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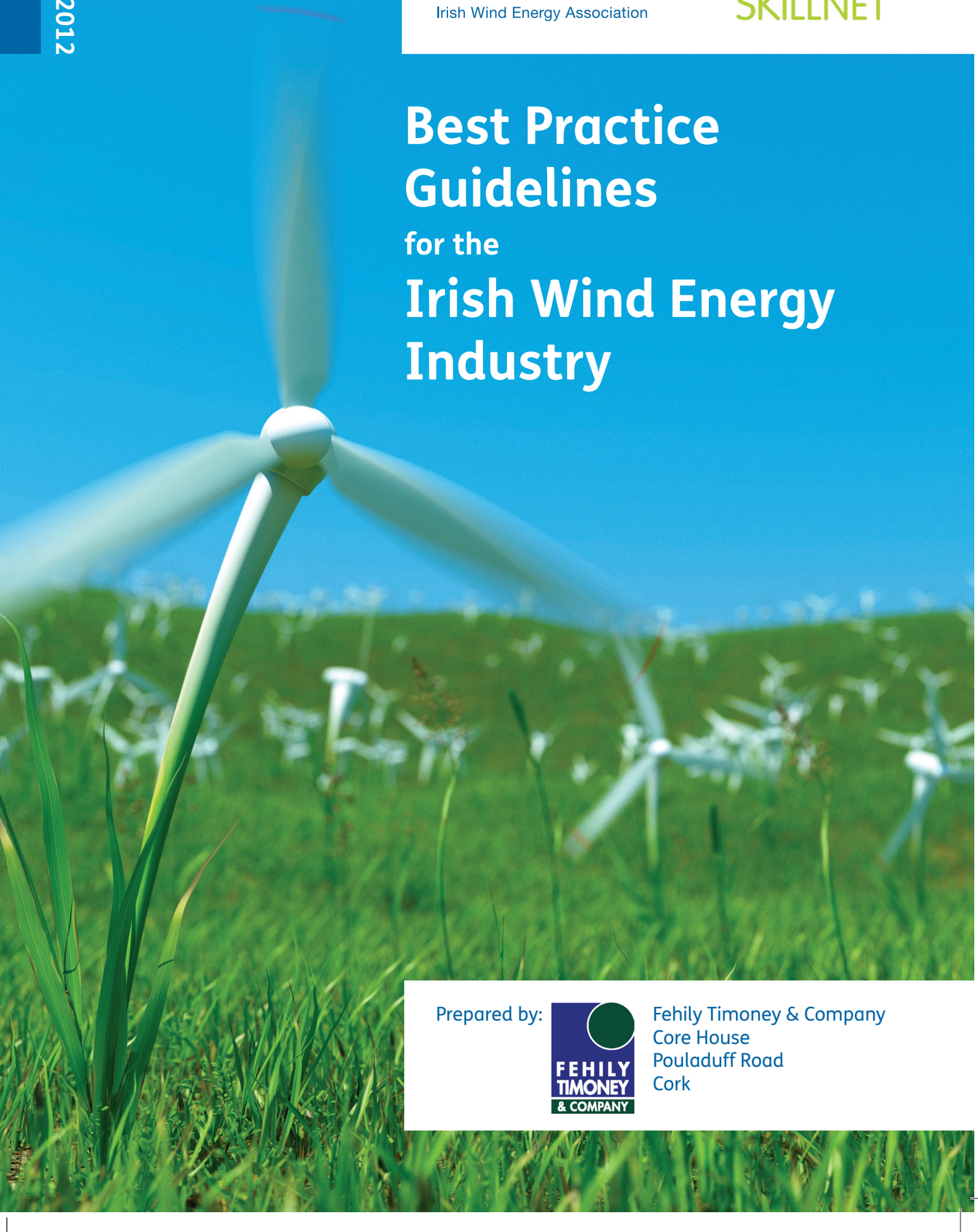
IWEA
Irish Wind Energy Association

WIND SKILLNET

Best Practice Guidelines for the Irish Wind Energy Industry



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Acknowledgements

The IWEA would like to thank Fehily Timoney & Company for their work on the document. The guidelines involved significant input from many members of IWEA who participated in workshops, meetings and telephone conferences and we would like to thank all those involved.

FOREWORD

Our industry is facing into a period of tremendous change and opportunity. The opportunities and necessity of developing renewable energy grows with each passing year. As the developing world continues to raise the standard of living of its citizens the global pressure for energy supplies will increase. At a European level there is a clear understanding of the need for more sustainable indigenous energy sources. Ireland is fortunate to enjoy one of the best wind resources in the world. We must however ensure that this is developed in line with international best practice. The challenge therefore is to develop and harness the abundant wind resource that we have in Ireland to meet our energy needs and EU binding commitments but to continue to do so while protecting sensitive areas and the environment. This will be a key challenge for all policy makers and developers for the coming decades.

These revised and updated guidelines will continue to encourage and define best practice development in the industry. IWEA believes that we should continue to have best practice development at the core of what we do. IWEA will continue to be at the forefront of the industry in advocating responsible and sensitive windfarm development aligned with key legislation. In doing so we will continue to work in partnership with our members and stakeholders. We trust these guidelines will provide relevant practical guidance and recommendations for those developing onshore windfarms in Ireland now and in the coming years.

Finally I would like to thank Fehily Timoney for their work on updating these guidelines and all the IWEA contributors who gave so freely of their time and expertise to deliver a quality update to these important guidelines.

Kenneth Matthews
CEO IWEA

GLOSSARY

BWEA	British Wind Energy Association (now known as Renewable UK)
CER	Commission for Energy Regulation
CDP	County Development Plan
DoEHLG	Department of the Environment, Heritage and Local Government (pre 2011)
DoAHG	Department of the Arts, Heritage and the Gaeltacht (from 2011)
DoECLG	Department of Environment, Community and Local Government (from 2011)
EIA	environmental impact assessment
EirGrid	Ireland's electricity transmission system operator
EIS	environmental impact statement
ESB Networks	Ireland's electricity distribution system operator
FIDIC	Fédération Internationale des Ingénieurs-Conseils – the International Federation of Consulting Engineers
HSA	Health and Safety Authority
hub height	the height of the wind turbine tower
IAA	Irish Aviation Authority
IWEA	Irish Wind Energy Association
MW	MegaWatt – one million Watts – a unit of power
Natura 2000	EU wide network of nature protection areas established under the 1992 Habitats Directive (92/43/EEC)
NHA	Natural Heritage Area
NPWS	National Parks and Wildlife Service of the DoAHG
PSCS	Project Supervisor for the Construction Stage, for health and safety purposes
PSDP	Project Supervisor for the Design Process, for health and safety purposes
REIO	Renewable Energy Information Office, Sustainable Energy Authority of Ireland, Unit A, West Cork Business and Technology Park, Clonakilty, Co. Cork
rotor diameter	the width of the swept area of a wind turbine; just as the turbine blade is equal to the radius of the swept area, so the rotor diameter is equal to the length of two blades
SAC	Special Area of Conservation
SEAI	Sustainable Energy Authority of Ireland
SEM	single electricity market
SID	Strategic Infrastructure Development
SPA	Special Protection Area
reactive power	the power consumed by a wind turbine for its operation and control, which is normally supplied from the national grid
wind rose	a wind rose illustrates the average speed and energy of the wind, coming from the main wind directions of the compass
ZTV map	zone of theoretical visibility map – this is a map of a wind farm and surrounding area, showing where turbines are visible and where they are not

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1. INTRODUCTION

1.1. Background

The Irish Wind Energy Association (IWEA) first published its "Wind Energy Development Best Practice Guidelines" in 1994. This was updated in 2008[1] to reflect the significant changes in the industry in the intervening years. It is a reflection of the pace of change in the wind energy sector that further recent developments in the intervening time have now made a revision of the document desirable.

The IWEA wishes to encourage best practice within the industry. It is also anticipated that the new Guidelines will act as a reference document and as a guide to the main issues wind energy developers should be aware of in developing projects. It is intended that the Guidelines will provide practical guidance and recommendations for anybody developing an onshore wind project in Ireland.

1.2. Irish Wind Energy Association

The IWEA was founded in October 1993, with the aim of promoting wind energy development in Ireland. IWEA is the national body representing the wind industry in Ireland. IWEA members incorporate all of the leading industry voices and the association actively promotes awareness and understanding of wind power as the primary renewable energy resource. In the interests of the long-term development of the Irish wind energy industry, the IWEA is committed to responsible and sensitive wind energy development.

1.3. Purpose of the Guidelines

The purpose of the Guidelines is to encourage responsible and sensitive wind farm development, which takes into consideration the concerns of local communities, planners, and other interested groups. It outlines the main aspects of wind energy development. Its emphasis is on responsible and sustainable design and environmental practices, on aspects of development which affect external stakeholders, and on good community engagement practices.

The Guidelines are aimed primarily for the developer as proponent and project manager of the wind farm development process. However, they will also be of interest to others who have an interest in proposed wind farms. The Guidelines describe the standards which the Irish wind energy industry sets itself in developing wind farms.

The Guidelines discourage insensitive wind farm developments. While it is anticipated that individual circumstances can arise in which it would be unreasonable or over-prescriptive to insist on following certain aspects of the Guidelines, the principle of the Guidelines in encouraging responsible, sustainable wind farm development should still be followed.

The contribution of the Department of the Environment Heritage and Local Government's (DoEHLG's) "Wind Energy Development Guidelines"[2] (2006) is acknowledged. In approaching the development of IWEA's own Guidelines, the aim was to be complementary to DoEHLG's guidance rather than re-stating its subject matter.

The Guidelines can be applied to all sizes of wind energy development; however, they are mainly aimed at onshore commercial wind farms (> 1 MW) as this is the area where most of the wind energy development required to meet Irish national targets for energy generated from renewable sources is likely to be provided. For smaller developments, some procedures outlined in the guidelines could be too onerous and should be simplified on a common sense basis. These guidelines are relevant to development in the Republic of Ireland only.

The topics covered in these guidelines are set out below:

- an overview of wind energy project development
- guidelines for feasibility studies
- wind monitoring and analysis
- planning and environmental legislation
- environmental impact assessment
- wind farm layout
- contracts and construction
- health and safety
- operation, maintenance and decommissioning or repowering
- community engagement
- finance

1.4. Development of the Irish Wind Energy Industry

The Irish wind energy industry has developed very significantly since the preparation of the IWEA's Guidelines in 1994. Installed capacity has increased from 16.5 MW at that time to more than 1,500 MW at the time of printing. Turbine dimensions were very different at that time too, having had hub heights and rotor diameters of around 30 m at that time, to over 150 m tip height today. It can be expected that both generation capacity and turbine dimensions will continue to increase in the future.

The 2009 Renewable Energy Directive (2009/28/EC) set targets for the EU for 20% all energy to come from renewable sources by 2020. Ireland's target is that 16% of gross final consumption of energy should come from renewable energy sources by 2020. In order to meet this target, the Irish government set a target for the renewables contribution to gross electricity consumption of 40% by 2020.

In order to meet the 2020 target for renewable energy contribution to gross final consumption, a total additional installed capacity of at least 3,100 MW will be required.[3] Significant additional onshore wind energy capacity will be required to be constructed over the next eight years in order to meet this target.

As the size of wind turbines increases and the best available sites are taken up, significant challenges lie ahead for the industry to develop wind farms that are responsive to the human and other environmental impacts associated with their construction and operation. These challenges must be met through the promotion of best practices for the sensitive siting of wind turbines and associated infrastructure in the local community and the clear communication of the benefits and potential impacts of proposed schemes with those most affected by them.

1.5. Benefits of Wind Energy

The benefits of wind energy development rarely get much attention. The strategic national benefits are probably the best known, such as:

- achieving a larger degree of security of energy supply through use of freely available fuel (the wind) replacing carbon based imports;
- reduction of greenhouse gas emissions and associated health benefits and
- achieving EU mandated targets.

Another significant benefit of strategic national importance is the economic value of the industry to the national economy in terms of direct spending and employment. Over 10,700 new jobs could be created with over €14billion investment with the significant expansion of wind industry in the process of delivering on Ireland's 40% electricity from renewables target by 2020[4].

Often overlooked are the local benefits of wind energy development which can make a significant impact on the mostly rural communities where they are situated. These include:

- benefits to local landowners through lease agreements and associated benefits to the local community;
- spending on local businesses throughout the lifetime of the wind farm but particularly during construction;
- rates paid to the local councils which fund the provision of local services
- the improvement of the national electricity grid network which increases the potential for rural areas to attract industry and employment.

2. AN OVERVIEW OF WIND ENERGY PROJECT DEVELOPMENT

The most suitable approach to take to project development and scheduling will depend on both the individual project and on the individual developer. There is no one project schedule that can be applied to all developments equally.

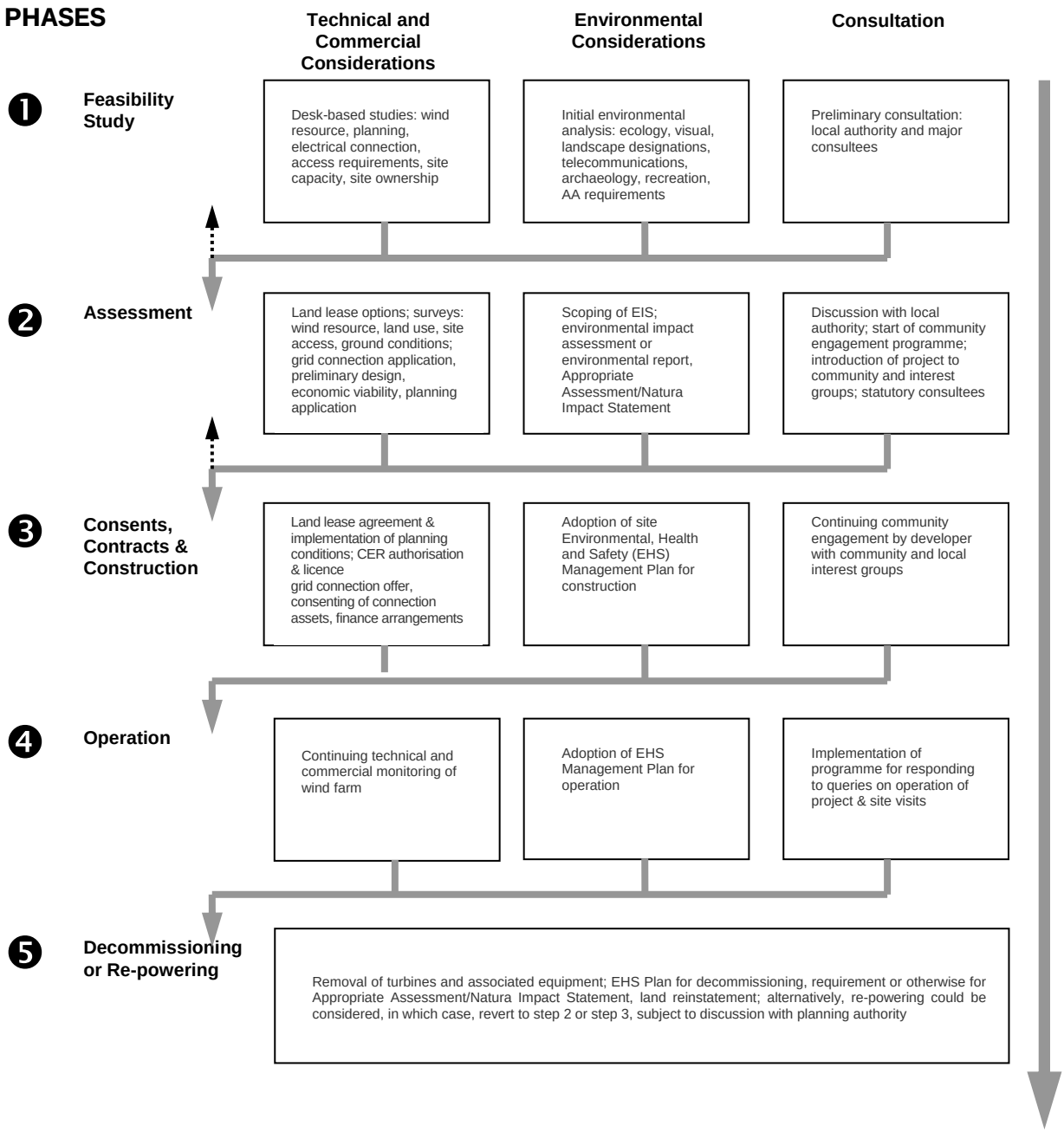
However, there are five main phases of development which are common to every project, albeit with a varying emphasis and timing of different elements from one project to another.

Table 2.1: Overview of Wind Energy Project Development

Phase of Development	Elements of Work
1. feasibility	a. desktop assessment and preliminary analysis of site potential (see Section 3) b. preliminary consultation c. site selection/feasibility report
2. outline design, environmental impact assessment (EIA) and planning	a. grid connection assessment and connection application b. environmental impact assessment c. statutory and community engagement d. wind farm layout design e. wind farm planning application
3. consents, contracts, and construction	a. wind energy analysis b. consents o grid connection o Commission for Energy Regulation authorisation and licence o accession to the Trading and Settlement Code o construction related consents (see Section 8.6) o planning compliance c. contracts o landowner options and leases o wind turbine and electrical equipment procurement o power purchase agreement o operations and maintenance agreement o finance o construction
4. operation	a. prepare operations manual including planning compliance and technical operations considerations b. procure operations management contract (if required) c. communications and complaints management plan
5. decommissioning or re-powering	a. prepare reinstatement plan and b. implement decommissioning and reinstatement plan or c. engage with stakeholders and d. revert to Stage 2 or 3 if appropriate

This document is broadly based on those phases, and examines technical, environmental, and consultation aspects of wind energy development in this context. This is reflected in Figure 2.1 overleaf.

Figure 2.1: Wind Energy Development Flow Chart



3. GUIDELINES FOR FEASIBILITY STUDIES

The feasibility study is the first phase of development for a potential wind energy project. The feasibility study is a "first-pass" screening approach, testing the main aspects of the development on a preliminary basis and should identify significant environmental sensitivities associated with the proposed development. If a number of sites are being considered, the feasibility reports will inform the cost benefit analysis used to select the best site(s).

3.1. Typical Scope of Feasibility Study

Matters which can be examined in the feasibility study are given in Table 3.1 below. Some sources of information for the preparation of feasibility studies are given in Appendix A of this document.

Table 3.1: Typical Scope of Feasibility Study

Aspect of Development	Comment
Planning	• national and regional development policy • County Development Plan (CDP) zoning of site, wind energy strategy, impact on scenic views and amenity areas/routes, local heritage designations and relevant policies • Local Area Plans and local area policies • planning history of site • planning route (SID or local authority)
Environment	• areas designated for environmental protection* • aquatic habitats • birds† • desktop review of local ecology • requirements or otherwise for Appropriate Assessment • County Biodiversity Action Plan
Archaeology and architectural heritage	• recorded sites and monuments
Landscape and visual impact	• ZTV map and wireframes/photomontages from key locations • tourism impact, landscape sensitivity, protected views, scenic routes, etc. (see also CDP)
wind resource	• assessment of site elevation, topography of site and surrounding area, land use; SEAI wind mapping[5]
proximity to existing land use constraints	• residences (existing and permitted but not yet constructed) • neighbouring wind farms (existing and permitted but not yet constructed) • forestry (assess proposed felling plans if possible) • telecommunications • nearby aerodromes – within 20 km of site*

*Note that proposed developments within Natura 2000 sites have additional legislative requirements and may therefore warrant a more detailed feasibility assessment.
† Regarding assessment of impact on birds, reference Section 6 of this document.

Aspect of Development	Comment
grid connection	• preliminary examination of grid connection possibilities • grid connection application if appropriate
access and transportation	preliminary assessment of transport of over-sized loads to and within the proposed site
markets for sale or use of electricity	options currently available: • power purchase agreement through REFIT • power purchase agreement on merchant basis • operation in single electricity market • auto-production[6†]
preliminary legal aspects	title to the land, rights-of-way, wayleaves, land use option agreement, etc.
outline wind turbine layout[‡]	based on known constraints, including the form and extent of existing development on the site and in its proximity
other existing site information	e.g., previous reports and investigations, information relating to adjacent sites, information on cumulative impacts, etc.
other topics	on a case-by-case basis, e.g., flooding, geotechnical risk, noise, shadow flicker

3.2. Feasibility Stage Consultation

Consultation is an important feature of this stage of development. An appropriate level of consultation depending on the site specific issues should be undertaken. Such consultations can help to determine potential constraints on any suggested development. The wider the net of consultation at the feasibility stage, then the more likely that potential impacts can be identified and resolved prior to the Environmental Impact Assessment process. Additionally, it is of key note that where developments are proposed in Natura 2000 sites an extended Feasibility Study should be undertaken which fully evaluates the opportunities for alternative locations, designs and methodologies.

A list of potential consultees is attached in Appendix C. It should be noted however that this list is not exhaustive and that the list of potential consultees provided in the EPA Advice Notes on Current Practice in the Preparation of EISs should also be consulted, as well as undertaking an assessment of relevant consultees for the development in question.

The feasibility study, and especially the zone of theoretical visibility (ZTV) map, will provide valuable information for a pre-planning meeting.

[*] A list of aerodromes is available from the Irish Aviation Authority and a link is intended to be provided from the IWEA website

[‡] this outline layout will facilitate the production of the ZTV, but it is likely to change once more detailed information is available at a later stage

3.3. Pre-Planning Meeting

It is recommended that a pre-planning meeting be arranged with the Planning Department of the local authority. It can be a good means of assessing the Council's initial views on the proposed development, or any concerns it may have. The pre-planning meeting is also an opportunity to discuss aspects of the proposed scope of the environmental impact statement (EIS), including, for example, potential photomontage viewpoint locations.

Where a development will fall below the mandatory threshold requiring an EIS (see also Section 6.1.2), the possibility of the Council's requiring an EIS can be discussed. Where an Environmental Report (ER) is acceptable to the Council for a sub-threshold development, it is of benefit to agree the scope of the report at the pre-planning meeting.

3.4. Grid Connection

Potential developers should be aware of the process for getting access to the national grid (where required). The current 'gated' process is based on a first come, first served model and the current group connection process, Gate 3, is closed to new applications. There are many further applications in the queue.

It is not known if the next round of grid connection applications will be based on the first come, first served model. The grid connection process can often take many years and this element of a wind energy project should be given appropriate attention at an early stage. In light of the above, a grid connection application should be made as soon as reasonably possible. Further information on the grid connection process can be obtained from the Commission for Energy Regulation (CER) website[7] and from EirGrid[8] and ESB Networks[9] websites.

Main Best Practice Points - Feasibility Studies

- feasibility study should identify significant environmental sensitivities associated with the proposed development
- consultation with external parties is key to identifying potential future project difficulties
- a pre-planning meeting with the planning authority can be especially helpful
- the feasibility study, and particularly the ZTV, will facilitate the pre-planning meeting
- early stage assessment of grid connection prospects and requirements is recommended

4. WIND MONITORING AND ANALYSIS

A wind monitoring mast will be required for most wind farm sites in Ireland. In general, the sooner a wind mast is erected the more useful the data obtained will be in informing the economic feasibility and layout design. The benefit of obtaining this data at an early stage will need to be assessed against the risk of expenditure on a site with planning and grid consents potentially not in place.

4.1. Data Quality

Data from the wind monitoring site is essential for determining the viability of the project and, particularly, for assessing financial viability. Problems with the quality of wind data can lead to significant difficulties in obtaining financing. The importance of paying attention to this cannot be over-stated. A significant effort is required to ensure good data.

4.2. General Recommendations for Wind Monitoring

Many of the uncertainties in an assessment of the energy production of a proposed wind farm are associated with the wind data used to perform the analysis. The following factors should be considered when undertaking a wind monitoring campaign, so that a robust or “bankable” assessment of the energy production of the wind farm can be completed when sufficient wind data have been recorded:

- Representative measurements: Meteorological masts should be located such that they are representative of the proposed turbine locations in terms of elevation, terrain and exposure.
- Number of masts: The number of masts required at a site is determined by the size and terrain of the site. For sites in complex terrain or forestry, it is recommended that masts should be installed such that no turbine is situated more than 1 km from a *representative* mast. In simple terrain, it is recommended that no turbine is situated more than 2 km from a *representative* mast.
- Mast height: It is recommended that mast height is equal to the proposed turbine hub height or at least three quarters of this height.
- Equipment: It is recommended that masts are equipped with sensors and equipment designed for use in the wind energy industry, with a proven track record regarding performance and durability. The industry standard for sensor mounting arrangements is IEC 61400-12-1 referenced below. It is important that wind speed measurements are undertaken at a range of heights and that distortion of the wind flow is minimised in all direction sectors, particularly the prevailing wind direction sectors.

- Measurement duration: It is recommended that 24 months of wind data are recorded at a site; an absolute minimum of 12 months of wind data is typically required for an energy production assessment. Data should be checked on a regular basis to ensure good data coverage and any errors or sensor failures are resolved in a timely fashion.
- Measurement consistency: It is important that the consistency of any wind measurements is maintained and therefore changes to equipment and mounting arrangements during a wind monitoring campaign should be avoided where possible.
- Documentation: A detailed mast installation report should be prepared for each meteorological mast. In addition, any changes to the mast and equipment during the monitoring campaign should be documented in a mast maintenance log.
- Remote sensing: Wind measurements undertaken using masts equipped with cup anemometry are still considered the norm for bankable energy production assessments, however remote sensing technology is being increasingly deployed. It is recommended that specialist technical advice is sought when considering the use of remote sensing technology on wind monitoring campaigns. Best recommended practice for wind measurement using SODAR and LIDAR are currently in preparation and are due to be issued in 2012[10].

4.3. Meteorological Mast Installation

The primary concerns in mast installation are:

- Health and safety
- Compliance with planning conditions e.g. aviation warning lights, bird deterrents, compliance with SI 215 of 2005 (Obstacles to Aircraft in Flight), as appropriate
- Correct installation and operation as per recommendations above

The use of a professional installer is recommended. It should be noted that a temporary meteorological mast of up to 80 metres is exempt from planning permission in most cases for a period of up to 15 months (see Section 5.1.1).

Sections 5 and 6 of this document should also be reviewed for environmental assessments which may be relevant to meteorological met mast installations.

Further Information on Wind Monitoring

1. International standard IEC 61400-12-1:2005, "Wind turbines – Part 12-1: Power performance measurements of electricity producing wind turbines, Annex G", Final edition 2005-12[11]
2. International Energy Agency Expert Group "Study on Recommended Practices for Wind Turbine Testing and Evaluation – Annex XI: Wind Speed Measurement and Use of Cup Anemometry" 2nd Print (2003)[12]
3. European Wind Energy Association "Wind Energy – The Facts, Chapter 2 Wind resource estimation" 2003/2004[13]
4. Measnet "Evaluation of site-specific wind conditions", Version 1, November 2009[14]

5. PLANNING AND ENVIRONMENTAL LEGISLATION

5.1. Planning Legislation

The planning process is subject to extensive legal requirements. Information is available from the relevant planning authority and the DoECLG website[15].

The Planning and Development Act 2010 has included a wide range of changes and amendments to existing planning legislation. This, together with all other relevant existing planning legislation (as referenced below), now forms the framework for development in Ireland in the coming years.

A few key elements of the planning legislation, of most relevance to wind energy development are outlined below. For more detailed information in this regard, please refer to the following sources:

- www.environ.ie/en/DevelopmentHousing/PlanningDevelopment/Planning/PlanningLegislation-Overview
- www.environ.ie/en/DevelopmentHousing/PlanningDevelopment/Planning/PlanningLegislation-Overview/PlanningActs/
- www.environ.ie/en/DevelopmentHousing/PlanningDevelopment/Planning/PlanningLegislation-Overview/PlanningRegulations/
- www.irishstatutebook.ie

5.1.1. Planning Exemptions

Planning permission is required for most elements of a wind farm development. There are some developments which are (normally) exempt from planning, which include:

- Temporary met masts, with a total height not exceeding 80 m and being erected for a maximum 15 months within a 24 month period (see SI 235 of 2008);
- Construction, erection and placing of a wind turbine in an agricultural, industrial or commercial setting, with a maximum height of 20 m and a maximum rotor diameter of 8 m (see SI 235 of 2008);
- Construction, erection and placing of a wind turbine within the curtilage of a house, with a maximum height of 13 m and a maximum rotor diameter of 6 m (see SI 83 of 2007);
- Construction of underground electricity cables (see SI 600 of 2001)

These exemptions are subject to a number of conditions as set out in Article 9.(1) of SI 600 of 2000 and it is advised that the relevant regulations are reviewed in relation to the extent of these exemptions. Where there is any doubt, an application should be made to the planning authority under Section 5 of the Planning and Development Act 2000 to determine if the proposed development is exempt or otherwise.

5.1.2. Planning Permission

With the exception of the various planning exemptions listed above, all other wind energy developments are subject to planning consent. Planning applications can be made either to the relevant local authority, or if the development is greater than 50 MW or 25 turbines, then an application may be required to be submitted to An Bord Pleanála, under the Strategic Infrastructure Act, depending on the size of the development (see information on SID Planning Procedure in Section 5.1.5 below).

It is considered that most developers will be advised at this stage by a planning or EIA consultant or an engineer, if such advice is not available to the developer in-house. The level of information given here reflects that. Only comments of particular relevance to wind farm planning applications are given.

Turbine dimensions will need to be given for planning purposes. As a particular make or model of turbine is unlikely to have been chosen at this stage, maximum likely dimensions should be given. Similarly, it will not be possible to state the exact electrical generation capacity of the proposed wind farm; however, a reasonable estimation can be given.

Grid connection planning is normally undertaken by EirGrid or ESB Networks. However, if desired and subject to certain conditions, the developer can undertake the planning application and subsequent grid connection works itself. This is known as 'contestability'. Detailed information on this process can be found in the following publications: one by CER in 2010 entitled 'Contestability for Distribution and Transmission Level Connections to the Electricity System'[16], one by ESB Networks, also in 2010, entitled 'Contestability on the Distribution System – ESB Networks Key Principles and Processes Paper'[17] and one by EirGrid in 2007, entitled 'Contestability of Connection Assets Position Paper'[18]. Planning permission for transmission system overhead lines should be referred to An Bord Pleanála to determine if they are SID (see Section 5.1.5 below).

Pre-Planning Consultation

It is recommended that at least one pre-planning meeting is held with the planning authority (preferably at an early stage in the application process, see also Section 3.3), to discuss the scope of the application and to seek any views held by the planning authority in relation to what should be included either in the application or the accompanying ER/EIS.

It may be appropriate to meet with the planning authority following the completion of the environmental assessment to review the findings and to discuss how it is intended to address any issues raised in the previous meeting(s).

Validation of Planning Application

A substantial number of planning applications tend to be declared invalid by some local authorities. The nature of wind farm planning applications, and their size and scale in particular, relative to more typical applications received by a local authority, render them even more vulnerable to being declared invalid.

For this reason, the following checks can be made:

- where non-standard drawing scales are used i.e. different to those required under the planning regulations, this will need to be agreed with the planning authority in advance*
- the local authority planning department can often provide assistance, should any difficulty arise in agreeing such matters
- the required fees, site notice, newspaper advert and planning application form can often be checked in advance with the planning validation section
- the definition of the site boundary will need to be carefully considered in instances where it is proposed to completely deforest an area of forestry in excess of 10 hectares of natural woodland or 70 hectares of conifer forest, a planning application accompanied by an EIS is required; the cumulative impacts here can be incorporated into the planning application and EIS for the wind farm.

Period of Planning Permission

Given the typical timescale for grid connections, and for other reasons outside the developer's control, it can be advisable to apply for planning permission which will be valid for a period significantly longer than usual. The normal duration of planning permission validity is five years. It is advised that developers, where relevant, apply for a ten year planning permission. The DoEHLG issued a circular PD 3/08 recommending that planning authorities consider granting permission for a period longer than five years where appropriate.[19] Moreover, it is recommended that this is stated clearly on the planning & site notices for the proposed development.

Further Information Requests

Should significant queries arise during the planning process, they will usually be transmitted to the developer for a response through a Further Information Request from the local authority. Some queries will have arisen within the planning authority; some will arise as a result of objections or observations submitted by third parties.

* Non-standard drawing scales are often used for wind farm developments due to the typically large site area. For most wind farm developments, use of the scales set out in the planning regulations would result in a large number of drawings with very little useful information.

Planning Appeals

A decision on a planning application may be appealed by the applicant or by a third party under certain conditions within a period of 4 weeks commencing on the date of the decision. A guide to the planning appeals process is given on An Bord Pleanála's website.* An Bord Pleanála may not confine its decision to the matters raised on appeal. It may consider the application afresh, as if it has been made to it in the first place. However, if the only appeal is a first-party one, An Bord Pleanála does have the discretion to consider only the planning conditions, and not review the application afresh.

5.1.3. Retention Permission and Substitute Consent

The 2010 Planning Act has clarified the position in relation to retention permissions for developments where an EIA is required. In these cases, retention permission will no longer be permitted where the project should have been assessed in accordance with either the EIA or Habitats Directive, prior to commencement.

In exceptional circumstances, An Bord Pleanála (only) may grant 'substitute consent' in such situations, but only where a planning permission has been found defective by a court or where such exceptional circumstances exist such that An Bord Pleanála considers it reasonable to allow the opportunity for the regularisation of the development.

5.1.4. Planning Permission – Extension of Duration

Under the Planning and Development Act 2010, an extension of permission (for a period of up to 5 years) can now be granted, where substantial works have not been carried out, but where commercial, economic or technical considerations, beyond the control of the applicant (e.g. grid connection) exist which substantially militated against either the commencement of development or the carrying out of substantial works. It should be noted that only one such extension is allowed and grounds for refusal of the extension are also included. It is also important to note that the application to extend must be made before the original permission expires. Developers can also still seek an extension of duration on the basis that substantial works have been undertaken on site.

* http://www.pleanala.ie/appealpack/howtomake.html

5.1.5. SID Process

The Planning and Development (Strategic Infrastructure) Act 2006, sets out the planning requirements for those developments considered 'strategic' for the state. All such developments must seek planning consent directly from An Bord Pleanála, through the SID process, rather than from the relevant local authority.

There are a number of wind energy development types which may require planning under the SID route. These include:

- Seventh Schedule development (under Section 37 E) of the Act - An installation for the harnessing of wind power for energy production (a wind farm) with more than 25 turbines or having a total output greater than 50 megawatts.
- Transmission lines as defined in Section 182 A) of the Act, with transmission defined as a) a high voltage line where the voltage would be 110 kilovolts or more, or b) an interconnector, whether ownership of the interconnector will be vested in the undertaker or not.

There is some variability in the interpretation of the SID in relation to 110 kV overhead electricity lines and substations. It is therefore advised that the opinion of An Bord Pleanála is sought in relation to such developments.

In relation to Seventh Schedule development, it is up to An Bord Pleanála to determine whether or not the development is 'strategic' and to that end, the developer must enter into consultations with An Bord Pleanála to so determine.

In relation to all SID development, the planning process differs from that associated with the local authority route. The main elements of the process are set out below:

- In the case of Seventh Schedule (Section 37 (A) development) the developer needs to seek confirmation from An Bord Pleanála that the development is considered SID
- This will take the form of pre-application consultations (these consultations can be lengthy and a fee is required (a partial refund is currently available if not more than one meeting is held)
- The applicant must formally write to An Bord Pleanála to start this process and this will then be placed on the Boards website (i.e. it will be in the public domain at this stage). An Bord Pleanála will determine, through the pre-application process, whether the application is SID or otherwise.
- The developer can request An Bord Pleanála to scope the EIA (at a specified cost), if so desired, or can alternatively scope the EIA themselves (through consultation with relevant bodies) and can seek comment from An Bord Pleanála in this regard
- The developer also needs to consult separately with the various local authorities involved

- At completion of pre-application consultations, all correspondence will be placed within the public domain (but not until then)
- Application to An Bord Pleanála – similar to planning application to local authority, but there are some differences and there is a requirement for a project specific website
- An Oral Hearing will most likely be held in relation to all SID applications
- There are potentially significant application costs involved

5.2. ENVIRONMENTAL LEGISLATION

Significant environmental legislation exists which must be taken account of in any wind energy development. It is vital that any development considers all relevant legislation in the assessment of impact of any project.

5.2.1. European Communities (Birds and Natural Habitats) Regulations, 2011[20]

In particular, the European Communities (Birds and Natural Habitats) Regulations, 2011, SI No. 477 of 2011, sets out to consolidate the European Communities (Natural Habitats) Regulations 1997 to 2005 and the European Communities (Birds and Natural Habitats) (Control of Recreational Activities) Regulations 2010, as well as addressing transposition failures identified in recent EU Court of Justice judgements. Of particular relevance to wind farm developers are the implications of the Regulations with regard to development within or adjacent to Natura 2000 sites (i.e. SPA's and SAC's) and the need to prepare Natura Impact Statements for submission to the planning authority, where an appropriate assessment screening or appropriate assessment is required under the Regulations. In essence, this means that it is necessary to assess whether or not the proposed development (and any ancillary development/activities off-site) will impact on the Natura 2000 site (either in the context of the conservation objectives of the site and/or the Qualifying Interests of the site).

A Natura Impact Statement, as defined by the Regulations means a report comprising the scientific examination of a plan or project and the relevant European Site or European Sites (Natura 2000 sites), to identify and characterise any possible implications of the plan or project individually or in combination with other plans or projects in view of the conservation objectives of the site or sites, and any further information including, but not limited to, any plans, maps or drawings, scientific information or data required to enable the carrying out of an Appropriate Assessment (AA).

It is vital to assess the requirements for an appropriate assessment (even for sub-threshold developments) at an early stage of the project and to include such an assessment with the planning application. There are a number of stages to be followed, depending on the level of impact likely on the Natura 2000 site. Specialist ecological advice should be sought in this regard.

It is important to note that all relevant planning applications must now include on newspaper planning notices, etc, that a Natura Impact Statement has been submitted as part of the application and that the Natura Impact Statement is available for inspection or purchase at the office of the planning authority – see S.I. No. 476 of 2011 Planning and Development (Amendment) (No.3) Regulations, 2011.

5.2.2. Other Environmental Legislation

There are a number of other pieces of environmental legislation which may have a bearing on a wind energy development. A non-exhaustive list of such legislation is provided below and the developer is advised to ensure that any proposed development is undertaken in accordance with all such legislation.

a) EU Water Framework Directive (2000/60/EC)[21]

The EU Water Framework Directive aims at improving our water environment. It requires EU governments to take a new holistic approach to managing their waters. It applies to rivers, lakes, groundwater, estuaries and coastal waters. Member States must aim to achieve good status in all waters by 2015 and must ensure that status does not deteriorate in any waters. In Ireland, river basin management plans have been put in place for each of our river basin districts and programmes of measures have been initiated to ensure compliance with the Directive.

b) EIA Directive (85/337/EEC as amended by 97/11/EC and 2003/35/EC)[22]

The EIA Directive requires that certain developments be assessed for likely environmental effects (commonly known as environmental impact assessment (EIA)) before planning permission can be granted. When submitting a planning application for such a development, the applicant must also submit an Environmental Impact Statement (EIS).

In the case of development which is under the relevant EIA threshold, planning authorities are required under article 103 of the 2001 Regulations to request an EIS where it considers that the proposed development is likely to have significant environmental effects. The decision as to whether a development is likely to have significant effects on the environment must be taken with reference to the criteria set out in the Planning Regulations.

c) Environmental Liability Directive (2004/35/EC)[23]

The European Communities (Environmental Liability) Regulations 2008, came into force in Ireland on 1st April, 2009. These Regulations (SI 547 of 2008) transpose EU Directive 2004/35/CE on environmental liability with regard to the prevention and remedying of environmental damage. The purpose of these Regulations is to establish a framework of environmental liability based on the 'polluter-pays' principle, to prevent and remedy environmental damage.

The Regulations supplement existing National and European Legislation to achieve the prevention and remediation of environmental damage by introducing, among other things, a positive reporting obligation on operators in respect of actual or threatened environmental damage. Environmental damage under the Environmental Liability Regulations means:

- Water damage that has significant adverse effects on water status under the Water Framework Directive.
- Land damage that creates a significant risk to human health as a result of the direct or indirect introduction, in, on or under land, of substances, preparations, organisms or micro-organisms.
- Damage to protected species and natural habitats.

d) Habitats Directive (92/43/EEC)[24]

The EU Habitats Directive requires Member States to maintain or restore the favourable conservation status of the habitats and species listed in its annexes. The Directive specifies that the habitats of 25 species listed in Annex 2 must be designated as SACs. SACs can also be designated for the presence of 60 Annex 1 habitats. Thus designation of a site as an SAC has wide-ranging implications. Land use practices that may be affected include farming, aquaculture, grazing, sporting and turf-cutting rights.

A further 33 species, requiring strict protection, are listed on Annex 4 (plant species listed on Annex 2 are also listed on Annex 4). Some species, while not requiring a high level of protection, need to be safeguarded against exploitation. These species are listed in Annex 5 of the Directive.

Certain activities restricted within SACs, SPAs and NHAs can only be carried out with the permission of the Minister for the Arts, Heritage and Gaeltacht Affairs, and these 'Activities Requiring Consent' vary depending on the type of habitat on the site. These and several other activities can only be undertaken with permits or licences.

e) Birds Directive (79/409/EEC as amended by 2009/147/EC)[25]

The Birds Directive is a European Union directive adopted in 2009. It replaces Council Directive 79/409/EEC of 1979 on the conservation of wild birds which was modified several times and had become very unclear. It aims to protect all European wild birds and the habitats of listed species, in particular through the designation of Special Protection Areas (SPA's).

f) European Communities Environmental Objectives (Freshwater Pearl Mussel) Regulations 2009 (S.I. No. 296 of 2009)[26]

The Freshwater Pearl Mussel Regulations are relevant to many wind farm developments and so are mentioned here. The purpose of these regulations is to support the achievement of favourable conservation status for freshwater pearl mussels. To that end the regulations set environmental quality objectives for the habitats of the freshwater pearl mussel populations (as set out in the First Schedule to the regulations) that are within the boundaries of a site notified in a candidate list of European sites, or designated as a Special Area of Conservation, under the European Communities (Natural Habitats) Regulations, 1997 (S.I. No. 94/1997). The regulations also require the production of sub-basin management plans with programmes of measures to achieve these objectives and also set out the duties of public authorities in respect of the sub-basin management plans and programmes of measures.

Significant other environmental legislation exists which must also be taken account of in any wind energy development. It is vital that any development considers all relevant legislation in the assessment of impact of any project.

6. ENVIRONMENTAL IMPACT ASSESSMENT

6.1. Environmental Impact Assessment

All wind farm developments, other than those exempt from planning, will be required to undertake some level of environmental impact assessment as part of the consent process. The level of assessment required will be dependent on many factors, including project size, complexity, location, etc. The decision as to whether a full Environmental Impact Statement or an Environmental Report is required will be dependent on statutory requirements and discussions with the planning authority.

In preparing either an EIS or Environmental Report, reference should be made to the following guidance documents:

- "Guidelines on the Information to be Contained in EIS" (EPA, 2002)[27]
- "Advice Notes on Current Practice in the Preparation of EIS" (EPA, 2003)[28]
- EU Guidance on EIA – EIS Review, 2001[29]
- DoEHLG "Wind Energy Development Guidelines" (2006)[30]

6.1.1. Requirement for an Environmental Impact Statement

An EIS is mandatory for any development with more than 5 turbines or having a total output greater than 5 MW.

6.1.2. Sub-EIA Threshold Development

For developments under this mandatory limit, local authorities are required to request an EIA if, in their view, the proposed development (not just wind farms) has the potential to have significant environmental impacts, or could have an impact on an SAC, NHA, or SPA, etc. Reference can be made to the DoEHLG's "Environmental Impact Assessment (EIA) Guidance for Consent Authorities regarding Sub-threshold Development" (2003).*

Sub-threshold developments will typically be for only one to two turbines. Auto-producers, for example at industrial sites, could fall under this category.

In practice, an EIS is not often required for sub-threshold wind farm developments. Where an EIS is not required, an environmental report will normally need to be prepared to support the planning application. This will need to cover the main items of information which the local authority will require.
It is important to agree with the local authority at a pre-planning meeting what the scope of work should be. Many of the topics covered in an EIS are likely to need to be addressed in some form.

EIA Screening

In relation to sub-threshold development, it is necessary to agree, with the planning authority, whether an EIS is required or not. To do so, it is recommended that a screening process is undertaken, in accordance with the requirements of the EIA Directive (85/337/EEC as amended by 97/11/EC and 2003/35/EC).

This screening process will assess the requirements both of the Directive and national and local legislative and planning requirements, to enable a decision to be made by the relevant authority as to the need or otherwise for an EIS.

Guidance on EIA screening is provided by the EU Commission in their publication – Guidance on EIA Screening, published in 2001.[31]

For sub-threshold development, it is advisable to prepare and submit a screening document to the planning authority, to assist them in reaching their decision in relation to the requirement for an EIS.

6.2. EIA Scoping

6.2.1. General

Scoping should be focused on issues and impacts which are:

1. environmentally based
2. likely to occur
3. significant and adverse

The "Scoping" section of the EPA's EIS Guidelines document contains important information on this aspect of the EIA process. The EIA scoping requires experienced, competent judgement, and consultation with relevant parties.

The feasibility study for the wind farm will have highlighted significant environmental sensitivities associated with the proposed development. This information will be relevant to the scoping exercise for the EIA.

It is important that the level of information required for the EIA is proportionate to the sensitivity of the site and to the scale of development. The legislation governing the EIA process requires information on "significant" impacts. Trivial impacts do not need to be covered although a brief statement outlining why any such issue is considered to be trivial should be included.

The EIS should consider potential impacts on all elements of the proposed development including improvements required to the access road to the site, borrow pits, substation, permanent meteorological mast, forestry, grid connection, etc. in as far as these impacts can be determined.

6.2.2. EIA Consultation

Consultation with relevant bodies is especially important in EIA scoping. It will need to be carried out at the very earliest stage, as some of these bodies can take some time to respond. The information received as a result can be extremely valuable and will very much guide the work to be carried out for the EIA. However, the initial consultation with these parties at the feasibility study stage ought to have identified the most significant or sensitive issues in advance. A list of the main suggested consultees is given in Appendix C of this document.

More detailed consultation and meetings may be required with some consultees. The level of additional consultation required and the relevant consultees will depend on site specific issues.

Other parties to be consulted are outlined in the following EPA documents:

- Guidelines on the information to be contained in EIS (2002)[32]
- Advice Notes on Current Practice in the preparation of EIS (2003)[33]

6.3. Main Aspects of EIS

EIA expectations have increased significantly in recent years. Detailed references to technical EIA requirements have not been given here. It is considered that, in the context of rapidly changing and increasing standards, the relevant specialists will be best positioned to advise on this matter at the relevant point in time.

The EPA documents referenced in 6.2 above provide detailed information on the content and potential structures to use in the preparation of an EIS. It is worth stressing that the consideration of mitigation measures to address potential impacts should be in the following order:

1. mitigation by avoidance
2. mitigation by reduction
3. mitigation by remedy

All mitigation measures undertaken in the course of the preparation of the design and the EIA should be clearly stated e.g. the preparation of constraint mapping which reduced the available area for certain infrastructure.

The main topics examined during the EIA process and discussed in the EIS, are well described in the DoEHLG's Wind Energy Development Guidelines.[34] Therefore, this IWEA document does not examine these topics in detail; however, some supplementary topics are listed below.

- description of proposed development
- consideration of alternatives
- noise
- shadow flicker
- ecology
- soils and geology
- hydrology and water quality
- landscape impact assessment
- cultural heritage
- telecommunications systems
- forestry
- cumulative impact
- scope of field surveys

For the detailed assessment of these topics, the advice and input of appropriately experienced consultants is highly recommended.

For certain topics, a structure has been adopted setting out the potential impacts, current best practice and consideration of cumulative impacts where appropriate.

6.3.1. Description of Proposed Development

The detailed description of the proposed development is very important. It should outline construction, operation, decommissioning, and any phasing envisaged for the project.

Associated development, including construction and any relevant off-site development, will need to be described in full. While these aspects of developments may not require planning permission, or where they could be subject to a separate application for planning permission, they will still require to be described for EIA purposes. This could include:

- construction-related activities, including borrow-pits and quarries
- road widening and improvement works on the approaches to the site
- drainage infrastructure
- the grid connection
- waste disposal locations, including spoil from excavation
- replacement afforestation, where this is relevant
- cumulative development

Due to circumstances often outside the control of the developer, not all information required on these matters might be available. In this case, any available information should be included, together with an explanation in the EIS of the limitations which prevent fuller information being presented.

The description of the grid connection is a pertinent example which is regularly encountered. In such cases, the level of information on the grid connection that might be desired by the planning authority is often not available, whether from EirGrid, or from any other party.

Section 4.3 of the DoEHLG's Wind Energy Development Guidelines and DoEHLG circular PD 3/08[35] acknowledge the difficulties encountered in such situations.

6.3.2. Consideration of Alternatives

It is very important, in determining that the proposed wind farm development is being undertaken in accordance with proper planning and sustainable development, that alternatives to the proposed development are adequately addressed within the EIS. This is a key element from the planning authority's perspective and it is critical to show that the developer has both identified and assessed alternatives to the proposed development. This can take the form of alternative types of development, alternative sites and alternative design layouts.

6.3.3. Noise

Potential noise impacts

Noise is defined as unwanted sound. The impacts of noise are subjective and can vary from person to person. Factors such as the frequency, tones, patterns, existing background noise levels, and the activities being carried out when the person experiences the noise, all affect the impacts of the noise levels being experienced.

There are two forms of potential noise which can originate from wind turbines: mechanical and aerodynamic noise. Mechanical noise originates from the gearbox and generator in the nacelle. Aerodynamic noise is caused by the movement of turbine blades as they rotate, creating broadband noise commonly described as a "swishing" sound.

Construction noise sources on site can include site traffic including excavators and heavy goods vehicles (HGVs), material excavation, rock breaking and blasting, crushing, concrete mixing and pouring of foundations, tree harvesting, etc.

Current best practice

The DoEHLG Guidelines on noise limits should be followed. It would also be useful to discuss noise conditions (and compliance with the DoEHLG Guidelines) as part of any pre-application consultations. Any additional requirements outlined by local authorities in their County Development Plans or formally adopted wind energy policies will need to be met. The following documents also provide guidance on the assessment of noise:

- "The Assessment and Rating of Noise from Wind Farms" ETSU-R-97 (1996), prepared by the Working Group on Noise from Wind Turbines on behalf of ETSU for the UK DTI[36]
- Page 35 to 37, Institute of Acoustics, Acoustics Bulletin March/April 2009[37]
- ISO 1996-1:2003 "Description, Measurement and Assessment of Environmental Noise"[38]

The EPA document Guidance Note on Noise Assessment of Wind Turbine Operations at EPA Licensed Sites (NG3)[39] will be particularly relevant for industrial sites where auto-production is proposed.

The assessment of construction noise impacts should be undertaken in accordance with British Standard BS 5228-1:2009 Code of practice for noise and vibration control on construction and open sites Part 1 Noise[40]. There are no published limits for construction noise in Ireland. However the National Roads Authority (NRA) Noise Guidelines[41] provide indicative noise limits allowable at dwelling facades during construction activities.

The assessment of impact on noise sensitive locations or receptors within 1 km of proposed turbine locations will normally be more than adequate for EIA purposes. It is recommended that background noise monitoring should be undertaken at least prior to the operation of any turbines but usually as part of the EIA.

The noise assessment and associated background noise monitoring survey where required should be undertaken by suitably experienced personnel. Guidelines for undertaking a background noise monitoring survey are set out in the document ETSU-R-97 referenced above. General experience indicates that a period of at least two weeks continuous monitoring will be required to get a good data set of noise readings for wind speeds in the range 3 to 12 m/s. This will be subject to weather conditions as, for example, a particularly calm period will result in insufficient data for background noise at higher wind speeds and data obtained during periods of rainfall will be unsuitable to include in the analysis.

Cumulative noise impacts

It is important to determine if there are other existing and/or permitted but not constructed wind farms in the vicinity of the proposed development which could contribute towards a cumulative noise impact on any receptors. Any such wind farm developments within 2 km of the proposed development should be considered in a separate cumulative noise assessment.

6.3.4. Shadow Flicker

Potential shadow flicker impacts

In times of direct sunshine, wind turbine blades could occasionally cast moving shadows on residences in close proximity to the turbines. At certain times of the year, the moving shadows of the turbine blades could periodically reduce light to a room causing the light to appear to flicker. This would not generally have any effect on health or safety, but could on limited occasions present a brief nuisance effect for some neighbours.

Current best practice

Calculations for shadow flicker modelling generally assume 100 % sunshine conditions. It is reasonable in Ireland's climate to modify these figures. Some attention can also be given to the wind rose which indicates the percentage of winds from each direction. If winds rarely come from the sectors which would give rise to the greatest shadow flicker effects on a dwelling, this can be taken into account.

Where shadow flicker is anticipated to lead to potential problems, measures can be implemented to mitigate these effects. Wind turbine control software is available, which can turn the relevant turbine off at these times. The developer may wish to consider the economic impact of use of this mechanism. Other mitigation measures could include the provision of screening measures, where this is acceptable to the relevant householder.

The assessment of potentially sensitive locations or receptors within a distance of ten rotor diameters from proposed turbine locations will normally be suitable for EIA purposes. The DoEHLG's Wind Energy Development Guidelines set recommended limits for shadow flicker which are 30 hours per year or 30 minutes per day for receptors within 500 m.

Cumulative shadow flicker impacts

It is important to determine if there are other existing and/or permitted but not constructed wind farms in the vicinity of the proposed development which could contribute towards a cumulative shadow flicker impact on any receptors. Any such wind farm developments within 2 km of the proposed development should be considered in a separate cumulative shadow flicker assessment.

6.3.5. Ecology

Potential ecology impacts

The potential impacts on ecology are too numerous to mention in detail here and will be very much site specific. In general, however, ecology impacts are typically associated with the following:

- potential impacts on birds – collision risk, reduction in available habitat and foraging lands, displacement and disturbance of breeding and roosting sites, deterrent effect, impacts on local and seasonal migratory bird populations, associated impacts on endangered species, etc
- potential impacts on bats – generally similar to potential impacts on bird
- potential impacts on habitats – removal of sensitive habitats, indirect impacts on sensitive habitats arising from construction activities (e.g. pollution, drainage effects, etc.), disturbance of protected species associated with sensitive habitats, etc.
- potential impacts on mammals – disturbance and displacement of protected species (e.g. badger, red squirrel), impacts on breeding and foraging habitat, etc
- potential impacts on flora – disturbance and displacement of protected species, impacts on suitable habitat for sensitive species, etc
- potential impacts on the aquatic environment – impacts on aquatic habitats, protected species (e.g. Fresh Water Pearl Mussel, salmon, etc.) arising from pollution associated with construction activities and drainage, impacts on biological water quality (see Water Framework Directive in Section 5.2.2), nutrient enrichment, etc.
- potential impacts on Natura 2000 sites – will generally be similar to the above depending on the qualifying interest of the relevant site but there are specific legislative requirements in respect of how they are addressed (see current best practice below and Section 5.2.1)
- potential impacts on invertebrates - disturbance and displacement of protected species, impacts on suitable habitat for sensitive species, etc.

Potential impacts during the construction phase will in many cases be different to potential impacts during the operational phase and both should be considered.

Particular attention should be accorded to the relevant legislation (see Section 5) when assessing potential impacts on ecology.

Current best practice

The scope and content of ecology surveys are continually evolving. This is particularly the case for bird surveys, for example. Occasionally, sites could now require several different types of bird surveys, each with different monitoring requirements and methodologies, depending on the bird species present (e.g., standard breeding bird survey, standard wintering bird survey, water birds, hen harrier, red grouse). An experienced ecologist can provide a relevant scope of work for this assessment. Guidance on this scope of work should be requested from NPWS.

Fish surveys, some of which require a licence, could be required in certain sensitive locations, e.g. where the development is draining into salmonid waters, and where there might be some risk of sediment or nutrient release. The requirement or otherwise for fish surveys in any location needs to be discussed with Inland Fisheries Ireland.

There has been more focus recently on the assessment of potential impacts on bats. The requirements for bat surveys will depend on the potential for bat roosts and use of the site and on the species that are known to be in the area. Draft guidelines are currently being prepared by Bat Conservation Ireland but these have not yet been agreed.

Many of the field surveys mentioned above are seasonally constrained (or may require more than one season of surveys) and it is important to factor this into the programme of works.

Should any complex matters arise on which NPWS, County Heritage Officer, or Inland Fisheries Ireland have some concerns, it can be of benefit to consult with the relevant party again when the appropriate section of the EIS is nearing completion. This helps to assess whether the requirements of statutory consultees are met in advance of lodging the planning application.

Particular attention will be required where there is any potential impact on the qualifying interests of a Natura 2000 site. See Section 5.2.1 for an outline of the legislative requirements in this regard. Detailed guidelines setting out the different steps and stages that are needed to establish whether a plan or project can be implemented without damaging a Natura 2000 site are published by the NPWS[42]. Further guidance on managing Natura 2000 sites, including a guidance document 'Wind Energy Developments and Natura 2000' are published by the EC[43].

The ecology assessment should be undertaken by experienced ecologists, who are familiar with the relevant legislation, current survey methodologies for the various species and habitats and the preparation of scientific reports outlining their findings. The ecology assessment and proposed mitigation measures should be prepared and reviewed in liaison with a multidisciplinary team as outlined in Section 6.3.5 below.

Cumulative ecology impacts

The potential for cumulative ecology impacts arising from other significant existing or permitted infrastructure should be assessed. There is a potential for significant ecology impacts at large distances from the proposed development. Significant existing and permitted infrastructure within a minimum of 20 km should be considered for the assessment of cumulative effects where there are potential impacts on sensitive or designated sites. Cumulative impacts such as other wind farms, land use such as agriculture and forestry, river catchment management and significant infrastructure including roads, quarries, abstractions and discharges in the wider area need to be considered. In the case of designated sites (Natura 2000 sites, NHA's, etc.), it is recommended, where possible, that the potential cumulative impact of all significant existing and permitted infrastructure within the site should be assessed.

6.3.6. Soils and Geology

Potential impacts on soils and geology

Potential impacts on soils and geology are outlined in the document "Geology in Environmental Impact Statements – A Guide" (2002)[44] published by the Institute of Geologists of Ireland, 2002. Some of the key impacts are listed below:

- impacts on ground stability
- contamination of the soil by leakages or spillages
- compaction of the soil and removal of the soils from site
- the removal of surficial/bedrock deposits and stability of same
- impact of construction activities on peatlands
- impact on groundwater levels and abstraction potential and pollution of same
- impact on geological heritage sites (CGS or NHA) identified by GSI

The most significant potential impacts associated with wind farm developments, in terms of the magnitude of the impact should it arise, are related to peat stability due to the fact that many wind farms are located in upland areas where peat soils are common.

Current best practice

The Institute of Geologists of Ireland has produced "Geology in Environmental Impact Statements – A Guide" (2002).[45] It has recommendations with regard to the soils and geology section of the EIS.

Local authorities will often require the assessment of soils and geology to be carried out by an experienced geotechnical engineer, geologist, or other similar professional. This is important in areas of peat slippage risk or other sensitive soils. This is further outlined below. In most instances this level of work will be required for sensitive soils only, and will not otherwise be necessary.

There are many different types of mineral and peat soils with different assessment requirements. The geotechnical specialist should determine the appropriate level of assessment based on the nature of the conditions on any particular site.

In the case of peat soils, it is important that the engineering or geology specialist engaged for this section of the EIA has good experience in and a thorough understanding of the dynamics of peat. A flow chart outlining a typical peat assessment process is included in Appendix F.

An introduction to the assessment of development in peat soils is given in Section 5.3 and Appendix 4 of the DoEHLG Wind Energy Development Guidelines. Its recommendations should be followed where relevant.

A good assessment methodology of geotechnical considerations at the EIA stage is also given in a document prepared by the Scottish Executive: "Peat Landslide Hazard and Risk Assessments - Best Practice Guide for Proposed Electricity Generation Developments" (2006)[46]. This document provides guidance for the geotechnical specialist when scoping the work required for the EIA. This scoping should be agreed in conjunction with the project hydrologist or hydrogeologist and the project ecologist.

The approach chosen should meet the requirements of all team members.

The long-term risks of construction on peat stability will also require assessment. These risks will include the effects of de-watering and oxidisation of cuttings and exposed embankments, which could lead to the degradation of under-lying peat, destabilisation, and long-term slippage risk. The choice of construction methodologies could have a significant effect on these risks.

Another issue of particular relevance to (but not limited to) peat soils is the question of the management of excavated material. This is more relevant in the case of soft soils where there is little bearing strength and therefore the volume of excavated material is likely to be bigger. It may be useful to prepare a table outlining the volumes of excavated material arising from different elements of the works as well as outlining the locations and volumes for final deposition of the excavated material. This may be addressed in conjunction with the reinstatement of the site. The proposed temporary or permanent deposition of excavated material on the site should be assessed to ensure that it does not result in an unacceptable risk of landslide or sedimentation. Other sustainable end uses for excavated material that cannot be reinstated on site or in the immediate vicinity should be suggested. Requirements (or otherwise) for waste licensing/permitting also need to be considered.

Where there is a residual risk of a landslide, consideration should be given to emergency measures that might be employed in the case of a landslide. It is not usually necessary to prepare a full emergency management plan with the planning application as this is better done by the contractor before construction commences, however it may be useful to mention some elements that should be included in such a plan in the EIS.

Geotechnical requirements for development in peat soils can have a significant effect on site hydrology, hydrogeology, or ecology. Thus, the recommendations of the geotechnical specialist will need to be made in conjunction with those of a hydrologist and an ecologist, or similar professionals. This will include, for example, the choice of approach for construction, including mitigation measures being considered.

Thus, assessments of peat landslide hazard and risk typically require a competent, multidisciplinary team, to cover geotechnical, hydrological, and ecological requirements. Based on the Scottish Executive Guideline's[42] recommendations, it is likely to comprise the following (or equivalent):

(i) engineering geologist or geotechnical engineer
(ii) engineering hydrologist, hydrogeologist, or environmental geologist
(iii) ecologist and/or bog vegetation specialist

These team members will need to have demonstrable experience in managing geotechnical risk and undertaking upland geohazard assessments and/or surveys, specifically in peatland environments. They should be appropriately qualified for this work. Matters specific to peat soils, which could be considered by the multi-disciplinary team, are outlined in Table 6.1.

Table 6.1: EIA Assessment in Peat Soils

Design Aspects to be Examined	Potential Impacts to be Examined
• location of turbines • location of other infrastructure • choice of construction methods • approach to drainage design • peat disposal measures	both construction-related and long-term impacts will need to be considered for the following: • health and safety, and slope stability • effects on surrounding bogland of de-watering in cuttings, and oxidisation of peat • sediment and erosion control • nutrient control • impact of site track and drainage design on soils, hydrology, and ecology, including fisheries where relevant • environmental impact of peat disposal measures • re-vegetation measures • permanent loss of Annex 1 habitats from footprint of development and access routes

In most instances the level of detail provided here would normally only be appropriate for the design stage of a wind farm, and would not generally be required for an EIS; however, in dealing with sensitive soils in sensitive locations, a greater level of detail could be necessary. Consultation with NPWS and Inland Fisheries Ireland, as well as other relevant organisations listed in Appendix C will highlight the level of detail required.

Geotechnical issues pertaining to peat will vary significantly from site to site. There is likely to be a greater environmental impact from development on pristine undisturbed bog compared to bog in a modified environment e.g. cutover bog, forested site, etc., some of which have relatively minor issues.

Carbon Calculations

Excavation of peat can be a contributor to carbon losses associated with wind farm construction. It is good practice to undertake a calculation of the carbon costs of the construction and operation of a wind farm. The carbon release associated with the excavation and oxidisation of peat soils can be relatively significant and should be included in any carbon calculation. A suggested method for calculating the carbon costs and saving associated with a large scale wind farm development is set out in the Scottish Executive document 'Calculating Potential Carbon Losses and Savings from Wind Farms on Scottish Peat lands: a total life cycle perspective'[47].

Cumulative impacts on soils and geology

The potential for cumulative impacts on soils and geology is relatively low. However, it should be considered and the results described in the EIS. The interaction between ecology, soils and hydrology are also key considerations in relation to cumulative impact here.

6.3.7. Hydrology and Water Quality

Potential impacts on hydrology and water quality

The most significant impacts on hydrology and water quality are often associated with the following mechanisms:

- sedimentation – runoff from excavated surfaces, material storage areas and fines from road construction material or poor track and hardstanding material increasing sediment load in nearby watercourses
- increase in runoff – the construction of tracks, turbine foundations, hardstandings and associated works can increase the rate of rainfall runoff from the new surfaces, increasing the risk of erosion and flooding
- nutrient enrichment – in certain catchments, such as agricultural land or forestry where historical fertiliser application has occurred, the impact of nutrient release into watercourses should be assessed
- pollution – hydrocarbons, hydraulic fluids, sanitary waste, cement washings and spills, etc. associated with the construction and operation of the wind farm
- potential impacts on water table – dependent on depths of excavations

Consideration must be given to the protection of all waters for ecological communities. More detailed consideration however will be required where the adjacent or downstream watercourses are particularly sensitive e.g. presence of Fresh Water Pearl Mussel, Salmonid waters, Natura 2000 sites, Natural Heritage Areas, etc. In such cases, in addition to compliance with the Water Framework Directive (see Section 5.2.2), the potential impacts will need to be reviewed with regards to the relevant regulations.

Current best practice

A water quality sampling programme can assist in the description of the existing water quality and assessment of impacts. The sensitivity of the downstream waters and risks associated with the proposed development should inform the level of detail of any such sampling programme.

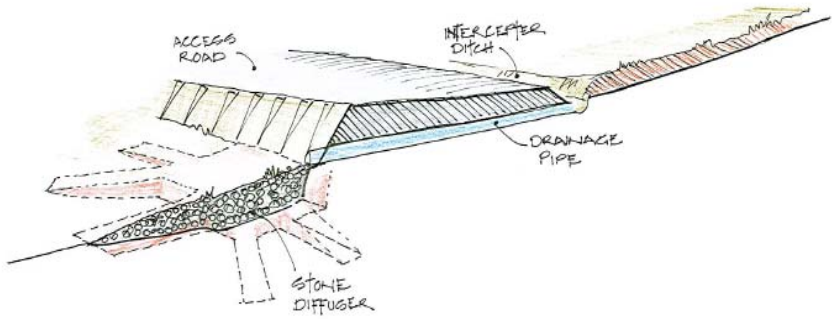
Water quality sampling can include physico-chemical and biological sampling. Where a detailed physico-chemical sampling programme is proposed it should include samples for a variety of different flow conditions to determine the impact of rainfall runoff on sedimentation, nutrient enrichment, etc. arising from the pre-development site. This may assist in determining the source and magnitude of construction stage impacts, should they arise.

Reference to the water quality status of the nearby watercourses as set out in the River Basin Management Plans (in accordance with the Water Framework Directive) and an assessment of the potential impact of the proposed development on that status is required.

A flood risk assessment report will be required if there are benefitting lands within the site or if there is a history of flooding adjacent to the site that might be affected by the proposed development. The requirements for the flood risk assessment are set out in the DoEHLG document 'The Planning System and Flood Risk Management'[48]. Additional mitigation may be required to reduce potential impacts of increased flood risk.

Guidance on the type of structures required in the vicinity of streams is provided by Inland Fisheries Ireland.[49]

Efforts should be made to minimise stream crossings where possible. Proposed construction works should be kept more than 50 m from existing watercourses where reasonably possible. There should be no direct discharges to existing watercourses where possible – discharges to land, subject to geotechnical and habitat sensitivities, provide for additional filtration of sediment. Run-off should be managed through well-planned implementation of silt fence installation, sediment ponds and in-stream sediment traps. The extent and location of such mitigation measures should be undertaken following input from a professional ecologist and hydrologist. The hydrology assessment and proposed design should be prepared and reviewed in liaison with a multidisciplinary team as outlined in Section 6.3.5 above.



The potential impact of the construction of drainage infrastructure, particularly in relation to sediment transport, should be carefully considered in the drainage design.

Consultation with the NPWS and IFI* at an early stage is recommended. Where possible, the proposed hydrology assessment and proposed design should be discussed with both of these consultees and the planning authority prior to submitting any planning application.

* IFI is currently in the process of producing its own Wind Farm Guidelines. At present, a wind farm scoping document is available from IFI.

Cumulative impacts on hydrology and water quality

Potential cumulative impacts associated with existing and permitted significant infrastructure within the same waterbody catchments as the proposed development will need to be considered. As the most significant impacts on hydrology and water quality are associated with the construction phase and the following couple of years (until natural vegetation has re-established), this should be considered in the assessment of cumulative impacts. Again, the interaction between ecology, soils and hydrology are a key issue in relation to cumulative impacts here.

6.3.8. Landscape and Visual Impact Assessment

Potential landscape and Visual impacts

Landscape has two separate but closely related aspects. The first is visual impact, i.e. the extent to which a new structure in the landscape can be seen. The second is landscape character impact, i.e. effects on the fabric or structure of the landscape. Landscape character is derived from the appearance of the land, and takes account of natural and man made features such as topography, landform, vegetation, land use and built environment and their interaction to create specific patterns that are distinctive to particular localities. Landscapes also embody the history, land use, human culture, wildlife and seasonal changes of an area.

Visual impacts are subjective, however a methodology has been developed whereby they can be assessed objectively. This involves an assessment of the sensitivity of potential views which will depend on a number of factors relating to the viewing areas such as the recreational use of the area, cultural or historical significance, number of potential viewers, natural features in the area, general impression of the views, etc. The dominance of the proposed development needs to be determined in order to define the potential impact on selected viewing locations. Landscape impacts are concerned with the effects of development on the elements, characteristics and the character of the landscape.

Current best practice

A detailed landscape and visual impact assessment will be required for any wind farm of a scale that requires an EIS. Sub-threshold development will also need to address landscape and visual impacts but this can usually be done in more compact form subject to the sensitivity of surrounding landscape conditions. Landscape and visual impact assessment is covered in significant detail in the DoEHLG Wind Energy Development Guidelines which should be reviewed for the preparation of any such assessment. It is recommended that consideration be given to the engagement of a suitably qualified landscape architect to address the landscape and visual impact assessment of the proposed development.

Zone of Theoretical Visibility (ZTV) plans and photomontages representing the constructed scheme will be required. The number of photomontage view points will depend on a number of factors including the sensitivity of the surrounding landscape, the number of scenic views, amenity areas, population centres, sites of cultural significance, etc. that can have a view of the wind farm as shown on the ZTV. It is not normally necessary to prepare a photomontage from every potential view point. The selection of view points should include the most sensitive locations and should be representative of the potential views from a number of different angles. It can often be found that the ZTV indicates a view of the wind farm from a particular location but when the location is visited, local hedgerows or other obstructions may obscure any actual views of the wind farm. The proposed view point selection should always be discussed with the relevant planning authority in case they have particular views, not already covered, that they would like included. Guidance on the preparation of photomontages can be found in the document 'Visual Representation of Windfarms Good Practice Guidance' published by Scottish Natural Heritage[50].

The landscape impact assessment should include a detailed description of the landscape context, the planning context and the method used to select the view points for photomontages. This should be followed by a detailed assessment of the sensitivity of each view point and the significance of the impact of the proposed development at each view point. This should be summarised in an overall assessment of the significance of the impact at each view point. Detailed guidance on landscape and visual impact assessment are provided in the document 'Guidelines for Landscape and Visual Impact Assessment' published by The Landscape Institute and IEMA, 2002.[51]

Cumulative landscape impacts

As the wind energy industry has developed and more wind farms are permitted, the potential cumulative impacts are increasing in significance. This needs to be clearly addressed in the landscape impact assessment.

For wind farm developments with a proposed tip height of over 100 m, the cumulative impact should be assessed over an area at least 20 km from the proposed development as set out in the DoEHLG Wind Energy Development Guidelines. For smaller developments, an area of at least 15 km from the proposed development will need to be considered.

6.3.9. Impacts on Cultural Heritage

The term cultural heritage as used in these guidelines includes archaeology, architectural and cultural heritage.

Potential impacts on cultural heritage

The most significant potential impacts on cultural heritage will include the following:

- disturbance or destruction of sites of archaeological interest
- visual impact on sites of significant archaeological interest
- visual impact on sites of architectural heritage or cultural significance

Current best practice

An archaeologist will normally carry out a field survey, and prepare an archaeological impact report. Other aspects of cultural heritage should also be assessed in the EIS, including architectural heritage and places of spiritual, traditional, or local importance. Consultation with the Heritage Officer or planning authority as well as the Development Applications Unit of the DoAHG as part of the EIS scoping should confirm the requirements for any particular development. It is also recommended in relation to the visual impact on cultural heritage sites, that the archaeologist liaise with those undertaking the landscape and visual impact assessment to adequately address these issues. Cognisance should also be given to the ICOMOS publication dealing specifically with Heritage Impact Assessment[52].

Cumulative impacts on cultural heritage

Potential cumulative impacts associated with existing and permitted significant infrastructure within the wider area should be assessed. It is likely that these will mostly relate to visual impacts.

6.3.10. Impacts on Telecommunications Systems and Aviation Issues

Potential impacts on telecommunications systems

Telecommunications signals can occasionally be affected by wind turbines. This can arise from a signal being blocked or interrupted by turbine towers and/or blades in the case of point to point signals or more general interference in the case of point to multi-point signals and radar.

Current best practice

Each of the main telecommunications service providers will need to be contacted. In order to determine if there are telecommunications links going through any potential site, the telecommunications service providers should be issued a consultation letter with the site boundary details. The locations of any links in the vicinity of a potential site should be mapped at an early stage to inform the site layout design. It is often necessary to survey the precise location of telecommunications masts to ensure that telecommunications constraints are mapped correctly.

Where telecommunications service providers have masts in the vicinity of the proposed wind farm, enquiries should be made about other parties who could be utilising the mast for private telecommunications networks. This can include companies such as the ESB, or veterinary practices.

Once the layout of the proposed wind farm has been confirmed, the proposed turbine co-ordinates should be issued to all the telecommunications service providers to confirm that there are no anticipated problems.

A sample list of telecommunications operators is given in Appendix C of this document. This list should not be regarded as definitive. Contact details will need to be checked, as the telecommunications market is subject to change and there are new service providers emerging frequently.

Point-to-Point Signals

Where line-of-sight signals are concerned, it is possible to identify potential negative impacts in advance, and design the wind turbine locations to avoid their paths. The telecommunications operators are best able to advise on this.

Point-to-Multipoint Signals

UHF- and VHF-type signals such as the radio and television services operated by RTÉ can occasionally be affected by turbines at some sites. Mitigation measures can generally be provided in this respect.

This might include supplying dwellings with more directional-style aerials; sometimes relay or booster signals might need to be provided, in conjunction with RTÉ.

It is RTÉ's usual practice to require a Protocol to be signed which, effectively, requires the developer to accept total financial responsibility for remedial measures which could be required as a result of potential negative impact of the wind farm on RTÉ's network. A copy of the report prepared by RTÉ outlining the potential impact of the wind farm should be requested. This is necessary for the developer to understand the degree of potential risk being undertaken in signing the Protocol.

These difficulties may arise less frequently in the future, with the roll out of digital television and the increasing use of satellite television and cable networks.

Irish Aviation Authority

Consultation with the Irish Aviation Authority (and where relevant the operators of other aerodromes outside the control of IAA) is particularly important with respect to airports, RADAR, and aircraft guidance systems. The IAA should be provided with proposed co-ordinates once these are known. The Irish Aviation Authority is also the safety regulatory body for civil aviation in Ireland. Wind turbines or any structure exceeding 90 metres in height are considered obstacles to aerial navigation and need to be shown on aviation charts. They will also need appropriate aviation warning lighting. The IAA should be informed 30 days in advance of the erection of any structure exceeding 45 metres in height under S.I. 215 of 2005[53]. This includes wind monitoring masts which may be exempt from planning permission. If located close to an airport (within 20 km), a wind turbine could interfere with the safe operation of an airport, simply by its presence and height. In the feasibility section of the guidelines, proposers of windfarms should include any airports or aerodromes within 20 km of the proposed development as early consultees.

The Sustainable Energy Authority of Ireland published a study: "Investigation of the Impact of Wind Turbines on Radar" (2004), which provides relevant information.[54]

Cumulative impacts on telecommunications systems

Potential cumulative impacts on telecommunications systems should be identified in consultation with the relevant service providers. These are most likely to relate to point to multi-point signals and radar.

6.3.11. Forestry Impacts

Potential forestry impacts

Forested sites often coincide with suitable locations for wind farms as they tend to be located on marginal land at higher elevations. These locations are usually associated with sensitive headwaters and with erodable soils and soils, such as podsols, gleys or peaty soils, that do not bind nutrients. They are often in highly visible landscapes and in or near protected areas such as SACs, SPAs, NHAs and pNHAs.

If there is forestry on or adjacent to a site proposed for a wind farm there are a number of additional elements that should be considered.

The nearby presence of forestry increases turbulence and wind shear which results in increased loads on the turbines which may affect the warranty on the turbines and the operation and maintenance costs. It also reduces the wind speeds above the canopy which will result in less productive turbines.

Where tree felling associated with the proposed development is required, additional impacts on the environment need to be assessed. The most significant of these potential impacts are associated with felling and subsequent replanting and include:

- water quality due to;
    - sediment release associated with ground disturbance associated with felling and replanting activities;
    - eutrophication (nutrient enrichment) associated with nutrient release from the decay of brash after felling, fertilizer application at replanting and sediment release;
- change in hydrology due to interaction with existing forestry drainage;
- decrease in the carbon sequestration potential of the forest due to premature clearfelling and/or associated deforestation or replanting with a slower growing tree species;
- loss of breeding, nesting and foraging habitat for a range of species
- landscape impacts and impacts on protected areas.

The risk of these potential impacts increases with increased size of felling coupes (most often associated with turbulence felling). The potential impacts may be exacerbated by interactions with existing or proposed felling plans and or interactions with the construction stage.

All afforestation approvals and Felling Licences issued by the Forest Service must abide by the following (where applicable) as well as other specific conditions as appropriate:

- Forestry and Water Quality Guidelines[55]
- Forestry and Archaeology Guidelines[56]
- Forestry and Biodiversity Guidelines[57]
- Forestry and the Landscape Guidelines[58]
- Forest Harvesting and the Environment Guidelines[59]
- Forestry and Kerry Slug Guidelines[60]
- Forestry and Otter Guidelines[61]
- Forestry and Freshwater Pearl Mussel Requirements[62]
- Code of Best Forest Practice.[63]

Current best practice

On forested sites there are a number of measures that can be taken to control impacts associated with turbulence and wind shear, for example increasing the hub height, optimising turbine layout and forestry felling.

Where felling is necessary, there are two main approaches:

- turbulence felling – this is where a significant area of forestry is cleared around each turbine or across the whole site
- keyhole felling – the only felling that takes place is that required to construct the turbines and associated infrastructure

In the case of keyhole felling, a broad rule of thumb used in the industry is that the vertical distance between the lower tip of the turbine blade and the top of nearby forestry should be at least twice the height of the forestry[64].

This will vary depending on the distance of the forestry from the turbines and the density and growth rate of the forestry. This should be verified by wind analysis. Computational Fluid Dynamics (CFD) modelling methods are often used to determine the impacts of forestry on wind farm efficiency and turbine loading.

Any tree felling, with a certain few exceptions, requires a tree felling licence from the Forest Service. The licensing requirements are set out in the Forest Service Policy on Felling Licences for Wind Farm Development[65]. These include information on replanting requirements as well as compensatory afforestation (compensatory afforestation describes new planting on lands not previously forested. The current policy is to require compensatory afforestation of an area equal to the area of deforestation and/or of an area equal to 10% of the area of turbulence felling. S.I. 558 of 2010 requires that afforestation requires prior approval from the Forest Service. The Forestry Act, 1946 requires that any land proposed for compensatory afforestation must, at the time of the granting of the licence, be in the ownership of the applicant for the relevant Felling Licence).

While it is not necessary to submit a tree felling licence with a planning application because a felling licence is only valid for two years whereas the wind farm may not be constructed for a greater number of years, the proposed method of felling should be considered at EIS stage and the relevant environmental impacts should be addressed.

The choice of felling method will have a large impact on the assessment of impacts in the EIS. The larger the area of forestry to be felled, the greater the environmental impact is likely to be. Two phases require to be considered: tree felling and subsequent replanting.

Some of the key areas that should be considered are set out below:

- description – site ; soil type, slope, risk of nutrient loss, risk of sedimentation
- description – felling; proposed extent of felling, method of access and extraction, tree species, age, yield class
- description – replanting; the species being replanted (native species where possible), site preparation/ground cultivation (if any) level of fertiliser applied (if any), etc. should be included in the description of the development
- felling – proposed extent of felling, method of access and extraction, use of waste material, etc. should be described
- water quality – tree felling in fertilised sites can result in nutrients being released into nearby watercourses; an assessment of potential water quality impacts is recommended
- other environmental impacts – impacts of forestry felling on drainage, soil stability, sediment transportation, visual amenity, etc. should be addressed
- forest management plan – the interaction between proposed wind farm felling and planned felling as part of a commercial management plan should be described
- carbon impact – the carbon impact of proposed tree felling i.e. loss of carbon sink, should be included in any carbon calculations

Cumulative forestry impacts

Potential cumulative impacts associated with forestry are most likely to be associated with interaction of felling proposed for the wind farm with commercial felling plans. Such impacts will include impacts on maximum size of felling coupes, potential visual impacts with other felling in the area, cumulative nutrient loading associated with other felling and sediment transport as well as impacts on traffic, archaeology, and protected species and habitats (including NHA's) .

6.3.12. Human Impacts

Potential human impacts

The key potential human impacts are associated with the following:

- socio-economics i.e. the interaction of social and economic factors
- recreation and amenity
- roads, traffic & transport
- land use
- health and safety
- noise (see Section 6.3.2)
- shadow flicker (see Section 6.3.3)

Current best practice

The socio-economic assessment will need to consider the impact of the proposed development on employment, economic, tourism and population issues. To date these assessments have been largely broad based estimates. There is a trend towards increasingly detailed economic and social assessments.

The assessment of impacts on recreation and amenity should include consideration of local amenities and recreation uses. The potential for access to the site upon completion of the construction of the works may improve facilities for recreation and amenity in the area although it is recognised that most developers will be required to close off wind farm sites for insurance and liability reasons.

A traffic survey at key junctions into the site should be undertaken. The level of traffic associated with the construction works should be compared with the level of traffic associated with the normal use of the road. Guidelines on the requirement for a detailed traffic impact assessment are set out in Table 2.1 of the document 'Traffic and Transport Assessment Guidelines' published by the National Roads Authority, 2007.[66] Operation stage traffic is likely to be insignificant.

The impact of construction traffic and heavy loads associated with large components on the quality of the local roads should be considered.

The impacts on land use are often minor, except in the case of forested sites where turbulence felling is required due to the small footprint of wind farm developments relative to the overall site area. In most cases, the remainder of the land can continue to be used as before.

Most health and safety impacts will relate to the construction phase although the operation and maintenance phase should also be assessed.

Cumulative human impacts

The most significant potential cumulative human impacts will most likely relate to traffic impacts. Cumulative impacts associated with construction traffic in relation to other existing and permitted significant infrastructure in the general area should be assessed.

6.3.13. Scope of EIA Field Surveys

Where practicable, it is often considered effective to have EIA field surveys cover the full area of the landholding where there is a legitimate anticipation that turbines could be located therein.
It is often more expensive to go back and re-survey additional ground if turbines are moved afterwards; also, the time of year may no longer be appropriate. A common sense view should be taken on very large sites.

It is desirable – from a practical point of view - that field surveys inform the layout design process and not the other way around. Otherwise the turbine layout might have to be re-designed once better information on the site becomes available.

6.4. Community Engagement for Environmental Impact Assessment and Planning

An appropriate approach to community engagement is important, both during early project development stages, and during the environmental impact assessment process. These matters are addressed in Chapter 11 of this document.

Main Best Practice Points - Environmental Impact Assessment and Planning

- The developer must have regard for all relevant national and EU legislation, including in particular the Planning and Development Act, 2010, the 2011 Habitats Regulations, etc.
- for an EIS, developers should refer to the following:
  - Guidelines on the Information to be Contained in EIS (EPA, 2002)
  - Advice Notes on Current Practice in the preparation of EIS (EPA, 2003)
  - DoEHLG Wind Energy Development Guidelines (2006)
- sub-threshold development will not normally require an EIS, but the local authority will need to be satisfied that adequate information has been provided for them to make a decision on the planning application;
- early and in-depth consultation with statutory and other relevant bodies will allow greatest opportunity to provide for any concerns which they may have, which ought to assist the planning process; detailed negotiation and agreement could be required in some instances
- assessment of potential impacts on ecology may require a significant survey effort which can be seasonally dependant and may require multi-season surveys
- compliance with regulations and directives regarding the protection of species and habitats must be addressed where necessary
- a Natura Impact Statement must be prepared where there is any potential impacts on the qualifying interests of a Natura 2000 site
- where peat or other sensitive soils are present, a multi-disciplinary team should be established for the relevant sections of the EIA, covering geotechnical, hydrological, and ecological impacts
- the recommendations for peat soils in the DoEHLG Wind Energy Development Guidelines (Section 5.3 and Appendix 4) should be followed where relevant
- potential impacts on hydrology and water quality must be addressed with reference to the Water Framework Directive as set out in the relevant River Basin Management Plan

- telecommunications operators, including RTÉ and the IAA, should be consulted once turbine co-ordinates are available
- the archaeological, architectural and cultural heritage impacts must be assessed
- proposed method of forestry felling should be detailed in description of the development
- environmental impacts associated with forestry felling should be considered
- cumulative impacts considering other wind farms, land use such as agriculture and forestry, river catchment management and significant infrastructure including roads, quarries, abstractions and discharges in the wider area need to be considered
- community engagement should broadly follow the approach proposed in Section 11
- when submitting a planning application, prior consultation with the local authority on the application can assist in avoiding invalidation

7. WIND FARM LAYOUT

The wind farm layout will be required for the application for planning permission. It will include the location and outline design of:

- wind turbines
- site tracks and hardstandings
- site entrance(s)
- permanent meteorological mast(s)
- control house or sub-station
- borrow pits
- grid connection (if known)

The make and model of wind turbine cannot usually be specified at this stage. This is a matter which is normally subject to change until a wind turbine supply contract is signed.

The development of a wind farm layout design is typically an iterative approach, in conjunction with an interactive EIA process, and wind modelling and analysis.

It is important that the layout of the wind farm and all ancillary infrastructure is considered in sufficient detail such that the proposed layout can be constructed as submitted to the planning authority. If there are significant changes to the layout required at the construction stage, further planning permission may be required and this would need to be discussed with the relevant planning authority.

7.1. Turbine Layout

The constraints identified during the EIA process will need to be applied to the process of turbine layout design.

This will include the identification of any areas on the site where wind turbines cannot be suitably located. In any of these instances, the local authority could also have additional requirements in the County Development Plan, which will need to be met; the local authority's wind energy policy and other relevant policies will need to be consulted in this regard.

This process will typically result in a "wind turbine search area". This identifies areas where turbines can be located, subject to review of impacts on other aspects of the environment. These additional constraints can be examined once an initial turbine layout has been identified. It is also good practice to ask the wind turbine supplier to comment on the proposed wind turbine layout. Examples of design constraints are outlined in Table 7.1.

Thereafter, a wind model of the proposed wind farm can be very useful in finalising the last stages of the wind farm layout design. It is a commercial decision for the developer to carry out this work at this stage. It can include, for example:

- optimisation of the turbine layout for power production purposes
- reduction of wake effects
- assessment of impact of forestry
- assessment of potential turbulence effects on long-term turbine performance

The turbine layout is likely to eventually require some level of approval by the wind turbine manufacturer if a turbine warranty is to be issued, and this will need to be borne in mind.

Table 7.1 overleaf sets out examples of design constraints for wind turbine layouts.

Table 7.1: Wind Turbine Layout – Examples of Design Consultants

Constraint	Aim of Application of Constraint	Typical Application[67]
site boundary	ensure that turbines are located within land under the control of the developer	this is usually covered by the neighbouring property constraint but in some cases a limited part of a landowners property may be under the control or option of the developer
neighbouring property/nearby dwellings	separation distance to avoid a variety of impacts, e.g., blade overhang meet noise protection and shadow flicker guidelines	as per current DoEHLG Guidelines and relevant county Wind Energy Strategy, where this is reasonable (e.g., this might not always be readily attainable for small landholdings) noise monitoring and modelling: end result compliance with standards can vary very significantly depending on the number of houses and their proximity to turbines; it will depend on the turbine chosen and its sound power level; any additional local authority noise requirements will need to be met. Where the local authority will allow, limits can be significantly relaxed for dwellings associated with the proposed development.[68] Shadow flicker modelling, as for noise
neighbouring wind energy development	where a neighbour is also committed to wind energy development, or has planning permission, or has installed wind turbines; significant wake effects on a neighbouring wind development should be avoided	Where significant commitment has been made to developing a neighbouring wind farm[69], it is considered best practice to allow a *minimum* of two rotor diameters' distance between the intervening boundary and proposed turbines. For an existing or permitted neighbouring development, a *minimum* distance of four rotor diameters should be allowed to the neighbouring turbines; analysis of wake effects can be of benefit in this instance. Discussion with the relevant developer in this instance may avoid a potential planning objection.

Constraint	Aim of Application of Constraint	Typical Application
distance to other turbines within the wind farm	avoid wake effects	this is a commercial decision for the developer and can ideally be informed by a wake analysis - usually a *minimum* of 4 rotor diameters; this can be reduced for very small developments, depending on the orientation of the turbines with respect to the prevailing wind direction; may require larger distances in some instances, depending on acceptability of wake effects obtained from wind analysis
electricity lines or other sensitive development	separation distance for safety of sensitive infrastructure	seek the advice of ESB, EirGrid and/or electrical consultant;
roads, railway and other similar infrastructure	separation distance for operational purposes, generally	confirm with the National Roads Authority, Iarnród Éireann, etc., and with the local authority; depending on the infrastructure, requirement will typically vary from no blade overhang to 1.1 times tip height
airports and radar stations	maintenance of operational safety and height/obstacle issues	stringent requirements depending on location; consult with the Irish Aviation Authority (or operators of other aerodromes outside control of IAA where necessary)
archaeology	separation distance for physical protection; some monuments could require a separation distance with regard to archaeological landscape	on the advice of an archaeologist; often 20 m for physical protection; visual aspects could require longer distances, on the archaeologist's advice
forestry	possible separation distance to existing forestry depending on proximity, extent, level of forestry development, and direction relative to the prevailing wind direction(s)	this is a commercial decision for the developer, and can usefully be informed by the results of modelling

Constraint	Aim of Application of Constraint	Typical Application
ecology	site specific, e.g., areas of sensitive ecology potentially affected by wind turbines	on the advice of an ecologist and on consultation with NPWS, IFI and the County Heritage Officer
soils and geology	ensure health and safety requirements are met; will be site specific but could include, say, avoidance of high risk areas for peat slippage	on the advice of a geotechnical engineer, geologist, or other similar professional with demonstrable relevant experience
hydrology and hydrogeology	site specific	on the advice of a hydrologist or hydrogeologist and/or an ecologist, in consultation with IFI
Topography / slope	site specific	meet construction requirements
Telecommunications	avoid existing line-of-sight signal pathways, etc.; avoid significant impact on airports and radar	based on consultation with telecommunications operators, RTÉ, and the Irish Aviation Authority
Landscape and visual impact, including potential visual impact on cultural heritage	Have regard to the site and context topography to ensure harmony between layout and landscape and have regard to potential for significant visual impact at sensitive viewpoints	Use topographic profile to inform spatial extent and layout, and landcover patterns to inform spacing (see DoEHLG Wind Energy Guidelines 2006 Chapter 6 for detailed guidance). Advice of a landscape architect can be of assistance; consultation with local authority is important (e.g., at pre-planning meeting)

7.1.1. Records of Design and Mitigation Processes

The processes outlined above can be recorded and outlined in the "Alternatives" section of the EIS. In particular, where turbine layouts have been modified as a result of the processes described above, maps of each layout can be retained and included in an appendix to the EIS.

A considerable level of work will typically be carried out to design a layout that attempts to avoid and mitigate environmental impact. It will be of benefit if this effort is clearly illustrated to the planning authority and in the EIS.

7.1.2. Turbine Micro-Siting

The DoEHLG Wind Energy Development Guidelines suggest that there should be some flexibility built into the planning permission for wind turbines to accommodate minor adjustments to the turbine location which may be required for geotechnical or other reasons. It states that the extent of this flexibility will be site specific but should not generally extend beyond 20 m. It may well be prudent to include a request for micro-siting in the planning application.

7.2. Site Track and Hardstanding Layout

The choice of location of site entrance(s) and wind turbine locations can dictate many aspects of the site track and hardstanding layout. However, a number of factors will need to be considered in finalising the layout:

- it is vital that manufacturers requirements regarding hardstanding, tracks, layout areas need to be taken into consideration
- it will normally be beneficial to use existing site tracks, particularly if they are well constructed, well used and conform to the required geometric guidelines, minimising the development of new site tracks
- note should be taken of areas to be avoided for ecological, archaeological, or other reasons
- where possible, tracks and hardstandings should follow land contours, once other environmental and engineering requirements are met
- the maximum gradient suitable for construction should be borne in mind (check with turbine manufacturers for maximum recommended gradients)
- bends and turning circles will need to be checked against the requirements of the largest vehicles using them[70]
- allowance needs to be made at bends for trailers swinging out over the edge of the road – the turning radius for the trailer body could be larger than that of the wheel base, and this is especially important when dealing with slopes; additional excavation may need to be provided for
- geotechnical, ecological, and archaeological advice will be required; on occasion, some areas may need to be avoided completely
- the suitability of drainage measures to be provided will need to be confirmed; detailed drainage design is generally not required at this stage; however, in some sensitive soils, additional information may need to be provided

7.3. Control House or Substation

The requirements of the electricity system operator (EirGrid or ESB Networks) and of the turbine manufacturer will need to be provided for in the outline design which is prepared for planning purposes. It is recommended that discussions with EirGrid/ESB Networks take place at an early stage to ensure that any particular requirements they may have can be taken into account.

A poorly-sited substation can act as an obstacle, and where the site layout permits, will ideally be located away from turbines, and not in the prevailing wind direction. It is also usual for the location to be in the general direction of the proposed grid connection point, if known. This is partly because the grid connection will usually run overground from this point, and overhead lines within the wind farm are to be avoided.

It should be understood that the operational requirements of the sub-station are critical in the choice of its location.

The location of the sub-station will where possible also need to be chosen according to criteria established from field surveys, as outlined in Section 6.3 of this document, for example, sensitive areas for ecology, archaeology, or geotechnical conditions, might need to be avoided. Visual impact may need to be considered. Planning authorities may not favour sub-stations on hill ridges, for example. Keeping the sub-station near field boundaries is often preferred by planning authorities, if this is possible or suitable. If desired, mitigation measures such as the use of earth berms or vegetation can be implemented for visual screening. Section 6.11.(1) and (2) of DoEHLG's Wind Energy Development Guidelines can also be consulted on this matter. We note that palisade fencing around the compound could be required for safety purposes.

The safety, health, and welfare requirements of operatives working in the sub-station from time to time will need to be provided for in its design.

It is recommended that advice should be sought from EirGrid/ESB Networks regarding the proposed substation layout, particularly if it is intended that the system operator will be taking charge of any element of the substation. The requirements of the Machinery Directive 2006/42/EC[71] will also need to be considered.

7.4. Borrow Pits

Where possible, it is often beneficial to source material required for the construction of site tracks and hardstandings, etc. from on-site borrow pits. This will reduce external traffic and costs associated with imported material.

The following factors should be considered when considering potential borrow pit locations:

- proximity to existing or proposed access tracks
- access to material suitable for the required purpose
- minimum amount of excavation required to access the material
- potential impact on the groundwater table
- noise and vibration impacts associated with blasting if required
- other environmental impacts – ecology, soil stability, hydrology, etc.

The reinstatement of borrow pits following the completion of construction should also be considered. Subject to suitable assessment, excess excavated material may be used in the reinstatement of borrow pits.

7.5. Drainage Infrastructure

Drainage layout and design will depend on a number of factors including the following:

- proposed track construction (floating or excavated)
- suitability of habitat/soil stability for construction of drainage infrastructure such as sedimentation ponds
- suitability of habitat/soil stability for receiving diffuse overland flow discharges (if these are proposed)
- suitability of watercourses for receiving point discharges (if these are proposed)
- potential for integration with existing watercourses and overland flow paths

7.6. Ancillary Development

If there are existing entrances to the site, it will usually be preferred if these are used where possible. They may need some modification. It will also be of benefit to discuss this with the local authority roads engineer. At least one permanent meteorological mast is likely to be required in most cases and should be sited appropriately.

7.7. Infrastructure Buildability Survey

As set out at the start of this chapter, it is important that proposed infrastructure can be constructed as per the layout submitted with the planning application. To this end, it is of benefit to have a walkover survey of the proposed infrastructure carried out by a suitably experienced engineer. Topographical and other features not evident from mapping could affect the suitability of proposed infrastructure locations, so a walkover survey of the final layout can be of benefit.

This work can include:

- site confirmation of suitability of slopes, local topographical features, stream crossings, etc.
- identification of structures such as bridges and culverts, which could be affected by construction traffic, both within the site, and in the local road network on the approaches to the site; an initial assessment of the suitability of these structures will be required, and any necessary strengthening or remedial work briefly outlined

Informal consultation with the Roads Department of the local authority and other relevant consultees can provide practical information this stage.

7.8. Health and Safety in Design

Designers will need to be mindful of their health and safety responsibilities, as outlined in Section 9 of this document. Guidance in relation to health and safety is provided in the recently published IWEA document – Health and Safety Guidelines for the Onshore Wind Industry on the Island of Ireland, 2011[72].

Main Best Practice Points - Wind Farm Layout Design

- design constraints for the wind farm layout are outlined in Section 7.1 and Table 7.1; these can be considered where applicable
- topographical and other features not evident from mapping could affect the suitability of proposed turbine locations; a walkover survey of the final turbine layout can be of benefit
- the main issues to be considered in site track design are outlined in Section 7.2 above
- similarly, a walkover survey of the proposed site tracks and approach roads can be usefully carried out by a suitably experienced engineer
- guidance on sub-station or control house design is given in Section 7.3 above and the DoEHLG Wind Energy Development Guidelines
- Designers need to be mindful of health and safety responsibilities (Section 7.7 above)
- Advice should be sought from EirGrid/ESB Networks regarding substation design

8. CONTRACTS AND CONSTRUCTION

All wind energy developments require a wide range of agreements and contracts in order to proceed. The construction of a wind farm must also be managed very carefully throughout. This chapter sets out the key issues to be addressed in terms of contracts and construction management, in order to allow the development proceed.

Legal advice will be required in respect of all contracts. Certain contracts will require solicitors to be experienced in a certain field, e.g., construction law. The following topics are outlined in brief below:

• landowner agreements • grid connection contract • company structure • wind turbine supply contract • sale of electricity • wind farm construction contract • construction management • safety issues	• tender documentation • contract with owner's engineer • community engagement • operations and maintenance contract • finance • other permits and authorisations • miscellaneous items during the construction stage

8.1. Landowner Agreements

Every landowner should be strongly advised to seek independent legal advice before signing any legal documents.

An option to lease land is first typically entered into, followed by the lease itself. Sometimes a separate licence agreement is drawn up for the wind monitoring mast, as it can take time to agree the full leasing arrangements. Wayleaves and rights-of-way may need to be negotiated separately in some circumstances, e.g., to provide access to the wind farm.

Where more than one landowner is involved, it is advised that, where possible, developers adopt a consistent approach to arrangements and communication strategies.

Landowner negotiations will need to be entered into as early as possible in a project. These processes can be very time-consuming, and can contribute to delays. Similarly, sufficient time must be allowed for landowners to consider legal documentation. Where no legal advice has been obtained by the landowner, agreements should allow for a cooling-off period; two weeks is suggested.

The impacts of potential burdens on the land such as turbary rights, shooting rights, etc. should be considered.

8.1.1. Lease for Monitoring Mast

A lease agreement with a landowner for a wind monitoring mast should at a minimum incorporate the following:

- mast location and total area required
- duration of monitoring period
- liability
- access to land
- insurance
- title to data and equipment
- payment schedule
- third party rights (grazing, for example)

8.1.2. Lease Option

The purpose of the Lease Option Agreement is to give the developer a legal right to call for a lease within a specified period subject to obtaining planning permission and a grid connection offer. As planning permission will not have been granted at this stage it is important to retain a degree of flexibility to alter the location of the turbines before the formal lease is granted. If and when planning permission for the project is granted and the other pre-conditions are satisfied the developer will exercise his Option and the Lease appended to the Option Agreement will be formally granted.

8.1.3. Lease for Wind Farm

A lease is normally granted for a period of 20 to 25 years with an option to renew. The area of land leased is normally limited to the land required for the turbine bases, sub-station site and site roads. This is sometimes referred to as a “herring bone” or “lollipop lease”. In leases such as these it will be important to have a buffer zone on the landowners lands around the turbines so that the landowner cannot erect any buildings or plant any trees which might interfere with the wind speeds and operation of the wind farm. In most wind farm leases the rent is calculated as a percentage of annual income from the wind farm subject to a minimum rent linked to the consumer price index.

A sample UK Wind Lease was drawn up under an ETSU contract and in consultation with Renewables UK, Country Land Owners Association, and National Farmers Union. It is based on UK law and not fully applicable in the Irish context; however, the main topics are considered.

A Declaration of Identity will normally be required by the lending institution, and this work will need to be carried out by a Chartered Engineer. This confirms that the turbines are located within the landholding intended, according to the lease.

8.1.4. Wayleaves and Rights-of-Way

Wayleaves and rights-of-way could be required by the developer where:

- access to the wind farm site is required from public roads and is not available through the wind farm landholding
- the developer chooses to negotiate a route for the grid connection, in the anticipation that it will be acceptable to EirGrid or ESB Networks
- a contestable grid connection is sought

The advice of a solicitor experienced in landowner negotiations will be important.

Where relevant, EirGrid or ESB Networks may need to approve the route chosen. Where underground cabling is proposed along the public road, the local authority will be required to approve the route, as road opening licences are likely to be required, as well as road closure licences during construction. The local authority could require a traffic management plan in these instances.

The negotiation of wayleaves should allow for assignment to EirGrid or ESB Networks as appropriate, who may also need to approve the wording of the wayleave. Access to the wayleave is also an issue of interest for each party to the contract. Points or routes of access to the wayleave should be specified. These should reasonably take into account the needs of each party.

8.2. Grid Connection Contract

Information on making a grid connection application is available at the CER website.[73] In particular, information on the grid connection Group Processing Approach can be found in the documents 'Joint TSO/DSO Group Processing Approach - Charging and Rebating Principles' (June 2010)[74] and 'Connection Offer Policy and Process Paper (COPP) – Approved by CER' (May, 2011)[75].

Current advice is to make an application as soon as there is any reasonable idea of the proposed capacity of the wind farm.

It is now usual for the System Operators to hold Grid Connection method meetings following submission of a grid connection application, these take place well in advance of the actual offer issuance and it's a good opportunity to review the Least Cost Technically Acceptable (LCTA) draft Grid Connection proposal. Additionally the developer has the option to customise the grid connection to some extent although this may be to the customers cost i.e. opting for a cable connection as opposed to an Overhead Line Connection. This meeting may also provide the opportunity to meet other developers connecting to the same Node.

Following the Grid Connection method meetings it is advisable to start building the economic assessment for the project and refine this on a regular basis as new information transpires, there are many inputs to consider, refer to section 12 for details on Finance. Once the Grid Connection Offer is issued it must be accepted within a short time period (presently 50 business days) barring any Regulator relaxation possibly due to policy uncertainty. To accept the grid connection offer a significant payment must be made so the more financial certainty about the project the better unless the Developer is content at managing this risk exposure.

Immediately on receipt of a grid connection offer, a detailed technical and economic analysis of the offer will need to be carried out. If any concerns are identified, EirGrid/ESB Networks can be contacted for discussion. Should these discussions fail to lead to agreement, the relevant aspects can be referred to the CER for resolution, bearing in mind the deadline for this.

The arrangement and structuring of finance to allow acceptance of the grid connection offer will need to be given consideration in advance, due to the tight timeframe, and the significant sums of money involved.

8.3. Company Structure[76]

It is common for a Special Purpose Vehicle (SPV) company to be established for the development of a wind farm. It is typically on this basis that a project is financed. A Memorandum of Association, Articles of Association, and a Shareholders' Agreement will be required. All of the required contracts and agreements should be vested in the SPV, including the land lease and grid connection offer.

8.4. Wind Turbine Supply Contract

The advice of an experienced Owner's Engineer and a solicitor experienced in construction procurement, should be sought before finalising a purchase contract.

It is normal practice for the wind turbine manufacturer to provide a defects liability period of between two and five years. This will often cover lost revenue, including downtime for repair. In addition availability and performance warranties should be provided.

8.5. Sale of Electricity

A review of the current markets for electricity should be undertaken, as this does change over time. There are currently four options for selling electricity generated by the wind farm:

- to an electricity utility under the government's renewable energy feed-in tariff (REFIT) scheme
- to an electricity utility under a merchant/private power purchase agreement, outside the REFIT scheme (under the new single electricity market - SEM)
- other potential opportunities through the opening of the SEM
- supplier lite

These options are briefly outlined below. Provision for any future green certificates (or similar) will need to be given some attention in the PPA.

Auto-production is an alternative use of the generated electricity, in which interest is steadily increasing.

8.5.1. REFIT

The current government support mechanism is the REFIT scheme. REFIT terms and conditions, and clarification on queries, is given on the DCENR website.[77] The government reiterated its support for REFIT in the White Paper (February 2007). An application from DCENR has been approved by the European Commission for state aid approval for the REFIT 2 scheme to support the next tranche of onshore windfarm developments to 2020.

8.5.2. Single Electricity Market and Power Purchase Agreements

The SEM was fully introduced in November 2007. There were significant changes in market operation as a result. This information is available at the All-Island Project website.[78]

Under the Trading and Settlement Code, wind energy developers with a maximum export capacity of less than 10 MW, can choose whether to supply directly to the SEM pool, or to enter into a power purchase agreement with a third party. For generators with a maximum export capacity of more than 10 MW, then all energy produced must be sold to the SEM pool, albeit that the generator can choose to enter into a power purchase agreement with a third party, who will sell the electricity to the pool on the generators behalf.

The electricity utilities with whom private or merchant power purchase agreements can be negotiated, are listed on the CER website.[79]

8.5.3. Supplier Lite

Instead of entering into a PPA with a third party supplier the developer can form its own separate supply company and enter into a REFIT approved PPA with that supply company. This is known as "supplier lite". The benefit to the developer is that it gets not only the energy payments but also other SEM payments such as capacity payments. However, there are quite a lot of administrative and compliance issues involved in operating a supply company. In addition, supplier lite may not be an acceptable model to project finance providers unless they are satisfied that the generator has the capability to successfully utilise the supplier lite model for the full term of the loan.

8.5.4. Auto-production

Auto-production is an alternative use of the electricity, which could be very favourable economically in some instances. This is where a developer operates one or more turbines to provide electricity for internal consumption at a particular facility. Interest in auto-production is increasing rapidly from a broad range of sectors, including industry, local authorities, and educational institutions.

8.6. Other Permits and Authorisations

8.6.1. CER Licence and Authorisation

Applications for an Authorisation to Construct or Reconstruct a Generating Station, and for a Licence to Generate Electricity will need to be made to the CER. Applications can be made at any time once the developer has available the required information. These applications are not necessarily a difficult process in themselves, but can be onerous in terms of the time required to compile all the required documentation. The process for smaller projects is significantly simplified.

Application forms and related guidance are available from the CER.[80]

8.6.2. Accession to the Trading and Settlement Code

Accession to the Trading and Settlement Code is required for all generators except those under 10 MW. On obtaining the necessary consents from the CER, application can be made to EirGrid (Settlement System Administrator – Market Support Division). The Accession Process is prescribed in Agreed Procedure 9 under the Code, and is published on EirGrid's website, which gives an outline of the accession process.

8.6.3. Miscellaneous Permits and Authorisations that May Be Required

See below a list of other permits and authorisations that may be required. Note that this list is not exhaustive.

- OPW Section 50 for culverts and stream crossings
- Felling licence (see Section 6.3.10)
- Fire certificate
- Waste licence
- Disability access compliance
- Road opening licence
- Section 14 – electrofishing permit

8.7. Wind Farm Construction Contract

While technical aspects such as obtaining a grid connection or planning permission tend to be of most concern to a developer, it is the construction stage, and particularly delay or cost overruns, which tend to cause most concern to financial institutions.

A developer is strongly advised to acquire the advice of an owner's engineer and a solicitor experienced in construction contracts on the choice of contract, specification of Employer's requirements, conditions of contract, on co-ordinating contractors if required, on administering the contract, on evaluating claims, and on certifying payments. Some developers may have these skills in-house.

The use of local contractors is recommended, quality and cost-effectiveness allowing.

Grid connection construction is normally undertaken by ESB Networks. However, if desired, the developer may undertake the construction itself. This is known as 'contestability'.

Detailed information on this process can be found in a number of publications, including one by the CER in 2010 entitled 'Contestability for Distribution and Transmission Level Connections to the Electricity System'[81], another by ESB Networks, entitled 'Contestability on the Distribution System – ESB Networks Key Principles and Processes Paper'[82] and finally, a publication by EirGrid in 2007 entitled 'Contestability of Connection Assets Position Paper'[83] In the case that the grid connection is successfully contested, a separate contract is likely to be required for the construction of the grid connection.

8.7.1. Procurement Procedures

Procurement procedures for the construction contract will require the following:

- preparation of contract documents
- specification of employer's requirements and scope of work
- preparation of tender package
- management of procurement process
- assessment of tenders
- provision of recommendation on successful tenderer

8.7.2. Contract Documents

The structure and type of construction contract should be given significant consideration. An outline of these matters is given below.

There are many types of construction contract, from an EPC (turnkey) contract with the turbine supplier (generally) responsible for all design, procurement and construction, to separate construction contracts for each distinct element, such as turbines, civil works, electrical infrastructure, etc.

The choice of contract is primarily related to the management of risk and to the optimum allocation of risk between the developer and the contractor.

The advice of an owner's engineer and solicitor with suitable experience in contract management should be sought on the choice of contract, whether in-house or externally. Some contracts will expose the client to greater risk; others will expose the contractor to greater risk. The contractor can be expected to price accordingly. Some contractors may have no interest in operating under certain types of contracts. Therefore there will be a trade-off for the client in terms of risk vs. price. It is up to the client (or the lending institutions) to decide how much risk exposure is acceptable in the particular circumstances. A large company with a significant level of expertise (which reduces risk), and a portfolio of projects (across which risk can be spread) will have a different approach to risk than a landowner-developer with no experience in construction and one small project.

The structure of the contract can typically vary as follows:

- design and build contract with lead contractor only
- design and build contract in multi-contracting
- 'traditional' contracts, where design is procured separately from the construction contracts (less common in wind industry)

Design and Build Contract Led by Main Contractor

In Ireland, wind farms are frequently constructed under a design and build or turnkey contract. This means that the contractor effectively takes on the role of both designer and contractor. The contractor – often the turbine manufacturer - will then usually sub-contract the civil, structural and electrical design and construction elements to other parties.

This sub-contract might be to one balance-of-plant contractor, which might in turn be a joint venture company set up by an electrical contractor together with a civil and structural contractor. Alternatively, the manufacturer might engage the electrical and civil and structural contractors on separate sub-contracts. These contractors will typically in turn employ electrical and civil and structural designers.

The difficulty with these arrangements is that the wind turbine manufacturer's primary business is to manufacture and sell turbines. They manage construction contracts because they are obliged to in most cases, to see their turbines sold and built. Some wind turbine manufacturers, therefore, will engage only in the supply and installation of the turbines. They will not perform in the role of lead contractor, which requires taking responsibility for and co-ordinating sub-contractors, etc. Instead, they may accept a position on the construction team if another party, such as the Balance-of-Plant contractor, takes the role of lead contractor. Lending institutions could have a preference for one point of contract, to assist in avoiding protracted legal problems.

Multi-Contracting

Multi-contracting means that there is no lead contractor. All major parties contract directly with the developer. The client in this case will need to perform a very significant co-ordinating role.

Difficulties can arise where co-operation and consultation is required between the various parties involved. It is very important to establish in the contracts that a high level of co-operation and consultation is required. The contract should indicate a requirement for the structure and methodology for ensuring that this takes place. How this is set out is critical.

The importance of clear and agreed co-operation and communication structures will not be evident on a contract where all parties are co-operating and communicating well, and a good level of goodwill is present at all levels. However, where relationships have deteriorated, and little goodwill is present between the parties, then the contractual obligations become important.

For these reasons, multi-contracting is not an approach to be undertaken lightly. However, if operated successfully, it can lead to cost savings. Lenders may take a view on the risk associated with multi-contracting, depending on the experience of the developer.

A wide variety of contract types are available for wind energy developments. As an example, some of the FIDIC forms of contract are mentioned below. FIDIC contracts are in use internationally and are therefore usually familiar to most parties to the contract. They include:

- Silver Book (EPC/Turnkey Contract)
- Orange Book (Design-Build and Turnkey)
- Yellow Book (Plant and Design-Build)
- Red Book (Civil Engineering Contract)
- Green Book (Short Form of Contract)

The Silver and Yellow Books will be of principal interest; however, the Red or Green Books may be of some interest in a multi-contract situation. The Owner's Engineer and solicitor will advise on the suitability of contract type.

Lending institutions are likely to take an interest in the type of contract utilised. Banks will typically have a preference for fixed price, lump-sum contracts. Fixed price, lump-sum contracts are really only at their most useful where a clear and detailed scope of work has been provided. Otherwise, where the scope of work is unclear or incomplete, variations to the contract, outside the agreed scope of work, are likely to occur. This is likely to increase costs.

8.7.3. Employer's Requirements and Scope of Work

The more detailed the tender documents, the more likely the Employer is to achieve the desired objectives. The difference here between the Design and Build approach as opposed to the Traditional Contract, is that it is through performance criteria, quality specification, and tests that the requirements are set, rather than through a detailed design. For this reason, tender documents need to be drafted with care.

It is advisable that a preliminary design be carried out. This will allow the preparation of a detailed Scope of Work. Good attention should be paid to the payment schedule.

Detailed site investigation information should be available. This is particularly important. The site investigation should be designed with care. This can be a worthwhile investment, as it can reduce a Contractor's risk so that a more competitive price can be tendered.

The aim in providing as much information as possible to the Contractor is so that as much risk can be transferred as possible, and at the lowest cost.

The Employer should require that the works be supervised by a Resident Engineer, at least part-time. This means that the Engineer can certify that the works have been built in accordance with the design.

The Contract should state that the Contractor must construct the wind farm in compliance with planning conditions and EIA requirements, and must construct it such that it can be operated in compliance with these conditions and requirements.

Detailed requirements for testing, verification, and compliance of the wind farm's operation should be outlined. Where applicable, care should be taken to outline the interface between contracts, definition of roles and responsibilities, the interfaces between various contractors, and between contractors and the Employer, etc.

8.7.4. Project Supervisor Design Process and Project Supervisor Construction Stage

Health and Safety requirements are outlined in Chapter 9 and Appendix D of this document. It will be usual to anticipate that in a Design and Build Contract the Contractor will accept the responsibilities of the Project Supervisor Design Process (PSDP) and Project Supervisor Construction Stage (PSCS), once found to be competent and adequately resourced. This will need to be a separate written appointment, and confirmed in writing by the Contractor.

The developer will need to have regard to the timeframe of the project to ensure that the works are adequately resourced for safe construction. This is a specific requirement of health and safety legislation.

8.7.5. Typical Sources of Construction Claims

Most construction claims will typically be related to the following:

- variations and consequent claims due to an incomplete or unclear scope of work
- delays outside the Contractor's control
- inadequate tender documents
- unforeseen ground conditions
- inadequate site supervision
- exceptional or adverse weather

Where the developer has control of these matters, there is an opportunity to reduce the risk of claims (e.g., by providing a complete and clear scope of work, good tender documents, thorough geotechnical survey, adequate site supervision, and by minimising delays to the contractor where this is possible).

8.8. Contract with Owner's Engineer

Two possible model contracts between the Employer and the Owner's Engineer are:

- FIDIC White Book – Client/Consultant Model Services Agreement
- Association of Consulting Engineers of Ireland, Agreement CE 9201 - For the Appointment of Consulting Engineers for Civil Engineering Work

8.9. Operations and Maintenance Contract[84]

There should be sufficient redress through warranties if equipment fails during the operation of the wind farm. However, manufacturers' warranties will frequently only cover the equipment for the first two to five years, creating an element of risk in the latter years of the project. It is necessary therefore to have operation and maintenance (O & M) contracts, with service fees, in place with the manufacturers or others.

The O & M contract will require a defined duration, with performance standards, and should contain a right to replace the operator for non-performance.

A performance regime should be included as a benchmark, with a requirement for full operating records to be maintained and provided to the client on request. Variations and any right to sub-contract could be considered, with appropriate default or step-in clauses. Force majeure, and the circumstances in which it applies, should be included in the contract. The operating contractor will need to be certified to operate electrical equipment or otherwise this could negate the O & M contract.

8.10. Construction Management

8.10.1. Pre-Construction Issues

Prior to construction commencing, it is vital that adequate attention is given to the following, to avoid any unnecessary delays and additional cost during the construction process:

- Pre-construction planning compliance – ensuring that the final design complies with the planning permission and has local authority sign-off
- Site access issues – negotiations with landowners, realignments, etc
- pre-construction surveys, some of which could be seasonal
- early and regular consultation with EirGrid or ESB Networks on progress of grid works
- early and regular consultation with relevant stakeholders e.g. NPWS, IFI, etc.

It is recommended that a project quality/construction management plan is prepared, which will also incorporate the environmental management plan and the health and safety management plans. In this way, the construction process can be controlled by means of a documented quality system. It is often a planning condition that this document or certain elements of it are agreed with the planning authority as part of pre-construction planning compliance.

Livestock management needs to be considered at both the pre-construction stage and throughout construction, until handover. Provision for adequate livestock management and liaison with relevant third parties such as landowners, need to be included in the project quality/construction management plan, including items such as gates, access/egress, water supply, etc.

It is also important to ensure that best practice is followed throughout the construction process. A number of useful references to best practice guidelines which might inform the project construction management plan are provided below:

- Scottish Natural Heritage – Good Practice during Windfarm Construction[85]
- CIRIA – Environmental Good Practice On Site[86]
- CIRIA Control of Water Pollution from Construction Sites. Guidance for Consultants and Contractors (C532)[87]
- CIRIA Sustainable Construction Procurement. A guide to delivering environmentally responsible projects (C571)[88]
- UK Pollution Prevention Guidelines (PPG):[89]
    - o PPG1: General guide to the prevention of pollution
    - o PPG2: Above ground oil storage tanks
    - o PPG4: The disposal of sewage where no mains drainage is available
    - o PPG5: Works in, near or liable to affect watercourses

  - o PPG6: Working at construction and demolition sites
  - o PPG8: Safe storage and disposal of used oil
  - o PPG21: Pollution incident response planning
  - o PPG26: Dealing with spillages on highways
- British Standard BS 5228-1:2009 Code of practice for noise and vibration control on construction and open sites Part 1 Noise[90]

8.10.2. Environmental and Health and Safety Aspects During Construction

It is recommended that the construction contract require the contractor to specify and operate an Environmental, Health and Safety Management system.

The local authority can also be consulted on this matter. Among other things, the EHS management system could consider:

- legal, permit, and compliance issues
- control of the extent of the works
- erosion and sediment control
- dust and construction noise management
- vegetation management and rehabilitation requirements
- weed control
- water run-off, including storm water
- storage of hazardous materials
- waste management
- reporting of accidents, incidents and "near miss events" to the Client
- use of and reinstatement of borrow pits
- emergency management plans for various scenarios e,g, peat slide
- excavation procedures
- surface water monitoring
- construction traffic management plan
- archaeological monitoring
- fauna management (including any requirements for monitoring)
- handling of complaints
- reporting
- works permit requirements
- emergency and incident management
- fire hazard management
- audit and inspection programme
- any other relevant, site-specific requirements

8.10.3. Construction Management

The management of the construction process is critical to ensuring a successful project. All parties to the construction process must be committed to ensuring best practice is followed throughout, both to minimise risk (commercial, environmental and health and safety) and to ensure that the highest quality is maintained.

Ongoing monitoring will be required to ensure that the environmental targets set out in the EIS, planning conditions and construction management plan are being achieved. Where these targets are not being achieved, this may need to be reported to the relevant authority and remedial measures agreed.

8.10.4. Community Engagement during the Construction Phase

Engagement with the local community will continue to be important during the construction phase of a project. This is outlined in Chapter 11 of this document.

Main Points – Contracts and Construction

- every landowner should be strongly advised to seek independent legal advice before signing any legal documents, whether relating to option agreements, leases, wayleaves, or rights-of-way
- an environmental, health and safety management plan is recommended for construction
- community liaison should be carried out as outlined
- the advice of an experienced owner's engineer, or of a solicitor experienced in construction procurement, should ideally be sought before finalising a turbine purchase contract
- a developer is strongly advised to acquire the advice of an owner's engineer on the type of contract, specification of Employer's requirements, conditions of contract, on co-ordinating contractors if required, on administering the contract, on evaluating claims, and on certifying payments
- construction works should ideally be supervised by a resident engineer, at least part-time
- independent financial advice is recommended
- early and regular consultation with EirGrid or ESB Networks on progress of grid works is recommended

9. HEALTH AND SAFETY

A developer has legal obligations with regard to health and safety. These obligations apply to the design, construction, and operation of the wind farm. This section of the document concentrates on a developer's legal design and construction responsibilities.

IWEA has recently published the Health and Safety Guidelines for the Onshore Wind Industry on the Island of Ireland 2011[91], which are very informative and include detail on Designers Responsibilities, Duties of a Contractor, PSDP, PSCS Design Risk Assessment, Handover and Work at Height.

Advice on a Client's Health and Safety duties should be sought from a competent professional, e.g., health and safety specialist, Owner's Engineer.

Supplementary information on health and safety in construction in provided in Appendix D of this document.

9.1. Client's Duties for Design and Construction

In health and safety terms, the developer is known as the client. A client is a person (including a company) for whom construction work is being carried out for the purpose of a trade or business or other undertaking.

"Project" means an activity which includes or is intended to include construction work. A project includes all associated preparation, design, planning, and construction work. Several structures may be involved in a single project. Where the work is phased, with significant and substantial periods of time in between the phases, it may be appropriate to consider each separate phase as an individual project. An example of this would be a demolition operation far in advance of further site work. It may also be appropriate to use this approach on complex or lengthy projects that pass though several distinct stages, each requiring a specialist managerial input. Where structures are being constructed in different locations with separate sites and access and egress points and where there is minimal interaction between the work of each site, it may be appropriate to consider each separate site as an individual project.

A "**Client**" means a person for whom a project is carried out, in the course or furtherance of a trade, business or undertaking, or who undertakes a project directly in the course or furtherance of such trade, business or undertaking."

While most of the items have been listed the requirements of the Client need to match those of the Clients in Construction Guidance. Reference to employment and use of the checklists in this Document BP1 and BP2 would assist a client in evaluating a Designer, Contractors, PSDP and PSCS. Reference to the notification by a client and subsequent use of the AF 1 form needs to be included.

We would also recommend the inclusion of Procurement in the opening statement. We would also suggest reference to Clients in Construction Best Practice Guidance Published by the H.S.A.

The client is legally obliged to carry out the following duties for every construction project:

- **before design work starts**, appoint in writing a Project Supervisor Design Process (PSDP) who has adequate training, knowledge, experience, and resources
- **before construction begins**, appoint in writing a Project Supervisor Construction Stage (PSCS) who has adequate training, knowledge, experience, and resources
- obtain written confirmation of acceptance of each of these appointments
- be satisfied that each designer and contractor appointed has adequate training, knowledge, experience, and resources for the work to be carried out
- co-operate with the project supervisors and supply necessary information
- retain and make available the Safety File for the completed structure; the Safety File contains information necessary for future maintenance or renovation
- provide a copy of the Safety and Health Plan prepared by the PSDP to every person tendering for the project; this Plan documents how health and safety on the project will be managed up to project completion
- notify the Health and Safety Authority of the appointment of the PSDP where construction is likely to take more than 500 person days or 30 working days

Please reference the following document, which outlines all of the roles within regard to clients in construction: http://www.hsa.ie/eng/Publications_and_Forms/Publications/Construction/Clients_in_Construction.pdf.

The understanding of what constitutes design and construction work is important in identifying the point at which these procedures are to be implemented.

Design means the preparation of drawings, particulars, specifications, calculations and bills-of-quantities, where they contain specifications, or other expressions of purpose, according to which a project, or any part or component of a project, is to be executed.

The definition of **construction work** is wide and includes building work and any associated preparation, cleaning and maintenance, or the commissioning, maintenance and repair of energy systems. A fuller definition is given in Appendix D of this document.

The Safety, Health and Welfare at Work (Construction) Regulations, 2006[92] apply to all 'Projects' included or intended to include 'Construction Work' in respect of any 'Structure'. It can reasonably be seen that the Regulations shall apply to the majority of construction projects carried out. Whilst major projects are easily identifiable under the definitions of project, construction and structure, for smaller projects or scopes of work where a client still feels there is ambiguity and uncertainty, they should review the Safety, Health and Welfare at Work (Construction) Regulations 2006 and consult with a competent person. The definitions of the terms 'Construction Work' and 'Structure' are important in the context above and are detailed in the Regulations. In the wind energy sector the regulations are applicable to the design and construction and commissioning phases of projects, ongoing operations and maintenance, and decommissioning of wind farms.

In order to co-ordinate the design and construction work being undertaken, the Client must put in place persons or organisations to oversee the co-ordination of the design and construction work. These appointees are called the Project Supervisor Design Process (PSDP) and the Project Supervisor Construction Stage (PSCS). The appointment of the PSDP and PSCS by the Client must be in writing with a written acknowledgement from the chosen candidates that they accept the appointment. Any changes that are made to these appointments must be formally made in writing and acknowledged by the new appointees in writing. The Client should keep copies of these appointments on file. There can only be one Project Supervisor Construction Stage for one project at a given time. This requires that where various types of construction work overlap (geographically and in time) on a site, one Project Supervisor Construction Stage should be appointed for this work, and the work should be considered part of one project. However in case where there is clearly more than one project (for example main windfarm build and adjacent grid connection work which is substantially removed from the main site) there can be more than one PSCS or PSDP.

Early appointment of the PSDP in particular should be made to ensure that the safety and health implications of decisions taken at the earliest stages of a project are considered. The PSDP can bring about the greatest reduction in risk at the concept and scheme design phases. As the project moves further into the detailed design phase, it becomes more difficult to make fundamental changes that eliminate hazards and reduce resulting risks. On windfarm projects consideration should be given to appointing the PSDP when the initial layout is being developed i.e. pre-planning. The PSDP must be appointed at or before the start of design work to enable him or her to:

- advise Clients on the competence and resources of their appointees;
- ensure that early design decisions fully address significant safety and health issues;
- enable the development of an adequate preliminary Safety and Health Plan; and
- enable the Safety File to be produced in a user friendly format suitable for future use.

If construction work on a project is planned to last longer than 30 working days or exceed 500 person-days, the Client must promptly notify the Health and Safety Authority of the project, the details of the Project Supervisor Design Process, and the Project Supervisor Construction Stage where this is known, as set out in Approved Form AF.1 This Notification should be made at the earliest possible point after the making of the appointment of the PSDP. The notice should be sent by registered post to the Authority or as may be directed by the Authority. The Project Supervisor Construction Stage is also required to notify the Authority of a construction project.

Detailed guidance on criteria for competence assessment of project supervisors is given in section 4 of the HSA publication *"Clients in Construction: Best Practice Guide" (2009)*[93]

The Safety Health and Welfare at Work Act 2005 and SHWW (General Application) Application Regulations 2007 require work equipment, plant and plant equipment to be maintained in an efficient state, in efficient working order and in good repair. In addition the SHWW Construction Regulations 2006 will apply to any maintenance works which come under the definition of "construction work". In addition to plant and equipment being maintained in an efficient state, there is also the requirement for a periodic inspection of all work equipment that maybe subject to deterioration. In addition to this, lifting equipment requires a periodic statutory thorough examination, and this must be carried out by a competent person.

It is important to note that a written Safety Statement is required in every workplace under the SHWW Act 2005. On a windfarm this should cover the safety procedures and safe systems of work which are applicable both to the owners employees and any other contractors working on the windfarm.

9.1.1. Notes on the Client's Health and Safety Responsibilities for Design and Construction

In addition to the duties outlined in Section 9.1 above, the client should be aware of the following:

- geotechnical site investigations may require a PSDP and PSCS to be appointed, where excavations or drilling are to take place (excluding surveys); this should be checked
- a client can appoint himself as the PSDP or PSCS if he has adequate training, knowledge, experience, and resources
- if competent and resourced to do so, it is often the lead designer who undertakes the role of PSDP
- if competent and resourced to do so, it is often the contractor who undertakes the role of PSCS
- for a design and build projects, it will normally be the lead contractor who undertakes the duties of both PSDP and PSCS; a health and safety co-ordinator for the design process will then normally be appointed from within the contractor's team; normally the lead designer accepts this role
- the duties outlined above are sometimes also performed by specialist health and safety organisations, especially on particularly large or complex projects.

9.2. Duties of a Designer

The developer will often act as a Designer, particularly in early project stages (see definition of design work as given in Section 9.1 above). The Duties of Designers are outlined in brief as follows:

- identify any hazards that the design could present during construction and subsequent maintenance
- where possible, eliminate the hazards or reduce the risk, e.g., can roof-mounted equipment be placed at ground level, or can guard-rails be provided to protect workers from falling?
- communicate necessary control measures, design assumptions or remaining risks to the PSDP so they can be dealt with in the Safety and Health Plan
- co-operate with other designers and the PSDP or PSCS
- take account of any existing safety and health plan or safety file
- comply with directions issued by the PSDP or PSCS
- where no PSDP has been appointed, inform the client that a PSDP must be appointed

- the Safety Health and Welfare at Work Act 2005 requires Designers to ensure that the project is capable of being constructed safely, can be operated and maintained safely, and complies with all relevant health and safety legislation.

A more thorough examination of the Duties of Designers is given in the "Guidelines on the Procurement, Design and Management Requirements of the Safety Health and Welfare at Work (Construction) Regulations 2006", published by the Health and Safety Authority (HSA).[94]

9.3. Client's Duties During Operation of a Wind Farm

This advice relates specifically to construction-related health and safety legislation; general health and safety legislation for a workplace also applies.

Project supervisors may need to be appointed to cover routine maintenance work such as cleaning, decorating, and repair where any of the following apply:

- the work involves a particular risk
- there is more than one contractor

- the work will last more than 30 days or 500 person days

This also applies to the decommissioning (or re-powering) of a wind farm.

Main Points – Health and Safety:

- it is a developer's duty to be fully aware of legal responsibilities relating to health and safety; where there is any doubt, professional advice should be sought
- the Health and Safety Authority provides relevant advice
- the approach to health and safety outlined in the IWEA's "Guidelines for Health and Safety in the Wind Energy Industry" (October 2011)[95] is informative

10. OPERATION, MAINTENANCE AND DECOMMISSIONING OR RE-POWERING

Ongoing operations at a wind farm will include:

- its operation and maintenance
- possible environmental monitoring and reporting requirements, depending on the conditions of planning permission - these may need to be managed by the wind farm operator
- ongoing screening and monitoring of operational performance
- financial reporting requirements to lending institutions

Annual operations and maintenance costs include:

- servicing and spare parts
- rates
- land rent
- insurance
- reactive power charges
- monitoring and administration

Technical consultancy services are available for standard checks before the end of a guarantee period.

It is in the developer's interest to pay close attention to the wind farm performance during the operational period. Monthly performance can be analysed, and compared to similar monthly periods for previous years. Performance can be analysed relative to expected performance as indicated by the data from the wind mast on-site. Trends and patterns of behaviours can be noted, as well as departures from those trends. These checks can be set up to run automatically using information from the SCADA system. This process is carried out on a turbine-by-turbine basis, as well as for the wind farm as a whole.

An annual review of wind farm performance is a useful exercise. An example is given in Appendix C of the European Wind Energy Association's "Wind Energy – The Facts" (2004).[96]

Notes on wind farm insurance are provided in Appendix E of this document.

An environmental, health and safety management plan is recommended for the operation of the wind farm. This can also incorporate eventual decommissioning or re-powering. A safety statement is required for the operation of the wind farm.

10.1. Operational Health and Safety

Health and safety in wind farm operation should always be a priority. The Health and Safety Authority provides information on relevant legislation, Guidelines, and Codes of Practice. IWEA has also published its own guidelines - Health and Safety Guidelines for the Onshore Wind Industry on the Island of Ireland (2011)[97], which focus on the specific health and safety requirements for the wind industry. Developers should be cognisant of both the IWEA and legislative requirements in relation to health and safety throughout.

It is vital that an adequate handover is undertaken at the completion of the construction of the development. This will include a detailed handover in relation to the safety file, which has been prepared by the PSDP. The safety file must include all relevant information in relation to the design, construction, operation and maintenance and decommissioning of the wind farm, to ensure the health and safety of all throughout the lifetime of the project.

10.2. Public Communications during Wind Farm Operation

Communications with the public, including the local community, will continue to be important during the operation of the wind farm. This is outlined in Chapter 11 of this document.

10.3. Decommissioning or Re-powering

At the end of the turbine life-span, the machines can be removed; alternatively, the wind farm can be re-powered.

10.3.1. Decommissioning

Decommissioning should be planned well in advance of its occurrence.

An outline decommissioning plan should be included in the EIS accompanying the planning application for the proposed development. The planning authority may condition the developer to agree the final plan prior to the commencement of construction in order to comply with planning. Some planning authorities now also require a Decommissioning and Rehabilitation Plan to be submitted with the planning application.

Notice may need to be given to the local authority in advance of decommissioning work.

It is commonly considered that the scrap value of the turbines should cover the cost of decommissioning. However, there is little experience in this regard. This position should be reviewed from time to time. Funds may need to be set aside for this purpose over the life of the project.

10.3.2. Re-powering

Re-powering of wind farms is now being considered for some of the older wind farms in Ireland, instead of permanent decommissioning. This could include replacement of main turbine elements, such as the generator, and possibly the blades, or the entire turbine might be replaced. Planning permission could be required, depending on the type of re-powering being considered.

Operation, Maintenance, and Decommissioning or Re-Powering – Main Best Practice Points:

- an environmental, health and safety management plan is recommended for the operation of the wind farm
- health and safety in wind farm operation should always be a priority
- public communications should be carried out as outlined in Section 10.2 above
- eventual de-commissioning should be considered and planned at an early stage of the development

11. COMMUNITY ENGAGEMENT

11.1. Introduction

Engagement with the community is an important part of the development of a wind farm. There are a number of publications which provide guidelines and methodologies for undertaking community engagement such as the DoEHLG Wind Energy Development Guidelines and the Monaghan Model[98]. This section draws on elements of these documents. The legislative requirement for community engagement is based on the requirements set out in various EU directives, particularly the Environmental Impact Assessment Directive (85/337/EEC). It can be considered that the planning process meets the minimum requirements of community engagement required to satisfy current legislation.

However, current best practice in wind energy development is that direct engagement between the developer and the local community in some form should be undertaken. This section sets out a framework for such engagement. While such engagement is not required by law (at the moment), higher levels of community engagement will increase the likelihood of project success through the lifetime of the project.

11.2. Benefits of Community Engagement

A well considered and executed community engagement plan will improve the likelihood of community acceptance of the project. The corollary is that poor or non-existent community engagement can increase the likelihood of negative reactions resulting in increased opposition to the development and greater planning risk. A higher level of community engagement that is properly documented will also enhance the quality of any EIA. Continued proactive community engagement through the operation and decommissioning stages should facilitate community acceptance of the project through these stages.

11.3. Context of Community Engagement

Some points which can be considered in the context of community engagement when planning the engagement strategy and preparing associated literature are set out below:

- EU, national, regional and local energy policy and targets
- contribution to reducing carbon emissions associated with energy generation
- reducing reliance on imported energy
- onshore wind is the most competitive, abundant and least cost large scale source of renewable energy available in Ireland

- increasing community acceptance of wind energy is central to efficient deployment and expansion of wind energy in Ireland
- all parties need to commit to engage with integrity, fairness and transparency
- recognition that wind energy delivers a broad range of national and local benefits but these can be accompanied by local detrimental impacts and that these should be ameliorated, mitigated and/or compensated where necessary
- developers should seek to understand the views of host communities and that this should be done early enough to influence final design where possible
- recognition that early stage engagement may not always be possible for commercial reasons but that this should be considered in light of the potential benefits of such engagement

11.4. Planning Community Engagement

Proper planning of the community engagement process is crucial to enhance the opportunity of realising the maximum benefit. The model of community engagement that is chosen should take into consideration local circumstances bearing in mind the potential benefits outlined above. Where possible, the engagement plan should be designed for the full duration of the project as this will demonstrate the developer's commitment to continuing engagement.

Forms of engagement can include calling to local residences, local media notices, distribution of information leaflets in the local area, public open evenings, project website, online forum, public meetings, etc. The form of engagement for each stage in the development of the project should be clearly set out (some suggestions are set out in Section 11.5 below). Whichever form of engagement is chosen, it can be useful if the context, expectations and limitations of the exercise are clearly set out for all participants.

The nature and extent of the communities affected by the proposed development should be defined. This may be different for different stages of the engagement.

The timing of the initial engagement is important. It can be at feasibility stage or during the preparation of an EIA. The earlier that community engagement commences, the greater the potential benefits in terms of community acceptance and quality of the EIA. It is highly recommended that some form of direct community engagement is undertaken as part of the EIA process.

Where it is proposed that the general public are invited to participate in some form of meeting, consideration should be given to the location and timing of the meeting to facilitate the greatest level of participation. A venue situated in the local community is normally ideal taking into account the availability of disability access. The selection of the date and time should have regard to peoples differing employment circumstances and availability. Week days between mid afternoon and mid evening have generally proven to be satisfactory.

Information literature prepared as part of a community engagement plan should be clear, concise and non-technical.

11.5. Execution of Community Engagement

Some suggestions for the execution of community engagement plans are set out below for different stages of the project development.

11.5.1. Community Engagement in Early Project Development Stages

Local engagement can begin before a planning application is submitted for a wind monitoring mast (if required), which brings the project into the public domain. Immediate neighbours can be visited to explain to them the nature of the project. During these visits, it is important to put the need for the monitoring mast into context. This is a very early stage of the development process, and one in which many uncertainties remain. It can be emphasised that any decision to progress further with the development will require planning permission and that, depending on the size of the project, an environmental impact assessment will need to be carried out.

Ideally, a named contact person should be appointed to deal with queries, and contact details distributed among residents. Contact details for SEAI's Renewable Energy Information Office (REIO) can also be given. The REIO provides independent information on renewable energy.

11.5.2. Community Engagement for Environmental Impact Assessment

As the project develops and the EIA is initiated, it may be desirable to engage with local community groups, particularly environmental groups. Local authorities maintain a listing of registered community and voluntary organisations. Good points of contact should be established on both sides. Information packs should be provided to each group.

As before, neighbours can be visited in person. Neighbours should also be provided with information packs. Each neighbour should receive the same information.

A larger developer might wish to consider establishing a project-specific website, which would provide up-to-date material for interested parties. Contact details should be provided. An e-newsletter could also be considered.

Public Exhibitions

Public exhibitions have been found to be a suitable and productive engagement format. The following points can be considered in the holding of a public exhibition:

- the exhibition should be prominently advertised in the local community, e.g., shops, community centres, public houses; it may be possible to have advertisements in church bulletins and church announcements
- local community groups should be specifically invited
- maps, plans and illustrations should be plentifully used and prominently displayed
- it is important that the exhibition is adequately staffed; it is best that staff mainly be from the developer's organisation, as only the developer has authority to say what will or will not be done; landowners should ideally be present too, as should staff from the environmental consultancy preparing the EIA
- a draft copy of the EIS should be available if at all possible, because experience has shown that answers to queries are unlikely to be available otherwise
- an information leaflet relating to the project should be prepared and distributed; it should include a location map of the proposed development, information on the developers and on the wind farm proposed, and contact details for queries

The EIA and planning stages can often be the most sensitive for local communities. Where significant concerns arise locally, it can be of assistance to offer to bring a group of residents to visit an operational wind farm. This can be a good means of dispelling inaccurate views of wind farm operation.

Project Website

For all SID applications, a project specific website must be set up for the duration of the planning process, where all planning documentation must be available to download. It may be worth considering such a website, dependent on the size and scale of the development for non-SID projects, to inform the general public in relation to the wind farm proposals.

11.5.3. Community Engagement during the Construction Phase

Neighbours and local community groups should be contacted in advance of construction, and regularly over the construction period. Contact details for the developer should be given.

An information board can be displayed in a publicly accessible location, e.g. near the site entrance, giving contact details for the developer's site representative or other contact.

Where a developer has established a project website, it should be kept up-to-date during the construction period. Similarly, any e-newsletters should continue.

In the event of comments or complaints about the construction works, the developer or site representative should be accessible to the local community. Any complaints should be dealt with quickly and responsibly. A specific plan for dealing with construction stage complaints will be useful.

Consideration could be given to the formation of a community liaison group if considered desirable.

Emergency procedures will need to be established for 24-hour support to the project works in case of unforeseen problems. The existence of these procedures should be notified to the emergency services and the local authority, and can be referred to on the site information board.

11.5.4. Public Communications During Wind Farm Operation

Contact details will need to be made available to neighbouring residents and community groups. As before, if considered necessary, a more formal community liaison group could be established which would hold regular meetings.

It is a good idea to install a notice board at the entrance to the wind farm outlining information on the project. This could give information on:

- the developers or owners of the project
- the turbine numbers, make and model, dimensions, and name-plate rating
- the quantity of electricity generated in a year, and the equivalent number of houses this would supply
- quantity of avoided emissions
- contact details for queries
- information on any site visits or open days

A formal procedure should be established for recording and dealing with complaints from the public. The operator should investigate any complaints from individuals and, where appropriate, work with the relevant authorities to address any issues raised.

11.5.5. Community Engagement for Decommissioning or Repowering

Community engagement at the decommissioning stage may highlight issues that could be of benefit to all parties. One example of this might be where the community would like to keep the access tracks in place for recreation purposes. Any such agreements will be subject to the approval of the local planning authority. However, the presence of community support for any such measures in the decommissioning plan submitted to the planning authority should increase the likelihood of approval.

Where repowering is considered, the process for community engagement will be the same as for a new project. Previous positive community engagement should facilitate this process.

11.6. Direct Community Benefits and Participation

There is a wide range of models for the deployment of direct community benefits in practice. These range from project specific plans which vary from site to site to formal structured models with managed funds, specific listed criteria and independent monitoring.

In relation to public participation, a recent study has indicated that a higher level of community ownership is associated with higher levels of community support for wind energy projects and lower levels of opposition. The 'To Catch the Wind: The Potential for Community Ownership of Wind Farms in Ireland'[99] produced by the Renewable Energy Partnership, provides detailed information that should be considered when thinking about community participation or development of a wind farm. Further information can also be found on the Meitheal na Gaoithe – the Irish Wind-Farmers co-op[100] website and on the Comhar website[101].

Community Engagement – Main Best Practice Points:

- well planned community engagement is likely to increase the likelihood of success for the development
- engagement with the local community is recommended at each relevant stage of the project, e.g., early project stages, EIA and planning, construction, and operation
- approaches to be taken to community engagement will vary, depending on the stage of development of the project

12. FINANCE

Having acquired all the necessary consents, bringing a wind farm to construction is primarily focussed on the technical pre-requisites for putting finance in place so that a contractor can be procured.

Economic Assessment

Financial analysis is carried out throughout the project, by the developer or financial advisor, at a level which is appropriate for the relevant stage of the project. Both the wind farm as a whole and each individual turbine will need to be subjected to this analysis. There is software available for carrying out early stage financial analysis and this can provide useful information regarding the economic feasibility of any particular site. Note that this is not a substitute for professional advice.

Procurement of Finance

Financial arrangements and the financing method can have as much of an effect on the commercial viability of a wind farm as the wind regime does. It is critical that as much attention is paid to this work as to the design and planning stage.

The difficulty of raising finance on acceptable terms for a wind energy project should not be underestimated, especially for developers with limited resources and no previous experience in establishing similar projects.

It is strongly advised that the services of an independent financial adviser, together with an experienced law firm and consulting engineer, be obtained to assist in the procurement of finance, and assessment and comparison of finance options. These advisers will also assist in negotiating with banks, off-takers, turbine manufacturers, balance of plant contractors, and in preparing the developer in setting up the various requirements that must be set in place.

The following points are particularly important with regard to finance:

- the process of arranging finance is time-consuming and therefore should be undertaken in a timely manner
- problems could emerge that require determination and ingenuity to overcome
- much of the preparation can be carried out well in advance, and should be
- technical, contractual, and consent aspects of a project will all affect financing
- project lenders will carefully scrutinise every aspect of the project; attention to detail and anticipation of lender concerns is a vital component of this process

The technical difficulties of a project, which in themselves can appear daunting, can often be exceeded by the complexities of arranging the necessary finance.

Financing may have to be put in place over a very tight timeframe, in some instances between the offer of a grid connection and its acceptance. Therefore it is very important that all preparatory work has been done well in advance.

Some broad information on project financing is available on the SEAI website.[102] More detail on this and broader finance matters can be found in the UK DTI's "Financing Renewable Energy Projects – A Guide for Developers" ETSU K/FR/00028/REP.[103] Although the latter document is prepared for the UK market, it would be a good starting point for consideration of wind farm project financing.

Finance Documentation

When initiating and developing a wind farm, certain key documents will be required by the bank or investment fund providing the loan. Usually, this documentation will be a prerequisite before any bank will consider providing debt finance to the project. It will also be usual for a lender to have the right to 'step-in' to certain agreements should the project company default under the underlying agreement.

It is critical to plan ahead to ensure that all the documents are inter-related and consistent, particularly when seeking finance, to guarantee the "bankability" of the project. Failure to have the appropriate agreements in place can at best cause delays or cost over-runs, and at worst ensure that the project is non-bankable, failing to get financial support, with non-recoupable costs. This documentation can include:

- the loan facility agreement
- debenture
- first charge on voting share capital
- company documentation
- planning permission
- grid connection agreement
- land lease
- rights of way
- wayleave agreements
- road opening licences
- Declaration of Identity
- wind data analysis
- turbine supply agreement
- power purchase agreement and assignment documentation
- balance of plant construction contract
- balance of plant collateral warranty agreement
- wind farm operation and warranty agreement
- project management agreement
- service and availability agreement
- insurance documentation
- legal opinion, including ascertaining the validity of foreign legal documents

Appendix A:
Sources of Information for Wind Farm Feasibility Studies

SOURCES OF INFORMATION FOR WIND FARM FEASIBILITY STUDIES

General:

- http://www.npws.ie - all areas designated for environmental protection, recorded sites and monuments, aerial photographs, 6 " mapping, elevation contours, roads, streams
- http://mida.ucc.ie - all areas designated for environmental protection, national monuments, National Bedrock Geology map, soil distribution, soil classification, hydrology - main river basins, landscape character areas, land cover, Gaeltacht regions; mapping not great quality
- http://www.wfdireland.ie - water quality, objectives and management information

DoEHLG "Wind Energy Development Guidelines" (2006) is available at:
http://www.environ.ie/en/Publications/DevelopmentandHousing/Planning/FileDownLoad,1633,en.pdf

Scottish Natural Heritage - Good Practice During Wind Farm Construction is available at:

- http://www.snh.gov.uk/publications-data-and-research/publications/search-the-catalogue/publication-detail/?id=1618 (SNH Document – Good Practice during Windfarm Construction)

Cultural Heritage Information Sources:

- DoEHLG record of sites and monuments – available at www.archaeology.ie
- County Development Plan – available from the local authority, usually from its website
- County Heritage Plan, if available – often also on the local authority website
- relevant Local Area Plans are available from the local authority, usually from its website
- National Inventory of Architectural Heritage at www.buildingsofireland.ie
- Ordnance Survey's Discovery Series 1:50,000 scale maps
- local information

The *SEAI wind map* is at: http://www.seai.ie/Renewables/Wind_Energy/Wind_Maps/

Identification of Existing Grid Connection Infrastructure

Information on the location of the 10 kV, 20 kV, and 38 kV networks, and of 38 kV and 110 kV sub-stations, is given on ESB Networks' website at http://www.esb.ie/esbnetworks/en/about-us/our_networks/index.jsp.

Information on the location of 110 kV and higher voltage networks can be readily obtained from the Ordnance Survey's Discovery Series 1:50,000 scale maps.

Provision of Grid Connections – Commission for Energy Regulation (CER) website: www.cer.ie .

Group Grid Connection Processing Approach:

http://www.cer.ie/en/electricity-transmission-network-decision-documents.aspx?article=981a3ac0-aed2-4dce-b5b2-d512652ff099 "Joint TSO/DSO Group Processing Approach - Pricing Principles Guidelines" (Feb 2007).

Appendix B: List of Telecommunications Operators

Table B: List of Telecommunications Companies*

Contact	Position	Organisation	Address1	Address2	Address3	Address4
Ms. Emer Sheahan	Frequency Planning and Coverage Department	Radio Telefís Éireann	Room 17	Annex 4	Radio Telefís Éireann	Donnybrook, Dublin 4
Mr. Martin Towey	Corporate Affairs Division	Irish Aviation Authority	The Times Building	Fourth Floor	11 – 12 D'Olier Street	Dublin 2
Ms. Sylvia Martin Leon	Transmission Department	Telefónica O2	28 - 29 Sir John Rogerson's Quay	Dublin 2		
Mr. Cathal O'Donnell	Radio Transmission Manager	UPC Ireland	Goldenbridge Industrial Estate	Inchicore	Dublin 8	
Mr. Gerry Smullen		Irish Coast Guard	Unit 1	Rosemount Business Park	Ballycoolin Road	Dublin11
Mr. Ronnie Horan	Infrastructure Manager	ESB Telecoms Ltd†	27 Lower. Fitzwilliam Street	Dublin 2		
Chief Superintendent Eamonn Murray	Telecommunications Section	An Garda Síochána	Garda HQ	Phoenix Park	Dublin 8	
Mr. Neal Keavney	Broadcast Technician	TnaG	Baile na hAbhann	Galway		
Mr. Tony Maguire		TETRA Ireland Communications Ltd‡	114 St. Stephens Green West	Dublin 2		
Mr. Jason Sweeney	Operations Manager	TowerCom Ltd§	4th Floor Heather House	Heather Road	Sandyford Industrial Estate	Dublin 18
Sir/Madam	Director of Operations	Arra Communications	Unit 3/4, Kellys Offices	Gortlandroe	Nenagh	Co. Tipperary
Sir/Madam	Director of Operations	Irish Broadband	Unit 6	Sandyford	Sandyford	Dublin 18

* Please note that this is a non-exhaustive list and should be amended as required for each individual project.
† Also email karen.mcgeough@esb.ie, donal.haslam@esb.ie and Kevin.lee@esb.ie
‡ Also email Neville.reilly@tetraireland.ie
§ Also email requests@towercom.ie

Contact	Position	Organisation	Address1	Address2	Address3	Address4
				Business Centre	Industrial Estate	
Sir/Madam	Director of Operations	Echo IT Ltd	17 Cluain Muillean	Tyone	Nenagh	Co. Tipperary
Sir/Madam	Director of Operations	Wireless Connect Ltd	Unit 31	Parkwest Enterprise Centre	Lavery Avenue	Dublin 12
Sir/Madam	Director of Operations	Munster Broadband*	Unit 24 Innovation Works	Technology Park	Castletroy	Limerick
Mr. John Cusack	Head of Meteor Access Network Planning and Design	Meteor Communications†	4030 Kingswood Avenue	Citywest	Dublin 24	
Mr. Tim Ryan	Local Aids to Navigation Inspector	Commissioner of Irish Lights	Harbour Road	Dun Laoghaire	Co. Dublin	
Ms. Sharon Breen	Property Management Branch	Department of Defence	Coláiste Caoimhin	St. Mobhi Road	Glasnevin	Dublin 9
Gabi Benaim		Irish Telecom	gabi@irishtelecom.com			
		Three	DLH3GITransmissionPlanningAll@three.co.uk			
		Premier Broadband	info@premierbroadband.net			
Mr. Eamon Farrell		Vodafone	eamon.farrell@vodafone.com			
Ms. Louise Mullane		O2	louise.mullane@mosaicnet.ie			
		Dublin Airport Authority	Dublin Airport	Dublin		

Please note that these contact details are subject to change and should be confirmed in advance. Note also that this is a non-exhaustive list and should be amended as required for each individual project .

* Only in Munster
† Also email windfarms@meteor.ie. This covers the assessment for Eircom and Meteor signals.

Appendix C: Main Consultees for Wind Farm EIAs

Table C: Main Consultees for Wind Farm EIAs*

Comments	Salutation	Contact	Position	Organisation	Address1	Address2	Address3	Address 4
	Mr. Lumley	Mr. Ian Lumley	Heritage Officer	An Taisce	National Trust for Ireland	Tailors Hall	Dublin 8	
	Ms. Egan	Ms. Siobhán Egan	Policy and Advocacy Officer	BirdWatch Ireland	Unit 20, Block D	Bullford Business Campus	Kilcoole	Co. Wicklow
				Regional tourist authority	Check relevant address			
	Mr Mathews	Mr. Paddy Mathews	Manager Environment and Planning	Fáilte Ireland	88-95 Amiens Street	Dublin 1		
	Ms. Stone	Ms. Joan Stone	Climate Change Section	Department of Agriculture, Food and the Marine	Johnstown Castle Estate	Co. Wexford		
	Mr. Culleton	Mr. Noel Culleton	Head of Centre	Teagasc	Environmental Research Centre	Johnstown Castle	Co. Wexford	
Check name and address for relevant regional officer			Regional Development Officer	Irish Farmers Association	Check relevant address			
	Mr. O'Corcora	Mr. Tadhg O'Corcora	Conservation Officer	Irish Peatland Conservation Council,	Bog of Allen Nature Centre,	Lullymore	Rathangan	Co. Kildare
	Ms. Harvey	Ms. Alison Harvey	Planning and Development Officer	The Heritage Council	Áras na hOidhreachta	Church Lane	Kilkenny	
	Sir/Madam	The Manager	Development Applications Unit	Department of Arts, Heritage and the Gaeltacht	Newtown Road	Wexford		

* Please note that this is a non-exhaustive list and should be amended as required for each individual project. Reference should also be made to the EPA Advice Notes on Current Practice in the Preparation of EISs

Comments	Salutation	Contact	Position	Organisation	Address1	Address2	Address3	Address 4
	Mr. Dykes	Mr. Paul Dykes	Renewable Energy Information Office	Sustainable Energy Authority of Ireland	Unit A	West Cork Business and Technological Park	Clonakilty	Co. Cork
Check name and address for relevant planning officer			Planning Department	Relevant County Council	Check relevant address			
Check name and address for relevant heritage officer			Heritage Officer	Relevant County Council	Check relevant address			
Check name and address for relevant environment engineer			Environment Department	Relevant County Council	Check relevant address			
Check name and address for relevant roads engineer			Roads Department	Relevant County Council	Check relevant address			
(if different to above)				Local authority/National Roads Design Office	Check relevant address			
Check name and address for relevant regional officer			Director	Inland Fisheries Ireland	Check relevant local office address			
Requested to be emailed instead in Oct 2011- enquiries@iwt.ie	Ms. Pender	Ms. Joanne Pender	Development Officer	Irish Wild Life Trust	Sigmund Business Centre	93A Lagan Road	Dublin Industrial Estate	Glasnevin, Dublin 11
Only for jobs located in vicinity of a waymarked way	Mr. MacDonnell	Mr. Cormac MacDonnell	National Waymarked Way Office	Irish Sports Council	Top Floor, block A	Westend Office Park	Blanchardstown	Dublin 15

Comments	Salutation	Contact	Position	Organisation	Address1	Address2	Address3	Address 4
Check name and address for relevant local energy agency See list on http://www.irish-energy.ie/content/content.asp?section_id=718				Local Energy Agency	Check relevant address			
	Mr. Cagney	Mr. Denis Cagney	Director of Gas, Renewables and Legal	Commission for Energy Regulation	The Exchange	Belgard Square North	Tallaght	Dublin 24
	Mr. Lyden	Mr. John Lyden	Committee Member	Irish Raptor Study Group	3 Castle Court	Curabinny Rd	Carrigaline	Co. Cork
Include if widening or alteration to National Roads is required	Ms. Spain	Ms. Tara Spain	Planning Department	The National Roads Authority	St. Martin's House	Waterloo Road	Dublin 4	
Include if a forested site				Forest Service	Department of Agriculture, Marine and Food	Johnstown Castle	Co. Wexford	
	Ms. Préteseille	Sophie Préteseille	Irish Geological Heritage Programme	Geological Survey of Ireland	Beggars Bush	Haddington Road	Dublin 4	
Check name and address for relevant regional officer			Regional Environmental Officer	Health Service Executive	Check relevant address			
Check name and address for relevant regional officer				Relevant River Basin District	Check relevant address			
Check name and address for relevant regional officer				Office of Public Works	Office of Public Works	Trim	Co. Meath	

Comments	Salutation	Contact	Position	Organisation	Address1	Address2	Address3	Address 4
For IPPC licenced sites				Environmental Protection Agency	Office of Climate, Licensing and Resource Use	P.O. Box 3000	Johnstown Castle Estate	Co. Wexford
For aviation safety issues – heights/obstacles	Mr. Towey	Mr. Martin Towey	Corporate Affairs Division	Irish Aviation Authority	The Times Building	Fourth Floor	11 – 12 D'Olier Street	Dublin 2
For sites within 15 km of Dublin, Cork and Shannon Airports				Dublin Airport Authority				

Please note that these contact details are subject to change and should be confirmed in advance.

Appendix D: Supplementary Construction Health and Safety Information

HEALTH AND SAFETY IN CONSTRUCTION

Appointment of Project Supervisors - Checklist for Clients

A checklist for Clients with regard to the appointment of Project Supervisors is given below:

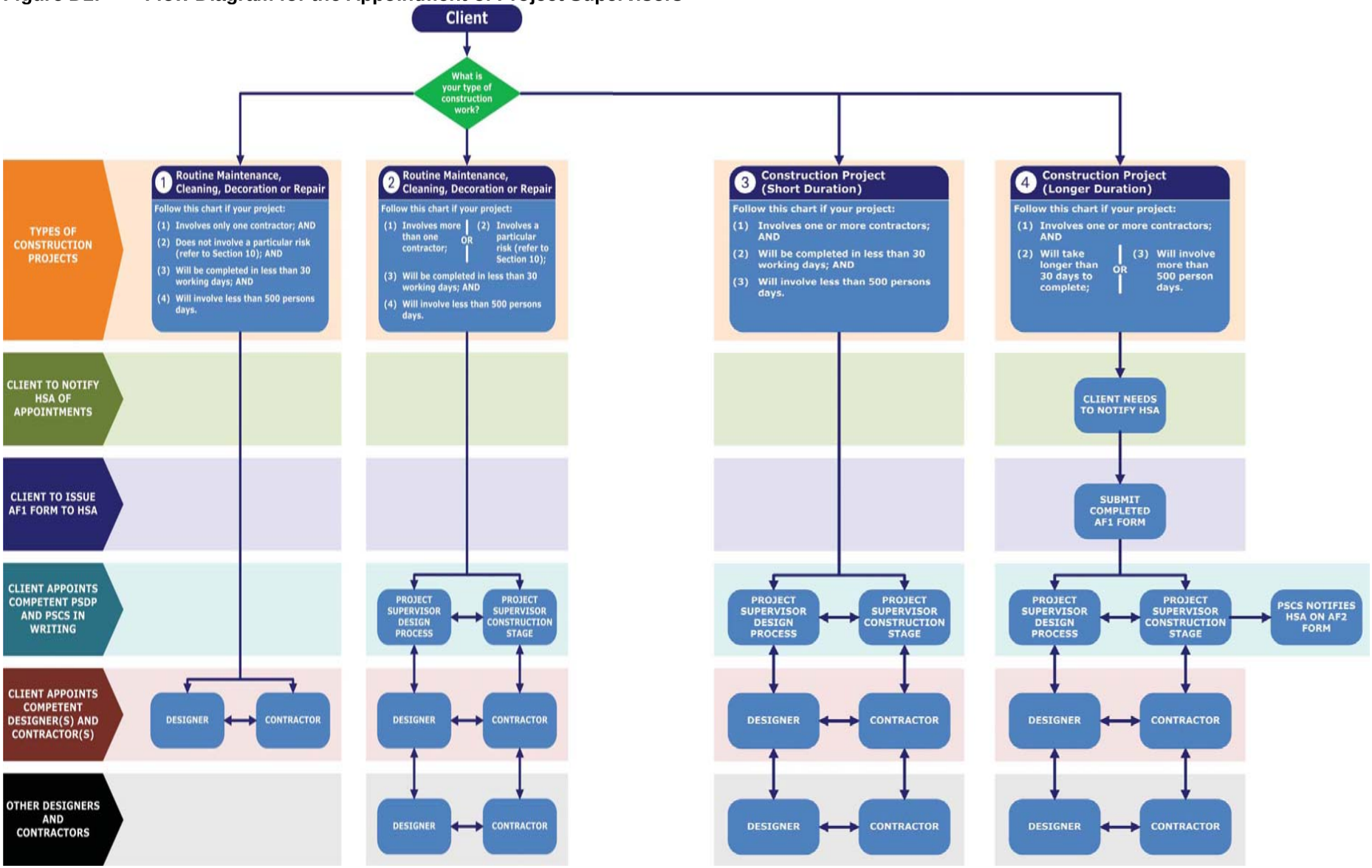
- A competent and adequately resourced PSDP should be appointed before the start of any design work.
- The competence and resources of the PSDP can be checked by asking for information on:
  - experience of carrying out similar projects
  - safety and health training or qualifications
  - the resources intended for use on the project
  - evidence of a good safety record, e.g., accidents, Notices issued by the HSA, and any prosecutions
- A competent and adequately resourced Project Supervisor Construction Stage will need to be appointed.
- The competence and resources of the PSCS can be checked by asking for information on:
  - experience of carrying out similar projects
  - safety and health training or qualifications
  - the resources intended for use on the project
  - evidence of a good safety record, e.g., accidents, Notices issued by the HSA, and any prosecutions
- Co-operation with the Project Supervisors is required. This requires a Client to:
  - give them any information available on the state or condition of a structure or of the site
  - give the Safety File to the PSDP, if available
  - set a realistic time frame for completion of the project, as rushing a project can lead to accidents
- If the project is to take longer than 30 days or 500 person days, then the Client must notify the Authority of the appointment of the PSDP and, if the PSCS has been appointed, must include this information in the Notification to the HSA.
- A Client should provide a copy of the preliminary Safety and Health Plan to all those being considered for, or tendering for the role of Project Supervisor for the Construction Stage
- The Client is required to keep the Safety File prepared by the PSDP when the project is completed.

Clients of small projects or persons who have never been a Client before can seek advice from the Health and Safety Authority in relation to their duties.

Checklists for clients and further information in relation to health and safety issues are available at the following links:

http://www.hsa.ie/eng/Publications_and_Forms/Publications/Construction/Clients_in_Construction.pdf
http://www.hsa.ie/eng/Publications_and_Forms/Publications/Construction/Clients_in_Construction.pdf
http://www.iwea.com/index.cfm/page/iweapartnershipsafetystrategy1

Figure D1: Flow Diagram for the Appointment of Project Supervisors*



* from the HSA's "Guidelines on the Procurement, Design and Management Requirements of the Safety Health and Welfare at Work (Construction) Regulations 2006"

Definitions

Construction work means the carrying out of any building, civil engineering or engineering work, other than drilling and extraction in the extractive industries, and includes but is not limited to each of the following:

(a) the doing of one or more of the following with respect to a structure:
  (i) construction
  (ii) alteration
  (iii) conversion
  (iv) fitting out
  (v) commissioning
  (vi) renovation
  (vii) repair
  (viii) upkeep
  (ix) redecoration or other maintenance (including cleaning which involves the use of water or an abrasive at high pressure or the use of substances or preparations classified as corrosive or toxic)
  (x) de-commissioning, demolition or dismantling

(b) the preparation for an intended structure, including but not limited to site clearance, exploration, investigation (but not site survey) and excavation, and the laying or installing of the foundations of an intended structure

(c) the assembly of prefabricated elements to form a structure, or the disassembly of prefabricated elements which, immediately before such disassembly, formed a structure

(d) the removal of a structure or part of a structure or of any product or waste resulting from demolition or dismantling of a structure or disassembly of prefabricated elements which, immediately before such disassembly, formed a structure

(e) the installation, commissioning, maintenance, repair or removal of mechanical, electrical, gas, compressed air, hydraulic, telecommunication and computer systems, or similar services which are normally fixed within or to a structure

Particular Risks in Construction

Schedule 1 of the Safety Health and Welfare at Work (Construction) Regulations – 2006

Non-exhaustive List of Work Involving Particular Risks to the Safety, Health and Welfare of Persons at Work

1. work which puts persons at work at risk of:
   (a) falling from a height,
   (b) burial under earthfalls, or
   (c) engulfment in swampland

   where the risk is particularly aggravated by the nature of the work or processes used or by the environment at the place of work or construction site
2. work which puts persons at work at risk from chemical or biological substances constituting a particular danger to the safety and health of such persons or involving a statutory requirement for health monitoring
3. work with ionising radiation requiring the designation of controlled or supervised areas as defined in Directive 96/29/Euratom2
4. work near high voltage power lines
5. work exposing persons at work to the risk of drowning
6. work on wells, underground earthworks and tunnels
7. work carried out by divers at work having a system of air supply
8. work carried out in a caisson with a compressed-air atmosphere
9. work involving the use of explosives
10. work involving the assembly or dismantling of heavy prefabricated components

Phased Construction Work

Where the work is phased, with significant and substantial periods of time in between the phases, it may be appropriate to consider each separate phase as an individual project. An example of this would be a demolition operation far in advance of further site work. It may also be appropriate to use this approach on complex or lengthy projects that pass though several distinct stages, each requiring a specialist managerial input. Where structures are being constructed in different locations with separate sites and access and egress points and where there is minimal interaction between the work of each site, it may be appropriate to consider each separate site as an individual project.

Further Information on Health and Safety in Construction

Further information is available from the HSA.[*]

The "Guidelines on the Procurement, Design and Management Requirements of the Safety Health and Welfare at Work (Construction) Regulations 2006" provides detailed guidance on each of the topics dealt with in Section 9 of this document. It is available from the HSA.[†]

Relevant legislation includes:

- Safety Health and Welfare at Work Act 2005
- Safety Health and Welfare at Work (General Application) Regulations 2007
- Safety Health and Welfare at Work (Construction) Regulations 2006

Other regulations deal with noise, vibration, chemical agents, and asbestos. Details on these matters are available from the HSA website.

[*] www.hsa.ie/eng/Publications_and_Forms/Publications/Construction/Clients_in_Construction_-_Best_Practice_Guidance.html
[†] http://publications.hsa.ie/index.asp?locID=6&docID=200

Appendix E: Notes on Wind Farm Insurance

NOTES ON WIND FARM INSURANCE

Insurance is likely to be required for the following:

- all-risks cover for equipment, e.g., towers, nacelles, blades, transformers, computers, generators, cabling, foundations Including cover for fire, lightning, malicious damage, storm, theft, accidental damage, subsidence, breakdown
- reinstatement cover
- loss of revenue during replacement or repair of turbines and other equipment
- failure of power supply
- contingency cover for sub-contractors
- third party liability
- employer's liability
- motor insurance

Non-core insurances could include:

- *force majeure*
- keyman (loss of key staff member or third party crucial to project)
- professional indemnity
- archaeological finds
- commercial "all risks"
- fidelity guarantee

Commonly Encountered Insurance Problems*

The following commonly encountered insurance problems can be considered in formulating insurance packages:

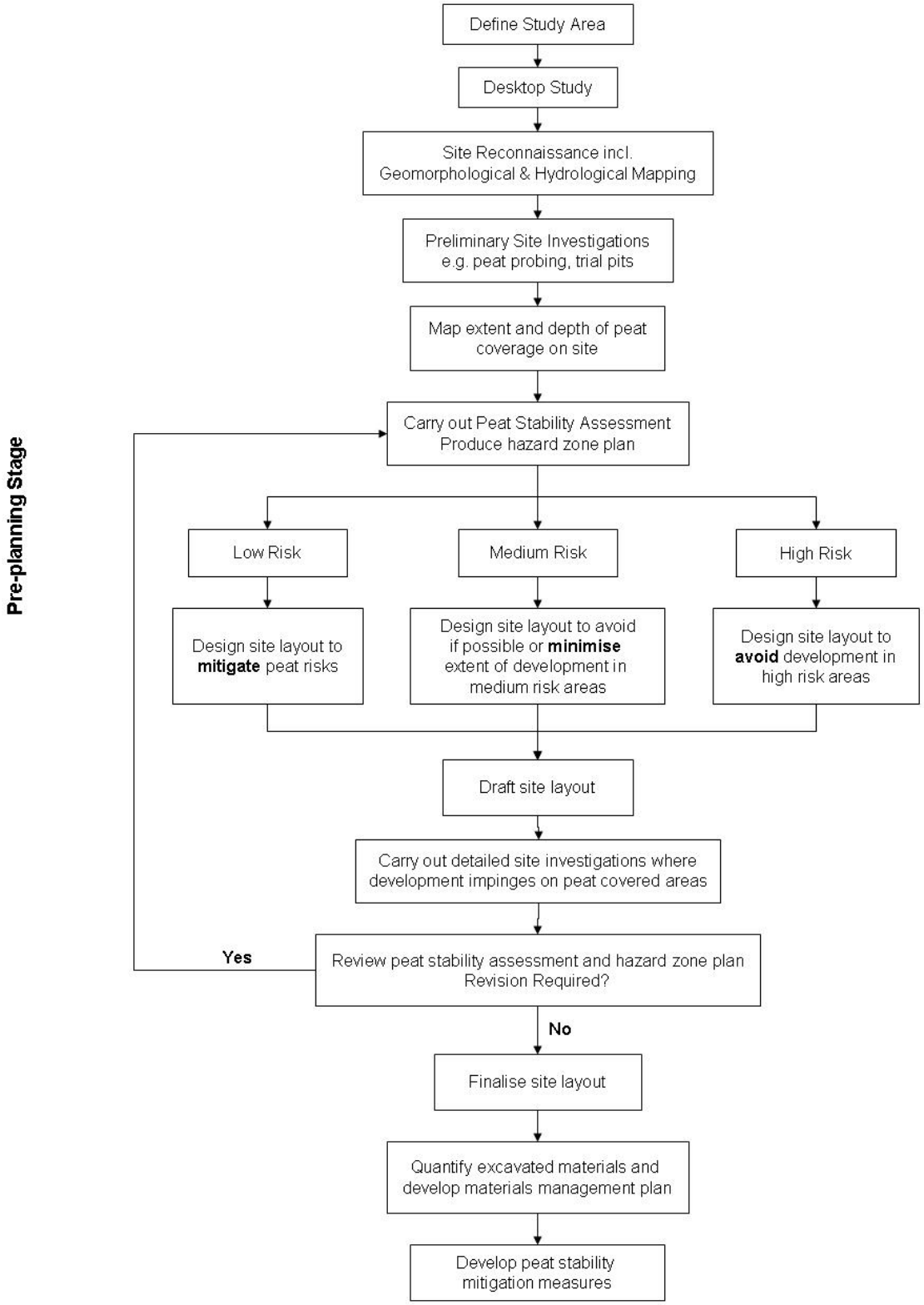
- non-compliance with the insurance provisions of the credit agreement, effectively putting the borrower into default with respect to financing
- inadequate limits of indemnity and/or sums insured
- not fully noting the interest of the financial institution, or failing to make it the first loss payee
- the use of standard policy wording which is not tailored to the risk and does not provide adequate cover
- ambiguously worded insurance documentation which could allow underwriters to avoid claims
- failure to finalise insurance documentation by agreed dates, delaying either financial close or first draw-down

* "Insurance Considerations for Renewable Energy Projects – A Guide for Developers," ETSU K/FR/00031/REP/S

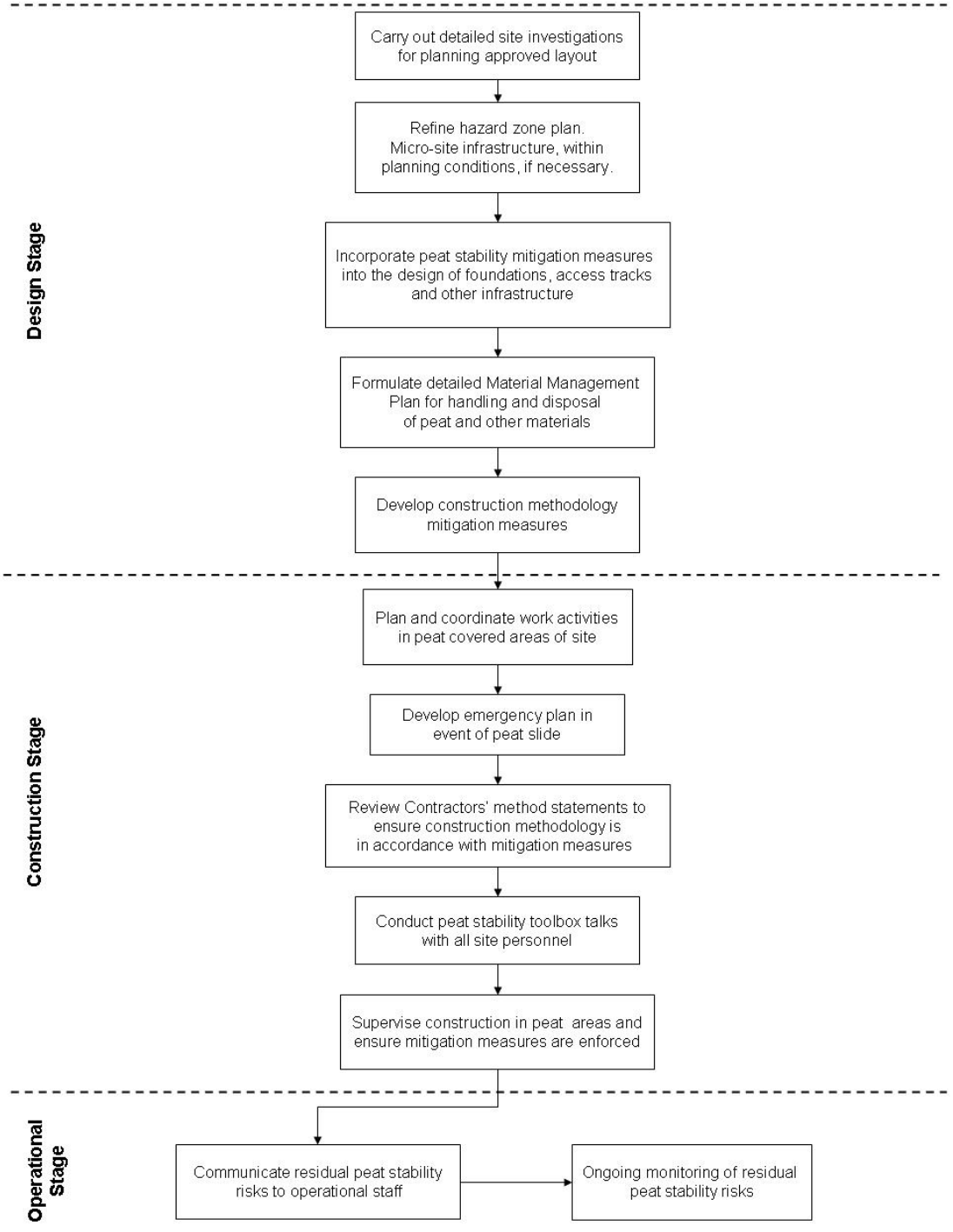
- lack of appreciation of the insurance market and its limitations, creating false expectation with financiers
- unrealistically high self-insured amounts which could create cash-flow problems
- not advising financial institutions of changes to insurance policies, leading to a breach of the terms and conditions of the loan

Appendix F: Flowchart for Peat Stability Assessment Process

Peat Stability Assessment and Control Process



Peat Stability Assessment and Control Process



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[65] http://www.agriculture.gov.ie/media/migration/forestry/felling/FellingPolicyWindFarms030611.doc
[66] http://www.nra.ie/Publications/DownloadableDocumentation/RoadSafety/file,10473,en.doc
[67] The local authority could have additional requirements in its County Development Plan or wind energy policy, which will need to be met.
[68] This is because noise and shadow flicker impacts of wind turbines on dwellings are in most cases a matter relating to nuisance rather than health. In such cases, letters of consent from the relevant householders should be submitted in support of the planning application, stating that they are aware of predicted environmental impacts on their dwellings, as outlined in the EIS, and that this is acceptable to them. This approach will be accepted by many local authorities.
[69] e.g., has applied for planning permission for wind turbines, or is engaged in the EIA process, etc.
[70] some turbine manufacturers provide a transport manual which provides this information
[71] http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2006:157:0024:0086:EN:PDF
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[75] http://www.cer.ie/GetAttachment.aspx?id=1c2fa72d-d759-48ca-915f-b501fd5980c7
[76] based on File 25 from the Renewable Energy partnership's "To Catch the Wind" (2004), and Matheson Ormsby Prentice presentation at *Meitheal na Gaoithe* workshop, Kilmainham, 27 May 2003
[77] http://www.dcenr.gov.ie/Energy/Sustainable+and+Renewable+Energy+Division/REFIT.htm
[78] http://www.allislandproject.org
[79] http://www.cer.ie/en/electricity-retail-market-licences.aspx?article=e3616c02-d62f-4d73-b59b-9dc708ee4d34
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