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<th><strong>Project Title:</strong></th>
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<td>Emerging preferred station and connectivity report.</td>
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<td><strong>Report No.:</strong></td>
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ESBI Engineering
Stephen Court,
18/21 St Stephen's Green,
Dublin 2, Ireland
Tel: +353 (0) 1 703 8000
Fax: +353 (0)21 4976344
Web: [www.esbi.ie](http://www.esbi.ie)

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1.1 Introduction

This Stage 1 Lead Consultant’s Report, has been prepared on behalf of EirGrid which is the state owned independent Transmission System Operator (TSO) and Market Operator (MO) in Ireland. EirGrid is proposing a substation and associated development in the East Kerry/Northwest Cork area – hereinafter termed the “East Kerry North West Cork Project” (EKNWC Project). The new substation is required to connect windfarm development in this area onto the grid network.

This Report identifies the context for the planned EKNWC project, and potential project solutions. It is intended that the information contained in this Report will enable meaningful consultation between the project team and all interested parties, including members of the public and An Bord Pleanála as likely competent authority for public planning, in relation to the proposed development.

1.2 Brief Description of Proposed Project

In summary, the proposed EKNWC Project comprises two key elements:

- **Part A** - Locate a new 220/110kV substation along the existing regional Clashavoon – Tarbert 220kV line.
- **Part B** - Connect a permitted windfarm near Cordal, Co. Kerry to the new 220/110kV station.

These elements are discussed in greater detail in the body of this Report.

1.3 Purpose of this report

The purpose of this Stage 1 Report is to:

- present the need for the project;
- identify a study area for the project;
- identify environmental and other constraints within the study area;
- identify potential substation sites for the project within the study area;
- identify potential options for windfarm connections to the proposed substation within the defined study area;
- evaluate the various options, having regard to technical, environmental and other constraints;
identify an emerging preferred solution to meet the project requirements.

This Stage 1 report is the first step in a four part consultation process, in accordance with EirGrid’s Project Development Roadmap. Stage 1 “Information Gathering”, Stage 2 is “Evaluate Options”, Stage 3 is “Confirm Design” and Stage 4 is “Prepare Planning Application”. EirGrid’s Project Development Roadmap is set out in Figure 1.1 below.

![Figure 1.1 EirGrid’s Project Development Roadmap](image)

1.4 Project History and Background

The EKNWC Project essentially comprises the creation of a solution to connect the extent of permitted and planned wind generation in this area onto the transmission network. Technical studies carried out by EirGrid has deemed the best solution to meet this requirement is by the development of a new node on the existing transmission network – comprising a substation. The substation needs to be capable of accommodating both the extent of existing permitted generation in the area, and potential future generation.

The EKNWC Project received capital approval (financial go-ahead by EirGrid) at the end 2009. A study area was selected as the broad
geographical area within which it is considered potential station sites, overhead line route corridors and cable routes can best occur to meet the justification for the project. The study area is identified and mapped in Figures 1.2 and 1.3 below.

![Figure 1.2 General Study Area](image)

In May 2010, at a pre-application consultation meeting, EirGrid presented to An Bord Pleanála a high level overview of the project, including the need for the development and associated transmission interconnection within the region. In relation to Part A (substation element) of the project, 15 identified site areas for the proposed substation were presented to An Bord Pleanála - the process for identification of these site areas is detailed in Chapter 2 of this Report. Initially, Part B of the project included the connection of Knockacummer and Cordal group of windfarms to the proposed substation.

Having regard to advice received by An Bord Pleanála at the pre-application consultation meeting, it was decided to extend the study area further south to examine the possibility of connecting either one or both windfarms into a new substation currently being planned by EirGrid in the Millstreet area, known as the Millstreet Project. This separate proposal is currently before An Bord Pleanála (ABP Ref.: PL.04 VA0039).
In October 2011 EirGrid met again with An Bord Pleanála in a pre-application consultation meeting, outlining the decision of the developer of the Cordal group of windfarms (hereinafter for convenience referred to as Cordal) to connect to the planned EKNWC substation by means of underground cable (UGC), and the decision of the developer of the Knockacummer windfarm to put this planned connection on hold pending further studies\(^1\). Accordingly, aside from the cable connection of the proposed station to the 220kV line via two cable interface towers, there is no overhead transmission line element proposed as part of this project. In addition, this decision obviated the need to explore a connection to the Millstreet Project.

1 For clarity, under commercial agreements for the connection of windfarms and other generation facilities to the transmission grid, the developer of those facilities can select the means by which they choose to make that connection
1.5 Description of the existing electricity infrastructure in the area

As detailed in Figure 1.3 above, the existing electricity network in the study area primarily consists of 38kV circuits radiating out from the existing Rathmore station. The existing transmission network primarily consists of a single 220kV circuit that runs from Tarbert substation on the southern bank of the Shannon Estuary through the study area, and connects to Clashavoon 220kV substation (near Macroom) in County Cork. A 110kV overhead line circuit runs across the southwest corner of the study area and another 110kV line runs out of the study area to the north east from Glenlara station near Newmarket Co. Cork. Neither of the existing 110kV or 38kV lines in the area are related to this project.

1.6 Need for the Proposed Project

Limitations of Existing Electricity Infrastructure

The existing 110 kV network between Tarbert, Co. Kerry, and Macroom, Co. Cork is not designed to facilitate the amount of generation which is currently planned to be connected in the East Kerry North West Cork (EKNWC) area. As such, the existing network is limited in its ability to provide a connection point for the number of contractually committed generators in the area as well as the additional generators that have recently received connection offers under Gate 3.

The proposed connection methods for the generation processed in Gate 2 and Gate 3 therefore need to either make use of the higher transfer capacity of the existing 220 kV line between Tarbert and Clashavoon 220 kV stations, or construct new lengthy 110 kV circuits to export the wind generation from the EKNWC area.

Alternatives Considered

Technical studies carried out by EirGrid indentified that acceptable connection options included either the establishment of a new 220/110 kV substation in the EKNWC area along the existing Clashavoon-Tarbert 220 kV line, or the construction of multiple 110 kV transmission circuits from centralised wind generation collection locations, connecting to existing or planned transmission substations outside the EKNWC area.

The technically acceptable options for connecting the generation in the EKNWC area are presented below. The figures represent a geographic schematic of the relevant part of the transmission network in the south west where the green line represents the existing Clashavoon – Tarbert 220 kV line, the small green dots represent 220 kV stations and the small black dots
represent 110 kV stations where the generation will be collected. The technically acceptable connection options (to accommodate planned connections including Gate 3 wind farms) are:

- **Option A** – New East Kerry North West Cork 220 kV station looped into the existing Clashavoon-Tarbert 220 kV line;
- **Option B** – No new East Kerry North West Cork 220 kV station (two new 110 kV circuits north);
- **Option C** – No new East Kerry North West Cork 220 kV station (two new 110 kV circuits south).

**Option A – East Kerry North West Cork 220 kV Station**

This option assumes a new 220 kV station looped into the existing Clashavoon-Tarbert 220 kV line. The location of the new station was considered to be within the shaded area shown in the figure below. The new station is indicated by a large green dot.

In this option, three 110 kV circuits will be required to cater for all Gate 2 & Gate 3 generation in the area. The circuits were assumed to be constructed with ACSR 430mm² which provides a minimum rating of 187 MVA. There will be no capacity available on these circuits to carry power from new generators beyond Gate 2 & Gate 3.

The total estimated line length required for this option is approximately 40km. The exact length will depend on the location of the new 220 kV station within the shaded area.

**Option A – EKNW Cork 220 kV Option**
Option B – No East Kerry North West Cork 220 kV Station (2 circuits north)

This option assumes no new 220 kV station in the EKNWC area and that the generation will be split and connected to two other 220 kV stations that are planned, one located to the north called North Kerry and one to the south called Millstreet.

In this option there will be one 110 kV circuit required between Glentanemacelligot and Cordal and two 110 kV circuits running north from Cordal towards Cloghboola and North Kerry. There will also be one 110 kV circuit required running south from Glenlara towards Millstreet, possibly making use of the route of the existing 38 kV line in the area. The circuits were assumed to be constructed with ACSR 430mm², which provides a minimum rating of 187 MVA. This arrangement will cater for all Gate 2 & Gate 3 generation in this area. There will be no capacity available on these circuits to carry power from new generators beyond Gate 3.

The total estimated line length required for this option is 89km.

Option C – No East Kerry North West Cork 220 kV Station (2 circuits south)

This option assumes no new 220 kV station in the EKNWC area and that the generation will be split and connected to two other 220 kV stations that are planned, one located to the north called North Kerry and one to the south called Millstreet. In this option there will be one 110 kV circuit running north from Cordal towards North Kerry. There will also be one 110 kV circuit...
required between Glentanemacelligot and Glenlara and two 110 kV circuits required running south from Glenlara towards Millstreet with one of these possibly making use of the route of the existing 38 kV line in the area. The circuits were assumed to be constructed with ACSR 430mm$^2$, which provides a minimum rating of 187 MVA. This arrangement will cater for all Gate 2 & Gate 3 generation in this area. There will be no capacity available on these circuits to carry power from new generators beyond Gate 3.

The total estimated line length required for this option is 98km.

Option C – No new EKNW Cork 220 kV Station (2 circuits south)

With respect to the above, it is clear that all three options are feasible from a technical standpoint in that they will all address the deficiencies previously identified with respect to servicing Gate 2 and 3 requirements. However, criteria other than technical suitability need to be considered and evaluated before an optimum proposal is chosen. In particular, the issue of environmental impact needs to be given special significance in this instance, given the proximity of Stacks to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA (Site Code 004161) which is a significant hen harrier habitat.

Having regard to this critical factor, notwithstanding the suitability of Options B and C from a technical perspective, it is proposed to rule out these options due to the requirement for their necessary extensive intrusion across the designated SPA in order to link to the existing 220 kV transmission line – assumed to be in whole or in part by overhead line given the potential difficulty of laying extensive lengths of underground cable across this area - and the resulting potential risk to the hen harrier population of the SPA that
overhead lines may represent. In contrast, Option A will require a significantly shorter connection to the existing 220 kV transmission line.

In addition to the above, the developer of the Cordal group of windfarms has expressed a preference to connect to the planned substation by means of underground cable (UGC). This further reinforces the view that Option A represents the most appropriate solution for the EKNWC project, with minimum potential environmental impact attached thereto

On this basis Option A only is considered as a suitable option to meet the nature, extent and location of the proposed project.

1.7 Planning Context

1.7.1 Cork County Development Plan 2009-2015

The County Development Plan for Cork was adopted in January 2009. Chapter 6 of the CDP considers Transport and Infrastructure. Within this chapter there are specific objectives relating to energy networks, renewable energy, wind energy, bio energy, energy transmission and power lines.

Objective INF 7-1(a) states ‘It is an objective to recognise the national importance of ensuring security of energy supplies for servicing a whole range of economic sectors in line with the Government’s White Paper ‘Delivering a Sustainable Energy Future for Ireland’.

(b) It is a general objective, where strategic route corridors have been identified, to support the statutory providers of national grid infrastructure by safeguarding such strategic corridors from encroachment by other developments that might compromise the provision of energy networks.

(c) It is an objective to protect areas of recognised landscape importance and designated sites including Special Areas of Conservation, Special Protection Areas and Natural Heritage Areas, from the construction of large-scale visually intrusive energy transmission infrastructure. In such circumstances, it is an objective to seek alternative routing or transmission methods.

1.7.2 Kerry County Development Plan 2009-2015

The County Development Plan (CDP) for Kerry was adopted in April 2009. Section 7.4.4 of the Plan states that “Ireland, and specifically Kerry, is well positioned to develop and benefit from renewable energy. Ireland has one of the best wind energy resources, and growing climates for biomass, in Europe and an excellent climate for some solar energy technologies. The
Council recognises the significant environmental and economic benefits associated with energy production from renewable resources”.

Policy **NR 7-21 Facilitate renewable energy** states that it is an objective to:
(a) Maximise the potential and promote the development of appropriate renewable energy projects throughout the County while having due regard to the need to protect the environment and the landscape and ensure the proper planning and sustainable development of the county.
(b) Facilitate the preparation of a Renewable Energy Strategy for the county during the lifetime of the plan.
(c) Facilitate the preparation of an Energy Conservation Strategy for the county during the lifetime of the plan.

Chapter 8 of the CDP considers Transport and Infrastructure: Within this chapter there are specific objectives relating to energy networks, energy transmission and power lines.

Section 5 “Power” includes for the following key provisions:-

8.5.1: ‘The provision of electric power as a resource is important to the economic well being and development of the county. It is vital that Kerry has sufficient capacity to meet current and future needs”.

8.5.2: In its role as a Planning Authority, the Council assesses proposals in relation to the supply and distribution of power throughout the county. This includes the provision of power from both conventional (coal, oil, gas etc.) and new renewable sources and the necessary network infrastructure to serve these.

INF 8-63 Support the infrastructural renewal and development of electricity networks in the region, including the overhead lines necessary to provide the required networks.

The proposed East Kerry North West Cork project is therefore supported and planned for at a County level policy context in both Cork and Kerry.

### 1.8 Consultation Process

Consultation has occurred during the Stage 1 process, to facilitate meaningful engagement with, and input from all concerned groups and individuals in respect of the planned development.
Consultation can be broadly separated between that with statutory agencies/bodies, that with non statutory agencies/bodies and that with the general public (which might also include landowners).

The principles behind consultation are to engage in open, honest and meaningful discussion, and evaluating, and incorporating where possible or appropriate, all comments and suggestions arising.

EirGrid held a public open day in Rathmore on the 17 February 2011. Members of the public were invited to view the study area and provide submissions, comments, information or queries in relation to the proposed developments. A copy of the newspaper notice can be seen on the EirGrid website.

A Briefing Document was produced for this stage of the consultation which provided project details updates and contact details for the project team. (copy on project website)

The provision of a project specific Web Page to facilitate widespread accessibility to project data and to facilitate the giving and receiving of information specific to the project. A dedicated email was setup for the project and a telephone number was provided for people to contact EirGrid directly.

(Copy on project website)

(Copy on project website)

Closing date for submissions for this stage of the project was Friday 18th March 2011. This allowed a period of about a month from the date of the public open day for feedback from the general public and local interest groups, and both statutory and non statutory consultees.

The initial consultation with the stakeholders to date has been invaluable and effective in shaping the project and informing decisions. This review period was followed by the evaluation and identification period as per the EirGrid project road map, leading to the production and the publication of this report.
Chapter 2 – Project Study Area and Constraints Identification

2.1 Study Area Identification and Description

A study area was selected as the broad geographical area within which it is considered potential station sites, overhead line route corridors and cable routes can best occur to meet the justification for the project. As outlined above, on the advice of An Bord Pleanála, the study area was extended south to allow for examination of any opportunities arising out of the concurrent Millstreet Project. The initial project study area was approximately 1,056km² in area (32.5km x 32.5km). Figure 2.1 identifies the study area in its wider regional context.

![Figure 2.1: Study Area Context Map](image)
2.1.1 Study Area

The study area initially identified in which to site the planned development (and upon which most of the studies referenced in this report are based), is detailed in Figure 2.2 below. The study area is located in Counties Cork and Kerry. Key settlements within this area are Castleisland, situated in the northwest of the study area, Newmarket in the northeast, Kishkeam, Ballydesmond and Rathmore in the central area, and Millstreet located in the south. Killarney is a short distance to the south-west of the study area.

Figure 2.2: Study Area Map showing Existing Electricity Infrastructure
The study area consists of a two upland areas, one in the north and the other in the south. The highest peaks in the upland area to the north are Mount Eagle at 431m and Knockacummer at 408m. This area in the North is a designated Special Protection Area (Site Code 004161 – Stack’s to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle).

The upland areas to the south of the study area comprise the northern face of the Derrynasaggart mountains. The mountain range is over 40 miles long; however most of the mountain range is outside the boundary of the study area. The twin peaks of The Paps Mountains are within the study area, and rise to over 690m. The other significant peak in the south of the study area is Caherbarnagh at 682m.

Otherwise, the study area consists primarily of rural farm land and commercial forestry, located within the river valleys between these two upland areas. The majority of the rivers in this wider area rise in the upland/mountain areas, including the Blackwater, Glenlara, Ownetaraglin and Owenkeal. Most of the rivers in the study area form part of the Blackwater Special Area of Conservation (SAC).

The main transport infrastructure in the study area is the N72 & N22 national routes and the Killarney/Tralee to Mallow (Cork/Dublin) Irish Rail route. The road network primarily consists of regional roads connecting settlements. There is also an intricate network of local roads within the study area.

The Kerry County Development Plan 2009-2015 identifies scenic views and prospects, and areas of special amenity. There is a designated scenic route in the north east of the study area near Taur.

The Study Area was further refined with respect to the potential underground cable routes as can be seen in Figure 6.1 in Chapter 6 below.

### 2.2 Identification of Constraints

The identification of environmental and other constraints within the study area informs the identification of potential station sites, potential corridors for transmission routes (though no overhead lines are proposed in this particular instance). The aim is to avoid identified constraints to the greatest extent possible while maintaining an economical and technically feasible solution. Constraints include physical (e.g. rivers, archaeology, lakes) environmental (e.g. SAC, SPA etc.) and those created by human beings such as settlements and dwellings. A constraints map has been produced as part of the Stage One public consultation process. This is appended to the end of this document.
Constraints were identified by consulting several sources such as:

- **Aerial Photography** - Initially Ordnance Survey aerial photography of the study area was reviewed. In late 2010 the study area was flown to capture a more up to date picture.

- **OSI Mapping** - used to identify potential geographic constraints.

- **Stakeholder Consultation** - Preliminary meetings occurred with Inland Fisheries Ireland, National Parks and Wildlife Service and Cork & Kerry County Councils.

- **Public consultation** - EirGrid held a public open day in Rathmore on the 17 February 2011. Members of the public were invited to view the identified study area and provide submissions, comments, information or queries in relation to the proposed development.

- **An Post GeoDirectory** - this information is a database of habitable dwellings in Ireland. Within the study area this was used to help identify housing.

- **GIS data from utilities and public sources** - includes Sites and Monuments, Special Areas of Conservation, Special Protection Areas, etc.

- **Site visits** - Frequent site visits were made by the project team to gain a full appreciation of identified constraints and also to gather a general appreciation of the local topography/landscape and environmental character within the study area. Initial site visits were roadside only. Private lands were not entered.

## 2.2.1 Artificial Constraints

### 2.2.1.1 Human beings

The main constraints in relation to human beings are the settlements in the area, including Newmarket, Castleisland, Kishkeam, Ballydesmond, Rathmore, Millstreet, Cullen etc. Elsewhere, settlement consists of farm houses and one off houses concentrated along the extensive road network. The north and south of the study area have significantly less housing then the rest of the study area due to the upland nature of the terrain.

### 2.2.1.2 Cultural Heritage

For the purposes of this report, cultural heritage is considered to include the following elements:
- Sites listed in the Sites & Monuments Record (SMR) (downloaded from www.archaeology.ie)
- Record of Monuments & Places (RMP)
- Sites listed in the Archaeological Inventory of Cork (East Kerry Inventory is not yet published)
- Sites listed in the Record of Protected Structures (RPS)
- National Inventory of Architectural Heritage, Buildings of Ireland: www.buildingsofireland.ie
- Sites uncovered in Excavations Bulletins

Figure 2.3: Identified Sites and Monuments
2.2.1.3 Existing infrastructure

Roads

Underground cable is generally installed in existing public roads. The key existing infrastructure within the study area is as follows:

The N72 road which bisects the study area is a national secondary road that runs east-west from its junction with the N25 near Dungarvan in County Waterford to the N70 in Killorglin in County Kerry. The road passes through; Lismore – Fermoy (N8) – Mallow (N20) – Rathmore – Killarney (N22) – Killorglin. The N72 is 176km long.

The N22 road enters the south of the study area briefly and is a national primary road which goes through counties Kerry and Cork, from Tralee in the west through Killarney, Macroom and Ballincollig to Cork City in the east.

The regional roads in the study area are the R570, R576, R577, R578, R582 and R583 which generally link the major population centres within the study area.

The vast majority of the roads in the area are local roads which typically provide access to intermittent one off housing and farms. In the upland areas the roads are very narrow and have a lower population density.

Existing High Voltage (HV) Overhead Lines and Stations (220/110kV)

The study area contains existing 220kV and 110kV transmission infrastructure as described below and is shown on the constraints map.

High voltage overhead transmission lines:

- Clashavoon – Tarbert 220kV Overhead Line
- Clonkeen – Knockearagh 110kV Overhead Line
- Charleville – Glenlara 110kV Overhead Line

High voltage stations:

- Garrow 110kV station
- Knockearagh 110kV station
- Glenlara 110kV station
- Cordal Windfarm (planned) 110kV station
- Knockacummer Windfarm (planned) 110kV station

There are also a number existing 38kV circuits radiating out from Rathmore 38kV station.
Other Infrastructure

There are no gas transmission pipelines in this study area. (At present Nov. 2011)

There is one major railway line in the study area it is the one that connects Killarney & Tralee to Cork and Dublin via Mallow.

Planned wind farms in the area are listed below. The primary purpose of the proposed project is to facilitate the capture of energy that will be generated by these proposed wind farms.

Gate 1:
- Mount Eagle Windfarm 2
- Coomacheo (41.25) WF

Gate 2:
- Carrigans 1.7MW Windfarm, Ballydesmond, Co. Cork
- Coolegrean Windfarm, Co. Kerry.
- Clydaghroe Wind Farm
- Mod request Clydaghroe Wind Farm
- Curragh WF, (18MW), Millstreet, Co Cork
- Foiladaun WF (13.8MW) Co. Cork
- Mount Eagle 3 WF (1.7MW), Co. Kerry
- WEDcross Wind Farm (4.5MW)
- WEDcross Wind Farm (0.5MW)
- Cordal WF
- Glentanemacelligot Windfarm
- Knockacummer (1) GUDP
- Scartaglen WF (14MW), Barna, Scartaglen, Co. Kerry
- Barna Windfarm (4.99MW), Scartaglen, Co. Kerry
- Caherdowney 10MW Windfarm
- Mod request Caherdowney 10MW Windfarm

Gate 3:
- Gneeyes Phase 2, Gneeyes, Millstreet, Co. Cork.
- Carrigans W.F ext, Ballydesmond, Co. Cork
- Scartaglen WF Ext
- Cordal 2 Wind farm Kooockanefune Tralee Co. Kerry
- Cordal 3 Wind farm Kooockanefune Tralee
- Glentanemacelligot Phase 2
- Coomacheo Pumped Storage (within existing wind farm)
2.2.2 Natural Constraints
2.2.2.1 Flora and Fauna

Designated Sites

The National Parks and Wildlife Services (NPWS) database of designated nature conservation areas was reviewed to identify any designated sites lying within the study area. Sites can be designated for their nature conservation interest under European and Irish legislation. The three principal forms of designation are as follows:

**Special Area of Conservation (SAC)**

These are sites that have been designated under the EU Habitats Directive and transposed into Irish law in the European Communities (Birds and Natural Habitats) Regulations, 2011. The Directive lists (Annex I) certain habitats that must be protected within SACs. There is also a list (Annex II) of species that must be afforded protection by designation of areas of land as SACs. Sites are designated as candidate sites (cSACs) until they have formally been ratified by the Minister.

**Special Protection Area (SPA)**

The EU Birds Directive came into force in 1979 and it requires each member state to designate "Special Protection Areas" for birds. The Directive contains annexes, which are lists of birds, which require particular conservation measures (Annex I), and also species, which may be hunted, and species, which may be sold. Annex I species include Hen Harrier, Whooper Swan, Greenland White-fronted Goose, Peregrine Falcon, Corncrake and Terns. Member states are also required to protect sites, which are important for migratory species such as ducks, geese and waders. The Birds Directive has been transposed into Irish law under the European Communities (Birds and Natural Habitats) Regulations, 2011

**Natural Heritage Areas (NHA)**

These are areas that have been designated under Irish legislation, the Wildlife (Amendment) Act 2000. Prior to statutory designation, sites are known as proposed Natural Heritage Areas (pNHA) but are still afforded some level of protection including recognition of their ecological value by planning and licensing authorities.
Habitats
Aerial photography of the study area was reviewed to establish the broad habitats that occur within each proposed Substation Site Option and future Corridor Options. A windscreen survey of all the Substation Site Options, and surrounding study area, was also undertaken to confirm the broad habitats present and to consider the ecological value of the study area in terms of its likely importance to flora and fauna. Key areas of national and international significance include:

- Lower River Shannon (cSAC)
- River Blackwater (cSAC)
- Glanaruddery mountains area (part of the Stacks to Mullaghareirk Mountains West Limerick Hills and Mount Eagle SPA).

Locally significant ecological features were also checked including areas of heath, bog, rush pasture and woodland.

Birds
A desk study assessment of existing EIS in the area particularly the SPA area in the study area was conducted.

Watercourses
A study of aerial photography, along with a review of the Environmental Protection Agency (EPA) website (www.epa.ie), was undertaken to identify any lakes, rivers or streams present within the study area and their potential fisheries value.

Other Fauna
A review was conducted of relevant references including Hayden and Harington (2000)\(^2\) and Whilde (1993)\(^3\) on mammals in the area.

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Consultation
A consultation letter was sent to the following Statutory and non-Statutory bodies on 31st January 2011.

- National Parks and Wildlife Service (NPWS);
- Inland Fisheries Ireland (IFI);
- Bat Conservation Ireland;
- BirdWatch Ireland;
- The Irish Wildlife Trust;
- Conservation Officer Cork and Kerry County Councils.

Information Sources
Information sources used for this report included the following:

- The NPWS database (www.npws.ie);
- The EPA database (www.epa.ie);
- The National Biodiversity Data Centre database (www.biodiversityireland.ie);
- Aerial photography and local maps; and
- Wind screen survey conducted on 27th January 2011 at all substation sites.

Protected areas identified in the study area
Stacks to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle
Mount Eagle Bogs NHA - Upland Blanket bog – Hen Harrier Red Grouse and Irish Hare
Blackwater River (Cork/Waterford) SAC - Examples of plant & animals listed on annexes I & II EU Habitats Directive

2.2.2.2 Landscape
The following list of information sources were reviewed in order to assess the landscape within the Study Area:

- Cork County Development Plan 2009-2015;
- Kerry County Development Plan 2009-2015;
- Ordnance Survey Mapping and Photography;
- Electoral Area of Killarney - Landscape Character Assessment;
- Electoral Area of Tralee - Landscape Character Assessment;
- Discover Ireland, Webpage: www.discoverireland.ie;
- OSI 1:50,000 Discovery Series Maps; and
- Aerial photography.

Key landscape characteristics such as vegetation, major and minor ridgelines, land uses, designations and settlement areas were mapped.

Figure 2.4: Landscape Character Areas (County Cork) & Visual Units (County Kerry)
Figure 2.5: Features of landscape significance within the study area

2.2.2.3 Water

The study area is located principally within the South Western River Basin District as defined under the European Communities (Water Policy) Regulations, 2003, (S.I. 722 of 2003).
Figure 2.6: Constraints Map for Water

In the north-west of the study area, the existing 220kV transmission line passes through the catchment of the Croaghane River, the headwaters of the Shanowen River which feeds into the Maine River flowing westward to the sea in Dingle Bay. The line then traverses the Glantane River and the Brown Flesk river catchment both tributaries of the Maine River. It also passes through the Munster Blackwater Freshwater Pearl Mussel Catchment – a designated Special Area of Conservation (Site Code 002170). The Yellow river sub catchment, a tributary of the Munster Blackwater and the Owentaraglin River, a tributary of the main Munster Blackwater River, sub catchments of the Finnow River also a tributary of the Munster Blackwater. Freshwater Pearl Mussel populations have previously been identified in the lower part of the upper Blackwater river. Freshwater Pearl Mussel populations have previously been identified in the Owentaraglin River and also on the main Blackwater River

Part of the study area is located in the Shannon International River Basin District (SHIRBD). This area drains northwards into the Glengariff Stream, Glenagharan Stream, Breanagh River and Owveg River. Windfarm developments in this area drain to the Glengariff stream which forms the headwaters of the Clydagh River a tributary of the River Feale.
A full description of the river basins and its characteristics as well as the WFD objectives can be found on www.wfdireland.ie, on www.swrbd.ie and on www.shirbd.com.

A constraint that may influence substation site selection is the issue of disturbance creating suspended solids. The potential for such disturbance is greatest where construction and forestry activities are undertaken on peat soil, but could also be significant on mineral soils if sufficient precautions are not adopted, or if construction at a sensitive location could be required particularly in the case of Freshwater Pearl Mussel catchments where siltation and nutrient enrichment are major issues.

2.2.2.4 Soils

The key constraints in relation to Soils and Geology within the Study Area are:

Areas of Blanket and Cutover Bog which should be avoided, if possible, due to potential construction constraints and potential peat slope failure following periods of excessive rainfall

Areas close to Karst Features should be avoided, if possible, due to the potential for contamination of underlying aquifers during construction and potential construction and stability/subsidence issues

Areas of bedrock outcrop near the surface should be avoided, if possible, due to the potential for contamination of underlying aquifers during construction. The volumes of bedrock that may need to be disposed of should also be considered

Construction of the Substation and any proposed steel structures should be avoided on areas of significant slope due to potential stability issues

There are a number of Geological Heritage Areas within the Study Area. However, the sites should be considered in the selection of future route corridors and all NHA/CGS sites should be avoided. Each location should be dealt with on a site-by-site basis in consultation with the GSI.
Chapter 3  Substation Site (Part A) and Cable Route (Part B )

Identification Methodology.

As noted above, EirGrid has identified the need for a new 220/110kV substation within the study area to connect the available and future generated renewable energy in this area onto the 220kV system. The first phase of meeting this need involves the construction of a new substation to link in to the existing 220 kV network, and an associated underground cable (UGC) link between this substation and the existing group of windfarm at Cordal. The methodologies involved in selecting a substation site and an UGC route are outlined below.

Having regard to the provisions of Class 26 of Part 1 of Schedule 2 of the Planning and Development Regulations 2001 (as amended), it is the current consideration of EirGrid that the laying of an underground electricity cable by a statutory undertaker is exempted development – i.e. such works do not require planning consent. This consideration is additionally based on the current likelihood that: the cable will be laid for the most part within existing public roads and tracks, and would not be laid in any area of ecological importance in terms of the site synopsis for the designated Special Protection Area (SPA); and that the area subject to the necessary cabling works (primarily excavation and backfilling) will be substantially returned to its pre-existing state after the works have been completed.

3.1 Potential Substation Type and Sites Selection Process

Substations are primarily comprised of switchgear, this is the combination of electrical disconnects, fuses and/or circuit breakers used to isolate electrical equipment. Switchgear is used both to de-energise equipment to allow work to be done and to clear faults downstream. This type of equipment is important because it is directly linked to the reliability of the electricity supply, thus allowing large currents and power levels to be safely controlled by automatic equipment.

Currently there are two types of substation designs used in Ireland; firstly, is the typical Air Insulated Switchgear (AIS) (Fig. 1.4.5.3) and the other is Gas Insulated Switchgear (GIS). (Fig 1.4.5.4)

Air Insulated Substations – which uses air as an insulator between circuits, are widespread throughout Ireland. However as these facilities require a large land area; also the main equipment is external, and thus an AIS station can be very obvious in the surrounding landscape.
In contrast the main characteristic of a GIS station is that a safe inert Gas (sulphur hexafluoride-SF\(_6\)) is the insulation rather than air. The switchgear can therefore be enclosed within a building. The result is much reduced development footprint, high reliability, smart and economic solutions for complex switchgear.

Typically the area of land required for a GIS substation development is about 10 to 30 percent of that for an AIS substation. This allows a station to be more easily integrated into its surroundings.

**Therefore, for the East Kerry North West Cork Project, a GIS station is proposed as it provides the better solution.**

From a technical point of view, the optimum parameters for a GIS substation are: a level site of sufficient size (approx. 6 -10 acres); an ability to connect easily both to the existing 220kV line as well as to general or identified windfarm nodes with the shortest 110kV connections feasibly possible; and its proximity to an adequate existing road network in the study area.

To minimise the amount of new 220kV overhead line required to loop into the new substation, the identification process for potential sites was primarily carried out along the existing 220kV line. Aerial photography and constraints maps were studied, and numerous site visits were carried out. These were roadside site studies only - at no time during this part of the site selection process did any member of the project team enter private lands.

15 potentially feasible greenfield areas were identified close to the existing 220kV line within the study area and these are illustrated in Figure 3.1 below.

**Site Area 1:** This is a relatively flat agricultural greenfield site located near a local road.

**Site Area 2:** This is a relatively flat agricultural greenfield site with isolated bedrock outcrops.

**Site Area 3:** This is a sloping agricultural greenfield site with bedrock outcrop and blanket peat in this area.

**Site Area 4:** This is a gently sloping agricultural greenfield site with blanket peat in this area.

**Site Area 5:** The proposed location is a valley with a combination of forestry, fields with long grass (potential areas of peat) and agricultural greenfields. The GSI records bedrock outcrop and blanket peat in this area.

**Site Area 6:** The proposed location comprises a combination of forestry, fields with long grass (potential areas of peat) and agricultural greenfield sites. The site is well screened from public view.
Site Area 7: This site comprises a combination of fields with long grass (potential areas of peat) and agricultural greenfield sites. The site is well screened.

Site Area 8: This a relatively flat agricultural area comprising fields with rushes and some disturbed areas of ground. Note that the GSI records blanket peat in this area.
Site Area 9: This is a relatively flat agricultural greenfield site.
Site Area 10: This is a gently sloping agricultural greenfield site but the GSI records blanket peat in this area.
Site Area 11: There are a number of relatively flat agricultural greenfields at this location.
Site Area 12: This is a relatively flat agricultural greenfield site. The GSI records blanket peat in this area.
Site Area 13: This is a relatively flat agricultural greenfield site.
Site Area 14: This is a relatively flat agricultural greenfield site.
Site Area 15: This is a sloping agricultural greenfield site. The GSI records blanket peat in this area.

3.2 Underground Cable Route Selection Process.
Underground high voltage cables are installed in a trench ranging from 600mm to 1000mm wide, up to 1250mm deep, typically along public roads. The trench contains three HDPE ducts laid in flat or trefoil (triangular) formation.

Figure 3.2: Standard cable trenching works in a public road.

The ducts typically range in size from 125mm outside diameter (OD) to 200mm OD. The power cables are installed in these ducts. There are also one or two communications ducts installed in the trench depending on the circuit requirements. These communications ducts would have a fibre optic
cable installed which is critical to the secure and safe operation of the power cables. The fibre optic cable also enables efficient telecommunications between substations on the transmission network.

In developing route corridors for a single circuit 110kV UGC circuit, the following route selection criteria were considered:

Routes were selected within the public domain e.g. roadways, public parks etc. which avoid private property. Cross country routes were not considered for the purpose of this report. Route corridors were investigated maintaining suitable clearances from existing structures.

Route corridors endeavour to avoid unnecessary crossings of major roads, railways and water ways. The cable route corridor was selected to avoid lakes and water features, where possible. Cable routes are identified that minimise the need for full road closures during construction. The routes were identified to minimise traffic disruption during construction where possible.

The routes identified aim to minimise impact on the community. The proposed route corridors attempt to minimise sudden changes in direction, both in horizontal and vertical. The proposed cable route corridors provide suitable locations for joint chambers. Constructability of the cable route corridor is a critical factor.

Cable routes were selected that minimise the overall length in order to reduce costs. The cable route corridors were selected to minimise conflict with future development. The cable routes identified attempt to avoid areas of significant planting or forestry.

Selecting routes within designated areas such as NHAs, SPAs and areas of archaeological importance are avoided where possible. Crossing points under SACs are avoided or minimised where no other viable alternative exists.

Access for future maintenance is critical when identifying the cable route corridor.
Chapter 4 – Environmental Consultant’s findings for Part A (Substation)

The 15 greenfield areas identified close to the existing 220kV line within the study area were examined under the following headings.

- Connectivity to existing Overhead Line.
- Connectivity by Underground Cable to Cordal windfarm.
- Flora & Fauna.
- Cultural Heritage.
- Landscape.
- Water.
- Soils & Geology.
- Human Beings
- Noise & Vibration
- Climate & Air
- EMF

Assessment under the following headings did not make a distinction for one potential site area over another, i.e. all sites scored equal marks when assessed against these four criteria:

- Human Beings
- Noise & Vibration
- Climate & Air
- EMF

Therefore, although all the sites were fully assessed, the evaluation matrix only illustrates the seven criteria listed below where distinctions were recorded in terms of differing potential negative and positive impacts associated with each identified substation site:

- Connectivity to existing Overhead Line.
- Connectivity by Underground Cable to Cordal windfarm.
- Flora & Fauna.
- Cultural Heritage.
• Landscape.
• Water.
• Soils & Geology.

With respect to the first two criteria, connectivity to the existing overhead line was determined by proximity of the proposed station site to the existing Clashavoon – Tarbert 220 kV line, while cable connection was determined largely by the local road network in the vicinity of the potential sites (see Chapter 6 below).

The evaluation methodology adopted has three categories of assessment in relation to potential impacts as follows:

- **Preferred** - From initial review, site areas in this group best avoid all constraints identified.
- **Less Preferred** - From initial review, site areas in this group are somewhat less preferred, as some effects on identified constraints may occur. It is, however, expected that with further investigation and/or mitigation, these areas could become emerging preferred.
- **Least Preferred** - From initial review, site area in this group are the least preferred of the options, as some direct effects on identified constraints may occur.

### 4.1 Artificial Constraints

#### 4.1.1 Cultural Heritage

Substation areas 3-7 are preferred in terms of their low archaeological potential and distance from recorded monuments. Substation areas 1-2, 8-9 and 11-15 are also suitable, but have a higher potential risk associated with greater proximity to watercourses and clusters of monuments. Only one substation location (10) has been categorised as least preferred based on its location within a potential Bronze Age ‘Landscape’. In all cases, the substation locations would require further assessment, when detailed footprints and potential land-takes have been provided.

**Assessment:** Preference for locations 3–7 due to minimal potential impact on cultural heritage.
4.2 Natural Constraints

4.2.1 Flora & Fauna

The assessment of impact allowed an evaluation of each site as to its suitability as detailed below.

Sites 1, 9, 10, 11 and 12 are the preferred substation site options while Sites 2, 3, 5, 6, 7 and 8 are categorised as less preferred.

Less preferred sites may give rise to slight impacts at the construction phase though careful mitigation, design (in terms of site location) and maintenance of buffer zones between key habitats (e.g. rivers and bog) mean these habitats are unlikely to be considered as "red flag" sites. Specific ecological surveys are recommended at specific sites.

It is recommended that Sites 4, 13, 14 and 15 are avoided mainly due to obvious excessive disturbance to the flora and fauna at these locations required for additional connection works compared to other options.

Assessment: Sites 1, 9, 10, 11 and 12 are the preferred locations due to minimal environmental impacts envisaged with these sites.

<table>
<thead>
<tr>
<th>Site</th>
<th>Description</th>
<th>Potential Issues</th>
<th>Preferred</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Improved Grassland</td>
<td>Nothing of note</td>
<td>Preferred</td>
</tr>
<tr>
<td>2</td>
<td>Field improved grassland/ wet grassland (rush) and forestry (post thicket), stream</td>
<td>Road access may require trimming/ modification vegetation, stream (water pollution controls)</td>
<td>Less Preferred</td>
</tr>
<tr>
<td>3</td>
<td>Improved fields available. Riparian area (stream) will require crossing</td>
<td>Disturbance to riparian and stream habitats during construction</td>
<td>Less Preferred</td>
</tr>
<tr>
<td>4</td>
<td>Improved field available. Location on sloping ground uphill stream. c.a. 100 from SPA</td>
<td>Vicinity of SPA may be issue (NPWS). Sloping ground to stream may increase water pollution risks. Over ground tower infrastructure (c.a. 1km from existing line) increases impact (construction and operational) relative to most other options.</td>
<td>Least Preferred</td>
</tr>
<tr>
<td>Site</td>
<td>Description</td>
<td>Potential Issues</td>
<td></td>
</tr>
<tr>
<td>------</td>
<td>-------------</td>
<td>-----------------</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Improved grassland, plantation and stream in valley. &lt; 100m from SPA (valley bottom is included)</td>
<td>Vicinity of SPA may be issue (NPWS). However can be located in non significant hen harrier forage habitat (improved grassland)</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Located in mosaic forestry/ degraded bog and rush pasture. A relatively more improved field is also available. Generally &gt;200m from SPA.</td>
<td>Habitats surrounding provide Hen harrier habitat (degraded bog, rush and forestry)</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Located in mosaic rush pasture, remnant degraded bog, forestry and improved grassland. Located</td>
<td>Habitats and birds.</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Located in mosaic rush pasture and small fields currently being modified for new forest planting. Habitats modified somewhat</td>
<td>Vicinity of SAC River may be issue (NPWS) &lt;50m. Small fields and wet grassland (rush pasture) may be impacted though should be scope to largely locate within modified habitats</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Improved Grassland</td>
<td>Nothing major of note except possibly road widening (vegetation clearance)</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Improved Grassland</td>
<td>Nothing major of note except possibly road widening (vegetation clearance)</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Improved Grassland</td>
<td>Nothing major of note except possibly road widening (vegetation clearance)</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Improved Grassland</td>
<td>Nothing major of note except possibly road widening (vegetation clearance)</td>
<td></td>
</tr>
</tbody>
</table>
### 4.2.2 Landscape

The potential substation site options are located in the following County Cork and County Kerry Landscape Character Areas/Visual Units:

**Electoral Area of Tralee, County Kerry**

Site 1 is located within Visual Unit T2 - Tralee and Castle Island Valley.

**Electoral Area of Killarney, County Kerry**

Sites 2 and 3 are located within Visual Unit KY2 - Glenane River Valley, substation 4 is located within Unit KY4 - Brown Flesk River Valley, substation 5, 6, 7 and 8 are located within Unit KY5 - Blackwater River valley.

**County Cork Landscape Character Area**

Sites 9, 10, 11, 12, 13, 14 and 15 are located within Landscape Character Area 11 - Broad Marginal Middle Ground Valley.

Summary of individual potential landscape and visual impacts of the construction of a substation in each of the 15 potential locations.

<table>
<thead>
<tr>
<th>Site</th>
<th>Description</th>
<th>Potential Issues</th>
<th>Preferred</th>
</tr>
</thead>
<tbody>
<tr>
<td>13</td>
<td>Improved Grassland</td>
<td>Issue with distance impacts associated with nos. tower/cable required for connection</td>
<td>Least</td>
</tr>
<tr>
<td>14</td>
<td>Improved Grassland</td>
<td>Issue with distance impacts associated with nos. tower/cable required for connection</td>
<td>Least</td>
</tr>
<tr>
<td>15</td>
<td>Improved Grassland</td>
<td>Issue with distance impacts associated with nos. tower/cable required for connection</td>
<td>Least</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Scenic Route 1km Viewshed</th>
<th>Area of Secondary Special Amenity (Designated Scenic Landscapes)</th>
<th>Natura 2000 Sites</th>
</tr>
</thead>
<tbody>
<tr>
<td>Site 1</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Site 2</td>
<td>No</td>
<td>No</td>
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<tr>
<td>Site 3</td>
<td>No</td>
<td>No</td>
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<td>-------</td>
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<tr>
<td>Site 4</td>
<td>No</td>
<td>Yes</td>
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<tr>
<td>Site 5</td>
<td>No</td>
<td>No</td>
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<td>Site 6</td>
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<td>Site 7</td>
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<td>Site 8</td>
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<td>Site 9</td>
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<td>Site 10</td>
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<td>Site 11</td>
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<tr>
<td>Site 12</td>
<td>Yes</td>
<td>No</td>
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<tr>
<td>Site 13</td>
<td>No</td>
<td>No</td>
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<tr>
<td>Site 14</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Site 15</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

Following an assessment of the identified substation locations, substation locations 6 and 7 are the preferred options in terms of minimising landscape and visual impact for reasons described below:

- Opportunities for screening due to existing mature coniferous plantations and scrub in close proximity;
- The enclosed nature of the sites would result in reduced visibility towards the sites from surrounding areas;
- Visibility of the proposed substation and overhead transmission lines (if overhead is selected as the preferred option) against the skyline could be kept to a minimum; and
- The proposed substation locations are situated within Landscape Visual Unit KY5 - River Blackwater Valley and Physical Unit D1 - Coniferous plantation, which sensitivity to change has been classified as “Low/moderate”.

The potential landscape impact would be reduced significantly by undergrounding the necessary 110kV connection to the windfarms, thereby eliminating the vertical elements of visual intrusion caused by a transmission line. The preferred UGC should create the least impact on existing vegetation, designated areas and areas of scenic value, thus having the lowest impact on the landscape.
**Assessment:** Substation locations 6 and 7 are the preferred options.

### 4.2.3 Water

In the north-west project area the existing 220kV transmission line passes through the catchment of the Croaghane River, the headwaters of the Shanowen River which feeds into the Maine River flowing westward to the sea in Dingle Bay. Proposed substation locations 1 and 2 are located in this catchment area. The 220kV line then traverses the Glantane river (location of proposed substation 3) and the Brown Flesk river catchment (substation proposed locations 4 and 5) both tributaries of the Maine river also. Following this the 220kV line passes through the Munster Blackwater Freshwater Pearl Mussel Catchment – a designated Special Area of Conservation (Site Code 002170). Within this catchment substation locations 6 and 7 are located within the Yellow river sub catchment, a tributary of the Munster Blackwater and 8, 9 and 10 within the upper catchment of the Blackwater. Proposed substation locations 11, 12 and 13 are within the Owentaraglin River, a tributary of the main Munster Blackwater river, proposed substations 14 and 15 are within sub catchments of the Finnow River also a tributary of the Munster Blackwater. Freshwater Pearl Mussel populations have previously been identified in the lower part of the upper Blackwater River within 7km of substations 6, 7, 8, 9 and 10. Freshwater Pearl Mussel populations have previously been identified in the Owentarglin River less than 6km downstream from location 13 and also on the main Blackwater River downstream of locations 14 and 15.

The achievement of water-related protected areas objectives is particularly relevant to the project with respect to the Munster Blackwater river and its tributaries as it is a Freshwater Pearl Mussel catchment for which a separate Freshwater Pearl Mussel, 2nd Draft, Sub-Basin Management Plan has been prepared. Ecological quality objectives for the Freshwater Pearl Mussel Habitat have been set out in the European Communities Environmental Objectives (Freshwater Pearl Mussel) Regulations 2009.

A constraint that may influence substation site selection is the issue of disturbance creating suspended solids. The potential for such disturbance is
greatest where construction and forestry activities are undertaken on peat soil but could also be significant on mineral soils if sufficient precautions are not adopted, or if construction at a sensitive location could be required particularly in the case of Freshwater Pearl Mussel catchments where siltation and nutrient enrichment are major issues.

The Freshwater Pearl Mussel, Second Draft, Munster Blackwater Sub-Basin Management Plan identifies key pressures acting on water quality which impacts the freshwater pearl mussel populations. As stated in the Plan:

“Of particular importance in the decline of the pearl mussel has been the increase in sediment movement through rivers and its settlement onto the river bed. When this happens, formerly clean gravels become clogged with fine sediment. This prevents oxygen movement into the waters in the river bed (interstitial) that feed the juvenile mussels, and they quickly die. Each time siltation of gravels occurs, all juvenile mussels below five years of age are killed, and in rivers with chronic siltation problems, juvenile recruitment is rare and unsustainable. In these populations, lots of adult mussels may still be present, however when the older mussels die off they will not be replaced by a younger generation. If the habitat of the river bed is not restored, these populations will inevitably go extinct. The status of these populations is known as “functionally extinct”

“In addition nutrient enrichment which could result from forestry operations can have serious and ongoing impacts on juvenile mussels. Increased inputs of dissolved nutrients to pearl mussel rivers tend to lead to filamentous algal growth, unless combined with siltation, where macrophyte growth can dominate. Macrophytes smother the juvenile habitat even further, and trap more sediment, exacerbating the problem in the long term. Filamentous algae can lead to the death of juvenile mussels, through blocking oxygen exchange with the sediment.”

Peat may be problematic in terms of stability, particularly where excavated and stored, and this may lead to increased organic particulate loading of waters.

Locations 1-5 are located outside the Freshwater Pearl Mussel Catchment approximately 400m from a 2nd order stream tributary of the Brown Flesk River which flows westwards.

Locations 6 to 15 are situated within the Munster Blackwater Freshwater Pearl Mussel Catchment, a designated cSAC. Location 6 is adjacent to a small first order stream (approximately 280m) which flows into the Yellow river a tributary of the Munster Blackwater. Freshwater pearl mussels were previously recorded at a location some 6km downstream from the proposed location. Locations 7 to 10 are also located within the Yellow river catchment. Location 6 and 7 are situated on degraded bog/improved grassland.
is a potential risk to the freshwater pearl mussel habitat from sediment release from any construction operations at these locations. Location 7 is additionally situated within a private forest stand (Sitka Spruce and Lodgepole Pine) although this is young forestry and poses little risk of nutrient release.

**Assessment:** Locations 1 – 5 preferred.

4.2.4 **Soils and Geology**

The key constraints in relation to soils and geology at each substation location are:

**Site Area 1:** This is a relatively flat agricultural greenfield site. Based on the site visit on January 27th 2011 and a review of all relevant geological databases and mapping, there are no significant constraints associated with this location.

**Site Area 2:** This is a relatively flat agricultural greenfield site. Based on the site visit on January 27th 2011 and a review of all relevant geological databases and mapping, there are no significant constraints associated with this location. However, the GSI records bedrock outcrop in this area and care should be taken to avoid these areas if possible.

**Site Area 3:** This is a sloping agricultural greenfield site. Based on the site visit on January 27th 2011 and a review of all relevant geological databases and mapping, there are no significant constraints associated with this location. However, the GSI records bedrock outcrop and blanket peat in this area and care should be taken to avoid these areas if possible.

**Site Area 4:** This is a gently sloping agricultural greenfield site. Based on the site visit on January 27th 2011 and a review of all relevant geological databases and mapping, there are no significant constraints associated with this location. However, the GSI records blanket peat in this area and care should be taken to avoid these areas if possible.

**Site Area 5:** The proposed location is a valley with a combination of forestry, fields with long grass (potential areas of peat) and agricultural greenfields. Based on the site visit on January 27th 2011 and a review of all relevant geological databases and mapping, there are no significant constraints associated with the greenfield site but the forested area and fields with long grass (potential areas of peat) would be less favourable as a site for the proposed Substation. The GSI records bedrock outcrop and blanket peat in this area and care should be taken to avoid these areas if possible.

**Site Area 6:** The proposed location for Substation 6 comprises a combination of forestry, fields with long grass (potential areas of peat) and agricultural greenfield sites. Based on the site visit on January 27th 2011 and
a review of all relevant geological databases and mapping, there are no significant constraints associated with any greenfield sites but the forested area and fields with long grass (potential areas of peat) would be less favourable as a site for the proposed Substation. The GSI records blanket peat in this area and care should be taken to avoid these areas if possible.

Site Area 7: The proposed location for Substation 7 comprises a combination of fields with long grass (potential areas of peat) and agricultural greenfield sites. Based on the site visit on January 27\textsuperscript{th} 2011 and a review of all relevant geological databases and mapping, there are no significant constraints associated with any greenfield sites but the forested area and field with long grass (potential areas of peat) would be less favourable as a site for the proposed Substation. The GSI records blanket peat in this area and care should be taken to avoid these areas if possible.

Site Area 8: This a relatively flat agricultural area comprising fields with rushes and some disturbed areas of ground. Based on the site visit on January 27\textsuperscript{th} 2011 and a review of all relevant geological databases and mapping, there are no significant constraints associated with this location but based on the site visit observations, there may be areas of wetland and/or peat in parts that should be avoided. Note that the GSI records blanket peat in this area.

Site Area 9: This is a relatively flat agricultural greenfield site. Based on the site visit on January 27\textsuperscript{th} 2011 and a review of all relevant geological databases and mapping, there are no significant constraints associated with this location.

Site Area 10: This is a gently sloping agricultural greenfield site. Based on the site visit on January 27\textsuperscript{th} 2011 and a review of all relevant geological databases and mapping, there are no significant constraints associated with this location. The GSI records blanket peat in this area and care should be taken to avoid these areas if possible.

Site Area 11: There are a number of relatively flat agricultural greenfields at this location. Based on the site visit on January 27\textsuperscript{th} 2011 and a review of all relevant geological databases and mapping, there are no significant constraints associated with this location.

Site Area 12: This is a relatively flat agricultural greenfield site. Based on the site visit on January 27\textsuperscript{th} 2011 and a review of all relevant geological databases and mapping, there are no significant constraints associated with this location. The GSI records blanket peat in this area and care should be taken to avoid these areas if possible.
Site Area 13: This is a relatively flat agricultural greenfield site. Based on the site visit on January 27th 2011 and a review of all relevant geological databases and mapping, there are no significant constraints associated with this location.

Site Area 14: This is a relatively flat agricultural greenfield site. Based on the site visit on January 27th 2011 and a review of all relevant geological databases and mapping, there are no significant constraints associated with this location.

Site Area 15: This is a sloping agricultural greenfield site. Based on the site visit on January 27th 2011 and a review of all relevant geological databases and mapping, there are no significant constraints associated with this location. The GSI records blanket peat in this area and care should be taken to avoid these peat areas if possible.

In general terms, it would be favourable to avoid wetland areas or areas of potential peat and bedrock outcrop and it is recommended that the agricultural greenfield sites are considered as preferable locations for the proposed substation.

From an environmental point of view, the shortest route from the Cordal windfarm to the preferred substation site would result in the lowest potential impact on the geological environment in this area.

An underground cable would result in the disturbance of a larger area of Soil/Subsoil/Bedrock than an Overhead line. However, the area impacted by the proposed development would be quite localised and if best practice mitigation measures are followed during the construction phase of both the proposed transmission connections (Overhead or Cable) and the Substation, the impact on the Soils and Geology should be negligible.

Assessment: In summary, following a review of all relevant and available geological information, the following is the assessment of the 15 no. sites in terms of suitability for location of a substation.

Sites 1, 9, 11, 13 and 14 fall into the preferred category, sites 4, 6, 7, 8, 10, 12 and 15 fall into the less preferred category and sites 2, 3 and 5 fall into the least preferred category.
Chapter 5 – Lead Consultant’s Findings & Recommendation – Substation

5.1 Introduction

Based on the initial findings of this report, this chapter outlines the lead consultant’s recommendations. It is part of the lead consultant role to review and evaluate all expert input into the project, with the aim of identifying an emerging preferred option for the new 220/110kV station site.

The table below graphically represents the assessment outlined in Chapter 4 above. Based on the various environmental studies, site options have been designated an evaluation of Preferred, Less Preferred or Least Preferred in respect of each environmental topic. It should be understood that this evaluation is based on the information obtained to date, and that this has the potential to alter in response to more detailed technical and environmental analysis, as well as public, stakeholder and other input.

It is the case that Site 6 appears at this stage to be the most preferable site for the location of a substation having regard to the assessment criteria as this site has the most amount of hits in the preferred category and no hits in the least preferred category. No other site scores as high in the evaluation matrix.

**Preferred.** From initial review, site areas in this group best avoid all constraints identified.

**Less Preferred.** From initial review, site areas in this group are somewhat less preferred, as some effects on identified constraints may occur. It is, however, expected that with further investigation and/or mitigation, these areas could become emerging preferred.

**Least Preferred.** From initial review, site area in this group are the least preferred of the options, as some direct effects on identified constraints may occur.
Having regard to the foregoing, Site 6 is the emerging preferred location for the EK NWC 220/110kV Station location. Initially, the generic term site area refers to a general area and not a specific field or site. However once the focus is narrowed down, then individual sites and fields within that area can be considered in more detail, particularly in terms of topography and landscape integration.

The emerging preferred site option 6 has a number of important characteristics: This site is in agricultural use; the land holding is of sufficient size and shape and is under the ownership of one landowner. Despite being
an open and large agricultural field, it remains relatively secluded and marginally sloped. Additionally it has significant mature forestry around it, which will provide natural screening. Selected cladding materials and local landscaping measures and screening would form part of the integration and design of this new GIS designed building.

![Aerial Photograph of site area 6](image)

**Figure 5.2** Aerial Photograph of site area 6

Access to the new station could be constructed along a new roadway in a linear corridor currently comprising a forestry fire break adjacent to the existing 220kV line.

![Indicative outline of station footprint and entrance access](image)

**Figure 5.3** Indicative outline of station footprint and entrance access
Having reviewed all data, it is the opinion of ESB International as Lead Consultants that Site Option 6 currently comprises its emerging preferred option, from a technical and environmental perspective.
Chapter 6 – Lead Consultant’s Findings & Recommendation – Underground Cable (UGC)

6.1 Emerging Preferred 110kV UGC Route Appraisal

Having regard to the emergence of Site No. 6 as the preferred location for the proposed substation, the issue of the optimum cable connection route from Cordal windfarm to site No. 6 needs to be addressed.

A desktop study has been carried out on 1:50,000 OSi Discovery Series Mapping. In order to select potential cable routes, information on environmental, ecological, historical and planning constraints were reviewed.

A constraints map was prepared showing, where applicable, Special Protection Areas (SPAs), Special Areas of Conservation (SACs), Natural Heritage Areas (NHAs) and Sites and Monuments Records (SMR’s). All information has been sourced from the latest list of registered sites on the National Parks and Wildlife Services’ (NPWS) and the Department of the Environment, Heritage & Local Government websites. This map is appended to this report (Drawing no: PE687-D272-007-001-000).

In addition, a revised Study Area map was drawn up following the decision of the developer of Cordal windfarm to pursue an underground cable (UGC) connection to the existing regional Clashavoon – Tarbert 220kV line (thereby making an exploration of the Millstreet Project unnecessary), the study area was refined and reduced in area, as now identified in Figure 6.1 below. The revised study area is located in County Kerry, and stretches from the planned windfarm at Cordal southward towards the Clashavoon-Tarbert 220kV line and encompasses the preferred substation site No. 6 as discussed in the preceding Chapter.

The UGC routes identified take account of the existing technical, environmental and economic constraints in the study area. They also are identified in the context of the associated identification of Site Option 6 as the Consultant’s emerging preferred option for the new substation in this area. As such, the UGC circuit has two identified end points – the Cordal windfarm and Site Option 6.
Figure 6.1: Revised Study Area for UGC Options.
6.2 Site Study

6.2.1 Route Option A

The cable route would be installed for a short distance from Cordal station to the local road along the permitted wind farm access road (as derived from developer drawings). It is assumed that this road would have to be upgraded sufficiently in any case in order to accommodate the transportation of the wind turbines to the area of the permitted windfarm development. This type of road upgrade is normally to a minimum standard that is considered suitable also for cable installation techniques.

The cable route would follow a local road in a westerly direction to the Newmarket Cross roads. This local road is approximately 3.5m wide with deep drains on either side (see Fig 6.2 below). The road surface is in poor condition and it is probable that there is no significant road structure. The cable route would cross a small bridge along this alignment - there may be insufficient cover on this bridge structure to accommodate cable installation. A solution to this problem may be to increase the road cover over a distance either side of the bridge and increase the height of the parapet walls on each side. Any cable installation works along this road would require a full road closure with significant traffic diversions.

![Figure 6.2: Looking west along local road towards Newmarket Cross](image)

The route would then run south east along another local road from the Newmarket Cross to Knocknaboul Cross (see Fig 6.3 below). This section of road is approximately 5m wide with long straight sections. The road surface varies but is generally good. Large sections of this cable route may be within roads that are overlaid on very soft ground, possibly peat in sections. It should be possible to install the route (with joint chambers) off the road carriageway in most instances. This may require the local acquisition of private easements at such joint chamber locations.
Figure 6.3: Section of road between Newmarket Cross and Knocknaboul Cross

The route would continue south from Knocknaboul Cross to Site Option 6. The overall route length is approximately 8km and is shown on drawing PE424-D8006-001-001-000 below.

In order to successfully deliver this UGC route to Site Option 6, it would be necessary to:

- Carry out further detailed route investigation including information on existing services;
- Complete detailed consultation with all statutory bodies including the local authority;
- Undertake soil investigation to determine the ground conditions which would impact on the method of installation and overall cost of civil works;
- Carry out a number of environmental studies to determine the level of any impact and mitigation measures possible.

This work will be carried out in the subsequent stages of the Project Development Roadmap, prior to submission of a planning application.
Figure 6.4: Cable routes from Cordal Wind farm to Proposed Station – Route A (Green) Preferred.

6.2.2 Route Option A1

This route option is also shown on drawing PE424-D8006-001-001-000 above. The route would exit the windfarm access road on the local road as per Route Option A. The cable would then run in an easterly direction before travelling south along a smaller local road. The route would then merge back onto route Option A close to Knocknaboul Cross.
This route option would be shorter, by approximately 1km. However, this route option is considered to be less preferred, in comparison with Route Option A, as it is generally very narrow - at less than 3m wide, in very poor condition, and with no road structure. There is also a concern that it may not be in public ownership along its entire route.

Figure 6.5: Section of local road on route Option A1.

6.3 Route Selection Matrix for Cordal 110kV Cable Route

Having regard to the two options outlined above, a comparative assessment of the two options was carried out using criteria such as environmental impact, cable length required, clearance from structures, etc which is graphically displayed in Figure 6.6 below. The scoring system is outlined in Figure 6.7 below. It will be noted that the scoring system employed here differs from that utilised in Chapter 5 above due to different assessment methodologies employed in each case.
<table>
<thead>
<tr>
<th></th>
<th>ROUTE OPTION A</th>
<th>ROUTE OPTION A1</th>
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<tbody>
<tr>
<td>OVERALL ROUTE LENGTH (km)</td>
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</tr>
<tr>
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<td>NO</td>
</tr>
<tr>
<td>PRIVATE WAYLEAVES / EASEMENTS REQUIRED</td>
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<td>YES</td>
</tr>
<tr>
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<td>3</td>
</tr>
<tr>
<td>CONSTRUCTABILITY</td>
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<tr>
<td>TECHNICAL FEASIBILITY</td>
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</tr>
<tr>
<td>CLEARANCE FROM BUILDINGS</td>
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<td>TRAFFIC MANAGEMENT IMPACT</td>
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<td>PRIVATE LANDOWNERS</td>
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Figure 6.6: Evaluation of Cable Route Options.

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<th>RATING TABLE</th>
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<tr>
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</tr>
<tr>
<td>LOW - MEDIUM</td>
</tr>
<tr>
<td>MEDIUM</td>
</tr>
<tr>
<td>MEDIUM - HIGH</td>
</tr>
<tr>
<td>HIGH</td>
</tr>
</tbody>
</table>

Figure 6.7: Scoring of Cable Route Options.
6.3.1 Recommendation

Having examined the study area and considering the economic, environmental and technical factors, the preferred route corridor for the 110kV cable between Cordal windfarm and identified Site Option 6 is **Route Option A** as described above, and as detailed in Figure 6.4 above. This route is deemed to be the optimum route based on the criteria above.
Chapter 7– Lead Consultant’s Findings & Conclusion

Having regard to the preceding Chapters, it can be seen that the Stage 1 Information Gathering report has had due regard to the various statutory designations in respect of environmental protection as well as to practicalities in terms of the technical requirements of the project.

The main findings of this report are as follows:

- That the Consultant’s current preferred location of the proposed substation will be Site Option 6, as detailed in Figures 5.2 and 5.3 above, in the vicinity of Knocknaboul Cross.
- That the connection between the planned substation and the permitted Cordal windfarm complex will be by UGC along the route identified in Figure 6.4 as Option A.

The next step in the consultation process involves the undertaking of public and other consultation in respect of the content and conclusions of this Stage 1 report. Subsequently a Stage 2 report will be produced, which will incorporate feedback from this consultation process. The Stage 2 report will review the substation location and cable route, having regard to feedback received, as well as to ongoing technical and environmental studies being carried out by EirGrid’s consultants.

Ultimately, an application will be made for statutory consent for the substation element of the proposed development (on the assumption at this stage that the underground cable element of the overall project comprises exempted development).
NOTE:

EirGrid are the Project Managers of the EKNWC Project and ESBI Engineering High Voltage (HV) has been appointed by EirGrid as lead consultant for this project. In support, other specialist consultants have also been appointed by EirGrid: AOS Planning were appointed for specialist input on Cultural Heritage. Tobin Consulting Engineers were appointed for specialist input on Soils & Geology, Noise & Vibration, Flora & Fauna, Traffic and Landscape. ESBI Environmental Group were appointed for specialist input on Climate & Air, EMF, Human Beings and Water.

This Stage 1 Report is a distillation and analysis of the information contained in several sub-consultant reports in specialised fields written by the consultants listed above. Due to the large amount of data contained within these reports they have not been printed as part of this Stage 1 Report but they can be viewed and downloaded from the project website, 
http://www.eirgridprojects.com/projects/eastkerrynorthwestcorkproject/overview/

or requested from the project team at the contact details below:

East Kerry Northwest Cork Project Manager (East Kerry North West Cork 220kV Project)
EirGrid Plc
The Oval
160 Shelbourne Road
Ballsbridge
Dublin 4
Telephone: 01 702 6642
E-mail: info@eirgrid.com