KNOCKACUMMER WIND FARM ENERGY DEVELOPMENT

Environmental Impact Assessment

Planning Submission to Cork County Council

Non-Technical Summary
Main Report & Appendices

SWS Environmental Services

MEMBER OF SWS Group

Prepared by
SWS Environmental Services,
SWS Group,
Shinagh House, Bandon, West Cork,

October 2004

SWS Environmental Services
MEMBER OF
SWS Group

KNOCKACUMMER WIND FARM ENERGY DEVELOPMENT
Environmental Impact Assessment

SWS Environmental Services
MEMBER OF
SWS Group

KNOCKACUMMER WIND FARM ENERGY DEVELOPMENT
Environmental Impact Assessment

SWS Environmental Services
MEMBER OF
SWS Group

KNOCKACUMMER WIND FARM ENERGY DEVELOPMENT
Environmental Impact Assessment

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

1.0 INTRODUCTION

SWS Environmental Services have been commissioned by SWS Natural Resources Ltd. on behalf of Coillte, Mr. Brendan O' Sullivan, Mr. John Roche, Mr. John Buckley, Mr. Robert Fox and Mr. Denis Cremins to undertake an Environmental Impact Assessment (EIA) for a proposed 29 turbine wind farm development at Knockacummer, situated in the townlands of Meentinny West, Meentinny East, Tooreengreana, Toreen Donnell, Commons North, Knockacummer, Cummerduff, Knockacluggin, Co Cork.

This Environmental Impact Statement (EIS) has been undertaken in accordance with the European Communities Environmental Impact Assessment Regulations 1989 (SI 349 1989) and Article 8 of the Second Schedule of the 1999 EIA Regulations.

The proposed development, with an installed capacity of up to 87 MW depending on the choice of turbine manufacturer, will involve the installation of up to twenty nine (80m towers with 90m blade diameter) turbines, two meteorological masts, the upgrade of access roads and the installation of an electrical substation.

The proposed site was selected based upon its high wind regime and the minimal environmental impacts this development would impose upon the surrounding area. The development lies off the R576 between Rockchapel and Newmarket and is 1.5km northeast of the village of Taur and 1.3km southeast of the village of Rockchapel (Figure 1.1).

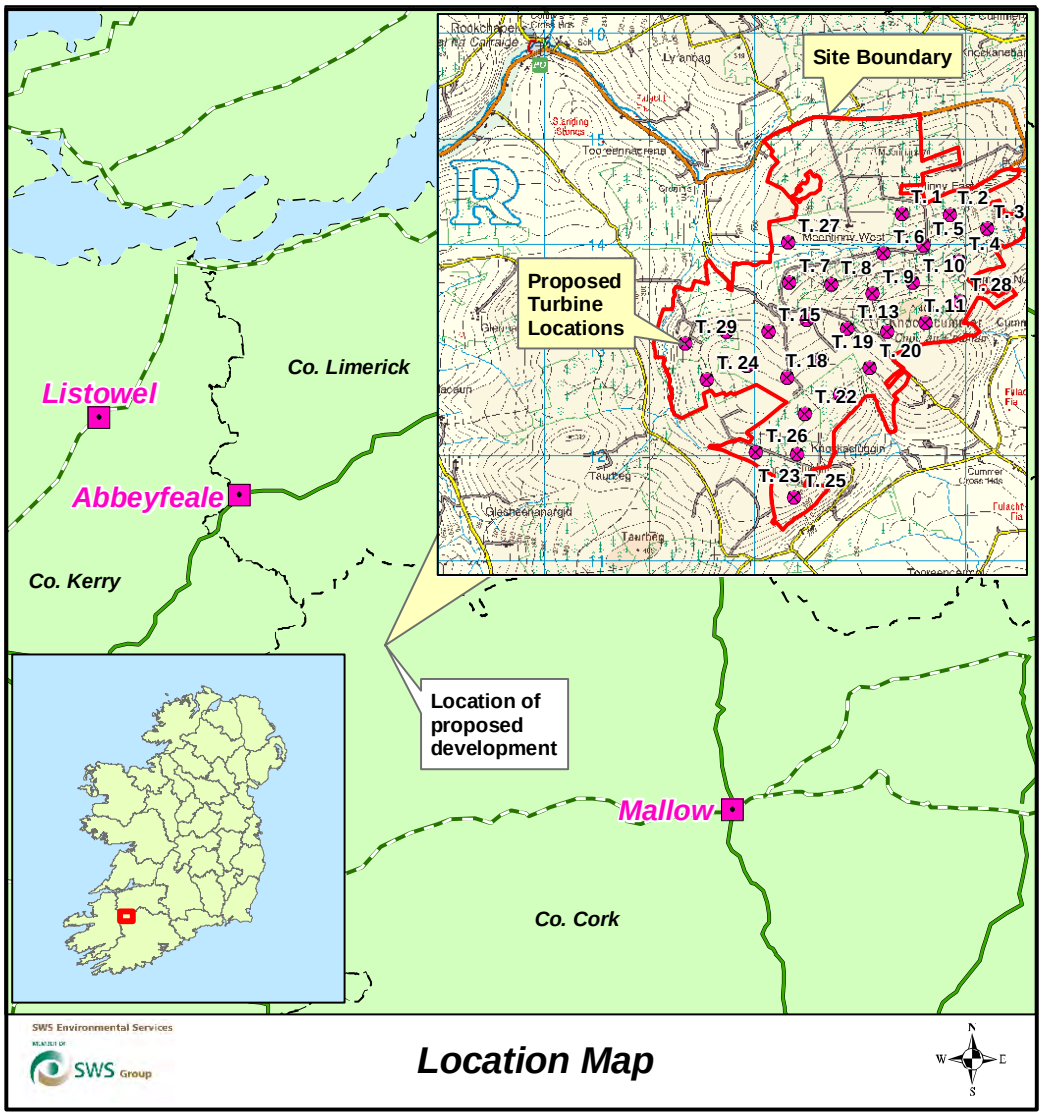
Project History and Development

A previous application for a wind farm development at this site was made to Cork County Council (PL ref N/03/3220) and on 11th November 2003, the planning authority made a decision to grant planning permission. Subsequently, the decision was appealed to An Board Pleanála who considered the proposed development to be premature pending further evaluation of the impact of the development on the hen harrier. This decision was made in May 2004. To address this, detailed site assessment base line data on hen harrier site and hinterland habitat utilization has been collated over a two year period and SWS have utilized this data to develop site specific mitigation measures in the form of a cumulative impact assessment to ensure sufficient habitat range exists for the hen harrier, detailed compensatory habitat measures and specific emphasis on spatial land use changes and land use management plans developed in conjunction with Coillte, landowners and advises from the National Parks and Wildlife Service to ensure no impacts on this priority species .

EIS

This Environmental Impact Statement (EIS) examines the impacts both positive and negative, associated with the proposed development and has been prepared for submission to Cork County Council in support of the planning application for this development.

Figure 1.1 Site location



1.1 Format of this EIS

An Environmental Impact Assessment (EIA) is the process whereby the environmental impacts of new or expanding developments are predicted; their significance assessed and proposed mitigation measures detailed.

The full EIS consists of the following two documents:

- EIS Volume 1: Non Technical Summary
- EIS Volume 2: Introduction and Appraisal of Environmental Effects

Each area of the EIS contains a discussion of the existing environment, potential impacts associated with the proposed development and any mitigation measures required to ameliorate these impacts.

1.1.1 Objectives of the Environmental Impact Assessment

This EIS has been prepared in accordance with guidelines provided by the EPA and existing as well as the Draft Guidelines (July 2004) published by the Department of the Environment, Heritage and Local Government. The purpose of the EIA is to identify and thereby minimise the environmental impacts of certain new or expanding developments. It involves a detailed review of the proposed development, examines the existing environment, assesses the predicted impact of the development on the existing environment and details proposed mitigation measures. Specialist subcontractors were employed for the completion of specific sections of this EIS and are referenced accordingly.

SWS Environmental Services recognise that there are particular sensitivities that need to be addressed in undertaking an environmental assessment for a wind energy development and these are dealt with at length within the EIS.

The site is located in the Mullaghareirk Mountains - an area being identified as suitable for the Hen Harrier – an Annex 1 bird species afforded protection under EU legislation. Accordingly, in the interest of ensuring that development of a wind farm at Knockacummer would not adversely impact the local population, site specific mitigation and compensation measures were developed by SWS Environmental. These measures were developed in consultation with Coillte, as owners of the majority of forestry both on the site and in the hinderland, the local landowners and in communication with the National Parks and Wildlife Service (NPWS) (formerly a part of Dúchas The Heritage Service) of the Department of Environment, Heritage and Local Government (DoEHLG) who are responsible for policies and protection of the State's natural heritage and advises received by hen harrier expert Dr Persival. The development of these measures to ensure no impact on this species was a major factor in the project scope.

The general area of the site is highly managed in terms of forestry and farming but is not considered a ‘natural environment’. Nevertheless, the value of both forestry and semi natural

habitats to the Hen Harrier is recognised and the management of forestry to maximise its biodiversity in the site environs is a significant factor in the development of a mitigation plan for Hen Harrier protection. Local landowners have also agreed to participate in a compensatory habitat scheme where certain lands will be managed to maximise their benefit to hen harriers.

1.2 The Developer

The developer of the site is SWS Natural Resources Ltd., based in Shinagh House, Bandon, Co. Cork.

1.3 Pre Submission Consultation

During the preparation of this EIS, consultation with interested government and non-government bodies and individuals was carried out. Information describing the proposed development was distributed and comments regarding the development were invited. A copy of the information distributed for the purpose of consultation is included in Appendix 2 of Volume 2 of the main body of this EIS. Public consultation with the local community was undertaken October 2004 by house visits to each dwelling within the immediate area of the site. The general reaction to the development was positive and any concerns raised by individuals are addressed in the EIS.

1.4 Wind Energy and the Environmental Benefits

Some economies in the developed world are beginning to implement significant changes in their energy policies and are looking to wind as a sustainable indigenous energy resource. Wind energy potential is one of Ireland's most important resources. With our exposure to Atlantic south-westerly winds, Ireland has a very strong wind resource that represents an accessible and environmentally sustainable energy potential. Wind power could generate around 6 times the current electricity production of the ESB system. This is however, as of yet, an underexploited resource.

The Irish economy is expanding and currently up to 66% of our energy supply comes from non- indigenous fossil fuels. Burning of fossil fuels has been acknowledged as a main contributor to the formation of Greenhouse Gas Emissions such as CO_2. More than 95% of the CO_2 produced in Ireland comes from the burning of fossil fuels and this is a major contributor to climate change. Under the 1997 Kyoto Protocol the EU agreed to reduce emissions of the six greenhouse gases to 8% below 1990 levels by 2008-2012. Within this limit, Ireland agreed to a maximum increase of 13% above the 1990 levels. A major element in Irelands strategy to achieve this is through the development of renewable energy resources. In the 1999 Green Paper on Sustainable Energy, Ireland has committed to achieving 500MW of green energy by 2005.

The Renewable Energy Strategy Group was established as a result of the Green Paper and has made recommendations to develop the Irish Wind Industry. One of the key recommendations is that large wind farms such as the 87MW wind farm at Knockacummer should be encouraged to achieve efficient deployment of wind energy, and to avoid a proliferation of grid connections.

The environmental benefits associated with wind energy developments include a reduction in greenhouse gas emissions and other harmful pollutants resulting directly from substituting and reducing fossil fuels currently used to meet our expanding energy demands.

1.5 Need for the Proposed Development

i) Environmental:

Ireland is already in breach of its target greenhouse gas emission limits and figures from the European Environment Agency as shown in Fig 1.2 show that our CO_2 emissions continue to rise. During the period from 2000-2001 Greenhouse gas (GHG) emissions from the European Union have increased for the second consecutive year, moving the EU further away from meeting its commitment to achieve a substantial emissions cut by the 2008-2012 period. Ireland's emissions in 2001 stood 31% higher than in 1990, well over double the 13% increase it is allowed between 1990 and 2008- 2012. Ireland could face significant fines in green taxes for non-compliance with these international agreements.

Recent scientific[1[1]],[2[2]] studies in the British Isles have identified that the main reason for the decline of the hen harrier species has been poor breeding success, due to climate change. The priority conservation measure to support the survival of this species (any many others) is to minimize the impact of this climate change.

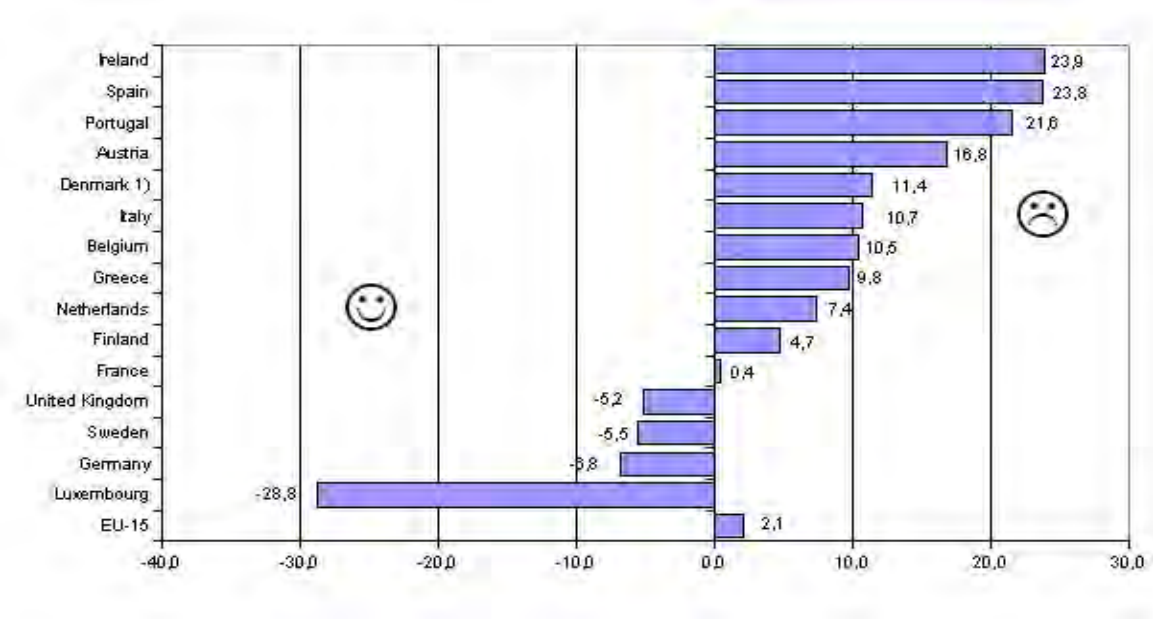
ii) Economic

The south of Ireland where the proposed project would be located has high average wind speeds. The development of an 87MW wind farm at Knockacummer, Co. Cork would help Ireland in obtaining energy from an indigenous source, reduce our current dependence on imported energy and would make a significant contribution towards our national CO_2 abatement strategy through a 202,088t reduction of CO_2 per annum. This is in line with our commitments to Kyoto and our Governments policy of supporting the development of renewable energy.

[1[1]] MOSS, R., OSWALD, J. & BAINES, D. 2001. Climate change and breeding success: decline of the capercaillie in Scotland. Journal of Animal Ecology, 70: 47-61.

[1[1]] S. M. Redpath, B. E. Arroyo, B. Etheridge, F. Leckie, K. Bouwman and S. J. Thirgood
Temperature and hen harrier productivity: from local mechanisms to geographical patterns. **Ecography** Volume 25 Issue 5 Page 533 - October 2002

Figure 1.2 Distance-to-target (DTT) for EU Member States in 2001



Positive contribution to EU trend: the negative distance-to-target indicator means that the Member State is below its linear target

Negative contribution to EU trend: the positive distance-to-target indicator means that the Member State is above its linear target

Source: European Environment Agency May 2003

1.6 Site Selection

There are a number of criteria that must be assessed when selecting the location of a wind farm development. The most important of these criteria is the average wind speeds available at that location and the environmental sensitivity of the site. Additional criteria that are used as determinants for selecting suitable sites for wind farm development relate to the distance from the electricity grid, proximity to environmentally designated areas, proximity to scenic areas or tourist attractions, site accessibility and distance to the nearest dwellings.

Such spatial planning considerations are crucial in determining suitable areas where wind farms may be accommodated. The relative importance of each is very dependent upon the viewpoint of the user, i.e. environmentalist, conservationist or developer.

SWS Environmental has developed a computerised management tool “RERSAS” (**R**enewable **E**nergy, **R**esource and **S**ite **A**ssessment **S**ystem) to provide strategic locational guidance in site selection for renewable energy developments.

RERSAS incorporates Geographical Information System (GIS) technology, satellite remote sensing information, and infrastructural and environmental digital datasets to locate developments in suitable areas. This system allows for integrated spatial planning considerations to be linked with development restrictions and environmental concerns. RERSAS provides a series of guidance principles on the location of renewable energy developments. The key objectives are:

- Adverse effects should be avoided on areas
- Renewable energy developments should be located so as to minimise transmission loss.
- Areas where anthropogenic influences on the landscape already exist

Some of the strategic spatial planning controls and areas of avoidance selected in RERSAS include the following criteria:

Table 1.1 Infrastructural, Ecological and Historical Criteria

Ecological/Historical Criteria	Distance Buffer	Infrastructure	Distance Buffer
Large town	2 km	Designated Scenic Area	1 km
Special Protected Area	1km	Electrical Connection	< 12km
Nature Reserves	1km	National Primary Routes	1000m
National Park	1 km	National Secondary Routes	1000m
Ramsar Site	4km	Regional Roads	1000m
Wildfowl Sanctuary	1.5km	Third Class roads	250m
Irish Wildbird Conservatory	1.5km	Railway	500m
Forest Park	1 km	Radio or TV mast	250m
Sites and Monuments	250m	Village	1000m
Lake, marsh or reservoir	250m	Residential dwellings	400m

Using this modelling system in combination with field investigations the suitability of the site was determined.

The site scoping and modelling assessment identified the following site attributes as favourable to a wind energy development of this scale at this location;

- The estimated high wind speeds due to the elevation and aspect of the site,
- Proximity to electrical grid infrastructure access to the site,
- Not impacting on any environmentally designated sites
- Landuse and Landscape character sensitivity
- Distance from cultural and heritage sites
- Distance from main regional tourism areas
- Distance from telecommunications and radar stations
- Distance from airports and proximity to regional routes

A desktop review examined the site suitability with respect to the strategic search areas of the Cork County Development Plan (2003). The site was found to be within an area classed as a strategic search area where "it is an objective [of Cork County Council] to encourage prospective wind energy developers assessing potentially suitable locations for projects to focus on". Therefore the development is in keeping with the policies of the County Development Plan. The Draft Planning Guidelines issued in July 2004 by the DoEHLG recommend that planning authorities identify key areas for wind energy development; therefore the proposed development is in line with the policies of these guidelines.

2.0 THE PROPOSED DEVELOPMENT

2.1 The Site

The proposed development comprising of up to 29 wind turbines and associated infrastructure will be located in the upland area of Knockacummer, Co. Cork (Eastings 124612, Northings 113261) as shown in Figure 1.1. The nearest settlements are Taur village 1.5km southwest of the site, Rockchapel village 1.3km to the northwest and Meelin village 3.5km to the east. The nearest town is Newmarket located approximately 8.5km southeast of the site. The site is accessed by a turnoff from the R576. Settlement patterns in the immediate area consist of scattered isolated dwellings with some linear settlement on the third class roads surrounding the site.

The site includes a total area of approximately 660 hectares which is highly managed, the vast majority of which (87%) is commercial forestry. The principal land uses are therefore commercial forestry plantation with some turbary and rough pasture. Land in the surrounding area is also highly planted with some non-intensive agriculture and rough grassland / rough heath being the predominant land types. More intensive agricultural activity in the area is limited due to poor soil quality and high wind speeds. The site is not located in a designated environmentally sensitive area and is located in a landscape area identified as suitable for large scale wind farm development.

2.2 Description of the Proposed Development

The proposed development will involve the installation of twenty-nine wind turbines, two galvanised steel meteorological masts (80m in height), a control building and internal site roads. The site layout is presented in Figure 2.1. Each wind turbine will comprise a tubular tower and three blades. The wind turbines will have a tower or 'hub' height not exceeding 80m and a blade diameter not exceeding 90m. The overall height from ground to blade tip will, therefore, not exceed 125m. The blade radius will measure up to 45m; all of the blades on the turbines will rotate in the same direction and at the same speed rate of 10-19 revolutions per minute depending on the wind speed.

2.3 Construction

It is estimated that the total construction phase will be 12 months in duration. The construction phase may be extended to avoid the breeding/fledging period of the Hen Harrier between April – June to avoid any possible impacts on the birds. It is anticipated that 50-70 people will be employed during this construction period. There will be a temporary increase in traffic movement during this construction period. 2 temporary site offices (6m x 3m) utilised during construction will subsequently be removed. Any wastes (excavated material, building rubble) produced during the construction phase will be either utilised on site or removed to a licensed landfill as appropriate.

2.4 Operation

The turbines will have an anticipated life span of 20 years and while they will operate automatically, they will require periodic servicing. When the turbines are decommissioned all materials associated with the development will be removed and the site allowed to revegetate. A reinstatement plan will be developed to restore the site to original/appropriate land uses.

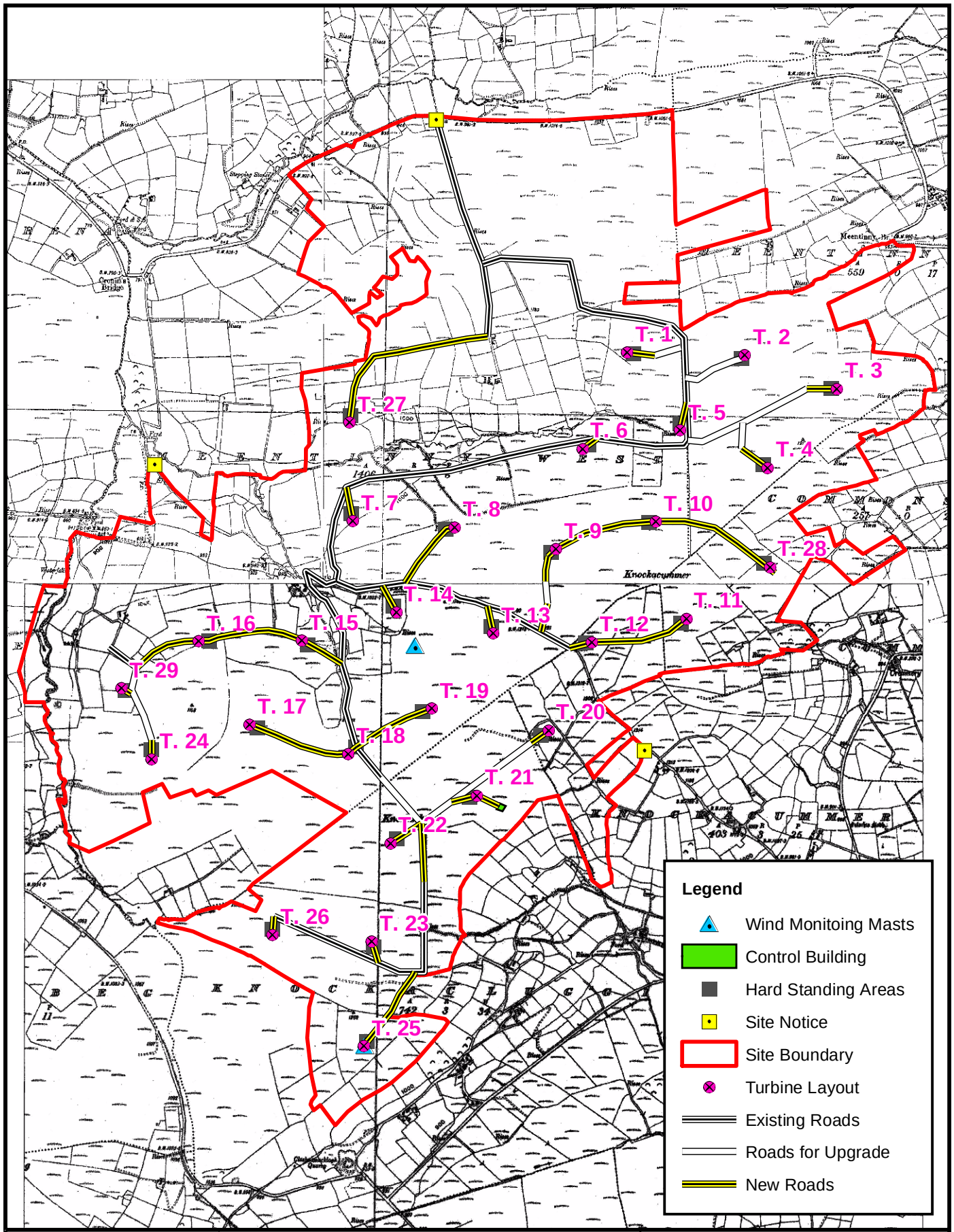


Figure 2.1
Site Layout

Scale: 1:20,000

N

0 500 1,000 m.

SWS Environmental Services
MEMBER OF SWS Group

Prepared by: R.H.
Checked by: K.O'D.
Created in: ArcGIS 9.1
Drawing date: 21/05/'03
Drawing No: 2004_154_Fig 2.1
Updated: 07/09/'04

3.0 IMPACTS OF THE PROPOSED DEVELOPMENT

During the scoping study the main environmental impacts were identified and were considered in detail as part of the EIS.

The EIA study examines all the key issues associated with the proposed development which are identified as follows:

1. Human beings and Existing Environment
2. Landscape and visual amenity
3. Ecological impacts
4. Geology, hydrogeology and drainage
5. Noise
6. Cultural and heritage resources
7. Electromagnetic interference
8. Other Impacts (traffic, shadow flicker, electrical grid connection)
9. Interaction of impacts.

Potential impacts associated with the development were assessed in relation to

- Assessment of the existing environment
- Predicted impacts
- Mitigation measures
- Assessment and conclusion regarding effects

3.1 Impacts on Human beings

3.1.1 Introduction

This section of the report describes the existing human environment in terms of land use, population and employment and assesses the likely impacts on the human environment arising from the proposed wind farm development. The main areas to assess with respect to the potential effects of this development on the human environment are noise and visual impact. These are discussed in detail in various sections of this EIS. Other potential impacts include shadow flicker, health and safety impacts to employees and locals, potential impacts on tourism, impacts on telecommunications signals and socio-economic impacts.

3.1.2 Site Context

The proposed site is located in townlands of Knockacummer, Tooreengreana, Meentinny West, Meentinny East, Cummerduff, Knockacluggin and Tooreen Donnell in County Cork.

The site location is remote upland and rural in character. The nearest settlements are the villages of Taur, 1.5km southwest of the site, Rockchapel village, 1.3km northwest of the site, and the village of Meelin 3.5km east of the site. There are 22 houses within 1km of the site. 1996 census information identify that the area has an aging and declining population density. The site is accessed by a turnoff from the R576.

Land within the area is predominantly non-intensive agricultural, rough grazing, semi natural vegetation, clearfell and commercial forestry planting. The principal land uses are commercial forestry plantation, turbary and rough pasture. There are no significant regional tourist or amenity sites in the immediate area. A number of scenic routes identified in the Cork County Development Plan are present in the area, notably the A16, A17, A18, A19 and A20. Classification of scenic routes is currently under review and some changes and declassification of routes is anticipated.

3.1.3 Potential Impacts

Potential impacts associated with the proposed development can be assessed based visual impact associated with the turbines, noise during construction and operation, traffic impacts, potential amenity losses, shadow flicker, and health and safety impacts associated with construction and wind farm operation. Additional concerns include potential impacts on material assets in the local community.

3.1.4 Summary of Findings and Mitigation Measures

1) Noise Impacts

The predicted and modelled noise emissions from the development indicate that noise will not impact significantly on residential houses. Predicted noise levels from the development were calculated for all dwellings within 1km of the site. It is considered that operational noise may be perceptible but not significant at some of the nearest residences. Noise associated with the construction period will be temporary and minimised through noise control measures.

2) Amenity

The regional tourism and amenity market for the area will not be impacted negatively by the development. There are a number of scenic routes in the surrounding area, however their landscape sensitivity is low and they are not frequently travelled. Therefore there will be no significant impact on tourism in the area. The wind farm may in fact have a positive impact on local tourism as the turbines themselves can be viewed as a tourist attraction.

3) Traffic

During the construction period some traffic impacts will be unavoidable. Traffic resulting from the construction development stage will be managed by the site engineer to minimise any

impacts. The developers will liaise with the Local Authority and An Garda Siochána to develop a traffic management plan to minimise traffic impacts. The operational phase of the development will require intermittent site checks and will not generate adverse impacts on local traffic.

4) Employment

During the construction period up to 70 workers both skilled and unskilled will be employed on site. Where possible, services and staff shall be sourced locally resulting in a temporary positive impact on employment and expenditure within the local community.

5) Landuse and Habitat

The primary land use in the area is forestry plantations and some small scale farming activity. The hinterland of the site is very extensively forested with plantation forestry.

6) Health and Safety

A site manager will be responsible for general construction safety. The development will be carried out in accordance with the Health Safety and Welfare at Work (Construction) Regulations 2001 and operated in accordance with the provisions of the Health, Safety and Welfare at Work Act and the Irish Wind Energy Association (IWEA) Best Practice Guidelines. No issues with respect to health and safety are expected. The turbines, which have a predicted life span of 20 years, will be periodically inspected and maintained. To date, there has been no known record of injury to members of the public as a result of wind farm operations.

7) Shadow Flicker

Shadow flicker can occur at certain times of the year when the moving shadow from the turbine blades may periodically block light to a room giving the impression that the light is flickering. An assessment of the potential for “Shadow Flicker” to impact on sensitive residents was carried out. The shadow flicker model indicated that a number of dwellings might, in certain circumstances, be affected by shadow flicker. The degree of impact is not regarded as significant. The model also does not consider any obscuring features around the residences that would minimise views of the site and hence reduce the potential for shadow flicker. It should also be noted that during periods of cloudy overcast conditions, shadow flicker would not occur.

3.1.5 Conclusion

Impacts associated with the human environment are discussed in more detail in other sections of this EIS. It is accepted that the development will give rise to increased traffic and noise during the construction phase. These impacts will be temporal in nature, every effort will

be made to minimise the impacts using best operational practices. After decommissioning no evidence of the development will exist outside the site boundary.

The development will have a significant positive impact during the construction phase with a considerable number of construction jobs and associated ancillary services. The benefits of this development to the local, regional and national economy including supporting environmental obligations will be significant.

3.2 Landscape and Visual Impact

3.2.1 Introduction

This section examines the landscape and visual character of the site and assesses the potential impact the proposed development would have. The assessment is made based upon a comparison of the existing landscape and visual character with simulated views of the proposed wind farm development. The following criteria were used to assess the suitability of the landscape for the proposed development:

- Would the wind farm development substantially alter the existing viewshed (project setting)?
- Would the development substantially degrade the existing viewshed, affect the use or visual experience of the area or intrude upon views of valuable visual resources?
- Would the wind farm development conflict with identified public preferences regarding visual environmental resources?
- Finally, would the development be in compliance with local goals, policy designations or guidelines identified regarding visual policy?

The visual impact of the development on the landscape was assessed as follows:

- The existing landscape in the study area was described and assessed to determine its sensitivity.
- Zone of Visual Influence (ZVI) maps were produced by Geographical Information System (GIS) software. Using high quality (10m contour interval) ZVI cartographic maps the visibility of the proposed development was determined. Potentially sensitive reference points were selected from the ZVI in order to produce illustrative photomontages of the proposed development. Landscape computer image modelling of the development at these locations were used to assess the actual visibility of the development and potential visual landscape impact.
- The overall visual impact of the development on the landscape was determined based on the results of the landscape assessment, visibility analysis and further desktop studies

3.2.2 Landscape Description

The overall landscape can be described as anthropogenic or “human-made” in character with landuse in the hinterland dominated by forestry and agriculture. Within the site the overall visual impression of the site is a complex of conifer plantation blocks, with occasional small fields supporting medium to marginal quality grazing. The area has low-density population with housing mainly concentrated in surrounding villages and towns. There is some scattered housing development along minor routes.

3.2.3 Landscape Impact Assessment

The visual impact of the proposed development was considered with respect to the magnitude of change the introduction of 29 turbines, 2 masts, one substation and internal road tracks would impose on the landscape. A landscape and visual impact assessment for the wind farm was undertaken.

3.2.4 Visual Impact

With regard to the visual impact evidence from the numerous photomontages, existing cultural and historical landscape for the site and the zone of visual influence for the proposed development, it is considered that the landscape and visual impact would be perceptible but minor. The majority of the proposed development site lies within an area identified by Cork County Council as being suitable for wind energy development. There are a number of scenic routes in the vicinity of the proposed site, which were designated by Cork County Council in the 1970's and more recently in the 2003 County Development Plan. Following an assessment carried out during this EIA process, these routes were determined to be of low sensitivity due to the development of coniferous forestry and agricultural practices and the fact that the actual level of tourist traffic on these routes is low. Therefore the impact on any passing tourist traffic will be minor. In most locations, the development will be screened from view by hedgerows and other vegetation. Wind turbines themselves are often viewed as a tourist attraction, with public attitudes and opinions in favour of green energy, and would add to the amenity value of the nearby scenic routes.

There is one archaeological feature within the site boundary but this will be unaffected by any element of the wind farm construction, installation or operation.

3.2.5 Summary of Findings

It is considered that the proposed development would not have a negative impact on landuse in the surrounding area with potential visibility and exposure most noticeable within 3km proximity of the site. The site and landscape would not be regarded as a high amenity scenic landscape. The site is located within an area identified by Cork County Council as suitable for wind energy development. It was determined that the visual impact of the proposed wind farm development could be considered minor to negligible beyond the immediate area.

3.2.6 Mitigation Measures

The turbines colour, type and surface finish will be designed to minimise visibility and the design and location of the substation will be carefully chosen to meet the same ends. The turbines will be located with regular spacing thereby avoiding visual protrusion of single turbines on high ground and providing a consistent image in relation to the surrounding landscape. In most Irish landscapes white or off white is considered to be the most appropriate colour.

3.2.7 Conclusion

The proposed development will not significantly impact on the surrounding landscape. The screening provided by the coniferous forestry plantations significantly reduces the visual impact. Based on the landscape assessment undertaken for this development, the landscape is deemed to be one that can support the development without causing major adverse impacts.

3.3 Ecology

3.3.1 Introduction

An ecological survey of the proposed development site was carried out in order to identify and describe the existing habitat and to carry out detailed assessments on the site flora and fauna. An assessment of the significance of predicted impacts of the development on the site ecology was conducted. The site is located within an area identified by the DOEHLG as of importance to hen harriers - a bird listed on Annex 1 of the EU Birds Directive and a red listed species in Ireland. Particular emphasis was placed on carrying out a comprehensive baseline survey of hen harriers in the environs and utilising this data in developing site specific management plans based on habitat utilisation and mitigation measures. In terms of the remainder of the site ecological survey works, they were carried out from early to late summer, a time when the occurrence of floral species is most apparent, and most migratory and resident animal species can be recorded. No significant ecological features were noted.

General description

The site occupies one of the peaks of the Mullaghareirk Mountains in the Munster Ridge and Valley province of Ireland, with the Knockacummer peak (408m) lying just over 6Km from the Mullaghareirk peak (405m) itself. The greater region has been extensively afforested with large-scale coniferous plantations occurring to the north and west of the site in particular. The site itself includes a total area of approximately 660 hectares, of which 87% has been afforested.

The site does not lie within any proposed Natural Heritage Area (NHA) listed by the National Parks and Wildlife Service nor is it listed as a Special Area of Conservation (SAC). No wildfowl sanctuaries, Ramsar Sites or nature reserves are located within the site boundaries.

3.3.2 Site Flora

The site was found to contain the following habitat types:

i. Improved grassland (GA1)
ii. Rough grassland (GS4)
iii. Unplanted moorland (HH3)

iv.	New Plantation	(WD4)
v.	Immature forestry	(WD4)
vi.	Mature forestry	(WD4)
vii.	Clearfell	(WS5)

Species occurring in these habitats were recorded and no species of ecological significance noted.

3.3.2.1 Predicted Impacts - Flora

The impact on the flora of the area would be as a result of land take for turbine foundations and site roads, however the actual area occupied by turbines and their access roads is relatively small. The unplanted upland bog division was identified as that with the greatest biodiversity within the site. No turbines have been located within these environs.

3.3.3 Site Fauna - Birds

Recent studies indicate that wind turbine developments have minimal impacts on flying birds and birds have been found to fly around large obstacles such as wind turbines. The construction phase may impact avian populations in terms of noise and intrusion, interfering with communication, but this is a short-term impact and not considered significant. One potential priority area of impact is that on Hen Harriers in the area. The Mullaghareirk Mountains are important breeding grounds for Hen Harriers and as such are currently one of a number of locations under consideration for SPA designation by the DOEHLG. Detailed Hen Harrier habitat selection and land use studies conducted for the site indicate that they forage preferentially in semi natural habitats such as rough grassland and also utilise heath/ bog and forage in young forestry plantations until canopy closure (=5-7 years) and do not utilise mature forestry.

A range analysis was carried out to assess any possible cumulative impacts associated with development of other wind farms in the hen harrier foraging range and to assess what impacts could occur if hen harriers were displaced from a zone around the turbines what loss of habitat would result and how important that would be in terms of alternative habitats available within foraging range. It has been determined that significant areas of suitable foraging ground are in existence within the foraging environs of the development.

It is widely acknowledged that while forestry plantations are of benefit to hen harriers, forestry development in Ireland does not lend itself to sustained harrier benefits as large monoculture mature plantations are not utilised by the birds and indeed the decline in hen harrier population in the 1980's is in part attributed to such forestry practices as well as changes in modern agricultural practices through intensive grazing or land reclamation/ improvement.

Hen harriers require a mosaic of habitat types and forage in young or pre thicket plantations and open semi-natural habitats. Achieving and maintaining a balance of suitable habitat types was a key requirement in terms of land spatial planning and management in developing the site specific compensation and mitigation programme.

3.3.4 Site Fauna – Mammals

The site is considered to be of low ecological interest in terms of mammal population with mammalian fauna being represented by common species such as foxes, rats, hares, and rabbits.

3.3.4.1 Predicted Impacts - Mammals

The construction phase of the development will impact upon mammalian populations in terms of noise and earth moving activity. It is predicted that the response of mammals will be mainly behavioural. This impact is not anticipated to be significant except on a local scale. As the site will not be enclosed no long-term impact on wildlife corridors will occur. During the operational phase, the impact on the bat population living in the environs of the site relates almost exclusively to noise disturbance, which potentially impairs a bat's echolocating capabilities. However bats in Ireland do not occur in densities comparable with populations in areas such as Minnesota, and as such, any potential impacts will not be of relevance.

3.3.5 Mitigation Measures

The proposed road layout of the wind farm has been devised in such a manner so as to minimise the extent of road upgrade required. One area will be used to dispose of all excavated material. Disturbed areas will remain ungrazed until they have established root systems and ground cover (4 on Braun Blanquet cover abundance scale) in order to minimise the potential for erosion. Good site management practices will be implemented where work is occurring close to surface water streams such as inclusion of silt traps.

An ecologist will supervise all site works in order to mitigate against disturbance of habitats, in particular to avoid disturbing breeding birds during the breeding season (May-June) and destruction of mammal dwellings. Although there are no known impacts associated with hen harriers and wind farms, the species ecological significance is acknowledged and site specific mitigation measures were developed to ensure this would not be an issue.

Accordingly, a conservation management programme was developed for the local hen harrier population taking account of the potential priority impacts identified in the form of potential disturbance/displacement/ collision.

This proposal has a number of key elements:

i) It identifies the area and features which can be expected to be useful in the hen harrier mitigation plan to support the population and continued development of hen harrier habitats. It identifies areas such as rough grassland, creation and maintenance of forestry mosaics in terms of a range of forestry age classes and structures and maintenance and management of habitats to link the existing semi natural areas and created semi- natural habitats such as changing improved grassland into rough grassland and development of longer term fallow areas through the establishment of an experimental phased fallow plan north of the site and change in habitat management practices within the site.

ii) Such a proposal is only possible with the help of landowners and support from statutory agencies such as NPWS and this proposal has received written endorsement from local landowners, forestry managers and Coillte which form an important element to the proposal's success.

Scope

- Review of habitat utilisation at the site and a 5km range analysis to review of foraging habitat availability. This determined that the site contains some optimal and sub optimal areas of foraging habitat in the form of rough grassland / heath and young forestry plantation but that significant areas of foraging habitat do exist outside of the site.
- The site mosaic of suitable habitat types will be managed and maintained through landscape planning and forestry management as well as through compensatory habitat creation to create semi – natural habitat areas.

The hen harrier conservation management plan notes features such as the positive management of areas both within and outside the site itself and notes that conservation is not simply a matter of controlling development but that positive measures are required through the sensitive management of land through measures such as:

- Review of and change in Coillte forestry management plans through the creation and maintenance of a mosaic of forestry habitats over the wind farm's lifetime both within and outside the site as it looks at the harrier present and potential future habitat range and type which is necessary for sustained hen harrier success which is demonstrated in the 25 year landscape management plan
- Landowners and Coilltes positive management and endorsement in terms of habitat compensation through development of a phased fallow plan north of the site and creation of semi natural habitats

- Review of cumulative impact assessment within the foraging range of the development which demonstrates that the landscape outside of the site is one that can continue to support the Hen Harrier population

3.3.6 Conclusion

The development will not have significant ecological impacts. The potential for impacts upon the Hen Harrier exist but the comprehensive base line survey of hen harriers and implementation of a site specific conservation management plan will be undertaken to ensure protection of this Annex 1 species.

3.4 Geology, Hydrogeology and Drainage

3.4.1 Introduction

This section of the EIS examines the potential impacts of the proposed development on the existing soil, geology, hydrogeology and drainage. Mitigation measures are outlined to minimise any significant impacts identified.

The existing environment is described in terms of the following:

- Site context
- Bedrock geology, soils, subsoils
- Hydrogeology

3.4.2 Baseline Environment

The proposed site at Knockacummer is located on an elevated site in the southern foothills of the Mullaghareirks. The ground consists of peat of depth 0.25-2.5m overlying stony gravely clay. The depth of the peat on-site is thus considered shallow. There are no springs or wells are present on the site. The Mullaghareirk Mountains form the watershed between two of the region's extensive river basins. The River Feale to the northwest and the River Blackwater (Munster) to the southeast. Six on site streams are present, of which two form part of the Feale river system and the remainder flow into the River Dalua.

The Draft Planning Guidelines for Wind Energy (2004) recommend an assessment of whether the development could create a hazard of bogburst, or landslide, and character of any unconsolidated materials that overlie bedrock, and tests on the depth to bedrock. An assessment of the peat stability by a Consulting Engineer indicated that there were no obvious signs of any previous peat slides on the site, a feature commonly noted on sites of landslide in recent times. The assessment also concluded that the risk of a significant slide arising from the construction of the proposed windfarm is very low.

3.4.3 Potential Impacts and Mitigation Measures

Potential Impacts from the development were assessed in relation to the following:

- Discharges to ground and surface water
- Accidental spills
- Impact on the hydrological regime
- Potential for Peat Slide

Discharges to ground and surface water

No direct discharges to groundwater will occur during the construction phase. Sanitary waste will be removed from site via a waste disposal contractor. Drainage ditches will be designed to provide a buffer zone for filtration before discharging to any stream. Sediment traps will be installed to control soil erosion runoff.

Accidental spills

The main potential impact to groundwater would be from an accidental spillage resulting in groundwater contamination. Fuel supplies will be handled and stored within enclosed buildings constructed with an impervious concrete floor. Oil and chemicals used on site will be stored within appropriate bunded containment areas.

Impact on the hydrological regime

Silt traps will be installed to prevent silt impacting on surface waters downstream of the site.

Potential for Peat Slide

The Draft Planning Guidelines for Wind Energy (2004) recommend an assessment an assessment of whether the development could create a hazard of bogburst, or landslide, and character of any unconsolidated materials that overlie bedrock, and tests on the depth to bedrock. An assessment of peat stability indicated that there were no signs of previous peat slides on the site. Also, the risk of a slide occurring as a result of the construction of the proposed windfarm is very low. Adequate site drainage will mitigate the potential of a peat slide.

3.4.4 Conclusion

The development will not have any significant impact on the local drainage regime. Good housekeeping in conjunction with correct storage and use of materials on site will prevent any spillage to surface or groundwater that could cause adverse environmental impacts. The shallow peat depths on-site and maintenance of adequate drainage indicate that potential for peat slide is low.

3.5 Noise

3.5.1 Introduction

A background environmental noise survey was carried out to determine existing environmental noise levels at the proposed development site. The results of the noise monitoring programmes were used to characterise and evaluate the existing environmental sound levels in the area and assess the impact of noise emissions from the proposed development.

The sound levels observed are characteristic of an upland rural area with low population densities, non-intensive agricultural practices and coniferous forestry plantations. As the site is exposed, wind induced noise was found to be the significant background sonic feature. Additional environmental (geophonic) noise sources included running water occurring in streams and drainage channels, which tend to exhibit a marked seasonal variation in sound levels corresponding to precipitation and flow. Anthropogenic noise sources included road

traffic and agricultural machinery originating from activity at lower elevations primarily to the south of the site.

Historically, noise has been considered to be an important consideration in the location of wind farm developments due to mechanical and aerodynamic noise associated with turbine operation. Modern turbine developments however are designed to minimise noise impacts and careful planning and site location will ensure that a wind farm development does not significantly impact on the environment. A total of 35 houses have been identified in the vicinity of the proposed development. All of the houses bar 5 are located at a distance greater than 500m from the nearest turbine.

3.5.2 Potential Noise Impacts- Construction

Outside the site boundary some temporary increases in noise levels will occur. Potential increases in noise due to construction activities include increased traffic from construction vehicles and construction of internal road tracks and turbine construction.

3.5.3 Mitigation Measures - Construction

During construction, noise activities will be confined to daytime and will be of short duration.
A number of noise abatement measures will be implemented:

- Limiting noisy construction activity to daylight hours where possible,
- Limiting the duration of the construction period,
- Plant commissioning activity will be confined to daytime,
- Noise activities will be required to comply with BS 5228: *Noise Control on Construction and Open Sites.*

3.5.4 Potential Noise Impacts – Operation

The impact of the proposed development on the residential community was calculated by monitoring the existing noise levels and mapping the predicted noise emissions from the development.

A noise sensitive residence is identified where the noise model predicts that the noise level will be 5 db (A) greater than the background noise level. At an operational wind speed of 4m/s (reference height 80m) two house locations (locations 3 and 24) may be regarded as potentially sensitive receptors. At an operational wind speed of 8m/s no houses were identified as sensitive receptors.

Overall, the impact of the proposed development on the soundscape of the greater area is regarded as not significant. The impact will be dependent on directivity of noise emissions which is dependent on wind direction, the geographical location of sensitive residences

related to noise sources, site receptor aspect, exposure and ground level background noise levels at the time of operation.

3.5.5 Mitigation Measures – Operation

The development should not impact significantly on the acoustic soundscape of the area. The development should meet all standard operating standards with regard to operating noise for wind power developments. It is recommended however, that additional post development noise monitoring in accordance with the European standard EN 61400-11:1998 be carried out to monitor accurately the acoustic impact of the development according to site atmospheric conditions and corrected for background wind speeds at any potentially sensitive locations. Subsequent to this noise control measures can be introduced if necessary.

3.5.6 Conclusion

Overall, the impact of the proposed development on the soundscape of the greater area is regarded as not significant. In comparison to the existing impact for example of road traffic noise on the R576, the impact of the proposed development will be minor. The externalities of noise emissions on the environment must be weighted up against the benefits of the development to the local, regional and national economy and environment.

The developer intends to ensure that source noise from the proposed windfarm will comply with the noise criteria outlined by the Draft Planning Guidelines for Wind Energy, published by the Department of Environment, Heritage and Local Government in August 2004.

3.6 Cultural and Heritage Resources

3.6.1 Introduction

In order to establish the existing archaeological environment of the site an archaeological site survey was commissioned. This was established through both a field survey and a desk based assessment within a 2km radius of the proposed site. One archaeological feature was noted as being present on the site. This is a natural feature which is assumed to be a mass rock and is therefore of archaeological significance. Accordingly, the turbine layout was designed to avoid this feature and no turbine is located <200m from this feature.

3.6.2 Potential Impacts

Relatively little ground disturbance is associated with wind turbines. It is not anticipated that any negative impacts on cultural or archaeological heritage will result from this development.

3.6.3 Mitigation Measures

During construction an archaeologist will be present on site to monitor the removal of topsoil and to ensure that construction activities to not impact on the mass rock. Any archaeological

discoveries will be reported to the Duty Officer of the National Museum of Ireland, and to the Heritage Service. The Heritage Service will be advised in writing prior to any construction works taking place.

3.6.4 Conclusion

Following the implementation of the above mitigation measures, the proposed development should not have any known impact on possible archaeological features within the site. An archaeologist will monitor site topsoil removal and construction activities for discovery of unknown significant archaeological findings, which will be reported to Heritage Service. No other mitigation measures are considered necessary at this point.

3.7 Electromagnetic Interference (EMI)

3.7.1 Introduction

Wind turbine blades can scatter electromagnetic signals and interfere with radio waves and microwaves used in communication systems. Potential impacts of EMI include interference with television receiving signals and radio and mobile phone transmissions. An electromagnetic impact assessment was carried out in order to:

- Survey the existing electromagnetic conditions
- Determine possible sources of electromagnetic emissions from the proposed development
- Assess any potential impact of electromagnetic emissions on the existing environment
- Determine if any mitigation measures would be required

A survey of the electromagnetic conditions at the proposed site was carried out on 16th July 2002. No unusual sources of electromagnetic radiation were detected. There were television signals in the VHF and UHF ranges. There were VHF radio signals in the FM range and some two-way radio transmissions in the VHF range and mobile telephone signals in the upper UHF range.

3.7.2 Potential Sources of EMI During Construction

Potential Sources of EMI during construction include electrical power tools and electrical generators brought on site before mains electricity is provided.

3.7.2.1 Mitigation Measures

Electromagnetic emissions from these devices are not anticipated to cause any EMI. All electrical components apparatus and system utilised during construction will be required to comply with the EMC Directive 89/336/EEC thereby ensuring that these devises will not cause interference.

3.7.3 Potential Sources of EMI During Operation

The turbine generator will emit electricity at low voltage.

3.7.3.1 Mitigation Measures

All equipment will be required to comply with the EMC Directive 89/336/EEC thus ensuring that electromagnetic emissions from these devices will be well below those specified in the ICNIRP 1998 Guidelines and in the EU Council Recommendation 1999/519/EC.

There are two existing transmitters, one to the NNE (at approximately 361m elevation) and the second to the ENE (at approximately 260m elevation) of the proposed development. It is

unlikely that the proposed wind farm will disturb the signals from these transmitters. The measurements were taken at an elevation of approximately 380m.

There is the possibility of abnormal operation of equipment, or faulty equipment causing higher than normal levels of electromagnetic emissions. This is a situation that can arise anywhere and is not unique to wind farm construction. If high levels of electromagnetic emissions are generated to the extent that they impact on other equipment or on the environment, the effects will be obvious and appropriate remedial action can be taken. Any electromagnetic emissions detected would not however be harmful to humans.

3.7.4 Conclusion

The mitigation measures outlined above examine both normal and abnormal conditions and outline appropriate remedial measures. There is no known risk to humans or animals from electromagnetic emissions from wind turbines. No significant impacts are therefore expected. Should there be interference with T.V. signals, the developers will remedy the problem in conjunction with RTE.

3.8 Other Impacts

3.8.1 Traffic Impacts

The site is accessed by a turnoff from the R576. Settlement patterns in the immediate area consist of scattered isolated dwellings with some linear settlement on the third class roads surrounding the site. The minor third class roads are used for domestic and agricultural purposes. They may require some alterations to accommodate the articulated lorries transporting the turbine towers and blades to the site. Following granting of planning permission the developers will undertake a more detailed assessment of any required alterations in accordance with the relevant Cork County Council engineer for the area.

3.8.2 Predicted Impacts – Construction

It is accepted that there will be an increase in vehicle movements during the construction phase due to delivery of building material and also due to workers commuting to/from the site. It is considered that the impact of traffic associated with delivery of raw material will be marginal within the larger infrastructural area and moderate in the immediate site area.

3.8.2.1 Mitigation – Construction

In order to minimise the level of traffic, all materials will, where possible, be sourced from within the property itself. A project manager responsible for ensuring site management during the construction phase will supervise the construction work and schedule and co-ordinate traffic activity to minimise any impact. In addition, improvements to the existing road access point will be required to facilitate heavy goods vehicles. Some maintenance and road

extensions will be required on the internal forestry roads, however this will not impact on the local population.

3.8.3 Predicted Impacts – Operation

The turbines will require routine maintenance during their anticipated 20-year life span. It is expected that this will require no more than one vehicle per day and will not impact significantly on the existing traffic levels or road condition.

3.8.3.1 Mitigation – Operation

No mitigation is considered necessary.

3.8.4 Electrical Grid Connection

A power line connection to the nearest suitable electricity sub-station will be required. This work will be carried out in consultation with the ESB, the landowners concerned and with the local planning authority. There are a number of 110kV lines within a 28-35km radius of the site and determination of the best grid connection option will form part of a separate planning application.

3.9 Interaction of Impacts

As a requirement of S.I No. 349 of 1989 and S.I. No. 93 of 1999, not only are the impacts on the individual elements of the environment to be considered, but so too are the interactions between those elements. The most common interactions are between human beings and noise, visual perceptions, construction impacts, biological resources, water resources and landscape.

These interactions have been considered in detail in the relevant sections.

In summary the landscape and visual impact of the development may be considered as with all wind farm developments to be the significant environmental impact for this development. The potential impact of wind farms in relation to the hen harrier was also assessed in detail and the implementation of a site specific conservation management plan was considered as a precautionary mitigation measure. As part of the conservation plan, a compensatory habitat proposal has been developed in conjunction with the NPWS to ensure no impact on this species.

In examining the interaction of the potential impacts for this development with regard to visual and landscape impacts, the evidence from the numerous photomontages, existing cultural and historical landscape for the site and the zone of visual influence for the proposed

development it is considered that the landscape and visual impact would be perceptible but minor.

It is important to note that the development will not impact upon any existing environmental designated area and that the landscape and visual impacts are entirely reversible upon decommissioning of the development.

The positive interactive elements of the development would be considered to be both of a temporary and long-term nature. The short term include employment generation, the longer term, suitable utilisation of wind resource in a technically and logistically desirable location, the diversification of land use in poor agricultural land, the replacement of fossil fuel life cycle emissions with a pollution free alternative. Additional positive impacts are benefits to the National grid and assistance in meeting peak power demands for County Cork.

4.0 SUMMARY AND CONCLUSIONS

Each of the sections of this EIS identifies and describes the potential and likely impacts associated with this development both on and off site. The interaction of impacts and the capacity of the landscape to absorb the development are also dealt with in detail.

From reviewing the above information it is evident that the proposed project will not cause substantial adverse effects on human beings, housing or recreation.

Effects on landscape character, noise, biological and ecological resources, cultural & historical resources, land use, tourism and material assets, have all been determined to be not significant. Careful measures will be taken both during the construction as well as the operation to minimise any potential adverse impacts identified. The potential impact of the development on Hen Harriers has also been carefully assessed and a compensatory habitat plan and site specific mitigation measures for the site have been prepared to ensure the development will not adversely impact on this priority species.

Positive attributes for the site with regard to supporting this wind energy development include:

- The estimated high wind speeds due to the elevation and aspect of the site
- Proximity to electrical grid infrastructure access to the site
- Not impacting on any environmentally designated sites
- Landuse and Landscape character sensitivity
- Distance from cultural and heritage sites
- Distance from main regional tourism areas
- Distance from telecommunications and radar stations
- Site accessibility and proximity to regional routes

The findings of the Environmental Impact Assessment indicate that the potential impacts associated with a wind energy development of this size and layout, can be absorbed and accommodated at this location without significant impairment of the existing environment.

Provided the recommended mitigation measures and management plans are implemented the environmental impacts associated with this development in the immediate are would be considered to be marginal, the regional and national impacts associated with this development would be regarded as significantly positive in terms of promotion of renewable energy development and indigenous energy production.

KNOCKACUMMER WIND FARM ENERGY DEVELOPMENT

Environmental Impact Assessment

Planning Submission to Cork County Council

Non-Technical Summary
Main Report & Appendices

SWS Environmental Services
MEMBER OF
SWS Group

Prepared by
SWS Environmental Services,
SWS Group,
Shinagh House, Bandon, West Cork,
October 2004

PREAMBLE

SWS Natural Resources Ltd. are seeking planning permission on behalf of Coillte Teoranta, Mr. Brendan O Sullivan, Mr John Roche, Mr John Buckley, Mr Robert Fox and Mr Denis Cremins from Cork County Council to develop a renewable energy twenty-nine turbine wind power development at Knockacummer, situated in the townlands of Meentinny West, Meentinny East, Tooreennagrena, Toreen Donnell, Commons North, Knockacummer, Cummerduff, Knockacluggin, Co Cork. The selected site was chosen based on its high wind regime and its low landscape sensitivity. This Environmental Impact Statement (EIS) examines the impacts both positive and negative associated with the proposed development and has been prepared for submission to Cork County Council in support of the planning application for this development. The three bladed turbines will have a maximum hub height of 80m and a maximum blade diameter of 90m. This EIS and planning application are developed taking account of the August 2004 Draft Guidelines for Planning Authorities.

A previous application for a wind farm development at this site was made to Cork County Council (PL ref N/03/3220 and on 11th November 2003, the planning authority made a decision to grant planning permission. Subsequently, the decision was appealed to An Board Pleanála who considered that the proposed development to be premature pending further evaluation of the impact of this development on the hen harrier. This decision was made in May 2004. Detailed site assessment base line data on hen harrier site and hinterland habitat utilization has been collated over a two year period and SWS have utilized this data to develop site specific mitigation measures in the form of a cumulative impact assessment to ensure sufficient habitat range exists for the hen harrier, detailed compensatory habitat measures and specific emphasis on spatial land use changes and land use management plans developed in conjunction with Coillte, landowners and advises from the National Parks and Wildlife Service to ensure no impacts on this priority species .

The development will involve the construction and upgrade of site access roads and ancillary works including a small control building, two meteorological masts, and underground cabling linking the turbines to the control building. There are a number of options for connecting the proposed wind farm to the National Electricity Grid. Further consultation will be required with the ESB National Grid to determine the final grid connection and this will form part of a separate planning application.

This EIS has been prepared by SWS Environmental Services on behalf of the developer SWS Natural Resources Ltd. and provides the community, government and non-government bodies and other interested parties with information regarding the proposed development. Each technical area of this EIS contains a discussion of the existing environment, potential

impacts associated with the proposed development and any mitigation measures required to ameliorate these impacts.

No significant difficulties were encountered during the compilation of these reports. A public consultation was carried out to allow community input into the development and to ensure any local issues or concerns were addressed.

After the EIS has been lodged with Cork County Council any person may inspect the document and make a submission on the project within a period of five weeks of the submission date. A non-technical summary of the Environmental Impact Statement is also provided for inspection at the Planning Department Offices of Cork County Council.

STUDY TEAM AND ACKNOWLEDGEMENTS

This Environmental Impact Statement was prepared by the combined efforts of the study team.

The report was written by SWS Environmental Services. The study team members who drafted and reviewed the sections are:

Environmental Ecologists	Cliona Ni Eidhin & Norma O'Hea B.Sc. M.Sc.
Environmental and GIS Consultant	Seamus Coveney B.A. M.Phil. M.Sc. H.Dip
Environmental and GIS Officer	Roni Hawe B.Sc. M.Sc. MGAI
Environmental Scientist	Caroline O'Connell B.Sc.
Electromagnetic Survey	Radio Frequency Technologies Ltd
Archaeological Study	Miriam Jones B.A. M.A.
Environmental Officer	Cliona O' Sullivan B.Sc.
Environmental Officer	Clare O' Donovan B.Sc
Environmental Engineer	Kevin O Donovan B.Eng.. M.Eng.Sc
Environmental Consultant	Sinead Hickey B.Sc. M.Sc.
Senior Environmental Consultant	Declan Waugh B.Sc.MIOA. MCIWEM. MIEIA. MSEE.

Citation: SWS Environmental Services 2004. Knockacummer Windfarm Development Environmental Impact Statement. Report Prepared for SWS Natural Resources Ltd.

SWS Environmental Services also wish to acknowledge assistance and advises received from Dr Steve Persival, Ecology Consulting and Dr Jervis Good of the National Parks and Wildlife Service (NPWS) as well as the essential contribution of the Coillte Forestry Manager and local landowners.

Table of Contents

APPENDICES

List of Appendices

List of Figures

List of Tables

1.0 INTRODUCTION

SWS Environmental Services were commissioned to undertake an Environmental Impact Assessment (EIA) and planning application for a twenty-nine turbine wind energy development at Knockacummer, located in the townlands of Meentinny West, Meentinny East, Tooreennagrena, Tooreen Donnell, Commons North, Knockacummer, Cummerduff and Knockacluggin, Co. Cork. The formal output from an EIA process is an Environmental Impact Statement, which is submitted to Cork County Council in support of the Planning Application for the proposed development. This EIS report consists of two sections:

EIS Volume 1. Non-Technical Summary
EIS Volume 2. Main Report and Appendices

1.1 The Purpose of this EIS

The purpose of this EIS is to provide a detailed description of the proposed development and outline potential impacts associated with the construction and operation of the wind farm. Where adverse impacts have been identified, mitigation measures are outlined. This report provides a description of the studies considered necessary to assess the environmental impacts of the project. It is provided to regulatory authorities and stakeholders for review and comment. SWS Environmental Services recognise that there are particular sensitivities that need to be addressed in undertaking an environmental assessment for a wind energy development and these are dealt with at length within the EIS.

1.1.1 The Need for an EIS – Legislation and Statutory Context

Environmental Impact Statements (EIS) are carried out as per the requirements set out in the EIA Regulations [EIA Regulations 1989 (SI No. 349 of 1989) and EIA (Amendment) Regulations (SI No. 93 of 1999)] and must be submitted in conjunction with a planning application.

The Planning and Development Regulations 2001 (S.I. No 600 of 2001) provides for the carrying out of an EIA for any development of a class specified under Article 24 of S.I. 93/99. This proposed development falls within the class of development types requiring an EIA under Article 24, First Schedule, Part II, Section 3 (Energy Industry) (i) — *Installations for the harnessing of wind power for energy production (wind farms) with more than 5 turbines or having a total output greater than 5MW.*

1.1.2 Format of this EIS

This EIS has been undertaken having regard to the Environmental Protection Agency's *'Guidelines on the information to be contained in Environmental Impact Statements" (*EPA,

March 2002*)*. The format of this EIS is designed to ensure that standard methods are used to describe all sections of the EIS. The development is assessed and described in terms of:

- The existing environment, including any proposed developments
- Description of the proposed development including any potential impacts associated with the development
- Proposals to mitigate against likely adverse impacts
- Conclusion

The Department of Environment Heritage and Local Government (DOEHLG) published Draft Planning Guidelines for Wind Energy Development in August 2004. These guidelines were also consulted during the composition of this document. The existing guidelines, Wind Farm Development, Guidelines for Planning Authorities (1996), were also consulted.

The scope of work associated with the development was determined following consultation between the developer and SWS Environmental Services. This scope of work, which outlines the range and aspects of the development, was determined through the following:

- A review of existing information
- Legislative requirements and guidelines of wind energy developments
- An assessment of the nature and scale of the proposed development
- Consultation with local residents and other interested parties

1.1.3 Contributors

This EIS was prepared by SWS Environmental Services. Specialist subcontractors were employed to undertake some sections of the EIS as outlined in Appendix 1. These reports are referenced accordingly in the relevant sections of this report.

1.1.4 Public Consultation and Dialogue

All residential houses in the immediate area of the proposed development were visited on the in October 2004 as part of the consultation process. Individuals were provided with information with regard to the proposed development, including site location and turbine potential visibility. Any concerns expressed by locals were recorded and addressed in this EIS.

A number of public organisation and special interest groups were consulted regarding the proposed development. Table 1.1 overleaf details the principle organisations contacted during the scoping of the project. Discussions with Cork County Council planning department also took place. A copy of the consultation material is included in Appendix 2. Copies of responses received before the submission of this EIS are included in Appendix 3.

Table 1.1 List of Organisations and Groups contacted during the Public Consultation

Name	Address
An Taisce	The National Trust for Ireland, Tailors Hall, Brack Lane, Dublin 8
Birdwatch Ireland	Ruttledge House, 8 Longford Place, Monkstown, Co. Dublin.
Cork County Council Planning Department	Model Business Park, Model Farm Road, Bishopstown, Cork.
Department of the Environment Heritage and Local Government, Development Application Section	(Formally, Dúchas: The Heritage Service), Dun Scéine, Harcourt Lane, Dublin 2.
Vodafone Headquarters	Blackthorn house, Bracken Rd., Sandyford, Dublin 18
Eircom – Radio Division	1st Floor NMC Building, Bianconi Avenue, Citywest, Dublin 24.
O2	O2 House, Baggot St., Dublin 2
Independent Radio and Television Commission	Marine House, Clanwilliam Place, Dublin 2.
Irish Aviation Authority	Aviation House, Hawkins Street, Dublin 2.
Kerry Airport	Farranfore, Co. Kerry
Irish Energy Centre	Glasnevin, Dublin 9.
Irish Wildlife Trust	Garden Level, 21 Northumberland Road, Dublin 4
Radio Telefís Eireann	Coverage Planning, Donnybrook, Dublin 4.
South Western Regional Fisheries Board	1 Neville's Terrace, Masseytown, Macroom, Co. Cork.
Shannon Regional Fisheries Board	Ashbourne Business Park, Dock Road, Limerick.

1.2 Energy Policy

The burning of coal, gas and oil resulting in the release of greenhouse gas emissions is a major cause of climate change and it is now widely recognised that future energy policy must be based on using less fossil fuel and more on renewable energies that do not produce atmospheric emissions such as utilisation of wind energy.

1.2.1 European Union (EU) Policy

The EU is responsible for about 15% of the world's greenhouse gas emissions and recognises that emissions must be reduced. The most important of the greenhouse gas emissions is carbon dioxide (CO_2), which accounts for approximately 80% of the impact of greenhouse gas emissions. CO_2 emissions result from the use of fossil fuels (coal, gas, oil) and are the most difficult to reduce as there are no existing removal technologies. In response to the threat of climate change, a number of measures were taken.

The Kyoto Protocol

In Kyoto in December 1997, the Kyoto Protocol was introduced to legally bind green house gas emission commitments for developed countries. These countries agreed to achieve

overall reductions of over 5% below 1990 levels in net emissions of six greenhouse gases by the period 2008-2012. The EU adopted the most ambitious reduction target, i.e. 8% reduction below 1990 levels on the basis that targets for individual Member States would be different, reflecting differing economic and other circumstances. Under the 1997 Kyoto Agreement Ireland has agreed to limit the increase the emissions of greenhouse gases to 13% above 1990 levels by the period 2008-2012.

Renewable Energy Policies

The EU general policy towards renewable energy including wind has been communicated through several regulations, recommendations, papers, communications and various research and development programmes of which two examples are outlined below.

- A White Paper on Renewable energy was published in November 1997 detailing a comprehensive strategy for promoting renewable energy.
- Following this, the Renewables Directive was approved on July 4th 2001 to create a framework to promote an increase in the contribution of renewable energy sources to electricity production in the internal market for electricity. The Directive details that a 22.1% share of electricity production must be from renewable resources. For wind energy there is a target of 40,000MW of installed wind energy by 2010 including 10,000MW in “large wind farms”.

1.2.2 Irish Policy

Ireland has a commitment to limit the growth of greenhouse gas emissions to 13% above 1990 levels by period 2008-2012. The Department of Public Enterprise published its Green Paper on Sustainable Energy in September 1999 referring to the following key policy areas:

- Policy for limiting greenhouse gas emissions
- Security of energy supply (due to our geographic location this area is of critical importance)
- Transport Policy
- Liberalisation of Energy Markets
- Promotion of the use of renewable energy and Combined Heat and Power (CHP).

Renewable energy is the one area of the Green Paper where specified targets where set for an additional 500MW of electricity capacity in the period 2000-2005. Additional targets will be set for 2005-2010. Annual AER competitions have been held to assist towards the achievement of this target (up to AER VI).

The Green Paper stresses that early action is essential to achieving Ireland’s commitments under the Kyoto Protocol. The target of 500MW renewable energy development by 2005 set

out in the Green Paper is mainly expected to come from the development of wind energy in Ireland.

The Renewable Energy Strategy Group was established as a result of this Green Paper and has made a number of recommendations in its "Strategy for Intensifying Wind Energy Development" to develop the Irish wind industry. This document reviews the progress in achieving wind energy targets and addresses the obstacles encountered in the planning process. This Strategy Document is now considered to represent best practice in relation to planning policy on wind farm projects and is thought to be more relevant than the 1996 Department of Environment and Local Government (DoELG) Guidelines. This was confirmed in a ministerial circular to the City and County Managers, which was issued on 14th March 2001 by the Minister for the Environment and Local Government and the Minister of State at the Department of Public Enterprise.

One of the key recommendations by the Strategy Group is that large-scale wind farms should be encouraged to achieve efficient deployment of wind energy, and to avoid a proliferation of grid connections. It should be noted that the proposed development at Knockacummer has the potential to generate up to 87MW depending on the particular Turbine Generating Capacity chosen. This would constitute a large-scale development, which would make a significant contribution to Ireland's renewable energy targets (Ireland's current largest operating wind farm has a capacity of 15.18MW). This is in keeping with the recommendations of the Draft Planning Guidelines (2004) published by the DoEHLG which state that *"the importance of the development of large wind energy projects … must be given due consideration in view of their strategic importance in achieving the aims of the National Climate Change Strategy and compliance with the Kyoto protocol on climate change"*.

Recent information from the European Environment Agency states the Ireland's greenhouse gas emissions have increased by 31% from 53.4 million tonnes CO_2 equivalent in 1990 to 70 million tonnes CO_2 equivalent in 2000. As Ireland's growth in the first commitment period of the Kyoto Protocol is to be limited to 13% over 1990 levels, a growth of 31% is an enormous increase.

The overall increase was driven by the growth in CO_2 emissions from energy use, which amounted to 46% over the 12-year period. The bulk of this increase occurred in the years between 1995 and 2000, during which Ireland experienced a period of unprecedented economic growth.

Table 1.2 Sector contribution to CO_2 emissions in 2001

Sector	% Contribution to CO_2 Emissions
Energy	65
Agriculture	27
Industrial Processes	6
Waste	2

As the energy sector contributes more CO_2 emissions than any other sector, making the move from fossil fuel based electricity generation to renewables such as wind is imperative if Ireland is to meet its commitment to the Kyoto Protocol. Government commitment to implementing the strategy was further demonstrated in August 2004, with the publishing of new Draft Planning Guidelines for Wind Energy Development by the Department of Environment, Heritage and Local Government (DoEHLG).

1.2.3 Cork County Development Plan and Policy on Wind Energy

County Cork has been identified as having one of the greatest wind energy potentials in Ireland. Cork County Council in its County Development Plan 2003, states that it is an objective of the Council "to support the National Climate Change Strategy and, in general to facilitate measures which seek to reduce emissions of greenhouse gases". Cork County Council has identified in broad strategic terms two special areas as follows:

Strategic Search Areas

"Areas, which have both relatively high wind speeds and relatively low landscape sensitivity to wind projects. These could be considered to be strategic "search areas" for wind farm development. Prospective developers would be encouraged generally to focus on these areas when searching for potentially suitable sites in County Cork."

Strategically Unsuitable Areas

"Areas, which because of high landscape sensitivity are considered generally to be unsuitable for wind energy projects……except on a small scale and at particularly suitable locations, wind projects would normally be discouraged in these areas."

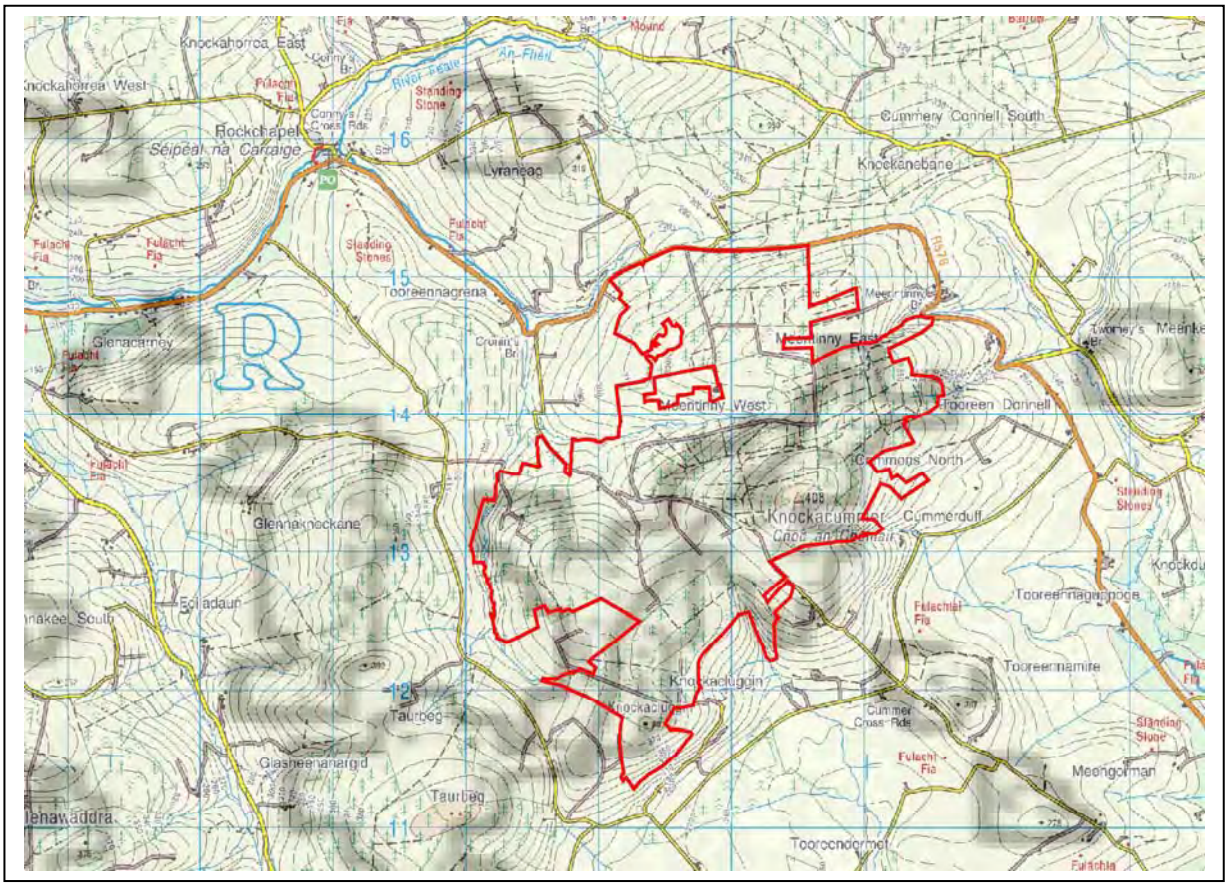
It is an objective of Cork County Council to "encourage prospective wind energy developers assessing potentially suitable locations for projects Cork County Council have issued a detailed document on the various development control considerations for wind energy projects as part of its Planning Guidance and Standards series.

In the Cork County Development Plan (2003), it is stated that any renewable energy development will be assessed in relation to a specific evaluation of each site having regard to the following:

- Sensitivity of the landscape and of adjoining landscapes to wind energy projects
- The scale, size and layout of the project, any cumulative effects due to other projects, and the degree to which impacts are highly visible over vast areas
- The visual impact of the project on protected views and prospects, and designated scenic landscapes as well as local visual impacts
- The impact of the project on nature conservation, archaeology and historic structures
- Local environmental impacts including noise, shadow flicker
- The visual and environmental impacts of associated development such as access roads, plant grid connections etc.

As can be seen from Figure 1.1, a significant section of the proposed site at Knockacummer falls within a strategic search area and so is an area preferred by Cork County Council for wind farm development.

Figure 1.1 Strategic Search Areas in North Cork



1.3 Wind Energy Development

1.3.1 Europe

In recent years some European Countries have taken advantage of their wind resources and have begun to implement significant changes in their energy policies. In September 2002, Europe's installed wind energy capacity reached 20,447MW, 74% of the world total (EWEA, 2002). This is a 40% increase in European wind energy capacity over the last 12 months. Table 1.5 demonstrates that these new capacities rose significantly in the last 2 years. Germany has the largest installed wind energy capacity in the EU with an 8,754MW capacity at the end of 2001. The next biggest market is Spain, where the development of large wind farms is resulting in a rapid increase in the wind energy capacity. There have also been significant capacity increases in Denmark, Italy and Greece. This is because it is both a pollution free technology, creating no greenhouse gases that contribute to global warming, and also a cheap, efficient method of generating electricity since the fuel source is free of cost and infinite in quantity. In contrast, Ireland, with its strong wind resource and reliance on imported fuels has not yet taken full advantage of its potential wind energy resource.

Table 1.3 Installed Wind Energy Capacity in the EU

Country	Capacity Installed at end 2000 (MW)	Capacity Installed at end 2001 (MW)	Capacity Installed at end 2002 (MW)
Germany	6113	8,754	12,001
Spain	2,235	3,337	4,830
Denmark	2,300	2,417	2,880
Italy	427	697	785
Netherlands	446	493	688
United Kingdom	406	474	552
Sweden	231	290	328
Greece	189	272	276
Portugal	100	125	194
France	66	78	145
Ireland	125	140	137
Austria	77	94	139
Finland	38	39	41
Belgium	13	31	44
Luxembourg	10	15	16
EU Total	**12,769**	**17,241**	**23,056**

(Source: European Wind Energy Association ,2003)

1.3.2 Ireland

Due to Ireland's geographical location, on the downwind side of the Atlantic Ocean, in the region of prevailing southwesterly winds, the Irish coastline is exposed to one of the most vigorous wind climates in the world. The ALTENER supported study "Total Renewable Energy Resource in Ireland", conducted by ESBI and ETSU (March, 1997), on Ireland's renewable energy resources established that the *feasible* wind energy resource, in areas at or above the $7ms^{-1}$ cost effective wind speed is estimated at 179 GW, or 40 times Ireland's current installed capacity. When areas, which are more sensitive to the environmental impact of wind energy, are excluded, what remains is the *accessible* resource estimated to be 2190 MW under certain assumptions.

Modern wind energy development is relatively new in Ireland, particularly when compared to other E.U. Member States such as Denmark and Germany. The first commercial wind farm of 6.45 MW was commissioned and supplying electricity to the electricity grid in 1992. This project was supported by the E.U. under the VALOREN programme. It remained the only wind farm supplying the electricity network until 1997 when a further 6 were commissioned with a combined generating capacity of 44 MW.

By the 13th February 2003, full planning permission in Ireland had been granted for 89 wind farms (including extensions to existing wind farms). There are 25 operational wind farms in the Republic of Ireland giving a combined generating capacity of 137MW. To place this in context, the Green Paper for Sustainable Energy target for all renewable energies is 500 MW by 2005.

If this target is met through wind energy, then it will account for 10.7% of Ireland's projected total installed electricity generating capacity and 7.1% of electricity generated by 2005. However, significant further expansion will be required if Ireland is to make a meaningful contribution to the EU target of 12% of Total Primary Energy Requirement (TPER) from renewables by 2010 and the national objective to limit CO_2 emissions as outlined in the National Abatement Strategy. At this stage 2% of Irish TPER is met from renewables, rising to 3.75% by 2005 under present targets. As part of this ambitious target the EU has also passed a renewable electricity directive, which will increase the minimum share for renewable electricity in Europe from 14% to 22% by 2010. Ireland is expected to increase the share of renewables in electricity consumption from 4% in 1997 to 13% by 2010 – more than a 3-fold increase.

The development of large-scale wind farms will be required to meet these targets as highlighted by the Renewable Energy Strategy Group. The proposed 87MW wind farm at Knockacummer will make a significant contribution by using the most efficient large wind turbine technology currently available.

1.3.2 Benefits of Wind Energy

The main environmental benefit of wind energy is that it reduces greenhouse gas emissions by displacing fossil fuel. Every unit (kWh) of electricity produced by wind turbines displaces a unit of electricity that would otherwise have been produced by a power station burning fossil fuel. Renewable energy already saves over 1,500 million tons of carbon dioxide each year worldwide or ~ 7% of current energy-related emissions. By 2020, depending on the future energy scenario, between 6,000 and 9,000 Mt of CO_2 emissions could be avoided. This latter figure corresponds to 40% of current, energy-related CO_2 emissions. Significant emission reductions are also predicted for the acid gases - sulphur dioxide and oxides of nitrogen.

More accurate results can be obtained by a life cycle analysis. Life cycle emissions include those released during every phase of the life of a scheme (e.g. manufacture and decommissioning of the plant, waste disposal, etc.) not just those from the generating phase. The life cycle emissions from renewable energy technologies are minute (often by over an order of magnitude) compared to those that they are likely to displace, as highlighted in Table 1.6 overleaf.

Other benefits of wind energy use:

- Diversifying and securing energy supply, thereby promoting price stability;
- Promoting the decentralisation of energy markets, by providing small, modular, rapidly deployable schemes;
- Developing economies by reducing their dependence on fuel imports;
- Providing job opportunities, in rural areas thereby slowing urbanisation.

Table 1.4 Comparison of Environmental Costs of Non-Renewable Sources with Renewable Sources of Energy

Non Renewable Sources	**COSTS (€) per kilowatt-hour**
Hard coal Lignite Oil	5.7 cents
Peat	3.5 cents
Natural gas	1.6 cents
Renewable Sources	**COSTS (€) per kilowatt-hour**
Windpower	0.1 cent
Hydropower	0.4 cent
Photovoltaic solar	0.6 cent
Biomass	1.4 cent

Source: **Environment Daily**, July 23, 2001; **European Commission**, July 20, 2001.

1.3.3 Environmental Liabilities of Wind Energy

Wind energy also has a range of potential environmental burdens. These are typically small, site-specific and local in nature and usually involve a loss of amenity (e.g. visual impact). Methods are available for reducing such impacts:

- Exercising sensitivity in site selection (avoiding areas of outstanding natural beauty);
- Carrying out an Environmental Impact Assessment to assess and minimize any impacts identified before implementation;
- Using the best available technology (such as a modern, efficient and low noise level wind turbines);
- Evaluating the local, regional and global benefits and impacts of a scheme;
- Including the public and relevant organisations in the early stages of planning;
- Demonstrating benefits to the local population affected by the scheme.

As part of the scoping exercise for this project these factors have all been taken into consideration and are discussed in detail in this report.

1.3.4 Conclusion

Climate change is identified as the most significant and threatening global environmental problem facing humanity today. Ireland has a responsibility to future generations to limit greenhouse gas emissions as part of the overall international effort to tackle this threat. Population increases and increased energy demand will result in the exhaustion of fossil fuels unless there is an increase in the use of sustainable energy resources. While the Irish Government is promoting the development of renewable energy with a view to producing as much of the national energy requirement as possible from indigenous sources, Ireland is still heavily dependant on imported fossil fuel based energy resources. Half of Ireland's primary energy supply as calculated for the year 2000 came from oil and less than 2.5% from renewable energy.

Against this backdrop, there is clearly a need to use renewable sources of energy if we are to sustain current rates of economic development. If Ireland does not meet its Kyoto targets, the significant fines in green taxes for non-compliance with International agreements and the predicted regional impacts of climate change for Ireland will result in significant adverse impacts on socio-economic sectors, ecosystems, land use, human health and coastal systems. Electricity generated from renewable sources is CO_2 neutral. Ireland has one of the best indigenous renewable energy resources in Europe in the form of the wind energy and national policy places a strong emphasis on wind in meeting Ireland's future energy needs.

The renewable energy strategy group recommends the development of large-scale wind farms. This will minimise land uptake and maximise our energy output. Thus the development of wind energy affords the opportunity to provide a sustainable and economically viable

method of helping to meet Ireland's energy needs while also meeting our commitments made under the Kyoto Protocol. The development of a wind farm with the potential to provide 87MW at Knockacummer, Newmarket, Co. Cork will contribute to a 242,506 tonnes/year reduction of CO_2 per annum towards this target.

1.4 Site Selection

There are a number of criteria that must be assessed when investigating and selecting the location of a wind farm development. The most important technical factor is the average wind speeds available at that location. Additional criteria that are used as indicators for selecting and determining suitable sites for wind farm development include; distance from the electricity grid, proximity to environmentally sensitive areas, proximity to scenic areas or tourist attractions, access to the site and distance to the nearest dwellings. In addition to those quantifiable physical characteristics, the site was also assessed in terms of the ability of the landscape to accommodate the development. The Cork County Council Strategic Area Assessment takes landscape sensitivity into account (see section 1.2.3) and the Knockacummer site is located in an area identified as suitable for windfarm development.

Spatial planning considerations as mentioned above are crucial in determining suitable areas where wind farms may be accommodated. The relative importance of each is very dependent upon the viewpoint of the user, i.e. environmentalist, conservationist or developer.

SWS Environmental have developed a computerized management tool "RERSAS" (**R**enewable **E**nergy, **R**esource and **S**ite **A**ssessment **S**ystem) to provide strategic locational guidance in site selection for renewable energy developments.

RERSAS incorporates Geographical Information System (GIS) technology, satellite remote sensing information, and infrastructural and environmental digital datasets to locate developments in suitable areas. This system allows for integrated spatial planning considerations to be linked with development restrictions and environmental concerns. As such, it is an excellent tool for examining all aspects of the site selection process.

RERSAS provides a series of guidance principles on the location of renewable developments. The key objectives are:

- adverse effects should be avoided on areas safeguarded by national and international designations.
- renewable energy developments should be located so as to minimise transmission loss.
- wilderness areas and areas of highest natural heritage value must be avoided
- areas where anthropogenic influences on the landscape already exist and areas with low biodiversity habitats should be favoured.

Some of the strategic spatial planning controls and areas of avoidance selected in RERSAS include those listed in Table 1.5, among others.

Table 1.5 Infrastructural, Ecological and Historical Criteria

Ecological/Historical Criteria	Distance Buffer	Infrastructure	Distance Buffer
Large town	2 km	Designated Scenic Area	1 km
Special Protected Area	1km	Electrical Connection	< 12km
Nature Reserves	1km	National Primary Routes	1000m
National Park	1 km	National Secondary Routes	1000m
Ramsar Site	4km	Regional Roads	1000m
Wildfowl Sanctuary	1.5km	Third Class roads	250m
Irish Wildbird Conservatory	1.5km	Railway	500m
Forest Park	1 km	Radio or TV mast	250m
Sites and Monuments	250m	Village	1000m
Lake, marsh or reservoir	250m	Residential dwellings	400m

By selecting strategic areas of avoidance within GIS, it allows the identification of areas potentially suitable or unsuitable for wind farm development.

1.5 RERSAS Site Assessment

1.5.1 Alternative Sites

A number of sites within the North Cork Area were assessed for wind farm development using the RERSAS model. In identifying specific sites for further investigation, land ownership and support from landowners are essential. Suitable sites may be identified through RERSAS but will not be suitable for development without owner's approval. In this study three sites were identified as possible suitable locations.

Alternative Site 1

Knockanade

A high elevation site located approximately 2km south of Toornafulla. This site is located in close proximity to a significant number of residential dwellings on the third class road south of the site. In order to maintain the recommended spacing between turbines and dwellings the potential to develop a wind farm at this location is limited.

Alternative Site 2

Tooreencormack

This site was identified as suitable due to its proximity to a grid connection at the 38kV station in Newmarket. However the site occupies a relatively small area for wind development and

when restrictive factors such as dwellings and minimum turbine spacing are taken into consideration the scale of the development would be severely restricted.

1.5.2 Knockacummer

This site was identified as a suitable site for wind farm development based on a combination of computer simulations of the RERSAS model and from field investigations. The suitable attributes of the site include the following:

- **Good elevation to ensure sufficient wind speeds**

  All the turbines are located at or above 295m.

- **Landscape suitable for Wind Farm Development**

  The general landscape in the region of Rockchapel has a strong anthropogenic (human-made) character as a result of intensive forestry plantation and agricultural practices. Current figures from the Forest Service FIPS survey state that 52% of the Rockchapel area is currently under forestry. There are no unique landscape or visual features in the area that would be adversely impacted by a wind farm development. In general it is considered that a development of the scale proposed can be accommodated on the site and overall visual impact on the area is acceptable.

- **Suitable distance for grid connection**

  The grid connection criteria in RERSAS indicates a distance buffer of <12km however this is an economic consideration and isn't relevant for a development of the proposed scale at Knockacummer. There are a number of 110kV lines within a 28-35km radius of the site that would be suitable for grid connection.

- **Suitable distance to environmental designated areas**

  The nearest environmental designated area is 8.5km from the proposed site.

- **Low level of visibility due to topography of the surrounding region**

  The Zone of Visual Influence shown in Figure 5.8 confirms the low level of visibility for the wind farm outside the immediate area, in particular to the north of the site.

- **Suitable distance from houses**

  Five houses are located less than 500m from the nearest turbine. One house is owned by a landowner involved in the development situated 358m from the nearest turbine. Four houses are located between 400m and 500m from the nearest turbine, one of which is owned by a landowner involved in the development. All other houses are located over 500m from the nearest turbines of the proposed development. Distances of this magnitude considerably reduce the potential impact of noise and shadow flicker on any dwelling in the immediate area.

- **Good access available to the site**

  While there may be some remedial works required at particular sections of the approach route to the site there are no serious obstacles to transporting the turbines to the site.

2.0 PROJECT DESCRIPTION AND CONSTRUCTION

2.1 Introduction

The proposed development comprising of twenty nine wind turbines (hub height not exceeding 80m and overall height from ground to blade tip not exceeding 125m) and associated infrastructure will be located in the upland area of Knockacummer in the townlands of Knockacummer, Tooreennagrena, Meentinny West, Meentinny East, Cummerduff, Knockacluggin and Tooreen Donnell, Co. Cork (grid reference 124612 E, 113261 N). The site location is shown in Fig 2.1 and 2.2.

The proposed project development includes a total of twenty nine wind turbines, associated access roads and hard-standing areas, drainage infrastructure, two 80m meteorological masts, a small control building and compound and underground cabling linking the turbines to the control building.

The layout of wind turbines, the site tracks and cables, the anemometer masts and the site grid connection building are presented on the site layout map (Figure 2.3). Grid references for the individual wind turbines are shown in Appendix 5.

2.2 Description of the Proposed Wind Farm Development

2.2.1 Wind Turbines

Wind turbines, of the type that the developer is considering for use at Knockacummer would be of a typical modern design, incorporating tubular towers and three blades attached to a nacelle housing, containing the generator, gearbox and other operating equipment. The development will consist of turbines with a rated power output capacity of up to 3MW, depending on the type of turbine used.

The selected wind turbine will have a tower or ‘hub’ height not exceeding 80m and a blade diameter not exceeding 90m. The overall height from ground to blade tip will therefore not exceed 125m. Details of the wind turbines are illustrated in Figure 2.4.

The colour of the proposed turbines and blades will be decided by Cork County Council subject to planning permission. The Draft Planning Guidelines (2004) recommend white/off-white since the colour is considered “expressive of an image of cleanliness and efficiency associated with wind energy”.

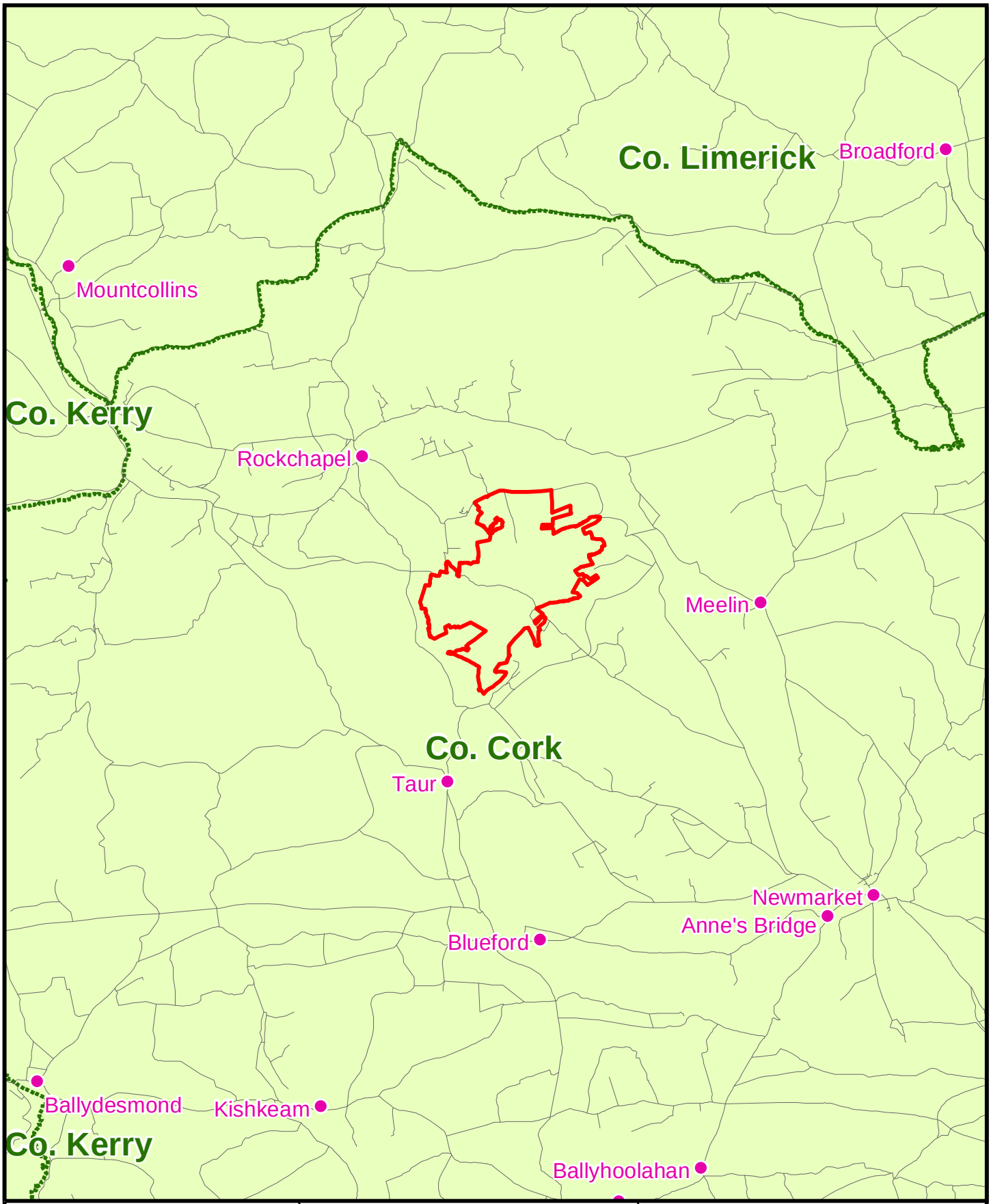


Figure 2.1
Site Context

SWS Environmental Services
MEMBER OF SWS Group

Scale: 1:100,000
0 2 4 km. N

Legend:
- Towns
- Roads
- Counties
- Site Boundary

Prepared by: S.C.
Checked by: R.H.
Created in: ArcGIS 9.1
Drawing date: 21/05/'03
Drawing No: 2004_154_Fig 2.1
Revised: 07/09/'04

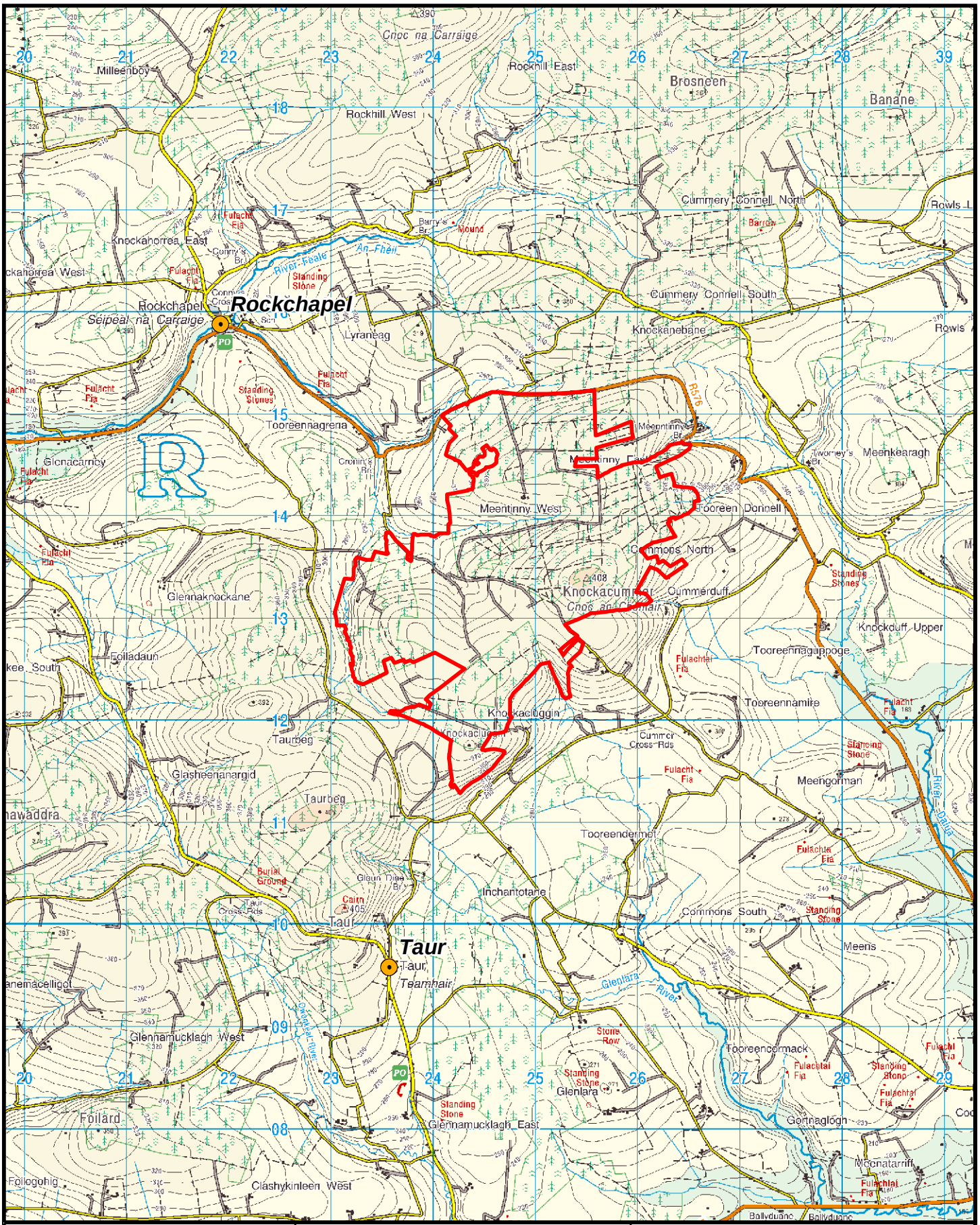


Figure 2.2
Site Location

Scale: 1:50,000

0 1 2 km.

N

Prepared by: S.C.
Checked by: R.H.
Created in: ArcGIS 9.1
Drawing date: 20/05/'03
Drawing No: 2004_154_Fig 2.2
Revised: 07/09/04

SWS Environmental Services
MEMBER OF SWS Group

Figure 2.3 Site Layout Map

The turbines commence power generation at wind speeds of 4 metres per second (m/s), rising to their rated output at wind speeds of 17 m/s. The design of the turbines is such that should wind speeds reach 25 m/s they automatically shut down in order to reduce high level wear and tear on the turbine.

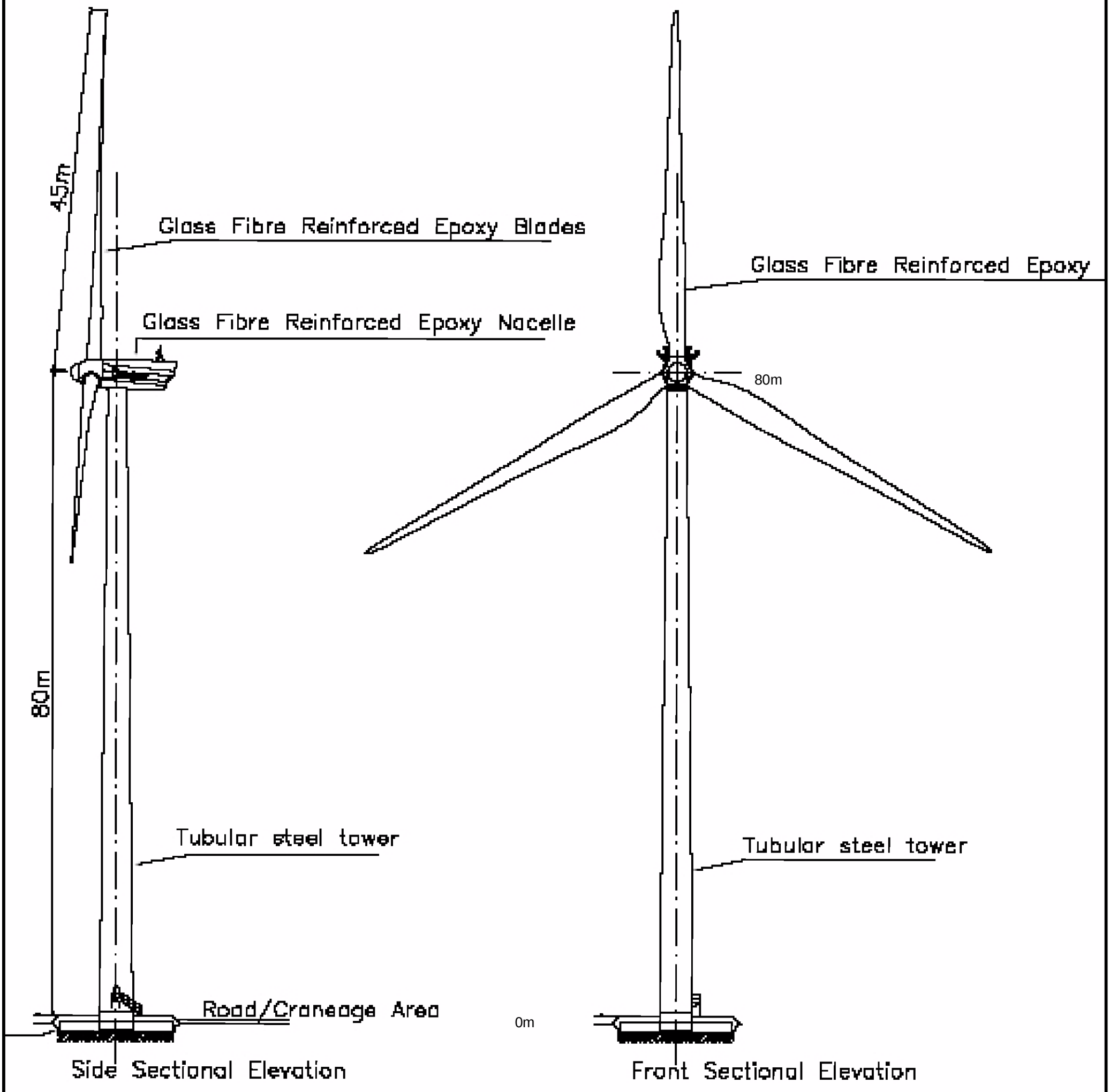
The wind turbines proposed are horizontal axis wind turbines consisting of a cylindrical metal tower, on which the generator and gearbox will be mounted in a housing known as a nacelle.

The blade radius will measure up to 45m; all of the blades on the turbines will rotate in the same direction and at the same speed rate of 8.6-18.4 revolutions per minute depending on the wind speed. Each of the turbines will require a transformer in order to step up the voltage of the electricity produced to 20 kV. The transformers will be located in the nacelle of the turbine. To reduce the visual impact of the development underground cables will link the transformers. Cable runs, including communications cables, will be located alongside site tracks at a depth of approximately 0.75m. The cable trench will be dug to a width of approximately 0.5m. The excavated material will be laid alongside the trench for use in reinstatement following the laying of cables.

The tower of the turbines will be fixed to a concrete foundation (hexagonal base with cylindrical shaft towers). Foundations are likely to be in the order of 15m x 15m x 2m approximately at their widest point. Exact specifications may change depending on the results of site investigation works at each turbine location.

The volume of concrete for each turbine base will be approximately 431m^3 and approximately 41300kg of reinforced steel bar. The depth of each turbine base may vary depending on the depth to bedrock; the extent of the excavation will likewise vary between 450-475m^3. Embedded in the centre of each foundation's 15m base would be a foundation mounting piece of some 4.19m in diameter rising to within 500mm of the surface level. The turbine would be bolted to this foundation mounting piece. It is intended to locate the top of the foundation at least 300mm below the existing ground level and to reinstate around the foundations with materials removed for excavation. The surface vegetation and topsoil layer would be removed and stored adjacent to the foundation site, whilst excavation of the foundation progressed. This stored material would be used during reinstatement of the foundation area following construction.

Once erected the wind turbines would operate automatically, requiring visits on a periodic basis only. These visits, primarily for turbine servicing, would typically be made using four-wheel drive vehicles.



Roni Hawe
SWS Environmental Services
Shinagh House
Bandon
Co. Cork

Figure 2.4
Wind Turbine Details

SWS Environmental Services
MEMBER OF SWS Group

Scale: 1:500

Prepared by: R.H.
Checked by: R.D.
Created in: ArcGIS 9.1
Drawing date: 1/11/'04
Drawing No: 2004_154_Fig 2.4

2.2.2 Meteorological Mast

Two meteorological masts are proposed for ancillary real time monitoring of wind speeds and direction on the site. The masts will be 80m high-galvanised steel poles. Three anemometers and three wind vanes will be mounted on each mast to monitor wind speed and direction. The masts will be held in place by guy wires connected to anchors buried in the ground. The locations of the masts are shown in site layout map (Figure 2.3) of this report. A schematic of a meteorological mast is shown in Figure 2.5.

2.2.3 Access Roads and Site Tracks

The proposed access point is from the R576 onto a forestry track located to the north of the site at grid reference E122891 N115137. The location of the access road is referenced in Figure 2.6.

Some parts of the access route leading to the site may require remedial works to facilitate the articulated trucks transporting the turbine blades. The developers subject to planning will consult with the Cork County Council Roads Section to establish the necessary remedial works.

Access tracks must be capable of supporting the loads associated with a wind farm development. It is proposed that 6.55km of new access tracks and 2.12km of existing track upgrade will be required for the development. Specifications of access tracks detailed below have been recommended by a turbine manufacturer based on the weight of a vehicle as follows:

- Max load per axle approximately 16t
- Max overall weight approximately 100t
- Max soil pressure of crawler crane approximately 25t/m^2

The width of the access tracks will be a minimum of 4.5m. The tracks will be made of gravel (diameter max. 60mm, layer thickness 0.4m) on compacted sand (approximately 0.3m). In order to prevent inundation, a textile layer may be needed to avoid later access problems with heavy loads. Crossfall from the road axis to the banking must be 2-3% to ensure proper draining. However the wind turbine manufacturer will be consulted before construction of the access tracks as depending on specific site conditions, the values stated above may change.

Proposed access tracks will follow the natural contours of the site as much as possible and will remain unsurfaced.

2.2.4 Grid Connection

The site would be linked to a grid connection building from which it would be connected to the electricity network.

The final grid connection specification will be subject to the requirements of Eirgrid (ESB National Grid) and details will be submitted with a separate overhead line planning application. There are a number of 110kV lines within 35km of the site however further consultation will be required with the ESB National Grid to determine the final grid connection.

The location of the grid connection compound and grid building are shown in the site layout plan Figure 2.3, this location has been chosen with regard to the visual assessment of the site. The location chosen, being on the lower parts of the site, would provide significant screening of the development and thereby minimise the effect on local views. In addition, the proposed location of the control building is in an existing forestry plantation. The forestry between the control building and nearby roads will act as a screen thereby minimising the visual impact of the control building.

The building will house the necessary metering and protection equipment for both the wind farm and the ESB. With the approval of Cork County Council, the building will be finished to standard ESB specifications for substations.. The walls and the roof will probably be pitched and will have a blue/black slated finish. The building is expected to measure 50m^2 in area.

The final technical specification with respect to this building would depend on the detailed design requirements of the ESB. A typical specification for the grid connection building is presented in Figure 2.7.

2.2.5 Crane Pads

Two example layouts (as recommended by a turbine manufacturer) for the crane area required for the erection of turbines of the hub height proposed for this development are illustrated in Figure 2.8. However the wind turbine manufacturer will be contacted prior to the construction phase to decide upon the best layout based on inspection of the proposed site.

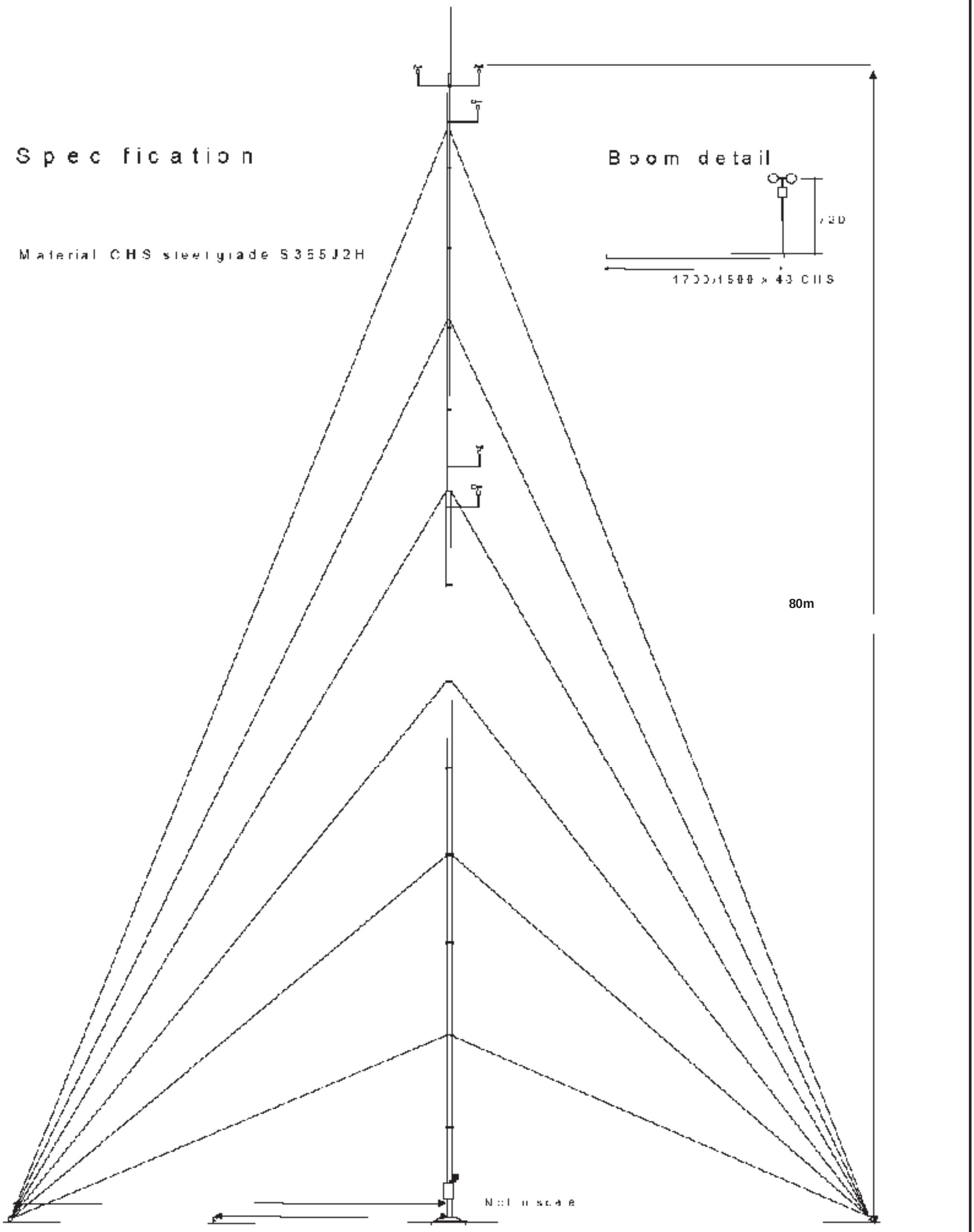


Figure 2.5 Schematic of Monitoring mast	SWS Environmental Services MEMBER OF SWS Group	Scale: 1:250	Prepared by: R.H. Checked by: R.D. Created in: ArcGIS 9.1 Drawing date: 03/11/'04 Drawing No: 2004_154 _Fig 2.5	Ordnance Survey Ireland License No: AR 0017004

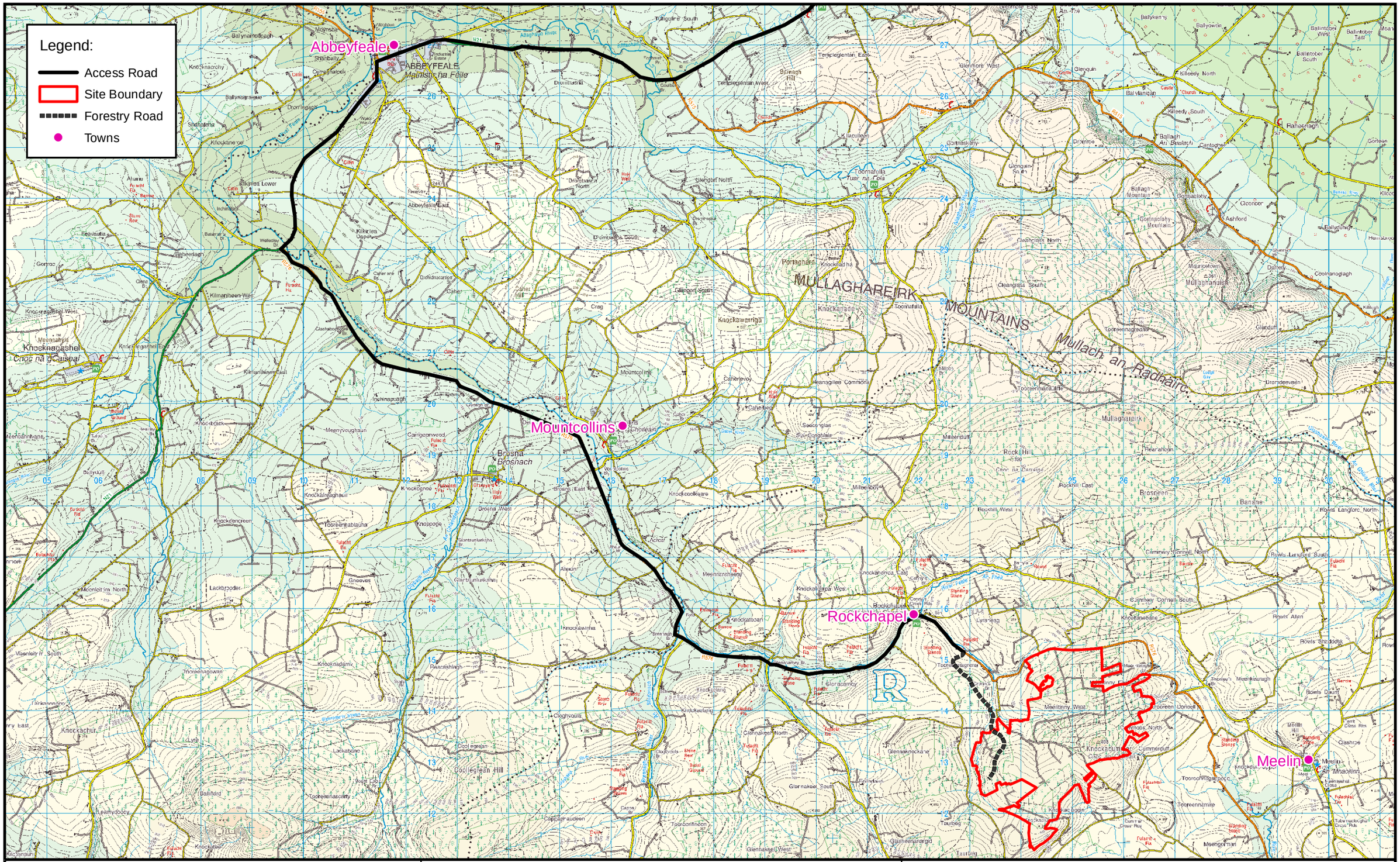


Figure 2.6
Location of Access Road

SWS Environmental Services
MEMBER OF SWS Group

Scale: 1:70,000

N

0 3 6 km.

Prepared by: R.H.
Checked by: K.O'D.
Created in: ArcGIS 9.1
Drawing date: 05/11/'04
Drawing No: 2004_154_Fig 2.6

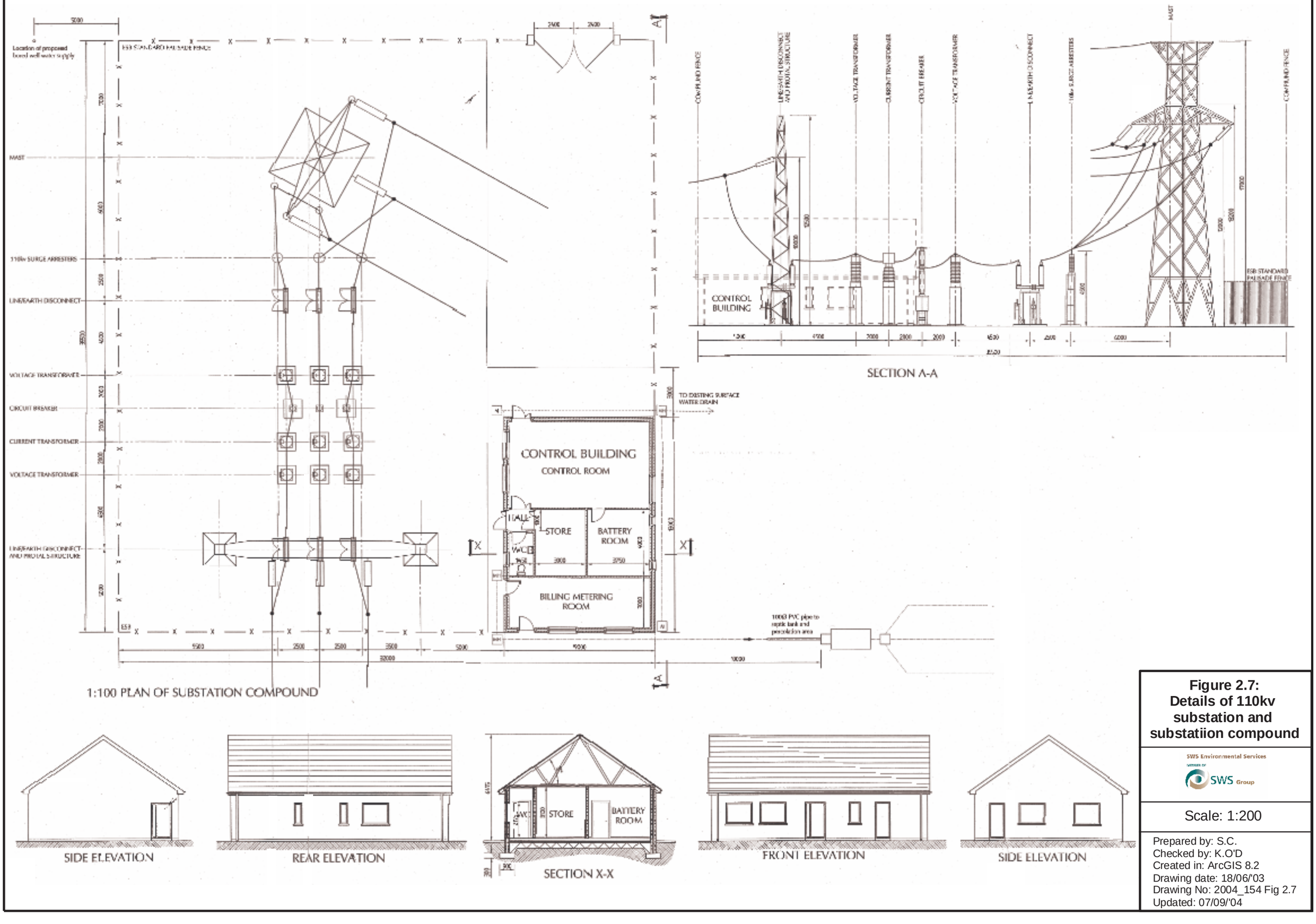


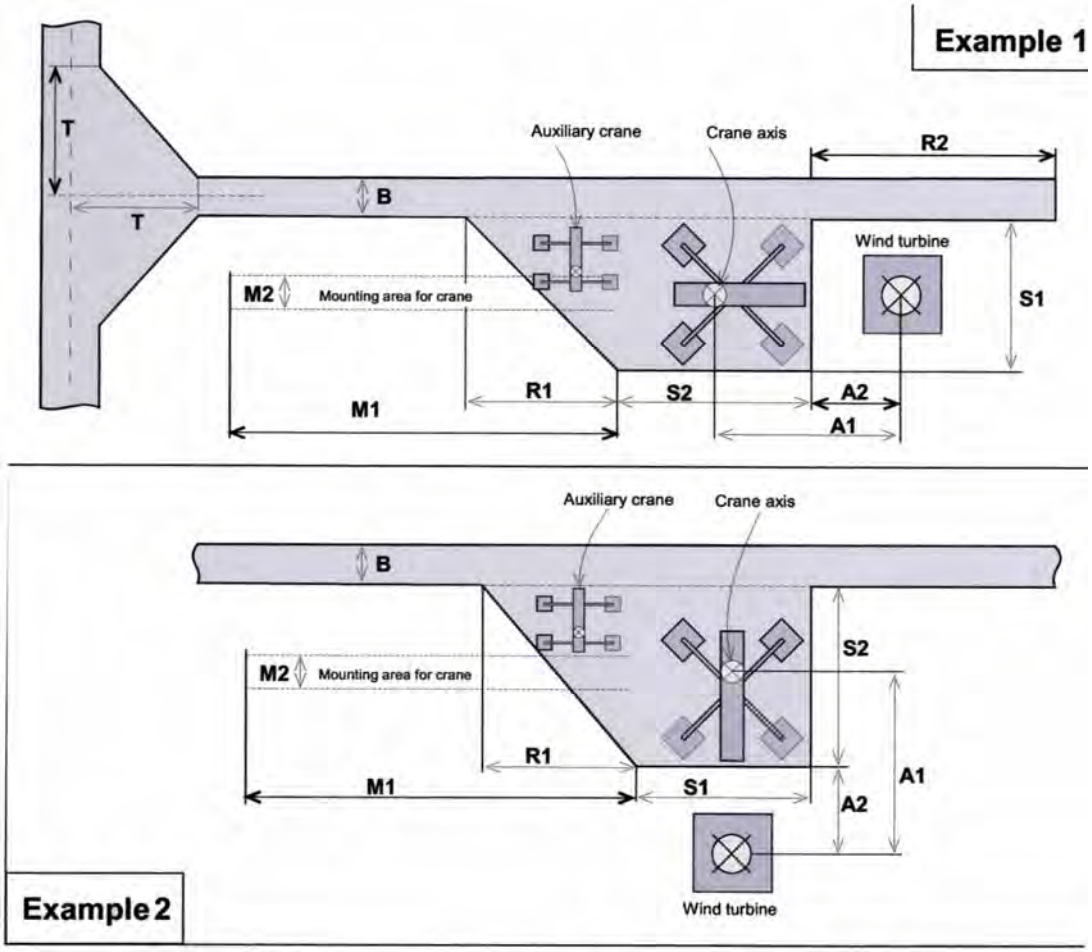
Figure 2.7: Details of 110kv substation and substatiion compound

SWS Environmental Services

Scale: 1:200

Prepared by: S.C.
Checked by: K.O'D
Created in: ArcGIS 8.2
Drawing date: 18/06/'03
Drawing No: 2004_154 Fig 2.7
Updated: 07/09/'04

Figure 2.8 Examples of Crane Area Layouts



	Hub height	60 m	80 m	100 m
R1	Length of shunting area	18 m	18 m	18 m
R2	Length of shunting road	20 m	45 m	45 m
B	Width of access road	4.5 m	4.5 m	4,5 m
S1	Width of crane area	18 m	18 m	22 m
S2	Length of crane area	22 m	22 m	25 m
A1	Distance crane centre - centre of turbine	22 m	22 m	22 m
A2	Distance crane area - centre of turbine	11 m	11 m	11 m
M1	Length of area necessary for crane jib assembly	110 m	110 m	125 m
M2	Width assembly space for crane jib	4 m	4 m	4 m
T	Delta of entrance bend to be used	25 m	25 m	25 m

The crane area must be levelled (maximum gradient ± 200 mm).

2.3 Project Construction Assessment

The approximate period of construction for completion of the total scheme is estimated at approximately 15-18 months. It is expected that during construction there will be an average of approximately 50-70 people employed on the site.

The total estimated cost of the proposed development is expected to be up to €90 million based on current prices.

2.3.1 Construction Methodology

Construction of the proposed development will take place in line with the sequence set out below.

- Install meteorological masts;
- Clear and hardcore area for temporary site offices and mobilise same;
- Construct bunded area for oil tanks.
- Construct new site roads and hardstanding. Use local stone for road construction in so far as is possible. Where rock is encountered, break out using breaker on hydraulic excavator. Construct drainage ditches etc. integral to road construction operations.
- Excavate for turbine bases. If necessary, dewater excavations. Store soil locally for backfilling and re-use. Place blinding concrete to turbine bases. Fix reinforcing steel and anchorage system for turbine tower section. Construct shuttering. Fix any ducts etc. to be cast in. Place concrete to bases by starting from the centre, working out to the edges and finishing with the rising section from the middle. Cure concrete. After 1-2 days, remove shutters.
- Construct sub-station building and bases/plinths for transformers.
- Excavate trenches for site cables, lay cables and backfill. Provide ducts at road crossings.
- Partially backfill foundations where necessary for crane operations.
- Mobilise and erect transformers at compound.
- Erect towers, nacelles and blades.
- Erect fencing at transformer compound.
- Complete earthings to towers and complete backfilling to foundations
- Complete electrical installation, SCADA system etc.
- ESB grid connection.
- Commission and test plant.
- Complete site works, tidy up site etc.
- Demobilise offices etc.
- Provide any gates, landscaping, signs etc., which may be required.

Detailed Method Statements and Risk Assessments will be prepared in advance of all construction activities and will incorporate any mitigation measures recommended elsewhere in this report.

2.3.2 Construction Plant-use

- 6-8 No. Hydraulic Excavators
- 4-5 No. Dump Trucks
- 350/500 tonne Crane
- 80/100 tonne Crane
- Concrete Pump (Lorry mounted)
- 2 tonne Dumper
- 150 mm Dewatering Pump
- 2 No. Site Offices
- 2 No. Toilets, Portaloo type
- 1 No. Canteen Block/Drying Vehicles
- Cement Mixer
- Miscellaneous Power Tools

2.3.3 Employment

Upon completion of the development it is anticipated that 1 person will be employed part-time on site. It is the intention of the developers that as many elements of the development as are viable will be manufactured or supplied locally. Local building developers will be engaged to carry out the site civil and ancillary works. Raw materials will be sourced locally as will the necessary support machinery and plant hire equipment. During the construction phase it is anticipated that in the region of 50-75 individuals will be employed on a temporary full time basis on the project.

Additional temporary employment will be created in any post development environmental assessments.

2.3.4 Temporary Site Facilities

Two site offices, approximately 6 m x 3 m each will be brought to site. The Site Management and various Sub-Contractors will use this. A canteen block, 6m x 3m x 3m and a small drying room will be provided. Two “portaloo” type toilets will also be provided. These will be emptied on a weekly basis (or more frequently, if necessary) under a service contract with the supplier. Water for tea, coffee etc. will be brought on site in 20-litre containers on a daily basis. Power will be provided using a diesel driven generator. Telephone communications will be by mobile phone.

The generator and diesel tanks (two tanks, up to 2000 litre capacity each) used to store fuel for the various items of plant will be located within a bund. This will comprise a reinforced concrete base and stub walls, 300 mm high.

2.3.5 Waste Generated during Construction

The wastes likely to be generated during the construction phase will include the following:

- Excavated material from road cuts and foundations. This material will be stored in a centralised area to minimise environmental impact and will be used on-site for hardstanding and embankments;
- Cut-offs from building material. This material will be taken off-site for re-use, recycling, or taken to a licensed landfill facility;
- Domestic-type waste generated by contractors. This material will be collected on–site, stored in an enclosed skip and disposed of at a licensed landfill facility.

2.3.6 Impacts of Construction Traffic

As with any construction development project, the transport of materials onto the site will give rise to increased traffic and associated impacts. It is considered that the proximity of the site to the regional route R576, (the primary access road to the site) will reduce the degree of traffic impact that would otherwise be associated with third class or minor roads.

Public perception of the construction phase will be influenced primarily from the impact of traffic movements. The degree of traffic disturbance caused by the construction phase of a wind farm depends on the number of turbines, the associated civil engineering requirements and the length of the construction period.

The traffic movements to be expected will involve:

- Vehicles bringing concrete (for foundations) to the site;
- Articulated vehicles bringing turbine components to the site;
- Vehicles of those employed on site for the construction phase;
- Cranes to erect the turbines.

Concrete is a perishable product and must be sourced within a specified distance from the construction site. This being the case the development will have a positive impact on local industry. The largest number of traffic movements will be associated with the delivery of concrete to the site for construction of turbine foundations.

Assuming a maximum load of 8.5m^3 lightweight chassis mixer the total number of Heavy Goods Vehicles (HGV's) is estimated at 945 over the construction period.. Given that the R576 is a regional route with corresponding existing HGV's traffic, the traffic impact

associated with this development will largely be focused on the site access road from the R576 to the site entrance.

Table 2.1 Predicted Traffic Loads for Development to Site

Item	Amount	Associated Traffic Loads	Comment
Towers	29	87 HGV's	Delivered in subsections assuming 3 sections per tower
Nacelles	29	29 HGV's	Assuming 1 section per turbine
Blades	87	87 HGV's	Three blades per turbine
Tower Bases	29	29 HGV's	Assuming 1 per truck load
Electrical Components	Not Determined	38 HGV's	Assumption is based on consultation with turbine manufacturers
Concrete	12528m^3	1473 HGV's	Assumes 8.5m^3 maximum load capacity
Stone	0	0	Will be sourced on-site
Bedding Sand and Road Finishing Material	2168m^3	271 HGV's	8.67km in total – new (6.55km) road and existing (2.12km) road upgrade
Building Material	Variable	40 HGV's	Ancillary building requirements
Meteorological Masts	2	2 HGV's	70m masts
Crane	2	4 HGV's	300 tonne crane and 450 tonne crane
Employees	50-75	50-75 PCU's	Will vary depending on activities
Fuel	40,000	Max 10 HGV's	Assumes 2 x 2,000L tanks onsite
Plant	10	25 HGV's	Track Excavators, etc.

HGV: Heavy Goods Vehicle
PCU: Personal Carrier Unit

It is considered that the impact of traffic associated with delivery of raw material will be marginal within the larger infrastructural area and moderate in the immediate site area. These impacts will be temporary in nature. Subject to planning permission the developers will liaise with the Local Authority and An Garda Síochána to develop a traffic management plan to minimise traffic impacts.

Traffic impacts associated with delivery of the turbine components may give rise to some logistical problems. The selection of final delivery times and routes will be subject to detailed consultation with the Planning Authority and the Garda Siochána. The site has good

accessibility with close proximity to a regional route. This will greatly assist the logistics of delivering components on site, compared to more remote and inaccessible locations.

Once turbines are in operation, traffic movements to and from the site will be very light, probably averaging one visit a week by a light commercial vehicle or car. The potential need to replace machine components may generate heavier commercial vehicle movements, but these are likely to be infrequent. The table below itemises the traffic volume and activity of origin expected for this development.

2.4 Alternative Layouts

A number of alternative layouts were investigated for this site based on their impact on the surrounding environment. The first design was completed based on the maximum number of turbines that could be placed within the site boundary.

A number of different turbine designs and specifications were used ranging in size from 660 kW turbines to 3 MW turbines. Given the total area and good wind regime at the site the large turbine class were deemed most suitable for this development. Consultation with a number of turbine manufacturers was undertaken to establish the specific turbine specifications most suitable for the site. Following a decision on the type of turbines the preliminary layout was designed.

The site engineering design was optimised to include only turbines above a specified height above sea level. This height was selected upon based on recorded wind speeds at various meteorological monitoring locations in the Munster region.

The developers originally designed the initial layout to include thirty turbines. The public consultation was carried out with reference to this layout. The layout was subsequently reduced to 29 turbines due to potential environmental and planning constraints. In the environmental impact assessment potential impacts associated with noise at sensitive residents were highlighted to the developers. Following detailed acoustic modelling the developer recommended the removal of one turbine (location 114268N, 124607E) to reduce potential noise impacts. The removal of this turbine from the layout was decided to be of additional precautionary merit in the consideration of potential impacts upon nesting Hen Harriers.

Turbines with an 80m-height tower were chosen over a 60m-height tower, as the visual impact from the 80m towers was only marginally greater than the impact from the 60m tower. The extra 20m height on the turbine tower will ensure maximum exploitation of local wind speeds.

The requirement to locate turbines a minimum of five rotor diameters apart results in a grid-type layout being optimal for the Knockacummer site. This grid arrangement was also determined to be the most suitable in ecological corridor terms as it retains longitudinal tracts of open ground which the Hen Harrier, a priority Annex I species occurring in the area, could potentially utilise for foraging purposes.

The final layout included buffer zones between dwellings not involved in the development and turbines. This layout is seen in Figure 2.3.

2.5 Alternative Access Routes

Two alternative access routes were considered as shown in Figure 2.5. These are:

Option 1

The direction of the route is from Foynes Port to Newcastle West and then onto the N21 through Abbeyfeale to Wellesley Bridge. From Wellesley Bridge the R576 is followed to Rockchapel. The route continues along the R576 as far as Tooreennagrena. From there, it takes a right tutn along a forestry road up to and into the site.

Option 2

The direction of the route is from Foynes Port to Newcastle West and then onto the N21 through Abbeyfeale to Wellesley Bridge. The R576 is taken from Wellesley Bridge and is followed north and east of the proposed site until Knockduff Upper where a right turn is taken unto a third class road, continues through Cummer Cross roads and unto a forestry track leading into the site.

Cronin's Bridge may need assessment by a qualified structural engineer to determine its capacity to carry the loads anticipated for this development and to ensure that the physical dimensions of the bridge suit those of the transport vehicles required.Modifications will also be required at Meentinny Bridge due to the sharpness of the turn. Some sections of the third class road leading up to the site may also require modifications.

After an examination of the two options it was decided that Option 1 would be the most suitable access route, as it will better accommodate the anticipated loads with minimum modification of the route required. Any required modifications to the route will be finalised in consultation with the Cork County Council Roads Section.

A detailed plan of remedial works required for Option 1 will be agreed with the Cork County Council Roads Section prior to construction commencing.

3.0 ENVIRONMENTAL ASSESSMENT PROCEDURE

3.1 Introduction

This EIA study shall address the key issues described below:

1. Human Element and Existing Environment
2. Land use and Habitat
3. Landscape and visual amenity
4. Ecological Impacts
5. Geology, hydrogeology and drainage
6. Noise
7. Cultural and heritage resources
8. Electromagnetic interference
9. Other Impacts (shadow flicker, traffic, health and safety)
10. Interaction of impacts.

The scoping study of the EIA identified the main potential environmental impacts of the proposed development as ecological impacts and landscape-visual impacts. Particular emphasis was therefore placed on assessing potential ecological and landscape-visual impacts with the siting of turbines at the proposed site. The developer has considered extensive mitigation measures to ensure no negative impacts as a result of the development.

4.0 HUMAN ENVIRONMENT

This section of the report describes the existing human environment in terms of land use, population and employment and assesses the likely impacts on this environment arising from the proposed wind farm development. The main areas of concern with respect to the potential affects of the development on the human environment are visual impact, ecological impact and noise impacts. These are discussed in detail in various sections of this EIS. Other potential impacts include health and safety impacts to employees and locals, potential impacts on tourism, potential impact of shadow flicker and socio-economic impacts.

4.1 Existing Environment

The site is situated on one of the peaks of the Mullaghareirk Mountains in the Munster Ridge and Valley province of Ireland, with the Knockacummer peak (408m) lying just over 6km from the Mullaghareirk peak (405m) itself. The site ranges in elevation from 250 to 408mOD. The nearest settlements are Taur village 1.5km southwest of the site, Rockchapel village 1.3km to the northwest and Meelin village 3.5km to the east. The nearest town is Newmarket located approximately 8.5km southeast of the site. The site is accessed by a turnoff from the R576 (Figure 2.6). Settlement patterns in the immediate area consist of scattered isolated dwellings with some linear settlement on the third class roads surrounding the site.

The site and surrounding area is located in the Duhallow region encompassing the market towns of Rathmore, Kanturk, Newmarket and Millstreet and a number of villages. The region is about 400 square miles in area with a population of approximately 30,000 people. Greater then 90% of the land in Duhallow is classified by the Department of Agriculture as disadvantaged or severely handicapped. The land is mostly subject to poor drainage and is of limited use due to the predominance of gley soils in the region. The Mullaghareirk Mountains cover much of the north and west of Duhallow, while the Derrynasaggart and Boggeragh ranges cover the area south of Rathmore, Millstreet and Banteer. Here the land is generally unproductive. There are also some upland areas where land use is severely limited with reclaimed podzol and peaty podzol soils. This is particularly true of the areas around Rockchapel and Ballydesmond where much of the land is covered by raised bog. Duhallow has one of the highest concentrations of forestry in Ireland.

The Knockacummer site itself consists of commercial forestry plantation, turbary and rough pasture. Two illegal municipal waste dumps are also located on the site in the Meentinny West area and are currently being monitored by Cork County Council.

All residential properties with the exception of five houses are over 500m from the nearest proposed turbine location. One dwelling is located 358m from the nearest turbine. This dwelling belongs to a landowner involved in the development. Four houses are located

between 400m and 500m from the nearest turbine of the proposed development, one of which is owned by a landowner involved in the development. A map outlining the location of residential houses within the surrounding area is shown in Figure 4.2.

4.1.1 Demographic Information

The proposed site is located in townlands of Knockacummer, Tooreennagrena, Meentinny West, Meentinny East, Cummerduff, Knockacluggin and Tooreen Donnell in County Cork. These townlands are in the District Electoral Divisions (DEDs) of Clonfert East and Glenlara. The *Report on the Socio-Economic, Environmental and Statistical Profile of Cork County (Excluding Cork City)* written for the Cork County Development Board by Peter Bacon and Associates (April 2001) was consulted for demographic information on Cork County. The *Census 2002 Preliminary Report* by the Central Statistics Office was consulted for specific demographic information on the DED of Clonfert East and Glenlara.

General Demographic Information on Cork County

The population of Cork (excluding Cork City) was 293,323 per the 1996 census. A growth rate was experienced in the period 1991-1996, however this growth was uneven, with a number of areas in the County (concentrated in the north and northwest) experiencing population decline. The number of females within the 20-30 age group in the countryside is low and there is a high proportion of unmarried males in some areas. It is likely that the declines were mostly due to the migration of the 20+ age group. However over time, this could become self-reinforcing, with the lower proportion of females forming families in the area leading to lower birth rates and further rural decline. The average population density in County Cork is 39 persons per square kilometre (based on 1996 census). Areas to the north and west of the Ring towns decline to the average of 23 persons per square kilometre. This is significantly lower than the EU average of 115 persons per square kilometre.

Clonfert East and Glenlara Demographic Information

The summary of census data for the Clonfert East and Glenlara DED (Table 4.1) indicates that although the population of Glenlara DED increased, the overall population of Clonfert East and Glenlara has decreased by 1.8% during the period 1996-2002. Clonfert East and Glenlara are DED's of the Duhallow barony. The population of this barony incorporating Rathmore, Kanturk, Millstreet and Newmarket has halved in the past 100 years. The decrease in the population of the study area may be attributable to out-migration of young people and an aging farming population.

Table 4.1 Demographic Information for Clonfert East DED

Clonfert East DED	**Persons**	**Change in Population 1996-2002**	**% Change +/-**
Total Pop 2002	361	-26	-6.7
Total Pop 1996	387		
Glenlara DED	**Persons**	**Increase Since last Census**	**% Change +/-**
Total Pop 2002	339	+13	+4
Total Pop 1996	326		
Clonfert East & Glenlara DED Combined	**Persons**	**Increase Since last Census**	**% Change +/-**
Total Pop 2002	700	-13	-1.8
Total Pop 1996	713		

Source: Central Statistics Office (CSO)

4.2 Characteristics of the Development That Could Impact on Human beings

Wind farms are moderately land intensive (approximately 6 ha/GWh/year) in regard to the total area required to harness the wind for an energy development The actual area covered by the turbines is much smaller however, so that together with site roads and other buildings, approximately 1% of the area within the wind farm is actually occupied. The percentage of actual land developed or land use lost due to the development means that wind energy schemes are unlikely to have significant impact on land use or habitat damage providing they are sited away from areas of archaeological importance, high conservation or recreation value or sensitive natural ecosystems.

Potential impacts associated with the proposed development in relation to any significant impacts to humans can be assessed based on impacts associated with noise during construction and operation, visual impacts associated with the turbines and potential impacts on tourism, health and safety impacts associated with traffic increases during construction and also potential impacts associated with turbine operation. Also of concern are any impacts associated with material assets in the local community. These impacts are discussed in detail in the following sections of the EIS.

North and West Cork have been identified as areas of decline by Cork County Council; the North and West Cork Strategic Plan 2002-2020 was drafted to tackle this issue. The productive potential of the area in which the site is located has been identified as weak by this Plan. Therefore it is anticipated that this development should have a positive impact on the human environment through the generation of revenue for people in the local community.

Figure 4.2
House Locations

SWS Environmental Services
MEMBER OF SWS Group

Scale: 1:50,000

0 1 2 km.

N

Scale: 1:35,000

0 1 2 km.

N

Prepared by: R.H.
Checked by: C.O'C.
Created in: ArcGIS 9.1
Drawing date: 11/10/'04
Drawing No: 2004_154_Fig 4.2
Revised: 2/11/'04

5.0 LANDSCAPE AND VISUAL IMPACT ASSESSMENT

5.1 Introduction

In order to be commercially viable wind farms must be located in exposed areas where they can harness the wind energy. They are usually located in rural areas, often with few residential developments and only intermittent human visitation and use. Visibility is largely dependant on site-specific conditions. The impact of wind farms on visual amenity is probably the most controversial and difficult to quantify of all the environmental issues affecting wind energy developments. The visual impact of a wind farm development is largely dependent on geographical location and landscape character value. In estimating the potential landscape and visual impact, the quality and value of the existing landscape must be determined. From this the likely impact of the introduction of wind turbines and how they may alter the perceived landscape character must be assessed. This section of the EIS examines and assesses the existing landscape, the visual impacts associated with the proposed development and the landscape's ability to accommodate these impacts.

5.2 Methodology

1. Landscape Assessment Methodology

The existing landscape in the study area is described and assessed to determine its sensitivity. The process of landscape characterisation focuses on what it is that makes one area different from the next. This is done by analysing combinations of landscape elements and features to define the distinctive characteristics of a landscape. This assessment is based on the identification of the major physical, visual and historical elements of the landscape. The process involves identification of land use, topography and physical geography of the area.

The aim of the landscape assessment approach is to utilise a computer based GIS mapping and overlay system to assist in the landscape character assessment. The methodology is based on the landscape assessment approach as supported by the Heritage Council in the Pilot Study on Landscape Characterisation in County Clare 2000. Figure 5.1 illustrates the computer based GIS methodology undertaken in the landscape assessment.

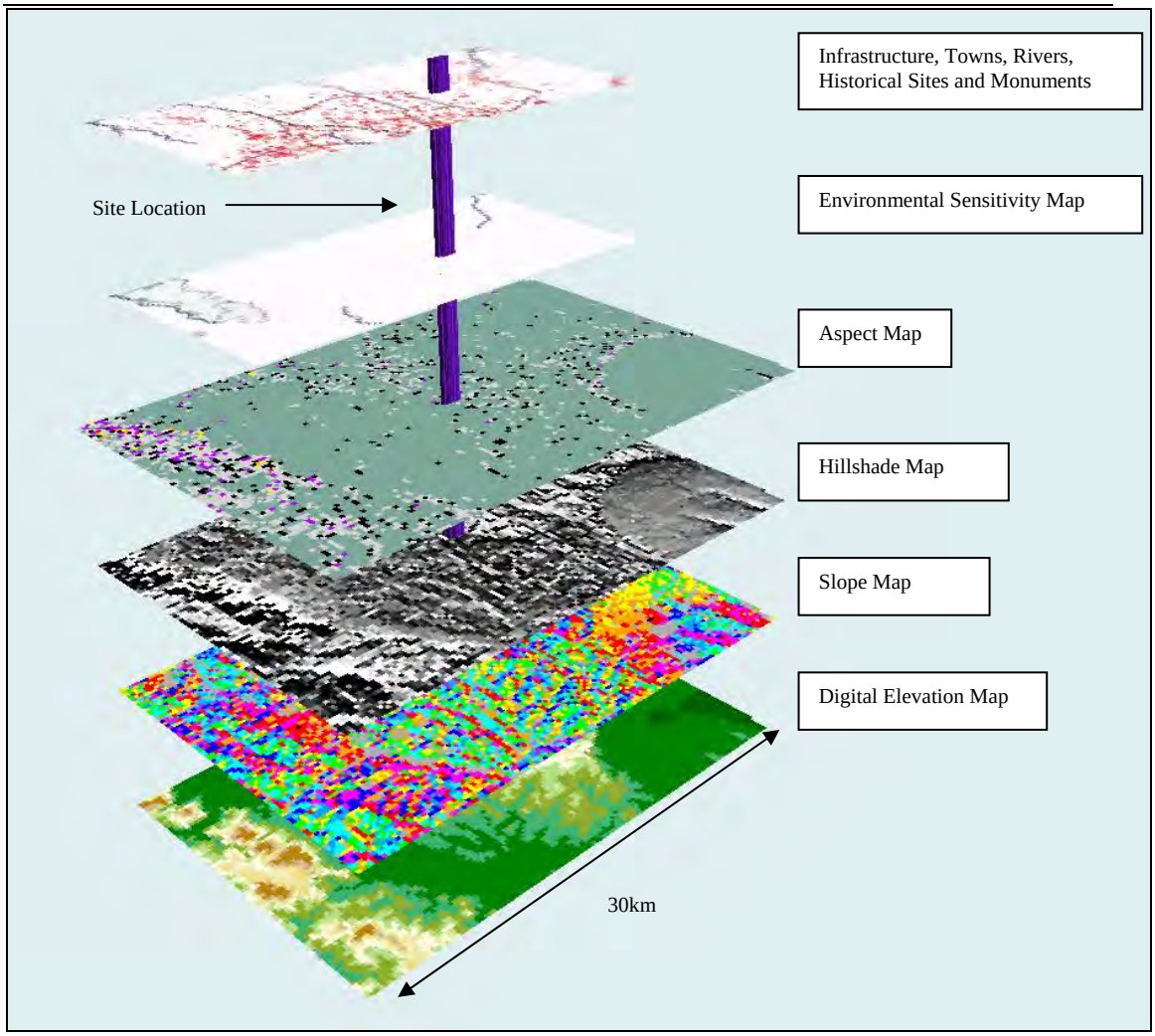


Figure 5.1 Landscape Assessment Methodology

2. Visibility Assessment Methodology

The visibility of the proposed development comprising twenty-nine wind turbines of 80m-hub height and 90m-blade diameter was assessed using a combination of the following methods:

i. Determination of Zone of Visual Influence (ZVI)

Zone of Visual Influence (ZVI) maps were produced by Geographical Information System (GIS) software. Using high quality (10m contour interval) ZVI cartographic maps, the visibility of the proposed development was determined. (These simulations assess the visibility based on the turbine blade tips)

A number of ZVIs were created for different layouts and were examined to assess the visual impact of the turbines in relation to landscape features such as principle roads, areas of interest (e.g., SAC's, NHA's), topography and vegetation. Using this approach it was possible to design a layout based on minimal visual impact.

The preferred layout and resultant ZVI map illustrates the locations from which the development might theoretically be seen within the physical landscape. It is important to note that this method is calculated on a lunar landscape with no vegetation or screening. The ZVI therefore represents a worst-case scenario for the visibility of the wind farm.

The maximum distance from which a development can be seen depends on criteria such as the observer and weather as much as the development size. In all cases, vegetation and buildings will further reduce visibility below the levels predicted from purely topographical studies.

ii. Viewshed Reference Points and Photomontages

Potentially sensitive viewshed reference points (VRPs) were selected from the ZVI in order to produce illustrative photomontages of the proposed development.

Landscape computer image modelling (photomontages) of the development at these locations was used to assess the actual visibility of the development and potential visual landscape impact. These photomontages demonstrate the difference between the theoretical visibility indicated by a ZVI and actual visibility as seen in the photomontages.

WINDFARM, a specialised wind development graphic imaging visualisation software was used to create photomontages to show the actual visibility of the development on the landscape. The software superimposes the turbine structures on geo-referenced photographic images of the area.

All photographs for this assessment were taken with a standard 50mm lens using an Olympus OM1 camera, as recommended the WINDFARM software developer and the draft Wind Energy Planning Guidelines, 2004.

The viewshed reference points (VRPs) selected are representative of a variety of viewing locations which reflect the following:

- A balance to the north, south, east and west,
- Views from the immediate area of the proposed development,
- Views at varying distances from the proposed development,
- Views from the Views and Prospects and other scenic amenity designative areas in the Cork County Development Plan,
- Views from and to residential areas.

5.3 Results of Landscape Assessment

Site Location

The proposed development site is located on the Cork side of the Cork / Limerick border among the southern foothills of the Mullaghareirk mountain range and within the townlands of Knockacummer, Meentinny West, Meentinny East, Tooreennagrena, Tooreen Donnell, Commons North, Cummerduff and Knockacluggin.

The site itself is approximately 8.5km southeast of Mountcollins, 9.8km north of Boherboy, 10km southwest of Broadford, 10km south of Ballagh and 11.2km northeast of Ballydesmond. It lies on R576 between Rockchapel and Newmarket.

Geomorphologic Context

The terrain within which the site is located can be described in general terms as rolling and elevated (see Figure 5.2). Knockacummer hill forms a spur off the main Mullaghareirk Mountain range, approximately 7km to the south. The site itself is comprised of Knockacummer hill to the east, Knockacluggin hill to the south, and the hill at Meentinny East to the north.

The site forms part of the greater watershed feeding tributaries of the River Feale (to the West, Northwest and North), the Glenlara River (to the South), and the River Dalua (to the South, East and Southeast).

Elevation

The site occupies a relatively elevated position and is enclosed to a significant extent by the undulating and elevated terrain that surrounds it. The highest point on the site is located on Knockacummer hill (at an elevation of 408mAOD) and the lowest point (at the most north-westerly point on the site) is at approximately 225mAOD.

Aspect and Site Exposure

The relative geographical context of the existing site within the surrounding landscape is significant in terms of the visibility from the site and to the site from the surrounding hinterland.

Visibility from the site is enclosed to an extent from the hills approximately 4km west of the site (Foilard hill 350mAOD Glentanemacelligot hill 393mAOD, Glenawaddra 375mAOD). Views from the north are constrained by the presence of the Mullaghareirk Mountain Range including Rock Hill (390m AOD and 3.5km northeast of Rockchapel village) and Lyranbeg hill (320m AOD and 2km east of Rockchapel village).

Aspect within the site (Figure 5.4) varies; with different areas of the site facing in different directions therefore there is no specific aspect with dominance on the site. In the proposed sites hinterland, it is evident from Figure 5.4 that the majority of the site exposure is available from the west and southwest aspect slopes in the south and east of the proposed windfarm. To the north and west of the proposed windfarm site exposure is limited to south facing slopes and east facing slopes respectively.

Site exposure beyond approximately 6km in all other directions is fragmented by undulations of the terrain that mask the site from Newmarket, Ballydesmond, Kishkeam and Blueford.

Landcover and Landuse

Land cover (Figure 5.6) within the site can be divided into Plantation forestry (89.8% of site area), Improved Grassland (6.47% of the site area), rushy Grassland (1.81% of site area) and Moorland (1.92% of the site area) (see figure 6.1).

Table 5.1 Landcover Areas

Habitat Type	Area m2	Area Ha	Area Acre	% Total Area
Clearfelled	178453	17.85	44.10	2.7
Immature Forestry	601992	60.20	148.75	9.1
Improved Grassland	427259	42.73	105.58	6.47
Juncus Grassland	120015	12.00	29.66	1.81
Mature Forestry	3436395	343.64	849.15	52.1
Moorland	127207	12.72	31.43	1.92
New Plantation Forestry	1710441	171.04	422.66	25.9
Total Area	**6601762**	**660**	**1631**	**100%**

The majority of the land area within the site (92.4 - 97%) can be classified as anthropogenic or ‘human-made’ landscape. The overall visual impression of the site is a complex of conifer plantation blocks, with occasional small fields supporting medium to marginal quality grazing. Land use within the hinterland is dominated by forestry and agriculture, and the closest conservation area is 8.5km from the site boundary (see Figure 6.2).

The Cork County Development Plan 2003, has assigned Landscape character values associated with local areas. In the area of the proposed windfarm the landscape character is described as ‘Marginal Moorland and Forested Hills’. This characterisation corresponds accurately with the overall impression of the site and its surroundings.

Cultural Symbology

A review of the DOEHLG Record of Monuments and Places (which includes all Sites and Monuments Record Sites (SMR), as well as additional notable monuments) revealed one Recorded Archaeological feature within the site boundary.

An additional 9 Archaeological features/monuments lie outside the boundary and within 2km of the proposed turbine locations (see Appendix 10). Of the nine features that lie within 2km

of the proposed turbines, five have potential views of the site. The five SMR sites concerned are listed below.

Table 5.2 Archaeological features/monuments within 2km of the proposed development.

MON. NO.	EASTING	NORTHING	DESCRIPTION
CO014-00101-	126400	112420	Fulacht fiadh
CO014-00102-	126400	112420	Fulacht fiadh
CO014-00201-	127840	113500	Standing Stone
CO014-00202-	127890	113450	Standing Stone
CO014-077---	126590	111500	Fulacht fiadh

A review of the Cork County Council Record of Protected Structures (Architecture) confirmed that the nearest protected buildings are located within Rockchapel village (3km from site) and the townland of Knockduff (Meelin Village) (3.5km from site).

A field survey of the site revealed no evidence of features of cultural significance within the site boundary. A review of the 2002 Governmental Spatial Strategy (specifically Figure 3.1 of that document) and various general texts on Archaeology and Cultural Geography support the conclusion that the area is remote, but not regarded as culturally distinctive.

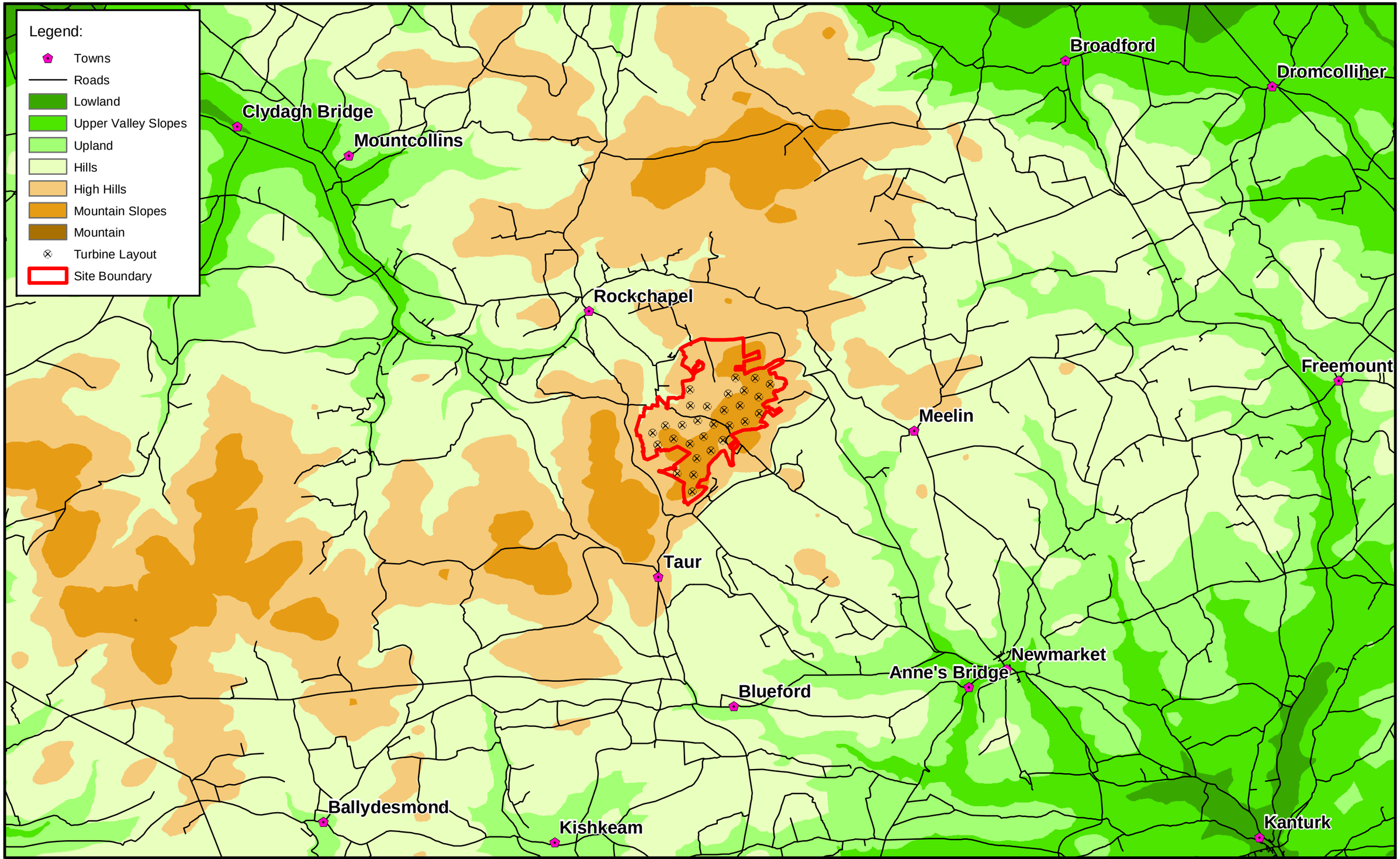


Figure 5.2
Digital Elevation Model

SWS Environmental Services
MEMBER OF SWS Group

Scale: 1:85,000

0 2,500 5,000 m.

N

Prepared by: R.H.
Checked by: C.O'C.
Created in: ArcGIS 9.1
Drawing date: 30/09/'04
Drawing No: 2004_154_Fig 5.2

Ordnance Survey Ireland
License No: AR 0017004

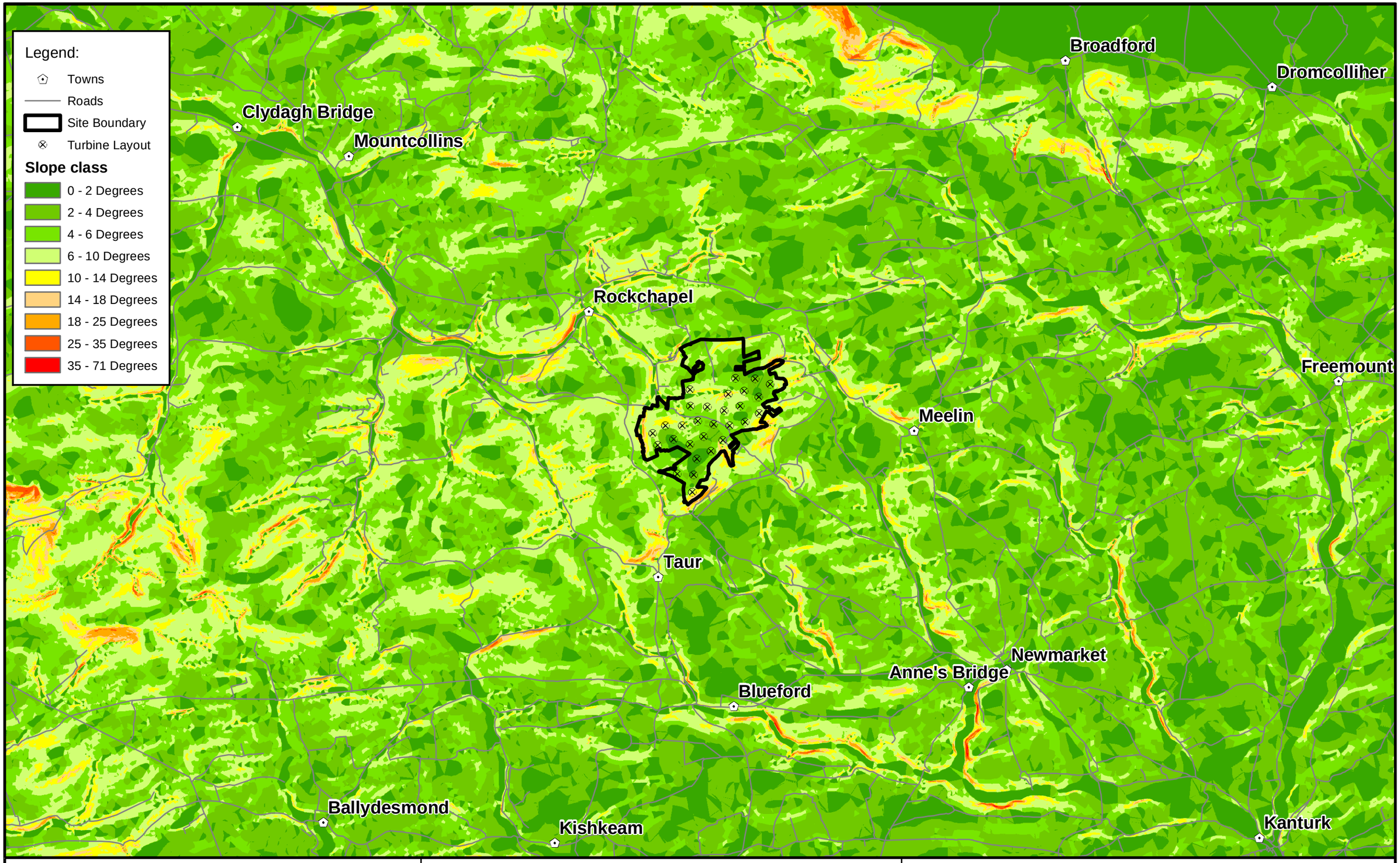


Figure 5.3
Slope Model

SWS Environmental Services
MEMBER OF SWS Group

Scale: 1:85,000

0 2,500 5,000 m.

N

Prepared by: R.H.
Checked by: C.O'C.
Created in: ArcGIS 9.1
Drawing date: 30/09/'04
Drawing No: 2004_154_Fig 5.3

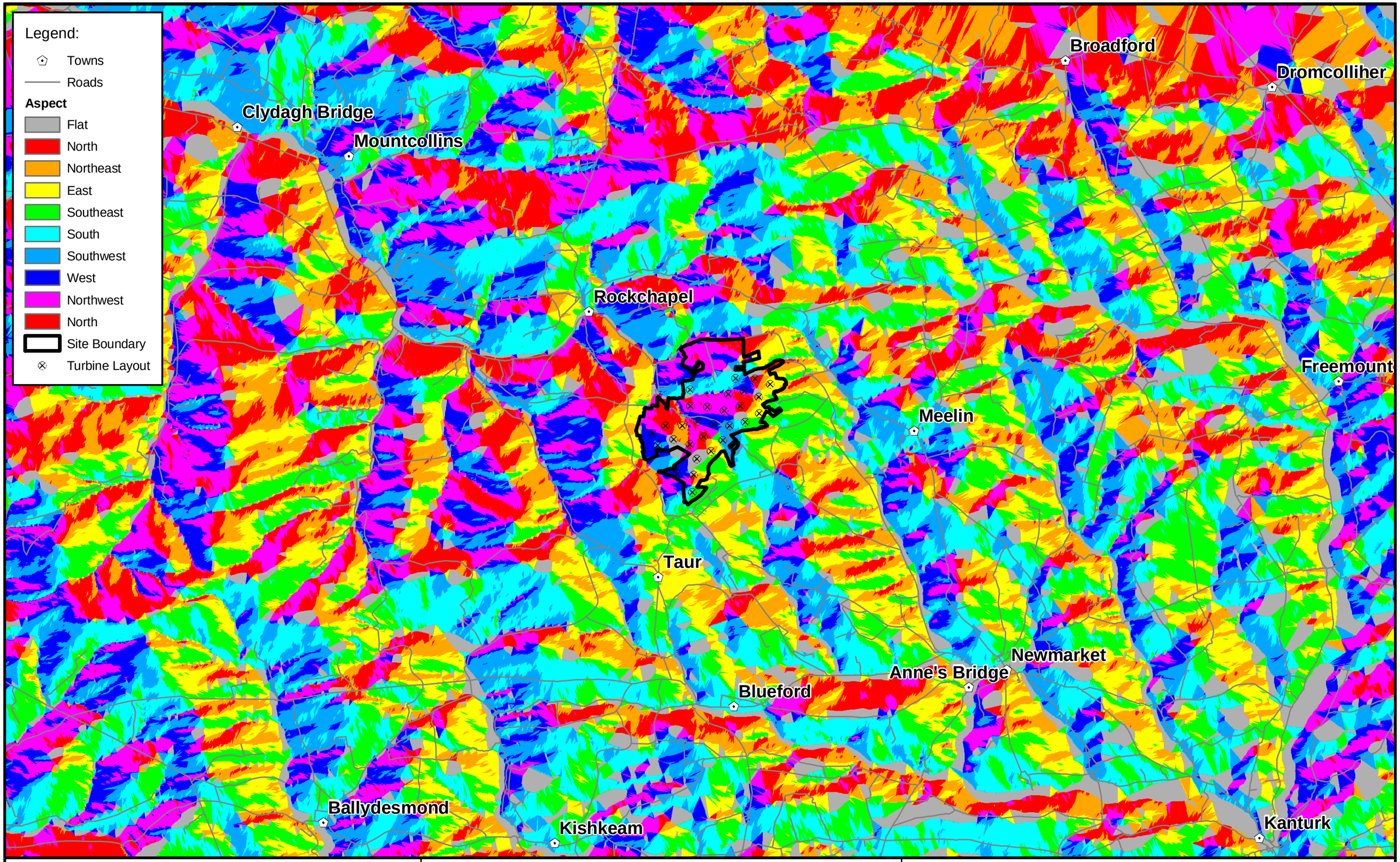


Figure 5.4
Aspect Model

SWS Environmental Services
MEMBER OF SWS Group

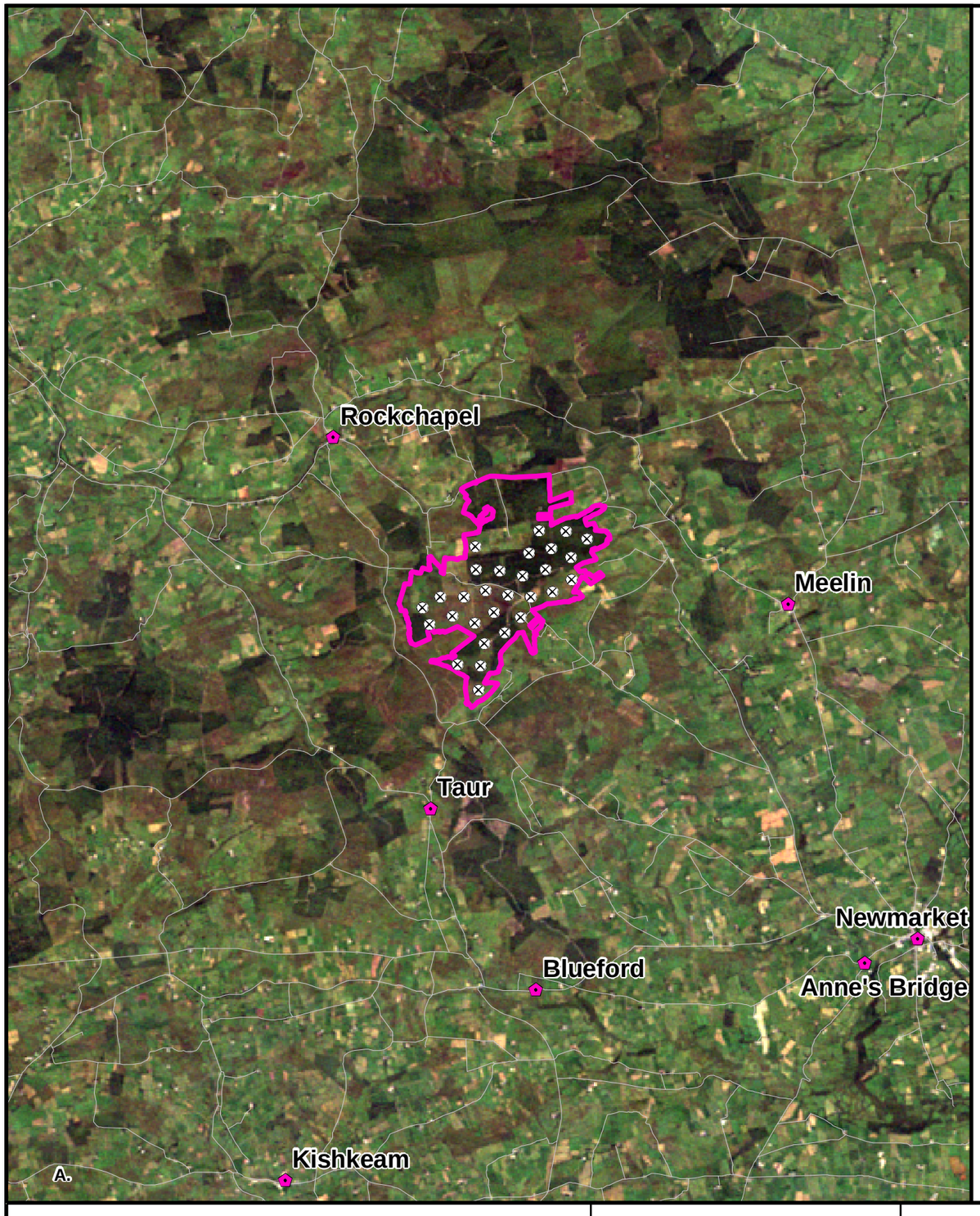
Scale: 1:85,000

0 2,500 5,000 m.

N

Prepared by: R.H.
Checked by: C.O'C.
Created in: ArcGIS 9.1
Drawing date: 30/09/'04
Drawing No: 2004_154_Fig 5.3

Ordnance Survey Ireland
License No: AR 0017004



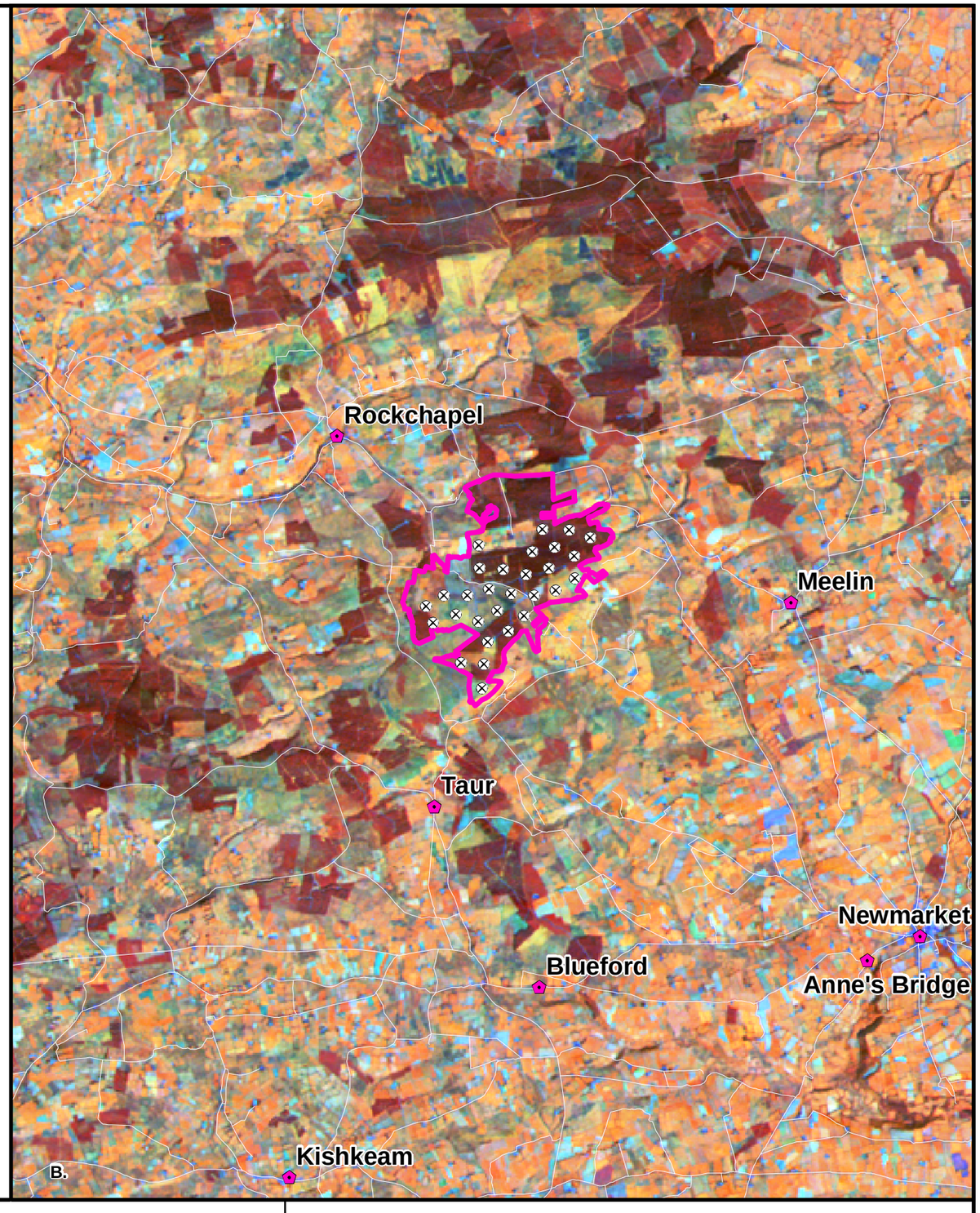


Figure 5.5
Satellite Imagery
(A. Natural Colour Image, B. Near-Infrared Image)

SWS Environmental Services
MEMBER OF SWS Group

Legend:

- Turbine Layout
- Site Boundary
- Roads
- Towns

Scale: 1:85,000

0 1,250 2,500 m.

N

Prepared by: R.H.
Checked by: C.O'C.
Created in: ArcGIS 9.0
Drawing date: 18/10/'04
Drawing No: 2004_154_Fig.5.5

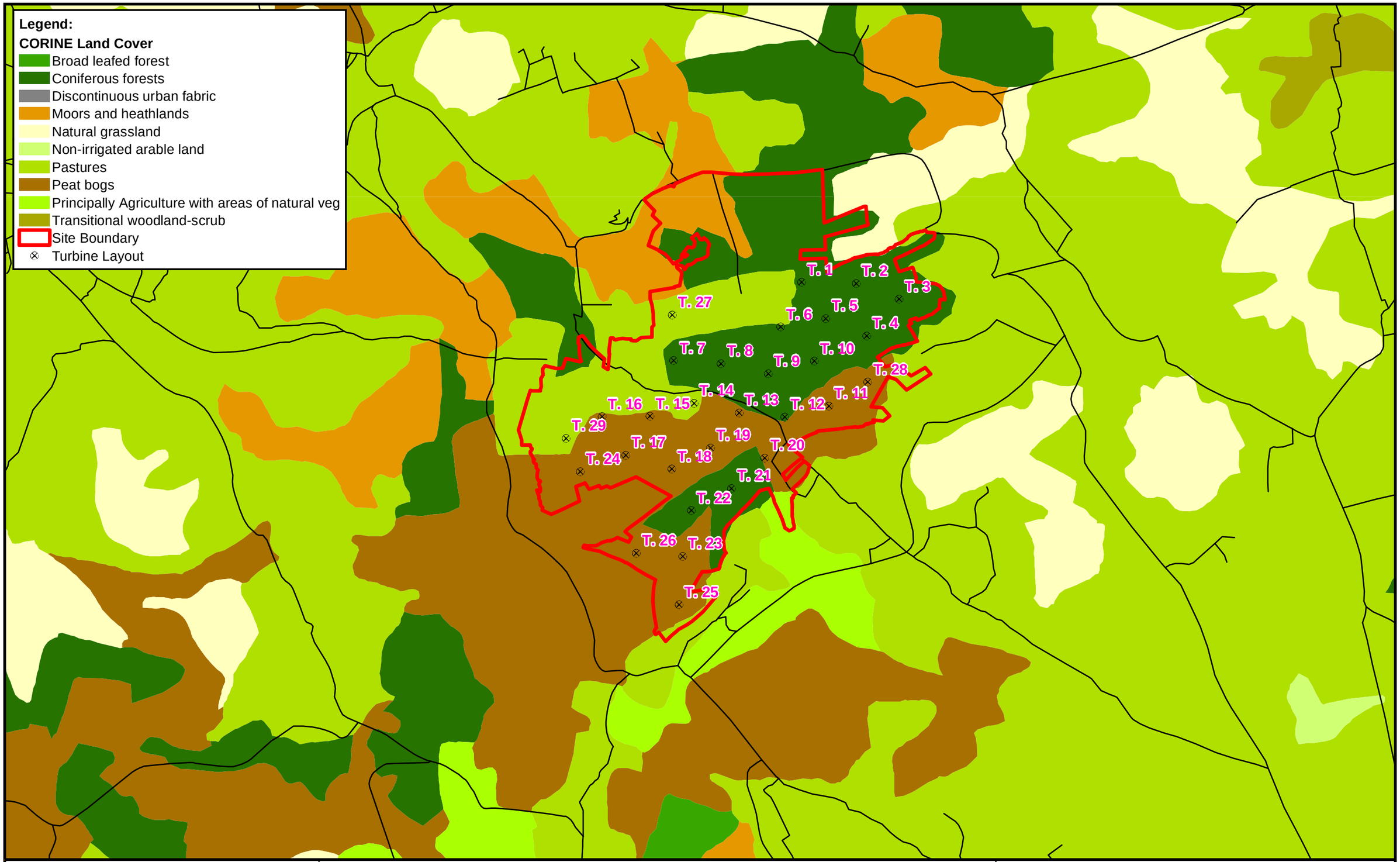


Figure 5.6
Landscape Cover
(CORINE 1990)

SWS Environmental Services
MEMBER OF SWS Group

Scale: 1:30,000

0 1,250 2,500 m.

N

Prepared by: S.C./R.H.
Checked by: C.O'C.
Created in: ArcGIS 9.1
Drawing date: 18/06/'03
Drawing No: 2004_154_Fig 5.6
Revised: 11/10/'04

Scenic Amenity

Scenic Amenity can be defined as *a measure of the relative contribution of each place in the landscape to the collective community appreciation of open space, as viewed from places, which are important to the public* (Environmental Protection Agency, Australia). In the Cork County Development Plan 2003, key objectives for Scenic Amenity, Views and Prospects, Scenic Landscape and Scenic Routes are set out:

ENV 3-2 General Visual and Scenic Amenity

It is a general objective to protect the visual and scenic amenities of County Cork's built and natural environment.

ENV 3-3 Scenic Landscape

It is a particular objective to preserve the visual and scenic amenities of those areas of natural beauty identified as 'scenic landscape'.

ENV 3-4 General Views and Prospects

It is a general objective to preserve the character of all important views and prospects, particularly sea views, river or lake views, views of unspoilt mountain, upland or coastal landscapes, views of historical or cultural significance (including buildings and townscapes) and views of natural beauty.

ENV 3-5 Scenic Routes

It is a particular objective to preserve the character of those views and prospects obtainable from scenic routes identified in this plan.

This Development Plan also identifies scenic areas and scenic routes in County Cork. In the area of the proposed windfarm there are six designated scenic routes within 10km of the site. Visibility impacts to the site from these scenic routes will be significantly reduced due to the presence of mature forestry alongside or parallel to communication corridors such as local roads and scenic routes. From Figure 5.7 it can be seen that approximately 11% of the scenic routes in the area are enveloped by plantation forestry. Total non-forested site-exposure along scenic routes outlined on the map amounts to c.55% of their total length.

Visibilities from scenic routes are assessed further in Section 5.4.1 to provide more detail of the degree of visual exposure from scenic vantage points.

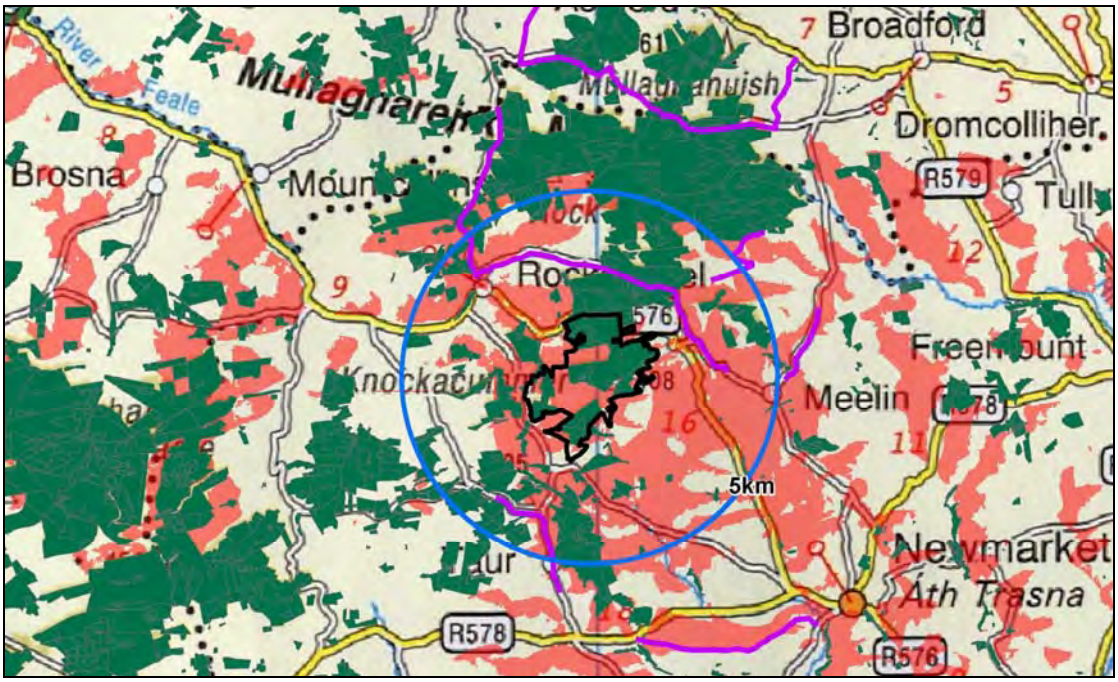


Figure 5.7 Visibility of the site from Scenic Routes and the influence of forestry.

The is no designated scenic landscape in proximity to the proposed site and the nearest NHA is located 8.5km ESE of the site, the Mount Eagle Bogs in Stanner Glen (Site No. 2449), according to recent DOEHLG GIS datasets. Potential exposure of the site in this NHA will be limited to a small portion of the east side of the glen however with the presence of woods in the glen itself views of the site should be restricted substantially.

There are no designated walking routes identifiable on the OS maps for the area however, a number of lesser known walking routes exist along the Mullaghareirk Mountains which stretch from Abbeyfeale to Liscarroll, and from Castleisland to Dromcolliher.

The Duhallow trail meanders from Newmarket to Freemount, Tullylease, Killileigh, Meelin, Rockchapel, Taur, Ballydesmond and on to Rathmore in County Kerry. This walking trail is not well known or publicised in many of the published walking guidebooks of Ireland. It is likely that the development of a wind farm could act as a focal point in the area that could attract more tourists to the immediate area to view the development.

Conclusion

The site is located in a relatively remote rural part of County Cork. The terrain consists of rolling shale / flagstone hills, and is mottled with a mix of plantation forestry, marginal grazing and small-scale tillage.

The area is not regarded as a major tourist area and many of the designated scenic routes now offer restricted views due to commercial forestry plantations. The nearest environmental designated area is 8.5km from the site boundary and only one minor archaeological feature is located within the immediate environs of the site boundary. The landscape has many anthropogenic influences and would not be regarded as a high amenity scenic landscape.

Potential visibility and exposure is most notable within 5km proximity of the site. Site exposure beyond 5km reduces significantly, with exposure from most towns, roads, and rivers reducing to moderate or marginal levels.

In consideration of topographical location, site exposure, land use, amenities, tourist, land cover, features of archaeological, architectural and cultural content, and the fact that Cork County Council have designated this area as an area that can accommodate large scale wind developments the overall impact of the development would be moderate to marginal in terms of impact on the landscape and the existing scenic value of the area.

Consideration of the potential impact of the proposed development on views in the locality is further assessed in detail in the next section.

5.4 Visibility Impact of the Proposed Wind Farm Development

This section investigates the impacts the proposed development may have on views obtained by people within the vicinity of the site.

5.4.1 Assessment Criteria

The impact of the proposed development on each viewpoint has been assessed according to the criteria set out below:

major - a fundamental change to the environment.

moderate - a material but non-fundamental change to the environment.

minor - a detectable but non-material change to the environment.

none - no detectable change to the environment.

5.4.2 The Zone of Visual Impact (ZVI)

The proposed wind farm at Knockacummer is located south of the Mullaghareirk Mountains. This type of landform has the potential to provide significant screening for wind farm developments as is evident in the ZVI map produced. The zone of visual influence map (Figure 5.8) identifies areas where the turbines are potentially visible. The ZVI was calculated based on the visibility of the blade tips to a radius of 15km. The total calculated area for visibility analysis was 870 Sq km. Of the total area the development is potentially visible in 371 sq km and not visible in 496 sq km.

For ZVI analysis (based on the size of the turbines being considered for this proposed development), a 15km radius was selected. The ZVI identifies all points on the landscape where the development may be visible based on a 10m-grid interval within 15km of the site. It is important to note that the proposed development will not be visible at all points identified in the ZVI as the presence of screening elements obscuring all or part of the view is not considered in the ZVI calculation.

It can be seen from the ZVI that the mountainous region to the north of the site provides significant screening of the proposed development beyond a 10km radius. The ZVI illustrates that the development will also not be visible within significant areas of the greater landscape.

Potential visibility will be most dominant within 3km of the development. However even within this close proximity to the proposed development not all turbines will be visible within this zone of influence. Figure 5.8 identifies significant areas to the south, east and north-east show where less than half of the proposed turbines will be visible within 3-4km of the development.

Visibility at distances greater 4km is most prominent in sparsely populated areas to the west and moderately populated areas to the south and east of the proposed development. Significant portions of these areas are not inhabited and are used extensively for commercial forestry plantations. In populated areas to the south, residential houses are predominantly south facing so visibility from houses will be further reduced. In addition at many locations visibility will be reduced by the presence of visual barriers such as forestry, hedges and trees on the landscape. The actual visibility of the wind farm is demonstrated in the photomontages (Figures 5.10 – 5.26).

Figure 5.8 Zone of Visual Influence

5.4.3 Photomontage Viewpoints

The viewpoint locations are shown in Figure 5.9. Photomontages were created for seventeen different viewpoint locations as referenced in Table 5.3.

Table 5.3 Viewpoint Locations

Viewpoint No.	Viewpoint Name	Distance (km) to Nearest Turbine
V1	View from R577 approaching Kishkeam	9.4
V2	View from scenic route A20	5.8
V3	View from scenic route A19	2.7
V4	View from R576 approaching Rockchapel	2.8
V5	View from R576 near Tooreennagrena	1.9
V6	View from scenic route A18 south of Knockanebane	1.57
V7	View from scenic route A16	4.7
V8	View from Cummer crossroads	1.4
V9	View from R576 near Meenaraheeny	7.5
V10	View from R576 southeast of Newmarket	10.1
V11	View from scenic route A18 north of Knockahorrea East	4.5
V12	View from scenic route A17	3.6
V13	View from N21 at Wellesley bridge	17
V14	View from R577 approaching Boherboy	10.2
V15	View from R576 east of Knockacummer	1.4
V16	View from R576 east of Meengorman	2.9
V17	View from Rockchapel Village	2.9

For the landscape and visual impact assessment each viewpoint was assessed individually using the standard assessment methodology as outlined. A line of sight analysis was created based on topographical data and taking a central viewpoint within the development site. The line of sight calculation is performed on a theoretical blade tip height of 125m and an observer viewing height of 2.0 m.

In all instances the line of sight is calculated in the direction of the centre of the proposed development. The line of sight analysis predicts what locations a structure of known height will be visible on the landscape within a specific line of sight. Areas marked as green show where the turbines are visible and areas marked as red show no visibility. For references purposes a topographic map identifying the photomontage position is also included.

Weather conditions are not always ideal for providing suitable photomontage images. Poor visibility and overcast conditions can exist for extended periods reducing visibility

substantially. In such circumstances to improve the clarity of photomontages, the following edits of images may be required on occasions:

- Alterations to the sky background (carried out in Adobe Photoshop 5.0)
- Alterations to the turbines (carried out in WINDFARM Software Release 3.1 and/or Adobe Photoshop 5.0.

For the purpose of improving the visibility of the turbines in these photomontages, the majority of the photomontages have been processed to:

- Give an indication of viewing conditions on a cloudless day and
- To ensure the turbines are clearly visible on the landscape.

Alterations to each individual photomontage are detailed in the Table 5.4.

Table 5.4 Photomontage Alterations

Viewpoint No.	Alterations
1	- The colour of the sky has been changed to a cloudless blue
2	- The colour of the sky has been changed to a cloudless blue - Turbines have been brightened in WINDFARM and further defined in Photoshop with a white pencil
3	- The colour of the sky has been changed to a cloudless blue - Turbines have been brightened in WINDFARM and further defined in Photoshop with a white pencil
4	- The colour of the sky has been changed to a cloudless blue
5	- The colour of the sky has been changed to a cloudless blue - Turbines have been brightened in WINDFARM and further defined in Photoshop with a white pencil
6	- The colour of the sky has been changed to a cloudless blue - Turbines have been brightened in WINDFARM and further defined in Photoshop with a white pencil
7	- The colour of the sky has been changed to a cloudless blue - Turbines have been brightened in WINDFARM and further defined in Photoshop with a white pencil
8	- The colour of the sky has been changed to a cloudless blue - Turbines have been brightened in WINDFARM and further defined in Photoshop with a white pencil
9	- The colour of the sky has been changed to a cloudless blue - Turbines have been brightened in WINDFARM and further defined in Photoshop with a white pencil
10	- The colour of the sky has been changed to a cloudless blue
11	- The colour of the sky has been changed to a cloudless blue - Turbines have been brightened in WINDFARM and further defined in Photoshop with a white pencil
12	- The colour of the sky has been changed to a cloudless blue - Turbines have been brightened in WINDFARM and further defined in Photoshop with a white pencil
13	- None
14	- The colour of the sky has been changed to a cloudless blue
15	- The colour of the sky has been changed to a cloudless blue - Turbines have been brightened in WINDFARM and further defined in Photoshop with a white pencil
16	- The colour of the sky has been changed to a cloudless blue - Turbines have been brightened in WINDFARM and further defined in Photoshop with a white pencil
17	- The colour of the sky has been changed to a cloudless blue - Turbines have been brightened in WINDFARM and further defined in Photoshop with a white pencil

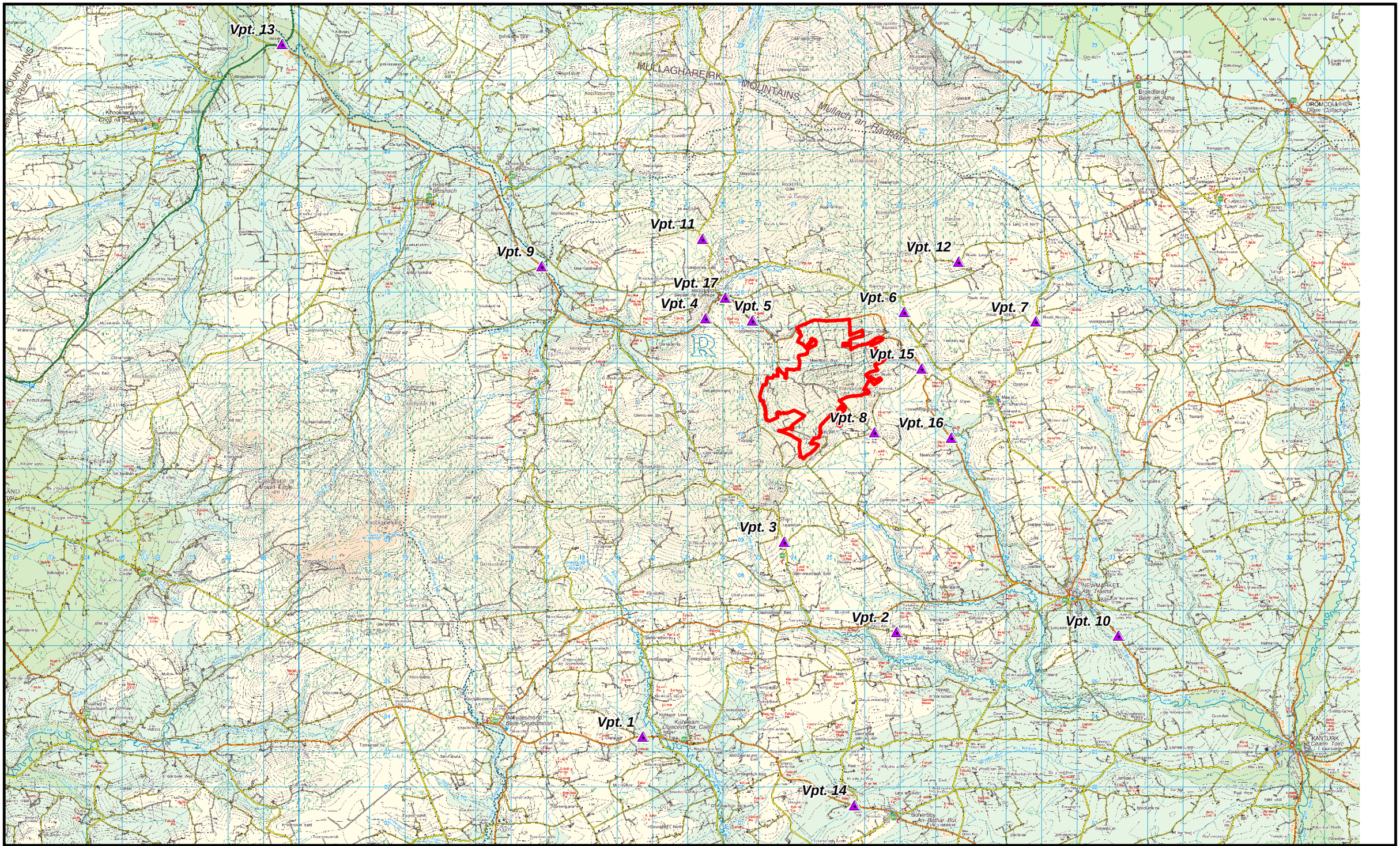


Figure 5.9
Viewpoint Locations

SWS Environmental Services
MEMBER OF SWS Group

Legend:

- Viewpoints
- Site Boundary

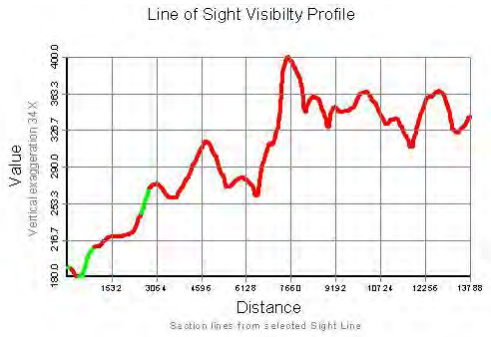
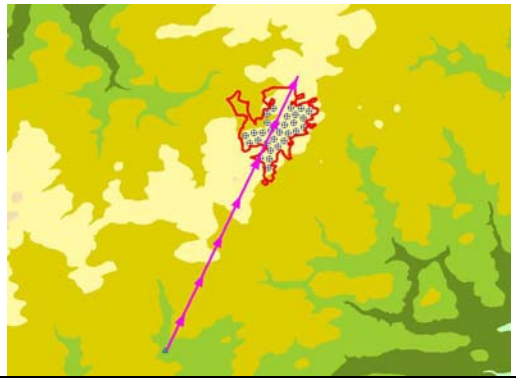
Scale: 1:100,000

N

0 4 8 km

Prepared by: R.H.
Checked by: C.O'C.
Created in: ArcGIS 9.1
Drawing date: 13/10/'04
Drawing No: 2004_154_Fig 5.9

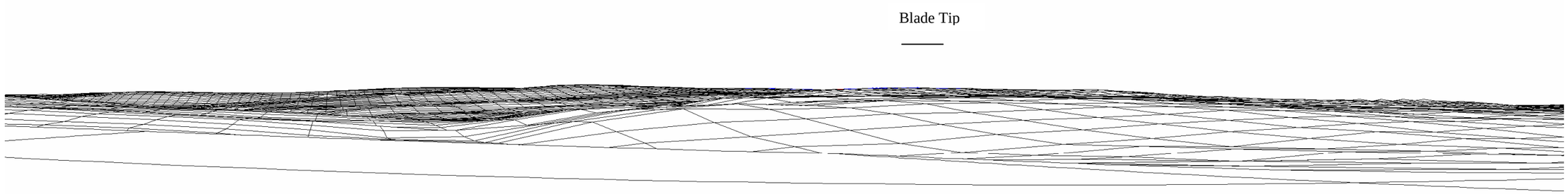
DESCRIPTION OF PHOTOMONTAGES **VIEWPOINT 1**

<table>
<tr><td> 
</td><td>  </td></tr>
<tr><td>Line of Sight Visibility Profile</td><td>Topographic map with viewpoint</td></tr>
<tr><td>Site Context</td><td colspan="2">Location: R577 approaching Kishkeam
E: 119713 N: 103421
Elevation: 190m Aspect: NE
Distance from site: 9.4 km</td></tr>
<tr><td rowspan="3">Cultural Heritage Resources</td><td>Historic sites and monuments in the line of sight</td><td>4 Fulacht fia, 5 Barrows, 1 Cairn</td></tr>
<tr><td>Places of traditional religious or cultural importance in the line of site</td><td>Church in Taur Village</td></tr>
<tr><td>Locations in the line of sight regarded by a community or neighbourhood, or others, as contributing to its "sense of place"</td><td>Taur Village</td></tr>
<tr><td>Ecological Landscape</td><td>Habitats and wildlife:</td><td>Verge vegetation, improved grassland, coniferous forestry.</td></tr>
<tr><td>Description of Landscape</td><td colspan="2">The description of the view and features in the landscape have been classified according to their distance from the viewer as follows:
Foreground: The foreground consists of colourful verge vegetation adjacent to the public routeway. The foreground vegetation slightly obscures the middleground from view
Middleground: Improved grassland is visible in the centre middleground. This slopes gently upwards toward the background.
Background: The background forms the horizon. Conifer woodland is visible at the highest point in the centre of the view, with smooth rolling hills sloping downwards gently to the left. Hilly farmland complex lies to the right of the coniferous forestry.</td></tr>
<tr><td>Visual Impact Analysis

At each viewpoint the existing view and the visual effect of the proposed development is assessed.</td><td colspan="2">Reference Fig 5.10 for photomontage and wireframe of this view.

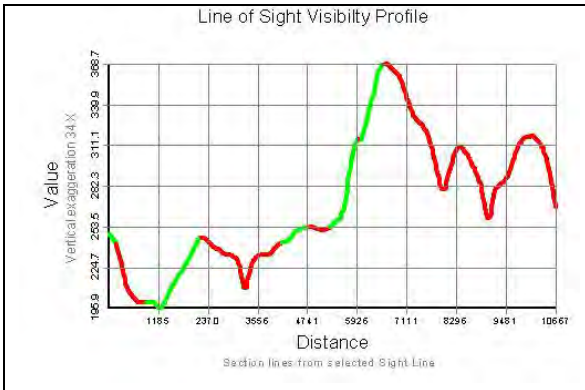
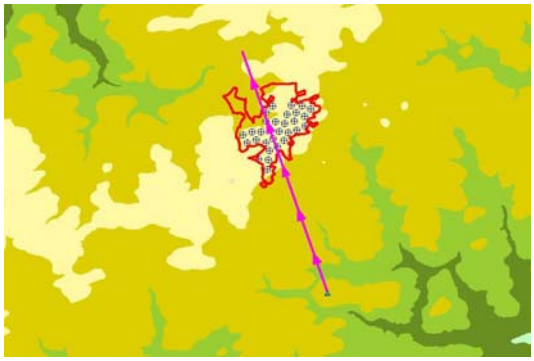
Conclusions:
Landscape sensitivity moderate, the view of the wind farm is obscured by mature coniferous forestry. There is no visual impact of the proposed development on this viewpoint.</td></tr>
</table>

SWS Environmental Services



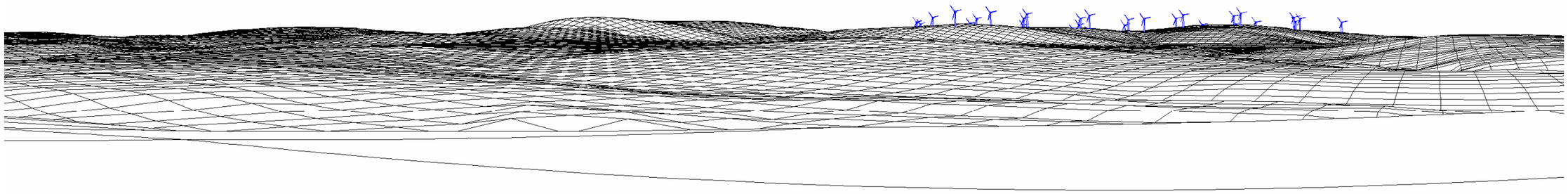
PHOTOMONTAGE ASSESSMENT OF WIND ENERGY DEVELOPMENT AT KNOCKACUMMER **Viewpoint 1** **View from R577 approaching Kishkeam** **Figure 5.10**	**Knockacummer Wind Energy Development** **Viewpoint 1** **Prepared by: C O'Connell** **Checked by: Declan Waugh** **Simulation Undertaken Using:** **Windfarm Software Release 3.1**	**View Position: 119713 E 103421 N** **Camera Height: 1.8m** **Included Angle: 79 Pitch Angle: 3.5** **Viewing Distance: 9.4km Elevation: 190m** **Number of turbines with tower and blade tips visible: 0** **Number of turbines with blade tips only visible: 0** **Total number of turbines visible: 0**	SWS Environmental Services MEMBER OF SWS Group

DESCRIPTION OF PHOTOMONTAGES **VIEWPOINT 2**

<table>
<tr><td> 
</td><td>  </td></tr>
<tr><td>Line of Sight Visibility Profile</td><td>Topographic map with viewpoint</td></tr>
</table>

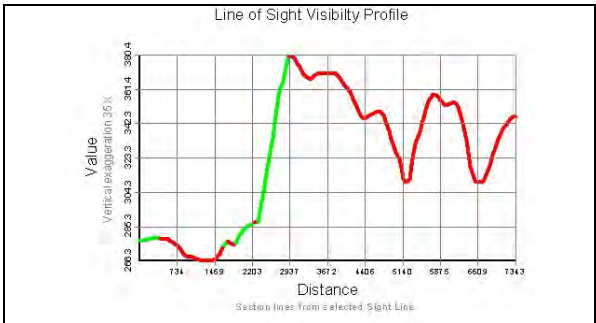
Site Context	**Location:** Scenic Route A20 **E:** 126893 **N:** 106382 **Elevation:** 248m **Aspect:** NW **Distance from site:** 5.8 km	
Cultural Heritage Resources	*Historic sites and monuments in the line of sight*	3 Standing stones, 1 Stone row, 1 Fulacht Fia
	Places of traditional religious or cultural importance in the line of sight	N/A
	Locations in the line of sight regarded by a community or neighbourhood, or others, as contributing to its "sense of place."	Glanlara River
Ecological Landscape	*Habitats and wildlife:*	Verge vegetation, hedgerow, improved grassland, tilled land
Description of Landscape	The description of the view and features in the landscape have been classified according to their distance from the viewer as follows: *Foreground:* The foreground is dominated by high roadside verge vegetation adjacent to a public routeway. Singular trees are present at either side of the road which curves to the left and extends to the middleground. *Middleground:* Ploughed farmland is visible to the left of the middleground with fragmented coniferous plantations interspersed. *Background:* the background is distant from the viewer and is represented by a mosaic of colours. The gently curved hills on the horizon are textured by discernable farmland hedgerow field boundaries and vague patterns of coniferous forestry and trees.	
Visual Impact Analysis *At each viewpoint the existing view and the visual effect of the proposed development is assessed.*	Reference Fig 5.11 for photomontage and wireframe of this view. *Conclusions:* Landscape sensitivity moderate. The windfarm will form the focal point of attention along one section of the horizon. The wind farm stretches along undulating tops of two hills. Variation in height of the turbines as a result of the topography reduces the visual impact. The windfarm is also in visual harmony with the linear coniferous forestry belt along the ridgeline and is balanced in the scale of the surrounding landscape. Therefore, considering the landscapes ability to absorb the development, the visual impact would be considered moderate.	

SWS Environmental Services

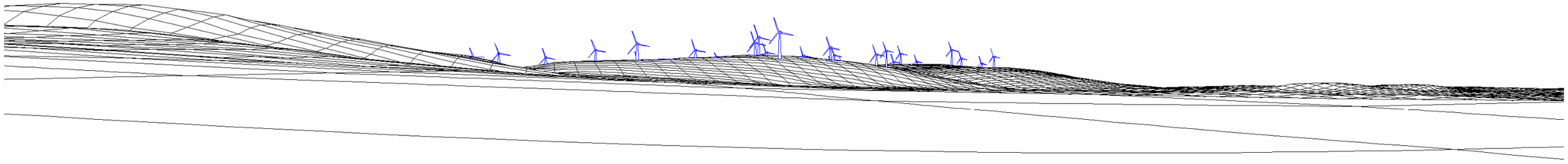


PHOTOMONTAGE ASSESSMENT OF WIND ENERGY DEVELOPMENT AT KNOCKACUMMER **Viewpoint 2** **View from Scenic Route A20** **Figure 5.11**	**Knockacummer Wind Energy Development** **Viewpoint 2** **Prepared by: C O'Connell** **Checked by: Declan Waugh** **Simulation Undertaken Using:** **Windfarm Software Release 3.1**	**View Position: 126893 E 106382 N** **Camera Height: 1.8 m** **Included Angle: 84 Pitch Angle: 2** **Viewing Distance: 5.8km Elevation: 248m** **Number of turbines with tower and blade tips visible: 20** **Number of turbines with blade tips only visible: 8** **Total number of turbines visible: 28**	SWS Environmental Services MEMBER OF SWS Group

DESCRIPTION OF PHOTOMONTAGES **VIEWPOINT 3**

<table>
<tr><td> 
</td><td>  </td></tr>
<tr><td>Line of Sight Visibility Profile</td><td>Topographic map with viewpoint</td></tr>
<tr><td>Site Context</td><td colspan="2">Location: Scenic Route A19
E: 123726 N: 108932
Elevation: 277m Aspect: NE
Distance from site: 2.7km</td></tr>
<tr><td rowspan="3">Cultural Heritage Resources</td><td>Historic sites and monuments in the line of sight</td><td>1 Cairn</td></tr>
<tr><td>Places of traditional religious or cultural importance in the line of sight</td><td>N/A</td></tr>
<tr><td>Locations in the line of sight regarded by a community or neighbourhood, or others, as contributing to its "sense of place."</td><td>Taur village</td></tr>
<tr><td>Ecological Landscape</td><td>Habitats and wildlife:</td><td>Verge vegetation, deciduous tree stands, wet grassland, gorse scrub, coniferous forestry.</td></tr>
<tr><td>Description of Landscape</td><td colspan="2">The description of the view and features in the landscape have been classified according to their distance from the viewer as follows:
Foreground: The left of the foreground contains a public routeway infrastructural feature, which extends to the middleground. A grassy verge separates the road from wet grassland habitats in the centre and right foreground. A line of wooden fence-post landscape accessories coincides with this verge, and creates the focal point in the immediate foreground. A field- boundary of linear gorse scrub divides the wet grassland in the fore- from the middleground.
Middleground: The middle ground encompasses the public routeway and grassy verge. A small cluster of Salix-like trees occur adjacent to the verge to the left. Muted green colours of wet grassland are truncated by a dark coniferous tree-line to the right of the view.
Background: The background is represented by a central, elevated, rounded ridge, sloping downward to the right. Here, the smooth line of the horizon is visible through the thin tops of the coniferous trees in the left middleground. A forestry plantation is also visible in profile as a dark band on top of the central hill. A second smooth rounded hill lies to the left of the background.</td></tr>
<tr><td>Visual Impact Analysis
At each viewpoint the existing view and the visual effect of the proposed development is assessed.</td><td colspan="2">Reference Fig 5.12 for photomontage and wireframe of this view.
Conclusions:
Landscape sensitivity is considered low considering the already anthropogenic nature of the viewpoint. 22 turbines at various heights will be visible from this view. While conspicuous in the landscape, the random layout of the windfarm clustered on the rounded hilltop is appropriate and balanced within the landscape. Therefore, the visual impact associated with the development is moderate on this viewpoint.</td></tr>
</table>

SWS Environmental Services



PHOTOMONTAGE ASSESSMENT OF WIND ENERGY DEVELOPMENT AT KNOCKACUMMER

Viewpoint 3

View from Scenic Route A19

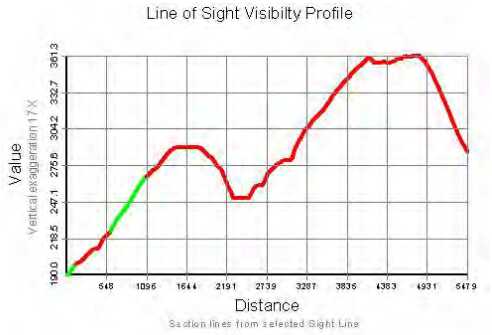
Figure 5.12

Knockacummer Wind Energy Development
Viewpoint 3
Prepared by: C O'Connell
Checked by: Declan Waugh
Simulation Undertaken Using:
Windfarm Software Release 3.1

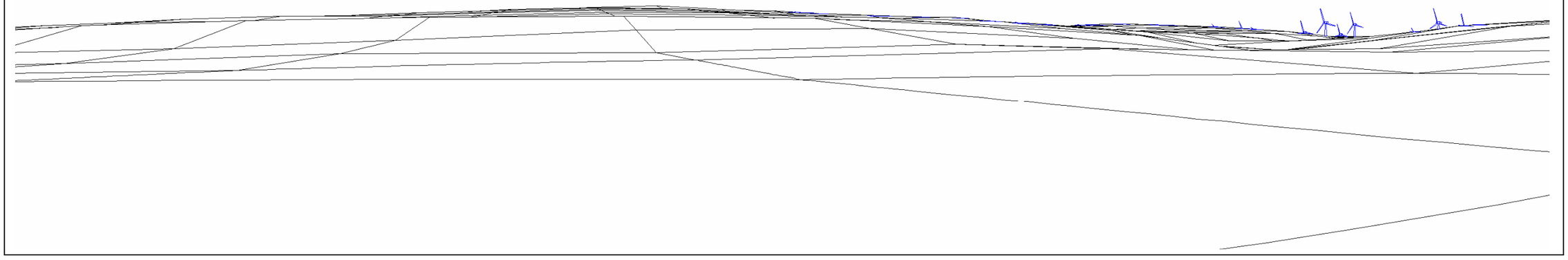
View Position: 123726E 108932N
Camera Height: 1.8 m
Included Angle: 91 Pitch Angle: 5
Viewing Distance: 2.7km Elevation: 277m
Number of turbines with tower and blade tips visible: 14
Number of turbines with blade tips only visible: 8
Total number of turbines visible: 22

SWS Environmental Services
MEMBER OF
SWS Group

DESCRIPTION OF PHOTOMONTAGES **VIEWPOINT 4**

<table>
<tr><td> 
</td><td>  </td></tr>
<tr><td>Line of Sight Visibility Profile</td><td>Topographic map with viewpoint</td></tr>
<tr><td>Site Context</td><td colspan="2">Location: R576 approaching Rockchapel.
E: 121494 N: 115263
Elevation:189m Aspect: SE
Distance from site: 2.8km</td></tr>
<tr><td rowspan="3">Cultural Heritage Resources</td><td>Historic sites and monuments in the line of sight</td><td>2 Standing stones, 1 Fulacht fia</td></tr>
<tr><td>Places of traditional religious or cultural importance in the line of sight</td><td>N/A</td></tr>
<tr><td>Locations in the line of sight regarded by a community or neighbourhood, or others, as contributing to its "sense of place."</td><td>N/A</td></tr>
<tr><td>Ecological Landscape</td><td>Habitats and wildlife:</td><td>wet grassland, road verge, gorse scrub, improved grassland, coniferous tree stands.</td></tr>
<tr><td>Description of Landscape</td><td colspan="2">The description of the view and features in the landscape have been classified according to their distance from the viewer as follows:
Foreground: The unmarked public routeway dominates the foreground. Architectural features, comprising a dwelling house and adjoining out-buildings occur to the right of the routeway, adding colour to the foreground and also representing the focal point of the entire view. A mesh and post fence creates openness at the left roadside, with rushy grassland vegetation visible behind.
Middleground: Juncus-dominated wet grassland in the left of the middle ground extends back to gently sloping low hills of improved grassland with clustered gorse scrub and linear stands of deciduous trees. A line of high coniferous trees occurs along the curve of the roadway, dominating the centre of the view and extending to the background.
Background: The centre background is largely obscured by high coniferous trees of the middleground. Tree-tops originating from ground close to the viewpoint form the horizon at all points. Dark coniferous tree-lines occur in the left background, with mixed species imparting colour and texture in the right. The vivid green coloured improved grassland presents a high degree of contrast against the dark coniferous tree-lines in the left. The horizon is low, relative to the elevation of the viewpoint.</td></tr>
<tr><td>Visual Impact Analysis At each viewpoint the existing view and the visual effect of the proposed development is assessed.</td><td colspan="2">Reference Fig 5.13 for photomontage and wireframe of this view.
Conclusions:
Landscape sensitivity low. No turbines visible therefore there is no visual impact associated with the proposed development on this viewpoint.</td></tr>
</table>

SWS Environmental Services



PHOTOMONTAGE ASSESSMENT OF WIND ENERGY DEVELOPMENT AT KNOCKACUMMER

Viewpoint 4

View from R576 approaching Rockchapel

Figure 5.13

Knockacummer Wind Energy Development
Viewpoint 4
Prepared by: C O'Connell
Checked by: Declan Waugh
Simulation Undertaken Using:
Windfarm Software Release 3.1

View Position: 121494 E 115263 N
Camera Height: 1.8 m
Included Angle: 88 Pitch Angle: 3.5
Viewing Distance: 2.8km Elevation: 189m
Number of turbines with tower and blade tips visible: 0
Number of turbines with blade tips only visible: 0
Total number of turbines visible: 0

SWS Environmental Services
MEMBER OF
SWS Group