surveys will establish the full value of the fishery.
- Relocation of the stream would have to be by agreement of the IFI and under their supervision. A management plan for the stream relocation would need to be agreed with IFI.
- Relocation of the stream could give rise to significant levels of silt into the stream and Knockbane River impacting on the fisheries habitat in the river and also in Ross Lake. Mitigation using silt control measures and good construction practice would significantly reduce the risk of this occurrence.
- Similarly the construction of the substation would generate significant mineral silt which would need to be managed.
- Chemical pollution for accidental spillages of oils associated with construction machinery and transport vehicles could also lead to contamination of waters and impact on the ecology of the Knockbane river and Ross Lake. Good construction practice will effectively mitigate against this occurrence.

7.6.2 Site 1A

At this location no or limited diversion of the stream flowing in the north eastern boundary of the site would be required. There will be less risk of impact on the existing water courses. The main threat to water quality would be:

- Runoff of silt leading to increased suspended solids in the small stream, Knockbane river and Ross Lake in a worst case scenario which could lead to chemical contamination of waters leading to impact on aquatic species and fish in the rivers and lakes.
- Removal of scrub and small trees at the south-western portion of the site.
- The same requirement to carry out surveys of the stream is still likely to apply to this site.

7.6.3 Site 2

This site is located on the southern side of the road opposite Site 1. The site is bounded to the west by the tributary stream flowing into the Knockbane River and to the south by the Knockbane River itself. The site is located on deep peat and rock outcrop. At the time of inspection the site was very wet. It was noted that drainage enters the site from forest stands located to the west. The most significant issue on this site will be the control of peat silt as significant excavation will be required for the substation.

The main issues based on the proposed footprint are:

- The site will require extensive excavation of peat which has the potential to lead to significant runoff of peat silt with impact on the Knockbane River and Ross Lake. Significant silt control measures will be required. It is probable that large silt ponds will be required for the construction period. This may result in a significant site constraint in terms of available area.
- There will be a high risk of suspended solids entering the river system and design of construction will be critical to minimise the risk.
- Peat disposal off site will be required and may give rise to water quality issues at the disposal area.

This site poses a significantly higher risk to water quality than the other sites examined.

7.6.4 Site 2A

This site is located west and south of Site 2 and partially overlaps Site 2. Construction on this site would require forest stand clearance off the site. The forest area drains to the Knockbane River through a forest drainage system. There is therefore some potential for runoff of silt during construction. Peat depths are lower at this location than Site 2 but still likely to be significant. The main potential impacts that could occur are:

- Silt into the stream and Knockbane River during construction impacting on the fisheries habitat in the river and also in Ross Lake. Mitigation using silt control measures and good construction practice would significantly reduce the risk of this occurrence.
- Nutrient loss to the river and lake system. Forest brash (branches) if left on site post forest clearance could generate nutrient loss in the form of phosphorous. This could

lead to enrichment of Ross Lake which favours cyprinid species in the lake and contribute to poor status.

7.6.5 Site 3

This site is located at a higher elevation on sloping grassland to the north of Site 1. Construction of the substation would require significant excavation and storage of excavated materials. Runoff from this location could occur through the southern boundary field drain to the small stream flowing through Site 1 to the Knockbane River. The main threats to water quality are:

- Silt into the stream and Knockbane River during construction impacting on the fisheries habitat in the river and also in Ross Lake. Mitigation using silt control measures and good construction practice would significantly reduce the risk of this occurrence.
- Accidental chemical or oil spillage causing impacts on aquatic organisms and fish life.

The site is located on sloping mineral soil type and good silt control measures will be needed to be effective in reducing the risk of impact.

7.6.6 Least Constrained Site(s)

Site 3 on sloping ground with mineral soil is thereby least constrained in terms of water. It has a high settlement ability if good silt control measures are used.

Site 1A has field drainage which runs into a small stream. There is a risk of silt runoff to the stream and Knockbane River and the possible requirement to realign the stream.

Site 2A has the potential for silt runoff through vegetated forest drains.

Site 1 would require stream and drain relocation giving rise to temporary sediment loss. There is a risk of silt runoff to Knockbane River and Ross Lake. There is possible loss of fish habitat in the stream.

Site 2 is very close to the stream and river. Due to the large quantities of peat excavation required there is a high risk of silt runoff to the site to Knockbane river and Ross Lake. Silt control measures are constrained by the site size.

Consultation with IFI is recommended with regard to Site 1 and 1A should these sites be selected, to determine the acceptability of altering the stream course flowing through the sites.

An assessment of the fishery potential of the small stream flowing through Sites 1 and 1A should be completed and the data provided to IFI to facilitate decision making. This would most likely include an aquatic survey of lamprey and salmonoids. Water quality monitoring (turbidity, suspended solids etc.) should be undertaken prior to and during construction to inform management of the silt control measures.

8 Conclusions and Recommendations

8.1 Introduction

The purpose of this report is to set out information gathered to date in respect of the proposed development, and to identify the site(s) with the least constraints which could potentially facilitate the nature and extent of the planned substation development.

In identifying such a site (or sites), the substation technology has been a consideration but the main focus of the report is on the environmental constraints relating to locations and sites.

This report identifies a number of potential general locations within the study area, and has deemed the designated southern location to be the least environmentally constrained, at a strategic level. It then focuses on specific sites within that identified southern location, which could potentially accommodate the proposed substation.

Both the northern and middle locations are considerably constrained in terms of potential a visual impact, as they would be highly visible in the landscape for some distance. Mitigation measures for visual impact, such as planting for screening purposes, are not feasible, as they would not be characteristic of the landscape at these locations. Screen planting would actually introduce an additional visual impact to the existing landscape. The ecological value of these two areas is also very high and construction at these locations would constitute a potentially significant impact. The northern and southern corridor sites are hydrologically connected via small streams and rivers to the Ross Lake and Woods cSAC. The status of this lake is moderate (though likely to be downgraded to poor/low based on the most recent fisheries assessments). Any additional impacts on this cSAC would have significant consequences for its ecology. There is also a high risk to water quality at the northern site, although this could be mitigated by good substation design and well designed mitigation measures.

Five potential sites were selected in the southern location for general environmental appraisal and suitability assessments for road and cable access.

The sites are located on “white lands”, which means that they are not zoned for any particular type of development, but any application on these lands will be assessed on its merits. As the purpose of the proposed development is to link two energy related developments, it is compatible with surrounding infrastructure development patterns.

8.2 Summary of Constraints

A summary of the ranking of sites based on the visual impact, ecological and water quality considerations is provided in Table 8.1. The other environmental topics considered, as addressed in section 7, are not of such comparable difference so as to distinguish between the results of the identified sites. The issue of peat excavation and removal is a technical constraint. Whilst it can technically be overcome, there is significant potential for environmental impacts. These potential impacts manifest themselves principally through the environmental mediums of water and ecology. Peat is not therefore listed in Table 8.1, which ranks the potential impacts associated with each site from lowest to highest.

Site	Northern Location	Middle Location	1	1A	2	2A	3
Visual	High	High	Low	Low	Low	Low	Medium
Ecology	High	High	Medium	Low	High	Low	Low
Water	High	Medium	High	Medium	High	High	Low

Table 8.1: Matrix showing Potential for Environmental Impacts Associated with Locations/Sites

8.3 Key Constraints at Southern Location

The key constraints identified within the southern location relate to landscape / visual impact, ecological conservation and water quality which are summarised for each site below:

o Site 1

This site would require diverting the existing small stream flowing through the middle of this site. The fisheries value of this stream cannot be determined until electrofishing under licence and other aquatic assessments are carried out post April 2012 and given the potential for impacts on protected species, there is a risk that IFI would not approve of diverting this stream. Diverting the stream could also give rise to silt generation which could impact on the Ross Lake and Woods cSAC. There is also a flushed area on the site which adds to its ecological value and this could be lost during construction.

The stream is the main area of ecological significance associated with site 1 but the fen / flush is tentatively (based on surveys carried out in winter) rated as having ecological value of higher local importance.

Peat excavation will be required at this site which has the potential to increase potential water and ecological impacts.

This site has no significant visual constraints.

o Site 1A

Site 1A has no significant ecological constraints; however the same comments regarding Site 1 in relation to the stream apply to this site. The planting of conifers has destroyed the former bog or heath habitat that would presumably have occurred there. The existing drainage channel and the small remnant of wet grassland/wet heath have only minor local value (rate local importance, lower value). The drainage channel provides hydraulic connectivity from the site to the stream flowing into the Knockbane River. The risk to water quality could be mitigated by good design and construction practice.

Peat excavation will be required at this site which has the potential to increase potential water and ecological impacts.

The visual impact ranking is also relatively low and any impact at this location could be further mitigated by screening with appropriate planting.

- **Site 2**

This is the least suitable site having regard to ecology and risk to water quality. Overall, this site is ecologically rated as having a Local Importance (at least lower value, possibly close to higher value) with the possibility of the site being used by the Marsh Fritillary. If the Marsh Fritillary were confirmed during spring/summer surveys this would increase the conservation value of the site significantly (as marsh fritillary is listed on Annex I of the EU Habitats Directive).

In addition large quantities of peat would need to be excavated at this site and deposited locally; the risk to water quality at the site is also high given the proximity of the Knockbane River and stream flowing at the southern boundary.

Site 2 is the least constrained from a visual impact aspect.

- **Site 2A**

This site is centred on a commercial conifer plantation. The former ecological interest at this site has essentially been destroyed due to the planting of conifers. There is some connectivity to the adjacent Knockbane River but the risk to water quality could be mitigated by good design and good construction practice.

Peat excavation will be required at this site which has the potential to increase water and ecological impacts.

It would have a higher impact from the visual aspect than the Site 1A but again some mitigation could be achieved by appropriate planting.

- **Site 3**

The site is elevated and sloping and the potential for visual impact would be higher than other sites at this location. It would have the highest visual impact of all the southern location sites assessed with little scope for screening of the site. However, it should be noted that the overall southern location is considered to have relatively little opportunity for significant or extensive visual impact, given its setting within the landscape.

Construction of the substation at this site would not have significant impacts on the ecology of the area as it is a worked agricultural field of low ecological value. The potential impact on water quality would be low also assuming the implementation of good design, construction management and mitigation measures.

- **Overview of Peat Related Issues**

Many sites identified are located in peat areas of varying peat depth. The excavation and removal of peat provides significant civil engineering challenges and silt control challenges. Peat when excavated should not be stored at an excessive depth, generally no greater than approximately 1m. For the safe storage of peat, a containment bund has to be built to contain the peat. It is also not recommended to store excavated peat on in situ peat due to the possibility of failure occurring within the in situ peat, and also for practical reasons. This is because the transport and placing of peat across the peat surface by construction plant is problematic due to the very low bearing strength of the underlying peat. Once a suitable containment area for peat is identified, it is vital that it is in close proximity to the site of excavation, in order to avoid the transport of large quantities of a practically liquid material with large trucks on public roads.

8.4 Conclusions

A suitable site for a new substation is required within an identified study area which encompasses parts of the townlands of Doon, Knockaunranny and Knockranny. This report provides a review of three designated locations within this study area, identified as the northern, middle and southern locations. Within the least constrained southern location, this report also reviews five sites which have the potential to facilitate the proposed substation development.

The appraisals and surveys summarised throughout this report have evaluated and ranked the sites in terms of different aspects of the environment.

The appraisals have concentrated on visual impact, ecology and water quality. Other environmental constraints which have been considered, but which will require more investigation when a specific site(s) is considered further, are road access, peat excavation and removal / rock removal.

Based on the assessment of visual impact, ecology and water quality, and taking into account the likely excavation and peat storage requirements for each site, the identified least constrained part of the study area is the southern location.

Within the southern location, the sites are ranked as follows:

- Site 1 is middle ranked in terms of potential visual impacts but is one of the higher ranked sites in terms of potential impacts on ecology and water quality.
- Site 1A is one of the lower ranked sites in terms of potential visual impacts but is middle ranked in terms of potential impacts on ecology and water quality.
- Site 2 is lowest ranked in terms of potential visual impacts but is the highest ranked in terms of potential impacts on ecology and water quality.
- Site 2A is middle ranked in terms of potential visual impacts but is middle ranked in terms of potential impacts on ecology and water quality.
- Site 3 is highest ranked in terms of potential visual impacts but is the lowest ranked in terms of potential impacts on ecology and water quality.

It should be re-iterated that the overall southern location is considered to have relatively little opportunity for significant or extensive visual impact, given its setting within the landscape. Visual impacts associated with Site 3 can be predicted with a greater degree of certainty (typically through the use of photomontages) than many of the potential ecological and water quality impacts, associated with all other sites, which are generally more difficult to predict and generally require detailed modelling and studies.

Further more detailed technical appraisals and studies, including the development of mitigation measures for whichever sites emerges, from the site selection process will be required as the project progresses.

8.5 Recommendations

8.5.1 Substation Technology

It is the Lead Consultants recommendation that AIS is emerging as the preferred technology for this project as it meets all technical requirements, the potential environmental impacts are within acceptable limits and it is the most cost effective technology. Notwithstanding this recommendation, other technology types have not been excluded from further consideration.

8.5.2 Least Constrained Sites

It is the Lead Consultants recommendation that Sites 3 and 1A represent the least constrained sites identified for this project. Whilst both sites still have some constraints it is recommended that both be further considered as part of the stage 2 process.

Appendix 1

Photographs of all Locations and Sites Considered



Plate 9 (Panoramic): View northwest from access road across Site 1 and of Site 3



Plate 10 (Panoramic): View southwest from access road across Site 1A

Photosheet 4: Southern Location - Options

PROPOSED SUBSTATION NEAR MOYCULLEN
COUNTY GALWAY
January 2012





Plate 11: View south from access road across north-eastern part of Site 2



Plate 12: View northeast from access road across south-western part of Site 2

Photosheet 5: Southern Location - Options

PROPOSED SUBSTATION NEAR MOYCULEN
COUNTY GALWAY
January 2012





Plate 13 (Panoramic): View south from access road across Site 2A



Plate 14 (Panoramic): View southeast from access road across Site 2A

Photosheet 6: Southern Location - Options

PROPOSED SUBSTATION NEAR MOYCULEN
COUNTY GALWAY
January 2012





Plate 15 (Panoramic): View north from access road across Site 1, Site 1A and of Site 3



Plate 16 Panoramic: View west from access road of Site 1 and Site 3



Plate 17 (Panoramic): View northwest of Site 3

Photosheet 7: Southern Location - Options

PROPOSED SUBSTATION NEAR MOYCULEN
COUNTY GALWAY
January 2012



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