4. Legislation

4.1 Introduction

This chapter of the EIS describes the key legislative requirements relevant to the project during the planning application, construction and operational phases.

4.2 Planning and Development Acts

4.2.1 Regulatory Overview

The *Planning and Development Acts, 2000 to 2007* provide the primary statutory basis for obtaining planning permission. A series of secondary legislation is set out in the *Planning and Development Regulations 2001 to 2009* associated with the primary statutory requirements.

The *Planning and Development (Strategic Infrastructure) Act, 2006* (the Act) amends the *Planning and Infrastructure Development Act, 2000* to provide for the introduction of a more efficient planning consent procedure for certain strategic infrastructure developments allowing the application to be made to An Bord Pleanála (the Board) and not to a local planning authority.

The *Planning and Development Regulations, 2006 (S.I. No. 685 of 2006)*, which make provisions for strategic consent procedures associated with the Act, became effective in January 2007.

The types of infrastructure subject to the revised strategic development consent procedure are listed in Section 5 of the Act which generally relates to major energy, transport and environmental infrastructure projects.

Seventh Schedule (Section 5) developments include:

"*A thermal power station or other combustion installation with a total energy output of 300 megawatts or more*".

In order for a Seventh Schedule development to be considered strategic it must exceed the thresholds specified in Section 5 and satisfy one or more of the paragraphs outlined in Section 37A-(2) of the Act; namely - :

(a) *The development would be of strategic economic or social importance to the state or to the region in which it would be situate*

(b) *The development would contribute substantially to the fulfilment of the objectives of the National Spatial Strategy or in any regional planning guidelines in force in respect of the area in which it would be situate*

(c) *The development would have a significant effect on the area of more than one planning authority*

Under Section 37B of the Act, a prospective applicant is required to engage in pre-application consultation with the Board to determine whether or not planning permission can be applied for under

the Act. Following consultation, the Board notifies the applicant in writing that, in the opinion of the Board, the project does or does not satisfy the provisions laid out in Section 37A-(2).

In accordance with Section 37E.-(1) of the Act, all Seventh Schedule strategic infrastructure development planning applications must be accompanied by an EIS.

Under the Act a prescribed number of copies of the planning application and EIS must be submitted to the relevant planning authority or authorities in whose area the proposed development would be situated. The planning authority then has 10 weeks to prepare a written submission to the Board on the environmental effects of the proposed development and the appropriateness of the development in relation to the planning and sustainable development objectives of the planning authority.

A prescribed number of copies of the planning application and EIS must also be submitted to the prescribed authorities. Submissions must be made within a specified timeframe, of not less than six weeks.

The application and EIS can also be inspected by the public within a specified timeframe of not less than six weeks, submissions and observations can be made within the same period. The Board will aim to make a decision eighteen weeks from the last day of receipt of submissions from the public. The Board may, at its discretion, choose to hold an oral hearing.

Following pre-application consultation meetings with An Bord Pleanála, on 24th June 2009, 1st October 2009 and 28th October 2009, it has been determined that the proposed development satisfies the conditions set out in Section 37A.-(1) and (2)(a) and (b) of the *Planning and Development (Strategic Infrastructure) Act*, 2006 for a Seventh Schedule development. A copy of the notice served by the Board confirming that the development comes under the remit of the Strategic Infrastructure Act is included in Appendix 1.1 (Strategic Infrastructure Notification).

As the Board has provided written notice to Endesa, subsequent to mandatory pre-application consultations, that the proposed development is a Strategic Infrastructure development, the planning application is being made directly to An Bord Pleanála.

4.3 European Directives and International Agreements

The following lists the key European Directives, Regulations and Agreements which apply to the proposed development. Specific regulations are listed under each relevant environmental topic in Chapter 8 – 17, as appropriate.

- EC Directive 85/337/EEC, as amended by Directives 97/11 and Article 3 of 2003/35/EC (commonly known as the Environmental Impact Assessment Directive);
- Integrated Pollution Prevention and Control Directive 96/61/EC, as amended by 2008/1/EC;
- Directive 2001/80/EC on the limitation of emissions of certain pollutants into the air from large combustion plants (the “Large Combustion Plant Directive”, LCPD);
- Proposed Industrial Emissions Directive;
- Council Directive 96/82/EC on the control of major accident hazards involving dangerous substances as amended by Directive 2003/105/EC (Seveso II Directive);
- The National Emissions Ceiling (NEC) Directive 2001/81/EC;The Kyoto Protocol to the UN Framework Convention on Climate Change (UNFCCC) – Emissions Trading Scheme; and

- Greenhouse Gas Emissions Trading Directive 2003/87/EC.

4.3.1 Environmental Impact Assessment Directive

Under Directive 85/337/EEC (the EIA Directive), as amended, certain developments are subject to the requirements of an Environmental Impact Assessment (EIA). Article 3 of the EIA Directive outlines the requirements of an EIA:

"*The environmental impact assessment shall identify, describe and assess in an appropriate manner, in the light of each individual case and in accordance with Articles 4 and 11, the direct and indirect effects of a project on the following factors:*

- *human beings, fauna and flora,*
- *soil, water, air, climate and the landscape,*
- *the interaction between the factors mentioned in the first and second indents,*
- *material assets and the cultural heritage"*

Article 5 of the EIA Directive concerns the information that is to be furnished to the competent authority by the developer. Member States are required to adopt measures to ensure that the developer supplies the information required under the Directive. "Developer" is defined in Article 1(2) as:

"*the applicant for authorization for a private project or the public authority which initiates a project*".

Pursuant to Article 5(2), the following information is mandatory:

- A description of the project comprising information on the site, design, and size of the project
- A description of the measures envisaged in order to avoid, reduce and, if possible, remedy significant adverse effects
- The data required to identify and assess the main effects which the project is likely to have on the environment
- A non– technical summary

The proposed development is listed in Annex I of the EIA Directive and is therefore subject to an EIA i.e.

"*Thermal power station and other combustion installations with a heat output of 300 megawatts or more*".

In Ireland, the *European Communities (Environmental Impact Assessment) Regulations, 1989 to 2006* and the *Planning and Development Regulations, 2000 to 2009* bring the EIA Directive into effect.

4.3.2 IPPC Directive

The IPPC Directive aims to prevent or minimise pollution from new and existing installations which come under the regime through an integrated licensing system. The IPPC Directive (96/61/EC) was

transposed into Irish law under the Protection of the Environment Act, 2003. Directive 2008/1/EC codifies the original IPPC Directive 1996/61/EC.

The First Schedule of the Act describes the activities that require an IPPC licence including:

"Energy: The operation of combustion installations with a rated thermal input equal to or greater than 50 MW."

The competent authority for IPPC licensing is the Environmental Protection Agency (EPA). Prior to issuing a licence the EPA must be satisfied that the installation does not cause adverse effects on the environment.

An IPPC licence sets conditions and requirements in order to prevent or reduce emissions to air, water and land and limit waste and noise generated. Conditions on the prevention of accidents, efficient use of energy / resources and decommissioning of plant are also set. Under the regime the operator is obliged to employ Best Available Technique (BAT) technology and follow BAT guidance.

BAT guidance appropriate to the proposed development includes *Reference Document on Best Available Techniques for Large Combustion Plants, (adopted July 2006), BAT Guidance Note on Best Available Techniques for the Energy Sector (Large Combustion Plants Sector), 2008* and *Reference Document on the Application of Best Available Techniques to Industrial Cooling Systems, (December 2001).*

Any significant changes to a licensed facility must be notified to the EPA in advance of any change taking place.

The existing power plant at Great Island currently operates under IPPC Licence Registration Number P0606-02. The existing licence will be required to be revised to include the proposed development. Endesa is in ongoing consultation with the EPA regarding the required IPPC licence amendments.

4.3.3 Large Combustion Plant Directive

The Large Combustion Plants Directive (LCPD) was adopted in 1988 and subsequently revised in 2001. The Directive applies to thermal plants with a thermal output of greater than 50 MW applying limits for emissions of Sulphur Dioxide (SO_2), Nitrogen Oxides (NO_x) and Particulate Matter (PM). The *Large Combustion Plants Regulations, 2003 (S.I. No. 644 of 2003)* transpose the LCPD into Irish law.

4.3.4 Proposed Industrial Emissions Directive

The European Commission (EC) recently undertook a review of the Integrated Pollution, Prevention and Control Directive (96/61/EC) and its implementation throughout the EU. The review determined that the key principles of the Directive provide a sound basis for the control of industrial emissions in the EU. However, the EC identified a number of shortcomings which have reduced the effectiveness of the Directive and resulted in lower than expected reductions in emissions across the EU. As a result the EC has proposed a Directive on Industrial Emissions which would replace and amalgamate the following Directives:

- Titanium Dioxide Directives (78/176/EEC, 82/883/EEC and 92/112/EEC on waste from the titanium dioxide industry);
- Integrated Pollution Prevention and Control (IPPC) Directive (96/61/EC);
- Volatile Organic Compounds (VOC) Solvents Directive (99/13/EC);

- Waste Incineration Directive (2000/76/EC); and
- Large Combustion Plants (LCP) Directive (2001/80/EC).

The proposed Directive on Industrial Emissions is likely to apply to combustion plants of a rated thermal input equal to or greater than 50 MW. Originally it was proposed that the Directive would apply to combustion plants with a rated thermal input of greater than 20MW, however, this is currently under review by the EC following significant political objections to the proposal.

In general, the proposed Directive will require that emission limits do not exceed the emission levels outlined in relevant BAT reference documents.

However, the Directive and associated legislation are currently under review by the EC and the provisions of the legislation are therefore subject to change.

4.3.5 Seveso II Directive

Council Directives 96/82/EC and 2003/105/EC (Seveso Directives) have been transposed into Irish law through the *European Communities (Control of Major Accident Hazards Involving Dangerous Substances), Regulations, 2006, (S.I. No. 74 of 2006)*. The regulations, commonly referred to as the Seveso Regulations, apply to facilities where dangerous substances are held in quantities above specified threshold limits as specified in Annex I, Parts 1 and 2, of the regulations. The Health and Safety Authority (HSA) is the competent authority under the Seveso Regulations.

A "major accident" is defined in the Regulations as "*an occurrence such as a major emission, fire or explosion resulting from uncontrolled developments in the course of the operation of any establishment, leading to a serious danger either to human health or to the environment, whether immediate or delayed, inside or outside the establishment, and involving one or more dangerous substances".*

Operators of facilities which come under the regime are required to take all necessary measures to prevent and mitigate the effects of major accidents to human beings and the environment. The regulations impose certain planning restrictions both within and adjacent to a regulated facility thereby controlling development that is incompatible with operations.

The Seveso Directive applies at two levels: top-tier and lower tier. The levels are defined by threshold quantities of hazardous substances that are present. The power plant at Great Island is governed by the lower tier Seveso requirements dues to the quantity of distillate that will be stored on site. The distillate will be stored as a back-up fuel to be used in the event of the gas supply not being available. The distillate which will be stored at the power plant is classified as a Gas Oil Petroleum Product in the Seveso II Directive, which has lower and top tier thresholds of 2,500 and 25,000 tonnes respectively.

The proposed plant will store approximately 10,000 Tonnes of low sulphur distillate oil on site, in accordance with the requirements of Commission for Energy Regulation (CER) Decision Paper *CER/09/001, Secondary Fuel Obligations on Licensed Generation Capacity in the Republic of Ireland*. Therefore the proposed development is considered to be a lower tier Seveso site.

In order to meet their general duties, operators of lower tier establishments are required to:

- Identify all major accident hazards and assess the consequences in terms of extent and severity of any such accident that may occur
- Provide and maintain:

- Safe plant
- Safe systems of work
- Safe means of access to / exit from all parts of the establishment

- Make arrangements for the safe handling of dangerous substances
- Provide the necessary information, instruction, equipment, training and supervision to ensure the occupational health and safety of people working at the establishment
- Use best practicable means to both prevent a major emission into the environment from uncontrolled developments and to render harmless and inoffensive any substances that might be released

The specific requirements are to:

- Notify the HSA at least six months prior to commencement of construction activities providing clearly defined details in relation to the operator, relevant dangerous substances, inventories, description of the activity and details of the immediate environment of the activity. Any significant changes to the facility must also be notified in advance
- Prepare and implement a Major Accident Prevention Policy (MAPP)
- Undertake specified actions in the event of a major accident event
- Maintain a register of notifiable incidents to be kept for minimum of 10 years

4.3.6 National Emissions Ceiling (NEC) Directive

The NEC Directive imposes limits on member states on emissions of Sulphur Dioxide (SO_2), Nitrogen Oxides (NO_x), Volatile Organic Compounds (VOC's) and Ammonia (NH_3) to the levels specified in the Directive by 2010.

4.3.7 The Kyoto Protocol

The Kyoto Protocol sets mandatory emission limits for the reduction of Greenhouse Gas Emissions (GGE). Ireland is committed to limiting GGE to 13% above its 1990 levels during the period 2008-2012. The European Union Council of Ministers has recently committed to achieving a 20% reduction in emissions of 1990 levels by 2020. The Greenhouse Gas Emissions Trading Agreement facilitates the aims of the Kyoto Protocol.

4.3.8 Greenhouse Gas Emissions Trading Directive

Under Directive 2003/87/EC listed operators are allocated greenhouse gas emission allowances at the beginning of each year. If the operator does not meet their target they can buy or sell allowances within the EU. Combustion installations with a rated thermal input exceeding 20 MW are included in the scheme.

4.4 Electricity Regulation Act

Under Section 16 of the *Electricity Regulation Act, 1999 (S.I. No. 29 of 1999)*, an authorisation to construct is required from CER prior to commencing construction on a new generating station or

reconstruction of an existing generation station. The criteria used to assess an application for an authorisation are specified in the *Electricity Regulation Act, 1999 (Criteria for Determination of Authorisations) Order, 1999 (S.I. No. 309 of 1999)*.

Under Section 14 of the Electricity Regulation Act all generators must obtain a generation licence from CER. Factors which may be considered in the evaluation of a licence application include the availability of sufficient appropriate financial, managerial or technical resources to ensure that the generator is able to comply with the terms and conditions that govern the electricity generation licence.

CER also has responsibilities regarding security of supply. In this regard secondary fuel supply requirements are imposed, as described in CER Decision Paper *CER/09/001, Secondary Fuel Obligations on Licensed Generation Capacity in the Republic of Ireland*. Generating units that expect to operate in excess of 2,630 hours per annum are required to hold stocks equivalent to five days continuous running based on the unit's rated capacity on its primary fuel. Generating units that expect to operate less than 2,630 hours per annum are required to hold stocks equivalent to three days continuous running based on the unit's rated capacity on its primary fuel. A stock of approximately 10,000 Tonnes of distillate oil is determined to be sufficient to meet the necessary capacity requirements of the proposed development.

Endesa will participate in the Single Electricity Market, (SEM), in accordance with the *Electricity Regulation Act 1999 (Single Electricity Market) Regulations 2007*, the new wholesale electricity market for the island of Ireland. The rules of the market require that the output from plant is traded through the market pool. The market rules also encapsulate the structures by which generators bid their cost of operation and get paid for producing electricity and providing reserve capacity to the system.

The market is administered by the Single Electricity Market Operator, (SEMO) and regulated by the Single Electricity Market Committee, (SEMC). This committee includes representatives of the energy Regulatory Authorities in both jurisdictions, namely CER in the Republic of Ireland and the Northern Ireland Authority for Utility Regulation (NIAUR) in Northern Ireland, as well as independent members.

The market rules require that each unit bids its cost of production into the market on a daily basis. Bids must be based on the short run marginal cost of production, and include the costs of performing a start, which may vary depending on the warmth state of the unit, and the cost associated with operation that is independent of the unit output, termed no load cost. Each unit must also declare technical data such as the length of time it takes to start or change load, its minimum stable generation and maximum available output. The bids must be submitted by 10:00 on the day proceeding the trading day to which they apply, and apply across the duration of the trading day. The trading day runs from 06:00 on the first day to 06:00 on the following day.

The market price paid to generators varies on a half hourly basis, and is based on the marginal cost of production in a half hour period to meet demand for that trading period, such that the total cost of production across the trading day is minimised. The price is based on the commercial bids submitted by generators, the out-turn wind generation, unit availability profiles and the technical capabilities of all the generating units in the portfolio. A forecast production schedule is prepared by the central market computer system on the day prior to the trading day, to guide the dispatch of plant in real time. However, the out-turn data in terms of actual demand, unit availability and wind generation is used after the production day to set the market price

Under the new market structure generators are centrally dispatched, such that individual plant operators do not decide when to operate their plants, but must be instructed, or dispatched, by the Transmission System Operator (TSO). The TSO will dispatch units that are scheduled to produce electricity according to the forecast market schedule produced by the central market system. The TSO must also make provision for reserve, which provides the capability of rapidly increasing output to the

electricity system, if required. The TSO will also adjust the dispatch schedule to meet variations in the real time demand, wind generation and unit availability profile, compared to those values used in the forecast. It should be noted therefore, that whilst the expected running profile of a generator unit can be projected one day in advance, a power plant operator has to be prepared to start a unit at any time.

4.5 Foreshore Act

Under the Foreshore Acts, 1933 to 2005, a foreshore licence must be obtained prior to the undertaking of any works or placing of structures or material on or for the occupation of or removal of material from State-owned foreshore.

The "foreshore", is defined in the 1933 Act as *the bed and shore, below the line of high water of ordinary or medium tides, of the sea and of every tidal river and tidal estuary and of every channel, creek and bay or any such river or estuary*. Subsequent amendments to the Act state that the foreshore *has the meaning as assigned to it by the Foreshore Act, 1933, but includes land between the line of high water of ordinary or medium tides and land within the functional area of the planning authority concerned that adjoins the first-mentioned land.*

In May 2009 the Government passed legislation which will transfer responsibility for granting Foreshore Licences from the Department of Agriculture, Fisheries and Food (DAFF) to the Department of the Environment, Heritage and Local Government.

Where a development is subject to the requirements of the *European Communities (Environmental Impact Assessment) Regulations, 1989 to 2006* a copy of the environmental impact statement must be submitted with the Foreshore License application.

A foreshore lease was granted for Great Island generating station in 1968. Part of this area, which is currently in use as part of the existing activity on site, is proposed to be used for the development. Endesa has engaged in consultation with the Coastal Zone Management Division and have served a copy of this planning application to the Minister of the Environment Heritage and Local Government.

4.6 Water Framework Directive

The Water Framework Directive (2000/60/EC) was transposed into Irish law by the *European Communities (Water Policy) Regulations, 2003* as amended in 2005 and 2008. The Directive commits Member States to achieve Good Status in river, lakes, estuaries, transitional waters, coastal waters and groundwater by the year 2015.

The *European Communities Environmental Objectives (Surface Waters) Regulations 2009 (S.I. No. 272 of 2009)* were adopted on 30th July 2009. The regulations:

- Give legal status to the standards and criteria being used by the EPA for classifying surface water quality in accordance with the ecological status of the Water Framework Directive requirements
- Give effect to the requirements of the Water Framework Directive to progressively reduce pollution to receiving waters for a list of 41 priority hazardous substances
- Prohibit discharges liable to cause water pollution, except where such discharges are subject to prior authorisation or general binding rules
- Establish environmental quality standards in surface water for a range of substances covered by the Dangerous Substances Directive (2006/11/EC)

4.7 Flood Risk Directive

The Flood Risk Directive (*Directive 2007/60/EC on the assessment and management of flood risks*) requires Member States to assess if all water courses and coast lines are at risk from flooding, to map the flood extent and assets and humans at risk in these areas and to take adequate and coordinated measures to reduce this flood risk. A preliminary assessment to identify river basins and associated coastal areas at risk is required to be complete by 2011 with a requirement for flood risk maps to be drawn up by 2013. Flood risk management plans are required by 2015. The competent authority for the implementation of the requirements of the Floods Directive in Ireland is the Office of Public Works (OPW). The Directive is expected to be transposed into Irish law by December 2009.

4.8 Habitats Directive and Birds Directive

An Appropriate Assessment (AA) is required under Article 6 of the Habitats Directive (*Council Directive 92/43/EEC*) where a plan or project may give rise to significant effects upon a Natura 2000 site. Natura 2000 sites are sites designated as ecologically important areas (Special Areas for Conservation - SAC) under the Habitats Directive or Special Protected Areas (SPA) under Council Directive 79/409/EEC on the conservation of wild birds, commonly referred to as the Birds Directive.

Under Article 6(3) of the Habitats Directive all plans and projects which either by themselves or in combination with other plans or projects, are likely to have a significant effect on a Natura 2000 site (SACs or SPAs protected under the Habitats Directive or the Birds Directive) shall be subject to an appropriate assessment of its implications for the site in view of the site's conservation objectives.

This means that such plans and projects are subject to a screening process, where existing documentation is used to assess whether they are likely to have significant adverse effects on a Natura 2000 site. If such effects can be ruled out, a detailed appropriate assessment is no longer required. The reasoning for the decision must however be adequately documented. In all cases, it is immaterial whether the plan or project in question has a direct effect on components of a Natura 2000 site or affects them indirectly from elsewhere. If uncertainties remain to as whether significant adverse effects can be completely ruled out, an appropriate assessment must be performed to provide clarity. Strict adherence to the precautionary principle is required when conducting the assessments so that the mere likelihood of significant adverse effects gives rise to an obligation to conduct a full appropriate assessment.

5. Planning and Policy Context

5.1 Introduction

This chapter of the EIS presents the Planning and Policy context of the proposed development. The information presented in this chapter has been sourced from the following documents:

- Department of Environment, Heritage and Local Government, *National Spatial Strategy for Ireland 2002 – 2020 People, Places and Potential,* November 2002
- Department of the Taoiseach*, National Development Plan 2007 – 2013, Transforming Ireland, A Better Quality of Life for All,* January 2007
- Department of Communication, Marine and Natural Resources, *Energy Policy Framework 2007 - 2020 (Delivering a Sustainable Energy Future for Ireland)*, March 2007
- Department of Environment, Heritage and Local Government, *National Climate Change Strategy 2007 – 2012,* April 2007
- Department of Arts, Heritage, Gaeltacht and the Islands, *National Heritage Plan*, April 2002
- Department of Arts, Heritage, Gaeltacht and the Islands, *National Biodiversity Plan*, April 2002
- Department of Environment, Heritage and Local Government, *Sustainable Development – A Strategy for Ireland)*, 1997
- Department of Environment, Heritage and Local Government, *The Planning System and Flood Risk Management Consultation Draft Guidelines for Planning Authorities*, September 2008
- Department of the Taoiseach, *Towards 2016; Ten Year Framework Social Partnership Agreement 2006-2015*, June 2006
- South East Regional Authority*, South East Regional Planning Guidelines 2004,* May 2004;
- South Eastern River Basin District, *Draft River Basin Management Plan for the South Eastern River Basin District,* December 2008
- Wexford County Council, *Wexford County Development Plan 2007 – 2013*, April 2007
- Kilkenny County Council, *Kilkenny County Development Plan 2008 – 2014*, June 2008
- Waterford County Council, *Waterford County Development Plan 2005 – 2011*, July 2005
- Waterford County Council, *County Waterford Climate Change Strategy 2008 – 2012*, 2008

National Context is discussed in Section 5.2, Regional Context is discussed in Section 5.3 and Local Context is discussed in Section 5.4.

5.2 National Context

5.2.1 National Spatial Strategy 2002 - 2020

The National Spatial Strategy (NSS) for Ireland is *"a twenty year planning framework designed to achieve a better balance of social, economic, physical development and population growth between regions"*.

To facilitate balanced regional development the NSS proposes that areas of sufficient scale and critical mass will be built up through a series of gateways and hubs.

Waterford City has been designated as a gateway by the NSS, and will be supported by the 'hub' settlements of Kilkenny and Wexford. Together, these three settlements will form a nationally strategic "growth triangle". It is anticipated that the gateways and supporting hubs will strengthen smaller towns and rural areas within their sphere of influence.

The populations of Kilkenny and Wexford town were 20,735 and 17,235 respectively in 2002, rising to 22,179 and 18,163 respectively in 2006. The population of Waterford city increased from 44,594 to 45,748 between 2002 and 2006.

The need for additional generating capacity to augment the grid due to accelerated growth in Ireland is highlighted in the NSS. The NSS emphasises that linkages in terms of transport, communications and energy networks are critically important to allow places and areas to reach their potential and promote balanced regional development.

The NSS outlines that physical networks of infrastructure such as roads, public transport, energy and communications are of particular relevance, because they have a spatial impact and can also influence the location, timing and extent of development. It is also highlighted in the NSS that reliable and effective energy systems, such as gas and electricity, are key prerequisites for effective regional development.

Prime considerations outlined in the NSS in terms of spatial policies relating to energy include;

- Developing energy infrastructure on an all-island basis to the practical and mutual benefit of both the Republic and Northern Ireland

- Enhancing both the robustness and choice of energy supplies across the regions, through improvements to the national grids for electricity and gas

5.2.2 National Development Plan 2007 - 2013

The *National Development Plan 2007 - 2013* is a blueprint for the economic and social development of Ireland until 2013. A key objective of the plan is to promote balanced regional development. The NDP builds on the previous plan which identified the need for a National Spatial Strategy to promote regional development in Ireland through the designation of a number of development corridors as Gateways and Hubs in individual regions. Gateways and hubs have been designated to act as development growth areas that will be promoted in terms of infrastructure and investment to act as economic drivers for their region.

The NDP's Energy Programme will encompass approximately €8.5 Billion in investment in energy over the plan period. In relation to energy infrastructure, the overall strategic objective of the NDP is to ensure security of energy supply nationally and regionally, which is competitively priced, in the long term while meeting a high level of environmental standards. Security of supply is considered of vital

importance to ensuring the continued economic development of the country. The NDP states that efficiency in the use of energy must also be improved. The management of energy demand is discussed in the plan and it is estimated that energy demand is projected to increase by 1.6% per annum up to 2013 while annual electricity demand is expected to grow by 3.1%, (it should be noted however that EirGrid, the national independent electricity Transmission System Operator (TSO), has recently revised their forecasts figures due to the deteriorating economic situation in Ireland. The latest estimates from EirGrid suggest a 4-5% decrease in Total Electricity Requirement in 2009 with a further fall of 0.9% in 2010. EirGrid anticipates that demand is to recover slowly to 2008 levels by 2012 - 2014).

The NDP states that the infrastructure investments required in the energy sector are of critical national strategic importance and they will help the sector's ability to ensure security of energy supply and overall economic sustainability. The following infrastructure developments are envisaged to be implemented over the period of the plan:

- Interconnection
- Market integration
- Network extension
- Storage for greater security of supply

5.2.3 Energy Policy Framework 2007 - 2020 (Delivering a Sustainable Energy Future for Ireland)

Security of supply is identified as being vitally important for the Irish economy in the Government White Paper entitled *Energy Policy Framework 2007 - 2020*. The paper emphasises the necessity for robust electricity networks and electricity generating capacity to ensure consistent and competitive supply of energy.

The Government supports the case for a process of structural change in the energy market and a key policy objective is the enabling of competition and delivery of consumer choice through structural change. In light of this objective the Asset Strategy Agreement (ASA) was entered into between Commission for Energy Regulation (CER) and ESB in April 2007 for the sale of certain ESB power stations (including Great Island power plant), with the objective to reduce ESB's dominant market share and promote competition for the benefit of the end customer. The CER-ESB ASA is discussed in detail in Chapter 2 (Background to the Project).

The paper also highlights the need for additional electricity generating capacity and improved availability of existing generating stations stating:

"Achieving an adequate safety margin between electricity supply and demand requires additional generating capacity including flexible plant and significantly higher standards of generating plant availability, as well as more interconnection….We will ensure that the strategic network development approach is underpinned by coordinated local, regional and national approaches to issues, which balance local interests with the national imperative to deliver strategic energy infrastructure. This approach will be supported by the new arrangements provided for in the Planning and Development (Strategic Infrastructure) Act 2006".

In order to ensure security of energy supply, the Governments objective is to ensure that energy is consistently available at competitive prices with minimal risk of supply disruption.

Strategic Goals outlined in the *Energy Policy Framework 2007 - 2020* in relation to security of energy supply include:

- Ensuring that electricity supply consistently meets demand
- Ensuring the physical security and reliability of gas supplies to Ireland
- Enhancing the diversity of fuels used for power generation
- Being prepared for energy supply disruptions

The Government White Paper highlights that Ireland has a well developed framework to ensure the adequacy of gas supplies and transportation infrastructure into the country with substantial investment in the transmission network and the new pipelines in recent years. The Paper states that natural gas will continue to play a vital role in the Irish fuel mix and the future use of oil in electricity generation could feature in terms of dual firing capability of gas fired plants.

5.2.4 National Climate Change Strategy 2007 - 2012

The predicted impacts of climate change in Ireland are outlined in the *National Climate Change Strategy 2007 - 2012*. It is recognised in the Strategy that Ireland cannot, on its own, prevent or ameliorate the impacts of climate change. However, the National Climate Change Strategy states that Ireland must meet its responsibilities with regard to reducing Carbon Dioxide (CO_2) emissions in partnership with the EU and the global community.

In relation to energy supply the climate change strategy identifies the following objectives:

- 15% of electricity will be generated from renewable sources by 2010 and 33% by 2020
- Biomass will contribute up to 30% of energy input at peat burning power plants by 2015
- Support for Combined Heat and Power projects
- Development of a National Ocean Energy Strategy

The Strategy highlights that the efficiency of electricity generation will continue to be improved in line with recent trends to commission additional high-efficiency gas fired power plants to displace less efficient generating capacity. In relation to gas transmission and distribution, it is stated in the Strategy that the natural gas network will continue to be extended over the 2008 - 2012 period, where it is cost-effective and economic to do so.

5.2.5 National Heritage Plan 2002

The National Heritage Plan sets out a strategy for the protection and enhancement of Ireland's national heritage. The key objective of the Plan is to protect the national heritage as well as promoting it as a resource to be enjoyed by all.

The National Heritage Plan recognises that the pace of economic activity and development in Ireland has accelerated dramatically over recent years and it is recognised that the achievement of balanced economic growth, in accordance with the principles of sustainable development, is of vital importance in the protection of our heritage. The plan highlights that the challenge to heritage posed by economic activity is significant and will continue to increase. However, the plan also highlights that development

can proceed in a manner that is sensitive to the demands of both our heritage and of economic investment.

The National Heritage Plan states that the impact on heritage of prescribed projects in all sites of national heritage importance should be assessed.

5.2.6 National Biodiversity Plan 2002

The overall objective of the National Biodiversity Plan is to secure the conservation, (including where possible) the enhancement, and sustainable use of biological diversity in Ireland and to contribute to conservation and sustainable use of biodiversity globally.

The National Biodiversity Plan recognises that conservation and enhancement of biological diversity is essential for sustainable development, and for maintaining the quality of human life. All sectors and actors are responsible for advancing the conservation of biological diversity in their respective areas. A key target of the Plan is to halt biodiversity loss by 2010.

The Planning and Development Act 2000 (as amended) provides that Development Plans must have mandatory objectives for the conservation of European and nationally important sites and for the conservation of biodiversity in general.

5.2.7 Sustainable Development – A Strategy for Ireland (1997)

Sustainable Development is defined by the Brundtland Commission as "*development that meets the needs of the present without compromising the ability of future generations to meet their own needs*".

Sustainable development relates to the balance between economic growth and preserving the natural environment. It aims to improve the quality of life through sustained economic growth, while supporting social progress and protecting the environment.

The aim outlined for Ireland in *Sustainable Development – A Strategy for Ireland (1997),* was "*to ensure that economy and society in Ireland can develop to their full potential within a well protected environment, without compromising the quality of that environment and with responsibility towards present and future generations and the wider international community".*

The principal goals and polices defined in the Strategy aim to inform the development and delivery of policies and programmes in the area of environmental protection and sustainable development. The integration of environmental considerations into other policy areas is considered a key means of securing balanced development.

The Strategy states that action will be continued to reduce emissions of Sulphur Dioxide (SO_2) and Nitrogen Oxides (NO_x) from power generation. These actions include fuel substitution, energy conservation and installation of low-NO_x burners.

5.2.8 The Planning System and Flood Risk Management Consultation Draft Guidelines for Planning Authorities

In accordance with the above mentioned guidelines, issued by the Department of Environment Heritage and Local Government, developers are required, at site-specific level to examine their development proposals to determine whether there have been instances of flooding or potential for flooding on specific sites. The Guidelines state that the relevant planning authority should be consulted at an early stage regarding any flood risk assessment issues that may arise. It is also

specified in the Guidelines that a site-specific flood risk assessment, should be carried out, as appropriate, with regard to the minimisation of flood risk.

5.2.9 Towards 2016: Ten Year Framework Social Partnership Agreement 2006 – 2015

"Towards 2016" outlines a number of key objectives for economic and social development in Ireland during the next ten years.

In relation to energy, "Towards 2016" recognises that *"it is imperative for a modern competitive economy to have reliable, secure and competitively priced energy available to it. Long-term actions and decisions regarding the energy sector must also be sustainable from an environmental perspective in order to provide safeguards for future generations."*

Energy policy aims outlined in the paper include security of energy supply, environmental sustainability and economic competitiveness. Key priorities for energy policy identified in "Towards 2016" include:

- The delivery of critical energy infrastructure
- The expansion of the contribution of renewable energy
- The progression of structural changes in the energy sector
- An improvement in energy efficiency and demand management across all sectors to address fuel poverty

5.3 Regional Context

5.3.1 South East Regional Planning Guidelines

The South East Regional Planning Guidelines 2004 (RPG's) have been prepared in accordance with the NSS. It is intended that RPG's will strengthen local authority development plans, addressing issues such as settlement, transportation, industrial development, community facilities and environmental protection.

To support sustainable development and efficient energy utilisation, the RPG'S state that local authorities in the south east region will recognise and support all energy source providers in the development of a suitable network in the south east region capable of sustaining the scale of development proposed for the region.

It is an objective (B10) of the RPG's to support the development and improvement of key economic infrastructure such as energy generation and transmission networks and telecommunications, which are considered essential for the continued development of the region.

The RPG's note that "*the region has significant capacity to provide much of its own energy through expansion of the existing Great Island power station and comprehensive provision of alternative energy sources such as wind".*

5.3.2 Draft Regional Planning Guidelines for the South East Region 2010 - 2022

The South East Regional Authority is currently preparing new Regional Planning Guidelines for the south east region for the period 2010 to 2022. These Guidelines are expected to be published in draft

form in October 2009. It is anticipated that the final version of the Guidelines will be adopted in early 2010.

5.3.3 Draft River Basin Management Plan for the South Eastern River Basin District

The Water Framework Directive (WFD) establishes a legal framework for the protection, improvement and sustainable management of inland surface waters, transitional waters, coastal waters and groundwater. The aim of the WFD is to prevent deterioration in the existing status of waters, including the maintenance of "High Status" where it exists, and to ensure that all waters, with some limited exceptions, achieve at least "Good Status" by 2015. In accordance with the objectives of the WFD eight River Basin Districts (RBDs) have been established on the island of Ireland for the co-ordinated management of water resources through the development and implementation of River Basin Management Plans (RBMPs). The proposed development site is located in the South Eastern River Basin District (SEBD).

The Draft River Basin Management Plan for the SEBD highlights that regional planning guidelines, county development plans and local area land-use and spatial plans should take account of the objectives established for waters in river basin management plans; thereby ensuring that new projects consider the objectives of the WFD.

Chapter 14 (Surface Water) assesses discharges from the proposed development with due regard to the objectives of the WFD and the Draft River Basin Management Plan for the SERBD.

5.4 Local Context

5.4.1 Wexford County Development Plan 2007 - 2013

Wexford County Development Plan 2007 - 2013 sets out Wexford County Council's strategy for the future development of the county over the period of the plan and includes measures for the conservation and improvement of the natural and physical environment and the provision of infrastructure. The Plan aims to accommodate the need to protect the environment with the demand for necessary development to meet the needs and aspirations of the people of *County Wexford. Wexford County Development Plan 2007 - 2013* was prepared in accordance with national and regional policy and takes cognisance of development plans of adjoining Local Authorities.

The NSS designates Wexford town as a hub and the County Development Plan, in its settlement strategy, designates Wexford town as a "Primary Growth Area". The settlement strategy designates Campile, the nearest settlement to Great Island in County Wexford, as a Strategic Growth Area. The plan also highlights that future development in Strategic Growth Areas will utilise and underpin the existing road and rail network.

The County Development Plan makes no specific reference to power generation or power generation sites. However, in terms of economic development, the plan recognises the importance to County Wexford of connecting to the national gas network. It is the intention of Wexford County Council to pursue this as an objective with Bord Gáis and other agencies. Additionally, it is the policy of the development plan to encourage economic development in a sustainable manner in order to create employment opportunities for all sectors of the community.

According to the Landscape Character Assessment for Co. Wexford, the proposed development site at Great Island is located within Policy Area 3 – Coastal – East Coast. Polices for this area include:

- Encourage development that will not have a disproportionate effect on the existing character of the coastal environment in terms of location, design, and visual prominence

- Encourage development that will not interrupt or penetrate distinct linear sections of primary ridge lines and coastlines when viewed from areas of the public realm

- Preserve any areas that have not been subject to recent or prior development and have retained a dominantly undisturbed coastal character

5.4.2 Waterford County Development Plan 2005 - 2011

The proposed development site is located at the confluence of the River Suir and the River Barrow on the shores of Waterford Harbour. The nearest area of settlement is at Cheekpoint, which is located to the south of the confluence in County Waterford. Due to the proximity of the proposed development site to County Waterford, the policies and objectives of *Waterford County Development Plan 2005* were considered.

Waterford County Development Plan is a six-year development Plan for the County that sets out Waterford County Council's planning policy for the county for that period. It is an objective of the development plan to facilitate the provision of infrastructure within the County including transport, energy and communication facilities, water supplies, waste recovery and disposal facilities, waste water services, and ancillary facilities.

5.4.3 Kilkenny County Development Plan 2008 - 2014

The County Kilkenny border is located to the west of the site across the River Barrow. As the proposed development site is located in proximity to County Kilkenny, the policies and objectives of *Kilkenny County Development Plan 2005* were considered.

The *Kilkenny County Development Plan 2008 - 2014* sets out Kilkenny County Council's policies and objectives for the proper planning and sustainable development of the County from 2008 to 2014.

It is the aim of the development plan, through the efficient management of a wide range of engineering services and infrastructure, to provide for the sustainable social and economic development of the county.

In support of sustainable development and efficient energy utilisation, Kilkenny County Council supports the infrastructural renewal and development of electricity networks in the region.

5.4.4 County Waterford Climate Change Strategy 2008 - 2012

The County Waterford Climate Change Strategy emphasises that Local Authorities have significant influence over emissions in their local areas, in relation to reducing emissions through their own energy use and procurement activities, and in raising awareness and stimulating action in local communities.

In terms of energy use, the Strategy states that Waterford County Council will *set targets to reduce energy consumption in buildings and through operation of plants and equipments*. It is also an objective of the Strategy to maximize opportunities for the generation of heat and electricity from renewable energy sources.

6. Scoping and Consultation

6.1 Introduction

Consultation is an important element of the Environmental Impact Assessment (EIA) process. This chapter of the EIS has been prepared in order to record the consultation carried out in respect of the proposed development.

Endesa has carried out extensive consultation in relation to the proposed development with various stakeholders, including members of the public, local residents, businesses, institutions, representative organisations, statutory bodies and bodies with environmental responsibility and interest. A scoping exercise was undertaken in order to encourage stakeholder input to the EIA process. The objective of consultation is to ensure that the views and concerns of all stakeholders are taken into account in the EIA process.

This chapter outlines the consultation initiatives undertaken by Endesa and the design team prior to the application to An Bord Pleanála and the main issues identified during this process. Public participation will continue right through the planning process and for the life of the project.

6.2 Preliminary Consultation

The EIS scoping exercise represented the beginning of the environmental assessment for the conceptual design. The purpose of the scoping exercise was to establish the scope and methodology for the EIS and to provide the public, relevant bodies with environmental responsibility and other interested parties with information on the proposed development and to invite their input to the EIA process.

Where the potential for significant effects was identified, detailed consultation with key stakeholders was undertaken. Consultations progressed in line with the developing project design and iterative environmental impact assessment process.

Consultation with a number of key stakeholders took place in 2009 under the direction of Endesa and the project team in order to ensure that the concerns of stakeholders were considered and addressed during the design process. Consultations were carried out by means of written correspondences, meetings, open days and telephone conversations.

6.3 EIS Scoping Consultation

In July 2009, a scoping report outlining the proposed approach to the EIA was prepared to facilitate consultation with statutory consultees regarding the scope of the EIS. The following parties were sent copies of the scoping reports, invite letters (inviting parties to request copies of the scoping report and to comment on the proposal) or information letters (notifying parties of the proposal and inviting them to request further information and to submit comments):

Local Authorities

- Waterford City Council
- Waterford County Council
- Wexford County Council
- Kilkenny County Council

Government Departments

- Department of Communications, Energy and Natural Resources
- Department of Justice, Equality and Law Reform
- Department of Environment, Heritage and Local Government
- Department of Enterprise, Trade and Employment
- Department of Transport
- Department of Agriculture, Fisheries and Food
- Department of Community, Rural and Gaeltacht Affairs
- Department of Arts, Sport and Tourism

Regional Authorities

- Health Service Executive - South (Kilkenny, Waterford, Wexford)
- South East Regional Authority
- Eastern Regional Fisheries Board
- Southern Regional Fisheries Board

State / Semi-State Organisations

- An Bord Pleanála
- Health Services Executive Headquarters
- Environmental Protection Agency
- Commission for Energy Regulation
- National Roads Authority
- Office of Public Works
- National Parks and Wildlife Service

- Geological Survey of Ireland
- Fáilte Ireland
- Health and Safety Authority
- Heritage Council
- Irish Aviation Authority
- Sea Fisheries Protection Authority Head Quarters
- Sea Fisheries Protection Authority Waterford Office
- An Garda Síochána
- Bord Iascaigh Mhara
- Central Fisheries Board
- Marine Institute
- Teagasc
- Sustainable Energy Ireland
- Iarnród Éireann
- Comhar Sustainable Development Council

National Special Interest Groups

- An Taisce
- ENFO
- Badgerwatch Ireland
- Birdwatch Ireland
- Bat Conservation Ireland
- Irish Farmers Association
- National Museum of Ireland
- Radiological Protection Institute of Ireland
- Irish Whale and Dolphin Group
- Irish Wildlife Trust

Companies

- Bord Gáis Éireann
- Eircom
- Electricity Supply Board (ESB)
- Waterford Airport
- Port of Waterford

Endesa and / or the project team met with the following stakeholders prior to submission of the planning application.

Table 6.1: Stakeholder Consultation Meetings

Stakeholder
Cheekpoint Community Alliance
Waterford County Council
Wexford County Council
Kilkenny County Council
Health Service Executive
Southern Regional Fisheries Board
An Bord Pleanála
Environmental Protection Agency
Commission for Energy Regulation
National Parks and Wildlife Service
Health and Safety Authority
Iarnród Éireann
An Taisce
Irish Farmers Association
Bord Gáis Éireann
Electricity Supply Board (ESB)
Port of Waterford

6.4 Public Consultation

Two public open days were held in order to inform the local population of the proposed development and invite comments. The open days were held on 7th September 2009 in the Reading Room at Cheekpoint and on the 8th September 2009 in Horeswood GAA Club.

Invitations to the open days were issued to members of the public by means of newspaper advertisements as detailed below:

- Munster Express, advertised on 4th September 2009
- Waterford News and Star, advertised on 3rd September 2009
- New Ross Echo, advertised on 2nd September 2009

- New Ross Standard, advertised on 2nd September 2009

Preliminary site layout drawings and photomontages of the proposed development were on display during the open days with members of Endesa, ERM and Mott MacDonald Ireland project management teams on hand to answer queries. The open days were well attended by local residents and representatives. While the majority of attendees expressed support for the proposal there were some concerns with regards to visual impacts, noise and vibration, air emissions and traffic. Attendees also expressed interest in the details regarding the route of the gas pipeline and the number of jobs that the project would create. A copy of the brochure presented at the public consultation is presented in Appendix 6.1 (Public Consultation Brochure).

6.5 Findings of the Consultation Process

Written responses to the scoping exercise are provided in Appendix 6.2 (Responses to Scoping Consultation). A summary of the concerns raised to date during stakeholder consultation is provided in Appendix 6.3 (Summary of Responses).

6.6 Post Application Public Consultation

This EIS accompanies a Strategic Infrastructure planning application for the proposed development.

The planning application and the EIS for the proposed development may be inspected free of charge or purchased on payment of a specified fee by the public at the following locations:

- The Offices of An Bord Pleanála, 64 Marlborough Street, Dublin 1
- The Offices of Wexford County Council, County Hall. Spawell Road, Wexford

The full application may also be viewed / downloaded on the following website:

www.greatislandpowerproject.com

Submissions or observations may be made only to An Bord Pleanála at 64 Marlborough Street, Dublin 1 within a specified timeframe, of not less than six weeks.

A prescribed number of copies of the planning application and EIS must also be submitted to the prescribed authorities.

An Bord Pleanála may, at its discretion, hold a public oral hearing in relation to this planning application. As well as writing to An Bord Pleanála as outlined above, members of the public can attend the oral hearing and those who have made a submission may express their views to the An Bord Pleanála inspector.

7. EIA Methodology

7.1 Introduction

This EIS sets out the findings of an Environmental Impact Assessment (EIA) of the likely significant effects associated with the construction and operation of the proposed power plant at Great Island.

7.2 Methodology and Approach

7.2.1 EIA Methodology

7.2.1.1 Overview

This section sets out the framework principles of the methodology that has been applied during the EIA process. The framework methodology that is used is broadly consistent across all chapters and has been adopted and adhered to as much as possible, in order to ensure that the assessment methodology is transparent and can be effectively communicated to, and understood by all stakeholders including the general public.

The general principles set out in this section have been developed to a greater level of detail by each of the environmental specialists. For this reason, more detailed, topic-specific methodologies are outlined in relevant chapters of this EIS.

The framework methodology used in this EIS comprises the following steps:

- Definition of the study area
- Date collection, baseline description and evaluation
- Identification of potential environmental impacts
- Definition of mitigation measures to minimise potential impacts
- Description and evaluation of the residual impacts once the mitigation measures have been implemented

This EIS has been prepared in accordance with the following EPA documents:

- *Guidelines on the Information to be contained in Environmental Impact Statements*, EPA (2002)
- *Advice Notes on Current Practice in the preparation of Environmental Impact Statements*, EPA (2003)

7.2.1.2 Scoping

The scoping stage of any EIA process is carried out on an ongoing basis to identify significant environmental issues to be examined as part of the EIA. The scope of the EIA is determined in

consideration of any legal requirements and the findings of any consultation undertaken. The consultation that has been carried out for this project and key findings in this regard are described in detail in Chapter 6 (Scoping and Consultation). Key legislative requirements relevant to the proposed development are described in Chapter 4 (Legislation).

With respect to the temporal scope of the EIA, the construction phase of the project is anticipated to commence in late 2010 and last for approximately 30 months. Construction impacts, including mechanical and electrical works and commissioning, are therefore assumed to occur during this period. It is anticipated that the CCGT plant will be commissioned in late 2012. Therefore, for the purpose of this EIS, the potential for impacts to occur during the operation of the development is assessed from 2012.

7.2.1.3 Defining the Study Area

A 'study area' has been defined, as appropriate, for each environmental topic. The defined study area encompasses all locations that may potentially be impacted upon by the proposed development. Impacts may occur during the construction phase or the operational phase and may be temporary or permanent, positive or negative.

For a development such as that proposed at Great Island the study area typically encompasses an area of between 100 and 500 metres around the proposed development. Depending on the local situation these dimensions may be increased (e.g. for long range impacts such as traffic, which may spread along a transport network and / or impacts on landscape views or atmospheric emissions). The extent of the study area may also be restricted to the immediate development area for example archaeological features will typically only be affected if they are in direct proximity to the proposed development.

7.2.1.4 Data Collection, Baseline Description and Evaluation

The data collection requirements for each environmental topic have been determined by the technical specialists and are driven by relevant legislation, guidelines and policy requirements.

Desktop reviews of existing information have been undertaken for each discipline, these desktop reviews have been supplemented by specialised field studies and consultation with interested parties, statutory bodies and local authorities, as deemed necessary.

Where appropriate, the baseline is evaluated to identify features of specific importance or sensitivity. This evaluation is undertaken by means of qualitative and / or quantitative criteria relating to the importance and sensitivity of the environment. A feature of the environment is deemed to be of importance if it performs a function that supports a specific environmental objective of the area. These objectives may be derived from legislation, policy documents or, in cases where legislation and policy are insufficient, guidelines or professional judgements.

The means by which this evaluation is carried out is explained for each environmental topic.

7.2.1.5 Identification of Potential Environmental Impacts

Each individual expert has identified potential impacts based on an assessment of the proposed development and their technical experience and expertise. Consultation with stakeholders, interested parties and the public has also been carried out on an ongoing basis to help identify potential issues. A summary of the activities carried out is provided in Chapter 6 (Scoping and Consultation). The source and type of potential impacts is clearly identified for each individual environmental topic in the relevant chapters of the EIS.

The proposed development has the potential to impact on the environment during both the construction and operational phases and the assessment of impacts has been differentiated accordingly. Construction impacts can be temporary or permanent nature while operational impacts are likely to be permanent.

The EIA must identify, describe and assess potential direct and indirect impacts on all environmental topics as outlined under Article 3 of the EIA Directive (Directive 85/337/EEC, as amended). Furthermore, an EIA must identify, describe and assess the potential for impacts on any one environmental topic to have an effect on other environmental topics due to interaction between the two topics. The potential for many small impacts (from one or more projects) to have a cumulative impact on the environment must also be considered. These types of impacts are known as interactions and cumulative impacts, additional detail in this regard is provided in Chapter 18 (Interactions of the Foregoing).

In accordance with best EIA practice, the assessment of impacts is conservative, considering "a reasonable worst case where there is any degree of uncertainty." The EIA therefore constitutes a robust and transparent assessment of the "*likely significant environmental effects"* associated with the "*reasonable worst case scenario"*.

7.2.1.6 Mitigation Measures

Certain potential negative environmental impacts associated with a power plant development have been mitigated against during the design process, which has been undertaken in accordance with *Reference Document on Best Available Techniques for Large Combustion Plants, (adopted July 2006)*.

In a number of cases, impacts of the proposed development could not be completely mitigated during the project design. Where impacts cannot be avoided mitigation measures are provided in the individual chapters of the EIS, as appropriate.

The mitigation measures provided will be incorporated into management plans which will be developed in consultation with the local authority and appropriate stakeholders. The plans will be implemented during the detailed design and construction phases of the development and will include a Construction Environmental Management Plan (CEMP), a Traffic Management Plan and a Construction and Demolition Waste Management Plan (C&D WMP). The plans will be subject to regular reviews and amendments as required with due regard to changing legislation and guidance.

7.2.1.7 Residual Impacts

Any likely significant impacts that continue to exist when the mitigation measures have been put in place are assessed for each individual environmental topic. These residual impacts are identified and the relevant ones are described in detail and assessed (where appropriate) in terms of a combination of Magnitude and Significance (as defined hereunder). For certain quantifiable impacts, such as noise and air quality, predicting magnitude at a receptor and comparing it with accepted standards is sufficient to determine significance.

Magnitude

The magnitude of the impact takes into account the quality, type and range of impact that will occur as well as the duration over which the impact will occur. Criteria are defined for each individual environmental topic and are used to evaluate the magnitude of impacts as set out in the relevant chapters of this EIS. These criteria take into account Irish legislation, international standards, accepted technical and / or good practice guidelines and the results of the scoping process.

Quantitative criteria are used in cases where this is possible. Qualitative criteria are assessed where non-quantifiable impacts are identified.

Significance

The significance of the impacts is defined by evaluating the magnitude of the impact relative to the importance and sensitivity of the affected area. The assessment of significance is carried out by the environmental specialist in light of their specialist experience and expertise.

7.2.2 Difficulties Encountered

No significant difficulties have been encountered in the course of this EIA that could not be addressed by taking a precautionary approach.

8. Human Beings - Land Use

8.1 Introduction

An environmental impact statement (EIS) must contain a description of the aspects of the environment that are likely to be significantly affected by the proposed development. This chapter of the EIS has been prepared in order to help fulfil this requirement with respect to Human Beings - Land Use.

The proposed development has the potential to impact on human beings in many ways. The impacts of the proposed development on human beings from traffic, noise and vibration, air quality and visual impacts are discussed in detail in Chapter 10 (Traffic), Chapter 11 (Human Beings - Noise and Vibration), Chapter 15 (Air Quality and Climate) and Chapter 16 (Landscape and Visual) respectively. Socio-economic impacts are considered in Chapter 9 (Human Beings - Socio-economics).

8.2 Methodology

8.2.1 Guidance Used

In order to provide the background for the assessment of the impacts of the proposed development on land use, a desk based study was undertaken to assess information regarding zoning, tourism, amenities and recreation and community facilities within the vicinity of the proposed development site. The aim of the study was to assess the positive and negative impacts of the proposed development on land use. Publications and other data sources that guided the preparation of this chapter are listed hereunder:

- Wexford County Council; Wexford County Development Plan 2007 – 2013; April 2007
- Waterford County Council; Waterford County Development Plan 2005-2011, July 2005
- Kilkenny County Council; Kilkenny County Development Plan 2008 – 2014; June 2008
- Fáilte Ireland Tourism Facts; Regions South East 2007, September 2008
- Fáilte Ireland Tourism Facts; Regions South East 2006, July 2007
- Fáilte Ireland Tourism Facts; Regions South East 2005, August 2006

8.2.2 Study Area

The study area for this assessment encompasses a 1 kilometre radius around the proposed development site.

8.2.3 Baseline Assessment Criteria

The baseline evaluation included:

- A desktop study of existing available information

- A review of planning applications in proximity to the site
- A field survey to identify current land use and sensitive receptors

The functional value of the study area is determined with reference to the importance and sensitivity of the area. Tourist facilities and sites are important because they define and add value to the character of an area. Recreational land uses are also important and include areas zoned as 'open space' and / or 'recreational amenity' areas. Community facilities such as schools, hospitals and churches contribute to the community, educational, health and social quality of life. The quality of the residential environment is perhaps the most important determinant to people's overall quality of life. Business and commercial activities are also important aspects of the local economy as they provide goods, services, and jobs to the local population.

Land use sensitivity can be described as the degree to which a land use can accept change of a particular type and scale without adversely impacting on its functionality. Residential properties in proximity to the site would be considered to be highly sensitive to change. In addition, tourist and recreational facilities and community facilities (schools, churches and hospitals) are also considered to be very sensitive to change.

Table 8.1 hereunder outlines the criteria used for evaluating the baseline land use, within the study area.

Table 8.1: Criteria for Baseline Evaluation of Landuse

Criteria	Importance/ Sensitivity
Tourist, amenity and / or recreational sites within 1 km of the proposed development site Community facilities such as schools, hospitals and / or churches within 1 km of the proposed development site Businesses / commercial premises / enterprises within 1 km of the proposed development site Planning permission granted for developments within 1 km of the proposed development site	High
Tourist, amenity and / or recreational sites within 2 km of the proposed development site Community facilities such as schools, hospitals and / or churches within 2 km of the proposed development site Residential properties within 1 km of the proposed development site Businesses / commercial premises / enterprises within 2 km of the proposed development site	Medium
Tourist, amenity and / or recreational sites are located further than 2 km from the proposed development Community facilities such as schools, hospitals and / or churches are located further than 2 km from the proposed development site No residential properties within 2 km of the proposed development site No businesses / commercial premises / enterprises within 2 km of the proposed development site	Low

8.2.4 Impact Assessment Criteria

The source and type of all impacts is set out in Section 8.4 (Identification of Potential Impacts). The mitigation measures that are defined for any potentially significant impacts are set out in Section 8.5 (Mitigation Measures). Any likely residual impacts are evaluated in terms of magnitude and significance in Section 8.6 (Residual Impacts).

Magnitude

The magnitude of an impact is assessed in consideration of its intensity, and its extent in space and time. The criteria used to assess the magnitude of the developments impacts on land use are presented in Table 8.2.

Table 8.2: Criteria for Assessment of Impact Magnitude

Criteria	Impact Magnitude
Irreversible and significant impacts on tourist, amenity and / or recreational sites in the area Severance / separation of communities and / or residents in the area from services and facilities Long-term loss of income and livelihood in the area due to changes in land use (>5 years) Long-term road closures (>5 years)	High
Short-term impacts on tourist, amenity and / or recreational sites in the area (1 - 5 years) Short-term severance / separation of communities and / or residents in the area from services and facilities (1 - 5 years) Short-term loss of income and livelihood in the area due to changes in land use (1 - 5 years) Short-term closure of roads during construction and long-term severance of access to local and regional roads (1- 5 years)	Medium
Limited impacts on tourist, amenity and / or recreational sites in the area No severance / separation of communities and / or residents in the area from services and facilities Minimal loss of productivity due to changes in land use Temporary and short-term disruption to traffic on some roads during construction (1 - 5 years)	Low

Significance

The significance of all impacts is assessed in consideration of the magnitude of the impact and the importance / sensitivity of the affected area.

Impact significance is described as being *Not significant,* of *Low* significance, of *Medium* significance, or of *High* significance.

8.3 Baseline Description and Evaluation

8.3.1 Land Use and Zoning

8.3.1.1 Land Use

The proposed development site is an existing power generating plant located in the townland of Great Island, Co. Wexford. The development site is 'Brownfield' in nature i.e. has been subjected to development previously and is not undisturbed natural environment. Great Island power plant occupies an area of approximately 58 hectares (143 acres). The proposed development site will occupy approximately 8 hectares (19 acres) of the existing site, i.e. 14%.

The site is located at the confluence of the River Suir and River Barrow, on the shores of Waterford Harbour. The nearest area of settlement is Cheekpoint on the opposite side of the estuary, in Co. Waterford, approximately 700 metres from the proposed development site. In Co. Wexford, the nearest significant area of settlement is Campile, located approximately 3.75 kilometres to the east. A number of one-off houses are located in proximity to the site boundary, the nearest occupied dwelling is located approximately 450 metres to the northwest of the actual development site.

Access to the site is gained via a local road, the L8072, which connects the site to the R733, a regional road located approximately 5 kilometres to the east of the development site. The R733 connects with the national N25 road, approximately 11 kilometres to the north east.

Agricultural lands are located to the north and to the east of the site. The Waterford to Wexford railway line runs under the site access road immediately north of Great Island power plant. The site is located at the confluence of the River Suir and River Barrow, on the shores of Waterford Harbour. The Barrow River Estuary is a proposed Natural Heritage Area. The River Barrow, River Nore and Lower River Suir are designated Special Areas of Conservation. Refer to Chapter 12 (Flora and Fauna).

8.3.1.2 Zoning

Wexford County Development Plan 2007 - 2013 states that there will be a presumption in favour of industrial and commercial development located in or adjacent to settlements where infrastructure has been provided and in line with the principle of sustainable development.

In addition, Policy L1 of the development plan states that *"in assessing developments the Council will have regard to the guidance contained in the Landscape Character Assessment. Proposed developments should reflect the guidance contained in the Landscape Character Assessment and seek to minimise the visual impact, particularly in areas designated as Sensitive and Vulnerable Landscapes."*

According to the Landscape Character Assessment for Co. Wexford, the proposed development site at Great Island is located within Policy Area 3 – Coastal – East Coast. Polices for this area include:

- Encourage development that will not have a disproportionate effect on the existing character of the coastal environment in terms of location, design, and visual prominence
- Encourage development that will not interrupt or penetrate distinct linear sections of primary ridge lines and coastlines when viewed from areas of the public realm
- Preserve any areas that have not been subject to recent or prior development and have retained a dominantly undisturbed coastal character

The proposed development site is also located in proximity to Policy Area 2 – Lowlands – Barrow River Corridor. In this policy area, Wexford County Council will continue to permit development that can utilise existing infrastructure, while taking account of absorption opportunities provided by the landscape and prevailing vegetation. However, the Council will only encourage development that will not have a disproportionate effect on the existing character of the landscape in terms of location, design, and visual prominence.

Waterford County Development Plan 2005 - 2011 designates the banks of the River Barrow as visually vulnerable. Waterford County Council specifies that development in the environs of these vulnerable areas must be shown not to impinge in any significant way upon its character, integrity or uniformity when viewed from the surroundings.

The proposed development site is located in proximity to an "Area of High Amenity" designated by *Kilkenny County Development Plan 2008 - 2014*. A high standard of design and siting is expected for all development in Areas of High Amenity. The development plan states that in conserving views, development, where permitted, should not seriously hinder or obstruct these views and should be designed and located to minimise their impact. The proposed development site has views onto the Suir Valley Landscape Character Area, as designated by the Landscape Character Appraisal for County Kilkenny. The landscape appraisal highlights the importance of avoiding visual intrusion by development in this area, which could interrupt and reduce the integrity of the river valley.

The proposed development is consistent with the established use of the Great Island site.

8.3.2 Tourism, Amenities and Recreation

The tourism industry is one of the primary sectors within the economy of County Wexford. The County is known for its considerable unspoilt coast line, countryside, natural and built environment and its reputation as the 'Sunny South East'. Tourist attractions in County Wexford include its beaches, its many walking routes, the coastal path and numerous heritage sites and historical monuments. Recreation and tourist activities which take place in Wexford include golf, walking, swimming, sailing, nature watching, horse riding, boating and fishing. The River Suir, River Barrow and Waterford Harbour also provide opportunities for additional recreational usage.

Table 8.3 illustrates that the number of tourists visiting the county increased significantly in 2007, following a decline in tourist numbers in 2006. However, there was a decrease in revenue generated from the tourist industry in 2007, despite the increase in tourist numbers, as illustrated in Table 8.4.

Tourism facts were not available for County Wexford for 2008 or 2009.

Table 8.3: Overseas Tourism to Wexford

Overseas Tourists	Total	Britain	M. Europe	N. America	Other Areas
2007	243,000	143,000	59,000	27,000	14,000
2006	215,000	116,000	53,000	30,000	16,000
2005	217,000	127,000	53,000	24,000	13,000

Table 8.4: Revenue Generated by Overseas Tourists to Wexford

Revenue Generated (millions)	Total	Britain	M. Europe	N. America	Other Areas
2007	64	40	16	6	2
2006	67	39	19	7	2
2005	63	37	17	5	4

There are no tourist attractions in the immediate vicinity of the proposed development site. However, there are numerous attractions in the surrounding area including Duncannon Fort located approximately 14 kilometres from the development site, Ballyhack Castle located approximately 10 kilometres from the site, Dunbrody Abbey, the JFK Dunbrody Famine Ship and the JFK Arboretum located approximately 5.2 kilometres from the site and Tintern Abbey located approximately 18 kilometres from the site.

The proposed development site is also located in proximity to a number of larger settlements, including Waterford City and New Ross, located approximately 23 kilometres and 16 kilometres from the development site respectively. These settlements have an important role within a tourism context by supporting and sustaining tourism services.

8.3.3 Community Facilities

There are no schools, hospitals or churches located within a 1 kilometre radius of the development site. However, a school and GAA club are located approximately 5 kilometres to the north east of the site. A health centre is located in Campile.

8.3.4 Businesses in the Area

As the area is generally rural in character, the predominant businesses in the area relate to agriculture. The area immediately surrounding the proposed site is pasture land. The closest settlements to the proposed development site are Cheekpoint and Campile which provide services to the local population.

8.3.5 Planning Applications

A planning search was undertaken of all planning applications in County Wexford, County Kilkenny and County Waterford within 1 kilometre of the proposed development site between 2004 and 2009 and these are presented in Table 8.5.

Table 8.5: Planning Applications

Application Number	Name	Description	Decision
Wexford			
20070736	Patrick O'Connor	Erection of 2 dwelling houses and garages at Great Island, Kilmokea	Granted April 2007
20060590	Michael Murphy	Agricultural Entrance	Granted November 2006
20053873	ESB	Erect a new tower under the existing Great Island Waterford 110 KV line	Granted March 2006
20043664	Margaret Fitzpatrick	Dwelling house	Granted January 2005
Waterford			
08/505	William & Nancy Doherty	First floor bedroom extension	Granted August 2008
07/541	Michael O' Brien	Retention of existing granny flat and existing sewage treatment system	Granted May 2007
07/1155	Bernard & Kathleen Cunningham	Construction of a single storey extension	Granted October 2007
06/1151	Ben & Marie Power	Construction of two storey extension	Granted October 2006
06/1622	Bridget & Alan Clifford	Retain and to complete a split level extension	Granted January 2007
05/470	Patrick Murphy	Extension to existing dwelling	Granted May 2005
04/349	Andrew Doherty	Extension to existing dwelling	Granted May 2004
04/922	Edward Quann	To construct a dormer extension	Granted September 2004
04/1366	Aidan McAlpin	Erection of a single storey store	Granted November 2004
04/1501	Joseph P. Power	Erect a dormer dwelling	Granted May 2005

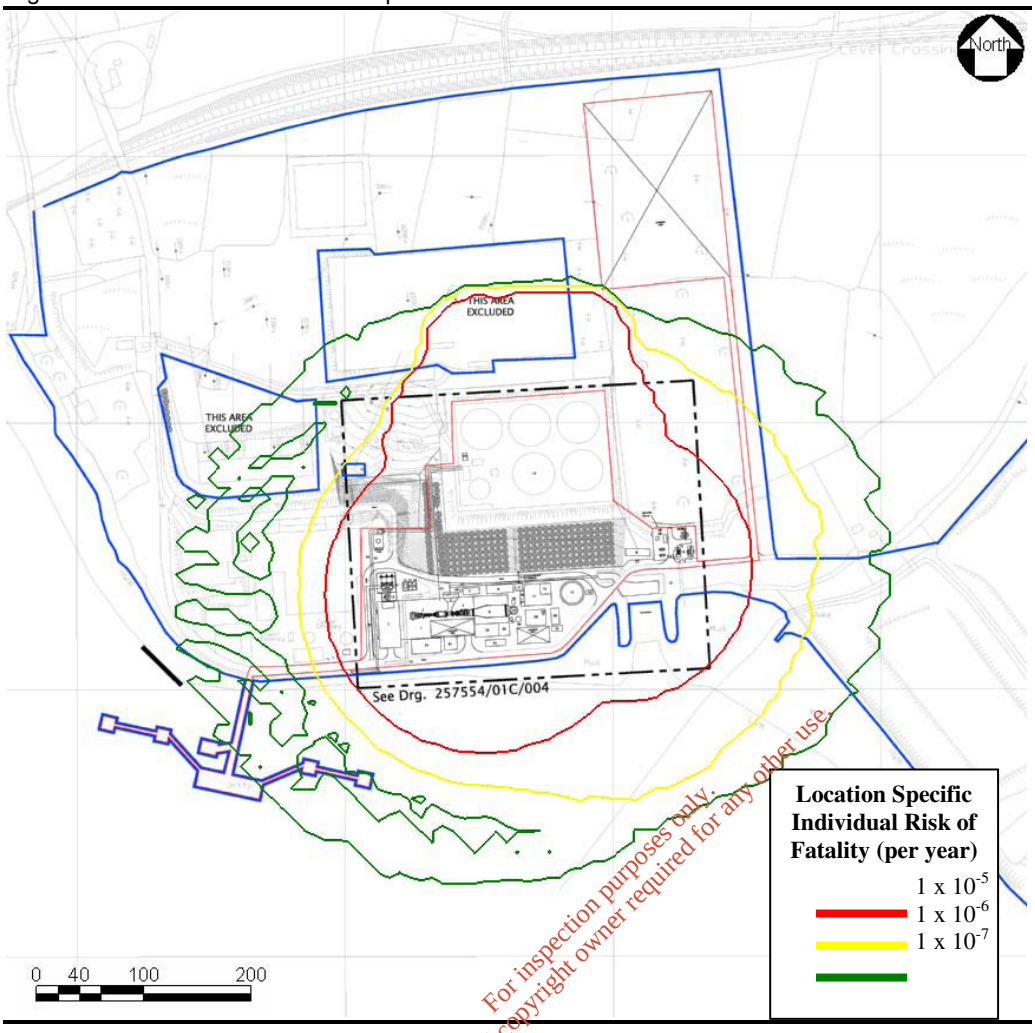
Source: Wexford County Council (www.wexford.ie), Waterford County Council (www.waterfordcoco.ie)

In addition, it is understood that Port of Waterford was granted an extension to planning permission for the construction of a new 6 Hectare quayside extension of the port (reference P.683/94, An Bord Pleanála reference 10/096935).

8.3.6 Land Use Planning

In accordance with HSA document *Policy and Approach of the Health and Safety Authority to COMAH Risk-based Land Use Planning, 2009* a Quantitative Risk Assessment and Land Use Planning assessment has been undertaken, Refer to Appendix 3.3. The results of that assessment show that there will be no impacts that will give rise to any need for restrictions or rezoning of the adjacent and local lands outside the ownership boundary of Endesa. The risk contours associated with the proposed development are presented in Figure 8.1.

Figure 8.1 Risk Contours for People Outdoors



8.3.7 Baseline Evaluation

The land uses within the study area have been evaluated in consideration of the factors detailed above and the criteria detailed in Table 8.1: Criteria for Baseline Evaluation of Landuse.

There are no schools, hospitals or churches located within 1 kilometre of the site. However, a school and a GAA pitch are located approximately 5 kilometres from the proposed development site. A number of residential houses are located in Cheekpoint which is located less than 1 kilometre from the proposed development site, on the opposite side of the estuary. A number of one-off houses and the Waterford to Wexford railway line are also located in proximity to the site boundary.

The development of the proposed power plant is located entirely within the confines of a Brownfield site and is consistent with current activities on the site. Therefore, the activities associated with the operation of the new power plant will not change significantly from those associated with existing operations.

Considering that there are a number of residential properties and a railway line located within 1 kilometre of the site and a number of planning applications have been granted within the same area, the baseline evaluation of land uses in the surrounding area has been classified as medium. The baseline evaluation of the proposed development site has been classified as low with due regard to the existing land use within the site boundary.

8.4 Identification of Potential Impacts

8.4.1 Construction Phase

It is proposed to construct the power plant within the confines of the existing site. It is anticipated that the construction phase will extend for 30 months and will commence in late 2010.

Construction activities can cause a nuisance to the local community and result in disruption. However, the impacts, outlined below, will be temporary in nature and will cease on completion of works:

- Increased traffic and HGV movements during the construction phase will have a negative short-term impact on the local community, primarily due to potential traffic disruption on local roads. Impacts on local landowners in the area, such as impacts on cattle movements, may result in some temporary and short-term negative impacts on these operations. A temporary parking bay will be provided, limiting Heavy Goods Vehicle (HGV) movements, adjacent to the local access road. However, it is not considered that the development will impact on the existing land uses of the surrounding areas in general. No impacts on the railway line, which runs under the site access road, are predicted. A new road surface is also proposed which will result in an improvement to the structural strength of the existing access road.

- A construction compound, including portacabins, welfare facilities and construction plant laydown areas, will be provided within the confines of the existing power plant facility. Abnormal loads will access the site via a jetty located within the confines of the existing facility. It is not anticipated that there will be any impacts on land-use in the surrounding area, outside the confines of the existing power plant.

8.4.2 Operational Phase

The area of land proposed for the development has been selected to take into consideration the following criteria:

- To minimise the routing of the 220 kV cables to the existing 220 kV substation
- To minimise the routing of the cooling water intake and discharge pipework
- To minimise the requirement for access roads
- To allow for ease of construction and access to the proposed laydown area
- To minimise the length required for the supply of gas pipework to the AGI station
- To mitigate against overhead lines and development of Greenfield sites
- To maximise the use of existing services e.g. effluent discharge, surface water drains
- To maximise the use of existing buildings and structures e.g. cooling water pump house and associated culverts
- To provide suitable access for future maintenance and removal of plant and equipment

As such, the land take requirement has been optimised as far as is practicable for a facility of the scale proposed. The construction of the proposed power plant is located entirely within the confines of a Brownfield site and is consistent with current activities on the site i.e. the activities associated with

the operation of the new power plant will not change significantly from those associated with existing land use.

8.5 Mitigation Measures

8.5.1 Construction Phase

It is proposed to utilise an area of land along the local access road, in proximity to the Regional R733 road, as a parking bay for HGV access during the construction phase of the proposed development. HGV traffic will be controlled thereby limiting disruption to traffic accessing the local road. Refer to Chapter 10 (Traffic).

The land take requirement for the parking bay and the construction laydown area has been minimised, as far as is reasonably practicable, and the land will be returned as close as possible to its original condition on cessation of construction phase activities.

A Traffic Management Plan will be developed as part of the Construction Environmental Management Plan (CEMP), in consultation with local landowners to ensure disruption to landowners is minimised as far as practicable.

8.5.2 Operational Phase

No mitigation measures are considered necessary during the operational phase as the development of the facility is located entirely within a Brownfield site and is consistent with current activities on the site.

8.6 Residual Impacts

Residual impacts are those that could arise as a result of the construction and operation of the development once the proposed mitigation measures are in place.

8.6.1 Construction Phase

The residual impact on land use associated with temporary land take and traffic movements associated with the construction phase of the proposed development, once mitigation measures are implemented, are considered to be of overall low significance.

8.6.2 Operational Phase

The proposal will result in a permanent noticeable development within the confines of the existing generating plant. However, as the development is consistent with current land use activities the impact is not considered to be significant for the purposes of assessing land use. There will be no permanent impact on land use on lands outside the ownership of Endesa during the operational phase. The impact on these lands is therefore not considered to be significant.

8.7 Summary Conclusion

A desk-based assessment of the impacts on land use was undertaken to assess information relating to zoning, tourism, amenities and recreation and community facilities within the vicinity of the proposed development site.

There are no schools, hospitals or churches located within 1 kilometre of the site. However, a school and a GAA pitch are located approximately 5 kilometres from the proposed development site. A number of residential houses are located in Cheekpoint which is located less than 1 kilometre from the

site, on the opposite side of the estuary. A number of one-off houses and a railway line are located in proximity to the site boundary. Also, a number of planning applications have been granted permission in proximity to the site. The construction of the proposed power plant is located entirely within the confines of a Brownfield site and is consistent with current activities on the site i.e. the activities associated with the operation of the proposed power plant will not change significantly from those associated with existing land use.

Increased traffic and HGV movements during the construction phase will have a negative short-term impact on the local community, primarily due to potential traffic disruption on local roads. Impacts on local landowners in the area, such as impacts on cattle movements, may result in some temporary and short-term negative impacts on these operations. A temporary parking bay will be provided, limiting Heavy Goods Vehicle (HGV) movements, adjacent to the local access road. A detailed Traffic Management Plan will be developed as part of the Construction Environmental Management Plan (CEMP), in consultation with local landowners to ensure disruption to landowners is minimised as far as practicable.

9. Human Beings – Socio-economics

9.1 Introduction

An Environmental Impact Statement (EIS) must contain a description of the aspects of the environment that are likely to be significantly affected by the proposed development. This chapter of the EIS has been prepared in order to help fulfil this requirement with respect to Human Beings - Socio-economics. The potential impacts on the socio-economic environment during the construction phase and operational phase have been assessed.

The proposed development has the potential to impact on human beings in many ways. The impacts of the proposed development on human beings from traffic, noise and vibration, air quality and visual impacts are discussed in detail in Chapter 10 (Traffic), Chapter 11 (Human Beings – Noise and Vibration), Chapter 15 (Air Quality and Climate) and Chapter 16 (Landscape and Visual) respectively. Impacts associated with land use are considered in Chapter 8 (Human Beings – Land Use).

9.2 Methodology

9.2.1 Guidance Used

In order to provide the background for the assessment of the impact of the proposed development on human beings, the socio-economic context was reviewed. A desk based study was undertaken to assess information relating to population, age structure, economic activity, employment and unemployment within the vicinity of the proposed development site. The aim of the study was to assess the positive and negative impacts of the proposed development on the socio-economic environment. Publications and other data sources that guided the preparation of this chapter are listed hereunder:

- Wexford County Council; *Wexford County Development Plan 2007 – 2013*; April 2007;
- Central Statistics Office (www.cso.ie); *Census 2006, Volume 1 Population Classified by Area,* April 2007;
- Central Statistics Office (www.cso.ie); *Census 2002, Volume 1 Population Classified by Area,* July 2003;
- Central Statistics Office (www.cso.ie); *Census 2006, Volume 4 Usual Residence, Migration, Birthplaces and Nationalities*, July 2007; and
- Central Statistics Office (www.cso.ie); *Census 2006, Volume 3, Household Composition, Family Units and Fertility,* May 2007.

9.2.2 Study Area

The study area is defined by the Electoral Division(s), EDs, in which the proposed development site is located. An ED is the smallest administrative area for which population statistics are published by the Central Statistics Office (CSO). Census data for the wider area, including counties Wexford, Kilkenny and Waterford were also considered.

9.2.3 Baseline Assessment Criteria

The EPA's *Guidelines on the Information to be contained in Environmental Impact Statements* (2002), states that economic activity, social patterns and employment should be assessed in the Environmental Impact Assessment (EIA) under the heading of "Human Beings".

The baseline data used to compile this chapter is taken from the most recent Census in 2006. This census includes the following data:

- Demographic data
- Age profile data
- Economic and employment data

Baseline socio-economic data is assessed in this chapter so as to describe the socio-economic context of the study area.

In the context of socio-economics, it is considered appropriate to assign an overall "functional value" of high to the study area for the purposes of categorising the baseline evaluation.

9.2.4 Impact Assessment Criteria

The source and type of all impacts is set out in Section 9.4 (Identification of Potential Impacts). The mitigation measures that are defined for any potentially significant impacts are set out in Section 9.5 (Mitigation Measures). Any likely residual impacts are evaluated in terms of magnitude and significance in Section 9.6 (Residual Impacts).

Magnitude

The magnitude of an impact is assessed in consideration of its intensity and its extent in space and time. The criteria used to assess the magnitude of the developments impacts on socio-economics are presented in Table 9.1.

Table 9.1: Criteria for Assessment of Impacts Magnitude

Criteria	Impact Magnitude
Impact is of long-term or permanent duration (>5 years) Impact on socio-economics has a clearly noticeable and significant impact on environmental functionality The affected area has limited or no potential to recover	High
Impact is of medium-term duration (1-5 years) Impact on socio-economics has a moderate and noticeable impact on environmental functionality The affected area has the potential to recover Socio-economics are moderately affected and alternative resources performing similar functions are not available in the area	Medium
Impact is of temporary (weeks) or short-term (months) duration Impact has only slight or no noticeable consequences for the environmental functionality Socio-economics in the area have the potential to recover A small or insignificant effect on socio-economics or alternative resources performing similar functions are available in the area	Low

Significance

The significance of all impacts is assessed in consideration of the magnitude of the impact and the importance / sensitivity of the affected area.

Impact significance is described as being *Not significant,* of *Low* significance, of *Medium* significance, or of *High* significance.

9.3 Baseline Description and Evaluation

9.3.1 Demographic Profile

As the proposed development site is located in proximity to the borders of counties Waterford and Kilkenny, this section will outline the population statistics in County Wexford, County Waterford and County Kilkenny on a county and local area basis.

9.3.1.1 National

Nationally, the 2006 Census recorded that the population of Ireland increased by 8.2% from 3,917,203 in 2002 to 4,239,848 in 2006, representing an actual increase of 322,645 persons.

9.3.1.2 Regional

According to Census 2006, the population of the South East region, which includes counties Wexford, Kilkenny and Waterford, has grown from 423,616 in 2002 to 460,474 in 2006, accounting for approximately 10.9% of the national population. The South East region is predominantly rural in character with the main urban centres being Waterford City, Kilkenny City and the towns of Carlow, Wexford and Clonmel. The region also consists of various smaller towns and villages evenly distributed across the region as well as a strong rural settlement pattern.

The *National Spatial Strategy for Ireland 2002 - 2020* (NSS) aims to achieve balanced regional development throughout Ireland. To achieve this, the NSS identified a number of "Gateways", and "hubs" which are primarily existing large urban centres, to promote economic and social development in their region. Waterford City has been designated as a Gateway, being supported by Wexford and Kilkenny as Hubs. These three together will form a nationally strategic "growth triangle" in the South East region. The NSS highlights the importance of reliable and effective energy systems, such as gas and electricity to power industry and services, as key prerequisites for effective regional development.

According to Census 2006, the recorded population of County Wexford was 131,749 persons, having increased from 116,596 in 2002 and 104,371 in 1996. The population of surrounding counties Waterford and Kilkenny also increased between 2002 and 2006, growing by 6.3% and 9% to 107,961 and 87,558 persons respectively. The population of Waterford City has increased by 2.6% between 2002 and 2006 growing from 44,594 persons in 2002 to 45,748 persons in 2006.

The *South East Regional Planning Guidelines 2004* estimated that the population of the South East region could reach 463,740 by 2020. The Issues Paper (dated February 2009) for the *South East Regional Planning Guidelines 2010 - 2022* states that the target population for the South East region for 2022 is in the range 580,500 to 596,500. *Wexford County Development Plan 2007 – 2013* estimates that if migration into County Wexford continues, at its current rate, the population of the county will increase to 177,110 by 2016, a further increase of approximately 45,000 in population.

Population figures for Ireland, County Wexford, County Waterford and County Kilkenny are presented in Table 9.2.

Table 9.2: Regional Population Trends 2002 - 2006

District	Census 2002	Census 2006	% Change 2002 – 2006
County Wexford	116,596	131,749	13%
County Waterford (including Waterford City)	101,546	107,961	6.3%
Waterford City	44,594	45,748	2.6%
Kilkenny	80,339	87,558	9%
Ireland	3,917,203	4,239,848	8.2%

Source: Central Statistics Office (www.cso.ie)

9.3.1.3 Local

The proposed development site is located in Great Island, County Wexford, at the confluence of the River Suir and River Barrow, on the shores of Waterford Harbour. The nearest area of settlement to the proposed development site is at Cheekpoint, County Waterford, located west of the estuary. In County Wexford, the nearest area of settlement is Campile, located east of the proposed development site. Great Island is also located near the County Kilkenny border. The assessment of local population trends therefore included surrounding areas in County Wexford and adjacent counties.

The smallest geographical units distinguished in the Census are Electoral Divisions (ED). The proposed site location at Great Island is located in Kilmokea ED, which is located within the New Ross Electoral Area. The nearest settlement to the proposed development site, Cheekpoint, County Waterford is located in Faithlegg ED. Campile is located in the Ballyhack ED. The closest Electoral Division in County Kilkenny to the proposed development site is Rathpatrick ED. Table 9.3 below presents the changes in population trends within these areas between 1996 and 2006.

Table 9.3: Local Population Trends 1996 - 2006

Location	1996	2002	2006	% change 1996 – 2002	% change 2002 – 2006
Co. Wexford					
Kilmokea ED	745	686	728	-7.9%	6.1%
Ballyhack ED	1,180	1,258	1,232	6.6%	-2.1%
Campile Village	396	335	347	-15.4	3.6%
Co. Waterford					
Faithlegg ED	1,513	1,809	1,905	19.6%	5.3%
Cheekpoint Village	320	325	313	1.6%	-3.7%
Co. Kilkenny					
Rathpatrick ED	1,622	1,204	1,173	-25.8	-2.6%

Source: Central Statistics Office (www.cso.ie)

As illustrated in Table 9.3, the population of the study area has been fluctuating over the past 10 years. In County Wexford, Kilmokea ED, which includes Great Island, experienced a population decline of 7.9% between 1996 and 2002 but the population increased again by 6.1% between 2002 and 2006 to 728 persons. Ballyhack ED experienced a fall in population numbers during the last inter-censal period, from 1,258 persons to 1,232 persons, a decrease of 2.1%. The population of Campile increased by 3.6% between 2002 and 2006, following a decline in population growth of 15.4% between 1996 and 2002.

A review of census data indicates that the population of Faithlegg ED, Co. Waterford has been increasing since 1996. Census 2006 shows that the rate of growth has slowed in Faithlegg, down to 5.3% in 2006 compared with 19.6% in 2002. Cheekpoint experienced an increase in population

between the years 1996 and 2002, growing by 1.6%. The population of Cheekpoint decreased by 3.7% between the years 2002 and 2006.

Table 9.3 also shows that the population of Rathpatrick ED in County Kilkenny has been experiencing a decline in population since 2006.

A key factor of County Wexford's population growth is the extent of migration into the county. As illustrated in Table 9.4, the average estimated net migration per 1,000 of population was 21.8 in County Wexford, which is considered high compared with 11.7 nationally. Census 2006 recorded average estimated net migration per 1,000 of population of 6.9 in County Waterford and 14.8 in County Kilkenny. This implies that migration is a contributing factor in population growth, particularly in County Wexford.

Table 9.4: Population Increases

Location	Natural Increase	Change in Population 2002- 2006	Net Migration	Annual Average Rates per 1000 of Population		
				Birth	Death	Estimated Net Migration
Ireland	131,314	322,645	191, 331	15.0	7.0	11.7
Wexford	4,319	15,153	10,834	15.9	7.3	21.8
Waterford	3,516	6,415	2,899	15.4	7.0	6.9
Kilkenny	2,233	7,219	4,986	13.4	6.8	14.8

9.3.1.4 Age Structure

According to Census 2006, the age structure of County Wexford is similar to that of County Waterford, County Kilkenny and the State. The age structure of County Wexford exhibits a high proportion of persons in the 25 - 44 year age group, representing 30.3% of the population, compared with 31.7% nationally, 29.9% in County Waterford and 30.2% in Kilkenny. There is also a high proportion of persons within the 45-64 year age group, 22.5% in Wexford compared with 22% in the State, 22.6% in County Waterford and 23.1% in Kilkenny. The 0-14 year age group represents 22.2% of the population in County Wexford, which is higher than the national average of 20.4%, and figures recorded in counties Waterford and Kilkenny, 20.7% and 21.5% respectively. County Wexford has a generally young population structure and it is likely that the high rate of in-migration to the county contributes to this.

9.3.1.5 Household Size

By comparing the absolute population figures divided by the number of private households recorded in County Wexford, it appears that the average household size in County Wexford, at 2.84 is slightly higher than the state average of 2.81. The average household in County Waterford is 2.71 persons and 2.88 persons in County Kilkenny. According to the National Spatial Strategy 2002 - 2020, in the long term, the average household size in Ireland will continue to fall towards the EU average of 2.63 persons per household.

9.3.2 Economic Activity

9.3.3 Employment

Information on economic activity was obtained primarily from the *Wexford County Development Plan 2007 – 2013* and the CSO document, *Principal Economic Status and Industries (2006)*.

The *Wexford County Development Plan 2007 – 2013* considers that the enhancement of Waterford as a gateway, supported by Kilkenny and Wexford as hubs, is vital for the future economic development of the county. Waterford, Kilkenny and Wexford form a nationally strategic "growth triangle". The development plan states that a critical mass of population will help support greater economic activity and quality of life. It is the policy of *Wexford County Development Plan 2007 – 2013* to "*build on the strengths and opportunities of County Wexford so that economic growth can be encouraged in a sustainable manner in order to create employment opportunities for all sectors of the community*".

The development plan specifies that in order to enhance economic development in the county, the plan will:

- Build upon the county's strengths including its strategic location and good road network
- Promote economic development in co-operation with other agencies where appropriate
- Promote the continuous upgrading of the infrastructural network to encourage and facilitate economic development

Traditionally County Wexford has had a strong agricultural base and primary and secondary agriculture still plays an important role in the County's economy. Although the numbers engaged in farming has declined in recent years, the sector remains an important contributor to the economic and social viability of rural areas in County Wexford and continues to play a defining role in the rural landscape.

Census 2006 recorded that County Wexford experienced a steady population growth between 2002 and 2006, increasing to 131,749 persons, an increase of 13%. The population of counties Kilkenny and Waterford increased by 9% and 6.3% respectively during the same time period. Consequently, the total number of persons at work increased up to 2006, with 54.6% of the population of Wexford at work, which is lower than the State average of 57.2%. In County Kilkenny, 57.9% of the population was at work, compared with 54% in Waterford and 52.4% in Waterford City.

According to Census 2006, the construction trade is the largest sector of the economy in County Wexford, with 16.7% of the population at work employed in the sector, as illustrated in Table 9.5: Employment by Broad Industrial Group. The Wholesale and Retail sector is the second largest sector accounting for 14.9% of the working population. These are higher than the State proportions for the same sectors, 11.10% and 13.3% respectively. Agriculture remains more important in Wexford than the State; 7.5% compared to 4.6% for the State.

Regionally, the construction industry, the wholesale and retail sector and manufacturing industries, are the largest sectors of the economy in Counties Wexford, Kilkenny and Waterford. Mining, quarrying and turf production, along with electricity, gas and water supply, are the lowest employment sectors in Wexford, Kilkenny and Waterford, according to 2006 figures.

Table 9.5: Employment by Broad Industrial Group

Broad Industrial Group	State	Wexford	Kilkenny	Waterford	Waterford City
Agriculture, Forestry & Fishing	4.60%	7.50%	8.10%	5.80%	0.70%
Mining, Quarrying	0.40%	0.30%	0.75%	0.14%	0.03%
Manufacturing	12.60%	12.30%	12.50%	19.45%	21.70%
Electricity, water & gas	0.60%	0.49%	0.46%	0.45%	0.41%
Construction	11.10%	16.70%	12.60%	10.80%	7.80%
Wholesale and retail	13.30%	14.90%	13.60%	12.70%	13.90%
Hotels & Restaurants	5.20%	6.30%	5.80%	5.80%	6.80%

Broad Industrial Group	State	Wexford	Kilkenny	Waterford	Waterford City
Transport, Storage and Communications	5.50%	5%	3.90%	3.80%	4.10%
Banking	4.40%	3.10%	3.50%	2.50%	2.50%
Real Estate	9.40%	5.90%	6%	7.50%	8.80%
Public Administration	5.20%	4.4%	4.90%	3.90%	3.30%
Education	6.60%	5.90%	6.70%	7.10%	6.70%
Health and Social Work	9.90%	9%	11.60%	9.80%	10%
Other community, social and personal service activities	4.20%	4.40%	3.90%	3.80%	3.50%
Other	6.80%	3.90%	5.50%	6.20%	9.50%

9.3.3.1 Unemployment

According to Census 2006, the percentage of persons unemployed in County Wexford in 2006, at 4.6% was slightly higher than the state average of 4.4%. The percentage of persons unemployed in Kilkenny was 4.1%. In County Waterford, the percentage of persons unemployed was 5.2% and 6.5% in Waterford City, according to Census 2006.

According to the Live Register 17,431 people were claiming unemployment benefit in October 2009 in County Wexford. This represented a profound increase on the same period in 2008, when 10,567 people were in receipt of benefits. In County Kilkenny, 6,834 people were claiming unemployment benefit in October 2009 (compared with the October 2008 figure of 4,250) while in County Waterford 14,158 were in receipt of benefits during the same period (compared with the October 2008 figure of 9,409). In the South East 52,869 people were in receipt of benefits in October 2008, an increase of 64% on the October 2008 figure of 33,616.

It is of importance to note that the live register is not the official measure of unemployment, as it includes persons in receipt of benefits who are in part time or casual employment. However, the live register is the most up to date information available and is indicative of the current unemployment situation in Ireland.

The *Quarterly National Household Survey* is a national survey of households in the Republic of Ireland that produces quarterly labour force estimates that include the official measure of unemployment in the State. The results for the second quarter (April - June 2009) indicate that the employment rate in the South East region was 14.7% (an increase of 3.6% on the first quarter) which is higher than the State average results for the second quarter, 12.0%.

9.4 Identification of Potential Impacts

9.4.1 Construction Phase Impacts

During the peak construction period it is anticipated that up to 500 construction workers will be employed.

As far as practicable local labour will be employed, this is a significant positive medium term impact for the local economy of the area.

It is likely that the proposed development will increase the population of the area in the short term during the construction phase, as it is probable that there will be an influx of construction workers. Construction workers will positively impact on businesses in surrounding settlements that will provide workers with services including accommodation, food, and entertainment creating employment opportunities in the local service industry. This will be a significant positive medium term impact on the

local economy addressing the need for employment opportunities in the region in light of recent increases in unemployment rates.

Construction activities have the potential to cause a nuisance to the local environment and result in disruption. However, it is important to note that these impacts, outlined below, will be medium term in duration and will cease upon completion of construction.

- Negative landscape and visual impacts will occur due to construction plant and activities on site including; site compounds, temporary fencing, material storage, plant and machinery, vegetation stripping, generation of dust and vehicle movements. However, these impacts will be medium term and will be restricted to the construction period. Construction phase landscape and visual impacts are discussed in detail in Chapter 16 (Landscape and Visual)

- Increased traffic and Heavy Goods Vehicle (HGV) movements during the construction phase will have a negative medium term impact on the local community, primarily due to potential traffic disruption on local roads. However, it is proposed to utilise a parking bay to control the movement of HGVs accessing the site. Traffic impacts are discussed in detail in Chapter 10 (Traffic)

- The construction phase will potentially have a medium term negative impact on the local population as a result of noise and dust during working hours. Normal working hours during the construction period are expected to be Monday to Friday 08:00 to 20:00 and Saturday 08:00 to 17:00. During certain stages of the construction phase it is expected that some work will have to be carried out outside of normal working hours, however this will be kept to a minimum. Construction works with a significant noise impact will be avoided outside of normal working hours. Construction phase noise and dust impacts are discussed in Chapter 11 (Human Beings - Noise and Vibration) and Chapter 15 (Air Quality and Climate) respectively

9.4.2 Operational Phase Impacts

The proposed development will offer many positive benefits to the local area and economy. The most significant positive impacts are the permanent employment opportunities that will be maintained by operating the power plant and supplying goods and services.

The proposed development will maintain long term employment for the area and the impact of this is anticipated to be positive.

The power plant will provide a significant positive impact on the national economy during the operational phase of the development, by improving the public utilities infrastructure and generating additional electricity. In addition, the provision of a gas supply to the area supports the development of a nationally strategic “growth triangle” in the South East incorporating Waterford City, Wexford and Kilkenny, as specified in the NSS.

9.5 Mitigation Measures

The mitigation measures proposed for the construction and operational phases of the development are described hereunder.

9.5.1 Construction Phase

In order to control potential negative impacts during construction, a Construction Environmental Management Plan (CEMP) will be developed and implemented by the nominated Contractor during the construction phase of the project.

Specific mitigation measures include:

- Connection to services will be carried out during low demand periods in order to minimise any potential disruption to services in the area
- Use of artificial lighting will be restricted to the minimum required for safety and security
- Large plant will be located as far away as possible from local residences to minimise the visual impact of construction activities
- Implementation of a Traffic Management Plant, including the utilisation of parking bay to control HGV movements. Refer to Chapter 10 (Traffic)
- Mitigation measures relating to noise, visual impacts and dust are discussed in Chapter 11 (Human Beings Noise and Vibration), Chapter 15 (Air Quality and Climate) and Chapter 16 (Landscape and Visual)

9.5.2 Operational Phase

It is not anticipated that any specific mitigation is required regarding the socio-economic context discussed in this chapter.

Other relevant mitigation measures proposed for the operational phase of the development are discussed in Chapter 15 (Air Quality and Climate), Chapter 11 (Human Beings Noise and Vibration), and Chapter 16 (Landscape and Visual).

9.6 Residual Impacts

The residual impacts are the final or intended impacts which occur after the proposed mitigation measures have been implemented. Residual impacts in relation to the proposed development are those that could arise as a result of the operation of the electricity generating plant once the proposed mitigation measures are in place.

9.6.1 Construction Phase

Following the implementation of mitigation measures as detailed for the construction phase, the residual impact of the proposed development on the socio-economic environment of the area is considered to be positive.

9.6.2 Operational Phase

The residual impact of the proposed development during the operational phase is considered to be significant, positive and long term due to the provision of long term employment opportunities and improved infrastructure.

9.7 Summary Conclusion

A desk-based assessment of the impacts on socio-economics was undertaken to assess information relating to recent trends in population, employment and economic activity in the vicinity of the proposed development.

It is likely that the proposed development will increase the population of the area in the short term during the construction phase, as it is probable that there will be an influx of construction workers.

Construction workers will positively impact on businesses in surrounding settlements that will provide workers with services including accommodation, food, and entertainment creating employment opportunities in the local service industry. This will be a significant positive medium term impact on the local economy.

There is a potential for negative impacts during construction due to visual impacts, increased noise, traffic and dust. However, these will cease following completion of construction. During the construction period a Construction Environmental Management Plan (CEMP), incorporating mitigation measures for reducing traffic, dust, noise and visual impacts will be implemented in order to minimise any negative impacts on the receiving environment. During the operation of the proposed power plant, it is considered that there will be a significant positive impact on the local and national economy.

Overall, impacts on the socio-economic environment of the area are considered to be positive.

10. Traffic

10.1 Introduction

An environmental impact statement (EIS) must contain a description of the aspects of the environment that are likely to be significantly affected by the proposed development. This chapter of the EIS assesses the impact of the proposed development on roads and traffic. A detailed description of the proposed development is provided in Chapter 3 (Description of the Development).

10.2 Background

This report has been prepared in accordance with *Traffic and Transport Assessment Guidelines, National Roads Authority, (September 2007)* and was carried out to assess the existing traffic and transport conditions in the area and to assess the impact that traffic generated by the proposed development would likely have on the road network local to the development.

10.2.1 Scoping Report

Prior to the preparation of this chapter a scoping report was issued to Wexford County Council for approval. The scoping report briefly summarised the existing situation and outlined the proposed development. It noted the issues to be addressed and summarised how these could be dealt with in the compilation of a comprehensive Traffic and Transport Assessment (TTA) for the development. It also outlined the proposed methodology and the analyses envisaged to be undertaken to demonstrate the impact that the proposed development will likely have on traffic flows in the local area. Wexford County Council were invited to provide comment on the scoping report and detail what, if any, further information would be required in the compilation of the TTA.

10.2.2 Consultation

Prior to the compilation of this TTA a pre-planning meeting was held with Wexford County Council on 21st August 2009. The purpose of this meeting was to discuss traffic and transportation issues likely to arise due to the construction of the proposed development. The meeting was attended by representatives from Endesa, Mott MacDonald Ireland and representatives from Wexford County Councils Roads Department. The following issues were discussed and agreed at the meeting:

- The contents of the scoping report were discussed. Wexford County Council stated that they were generally in agreement with the process and methodology outlined in the scoping report. Wexford County Council did however request that the undertaking of traffic counts be delayed until September so traffic generated by the national school at Ballinamona would be accounted for

- The condition of the pavement surface on the section of local road between the junction with the R733 at Ballinamona and the site entrance was discussed. It was agreed that that investigation works would be undertaken since the construction phase of the proposed development was likely to generate an increase in traffic volumes on this section of pavement. The pavement investigation was required to assess the impact of development generated traffic on the local road and to establish its residual life

- The width and alignment of the section of local road mentioned above was also discussed. It was noted that the width of this section of carriageway is generally between 4.0 to 5.0 metres and that there would not be sufficient road width to allow two HGVs to pass safely at a number of locations along this section of road

These issues have been taken into account in the preparation of this assessment and are discussed in later sections.

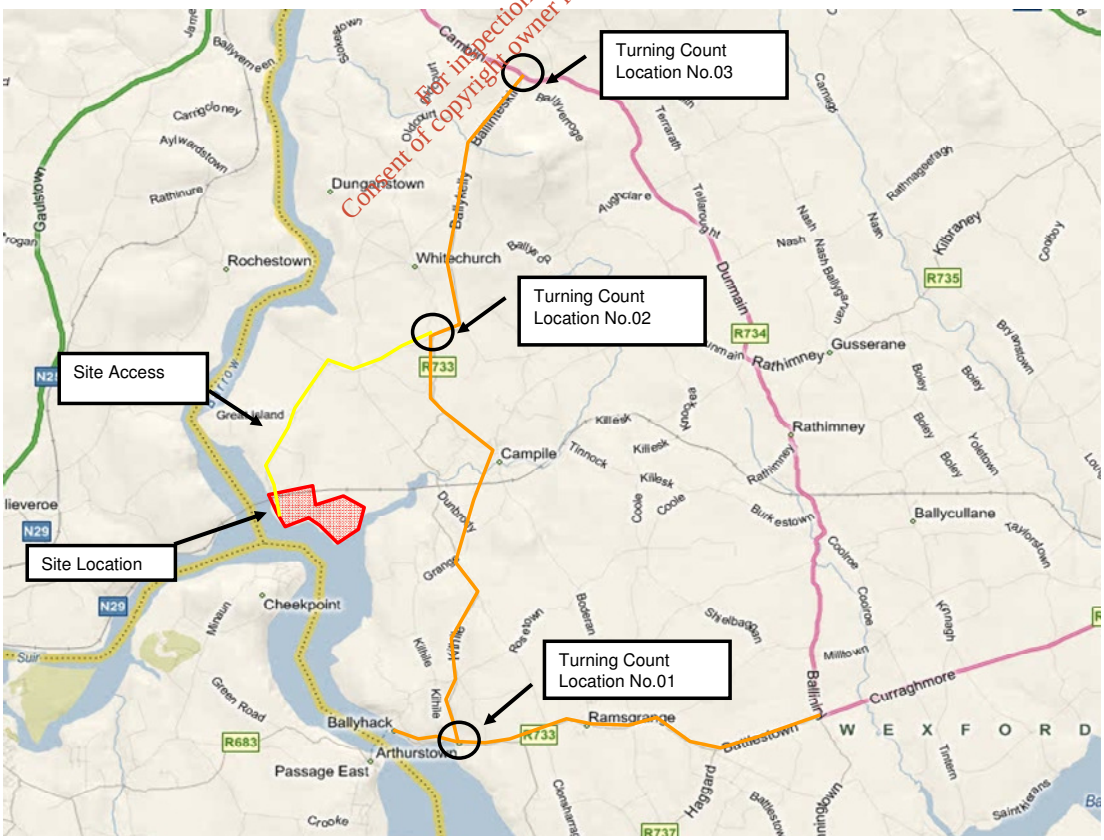
10.3 Traffic Impact Assessment

10.3.1 Traffic Counts

To obtain traffic volumes representative of those generally experienced in the vicinity of the proposed development turning movement counts were conducted at a number of key junctions in the vicinity of the development. The junctions at which turning movement counts were to be undertaken were agreed with Wexford County Council. The counts were conducted between the hours of 07:00 and 10:00 and 16:00 and 19:00 on Tuesday the 8th of September 2009. This date was chosen as the national school at Ballinamona was open, following summer holidays, from late August onwards. The locations at which counts were undertaken are detailed below and illustrated in Figure 10.1.

- Junction 1 - R733/R683 at Arthurstown
- Junction 2 – R733/Site Access Road
- Junction 3 – R733/R734 at Balinteskin

Figure 10.1: Traffic Count Locations

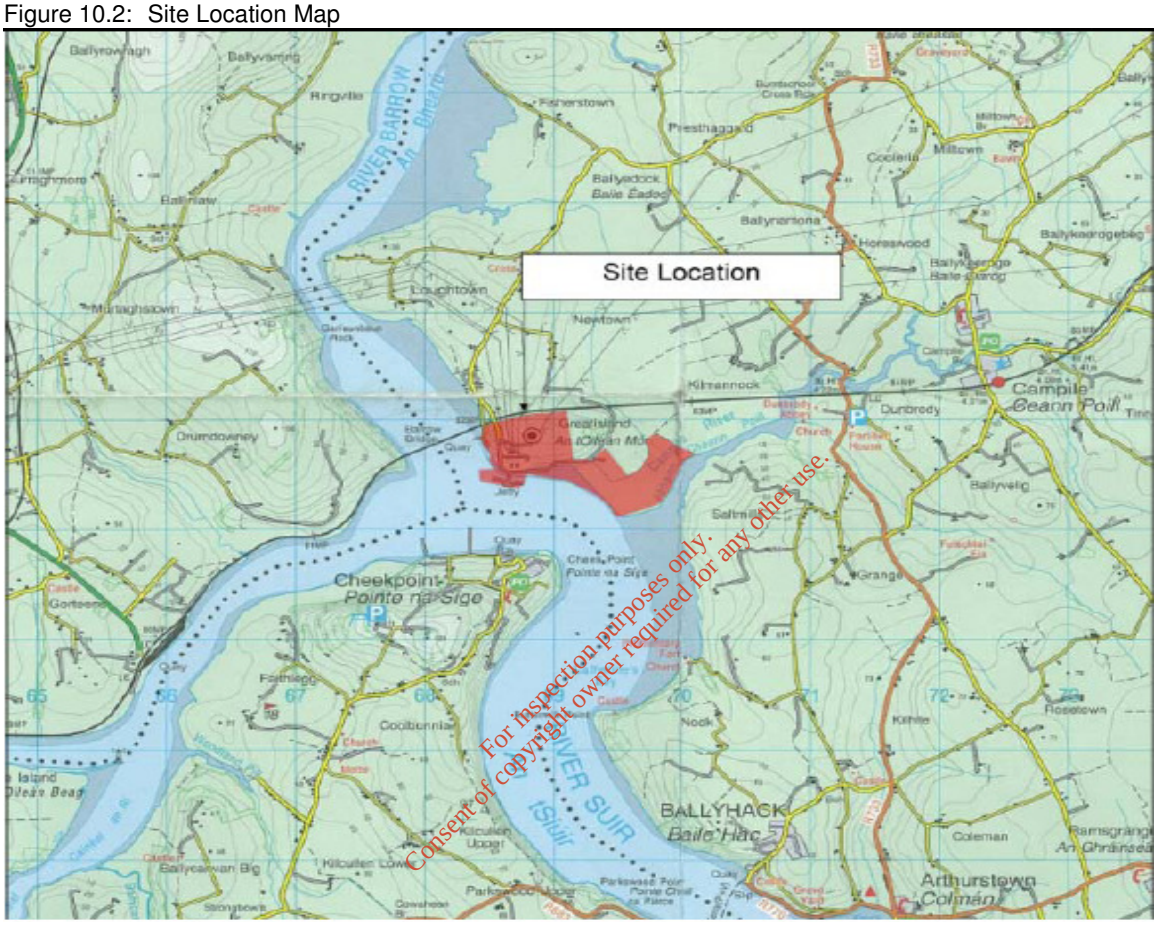


10.3.2 Receiving Environment

10.3.2.1 Site Location

The Great Island site is an existing power generating plant located on a 58 hectare site at the confluence of the River Suir and the River Barrow, on the shores of Waterford Harbour, as illustrated in Figure 10.2.

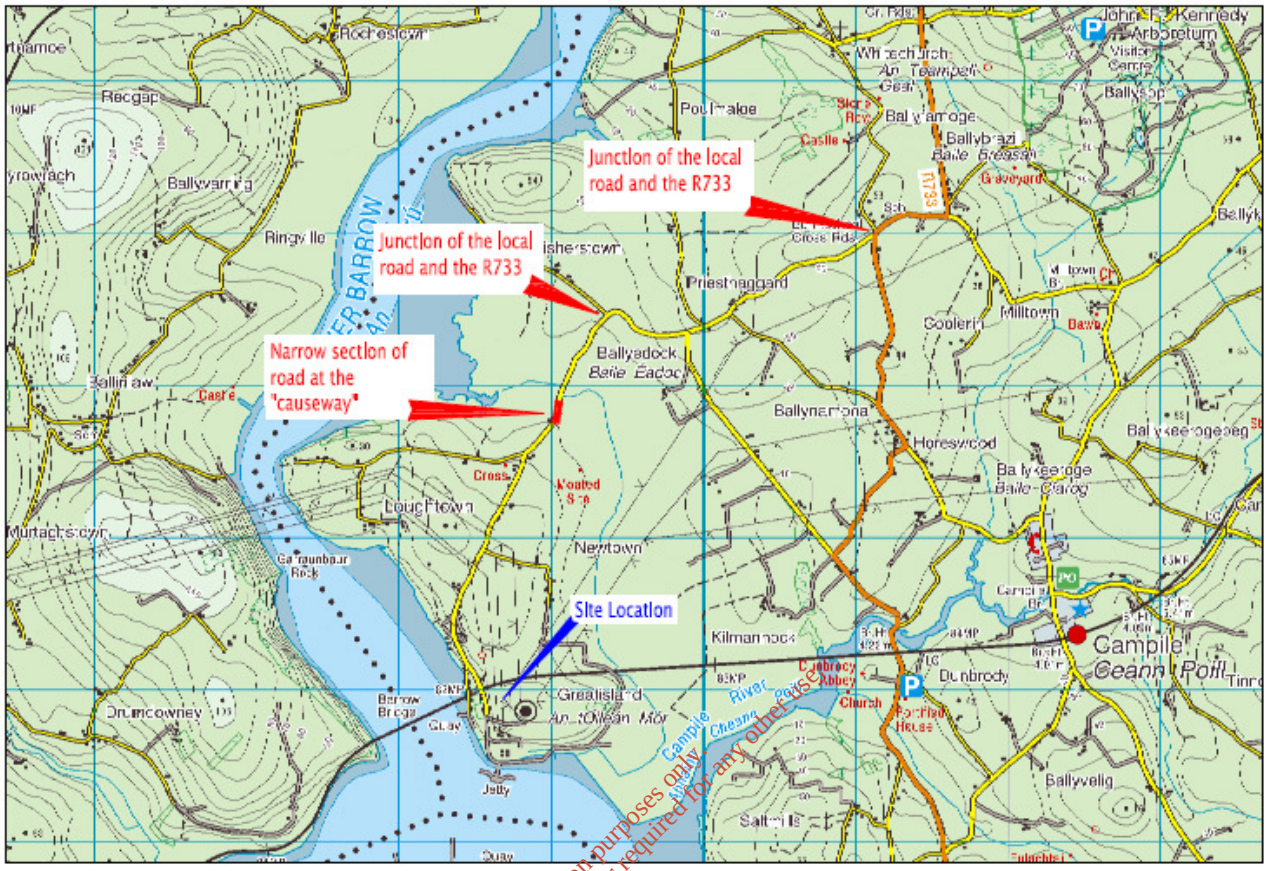
Figure 10.2: Site Location Map



10.3.2.2 Local Road Network

The site is accessed via a 5 kilometre section of local road. This section of local road forms a priority junction with the R733 at Ballinamona. The section of local road accessing the site is generally rural in character with road widths varying between 4.0 to 5.0 meters along the majority of this 5 kilometre section. This section of local road exhibits a number of acute changes in horizontal alignment with a particularly “tight” bend at Fisherstown. The road also narrows to approximately 3.5 meters in width for a section of approximately 400 metres along the “causeway”. The “causeway” is essentially a viaduct which historically formed a linkage between Great Island and the mainland prior to the silting over of the Barrow River basin, Figure 10.3 below refers.

Figure 10.3 Local Road Network Accessing the Site



10.3.2.3 Public Transport Facilities

There are currently no public transport facilities in operation to the site. However, Endesa does operate a subsidised bus service to the site.

10.3.3 Existing Traffic Conditions

The capacity and operation of a road network is dependant on the junctions within that network and it is the capacity and operation of these junctions that generally determines the capacity and vehicle delay on the network. In order to assess the current traffic conditions on the road network appropriate to the development site, traffic surveys were carried out at the junctions that traffic generated by the proposed development would likely affect, namely:

- Junction 1 - R733/R683 at Arthurstown
- Junction 2 – R733/Site Access Road
- Junction 3 – R733/R734 at Balinteskin

10.3.3.1 Interpretation of Traffic Surveys

Classified junction turning movement counts were carried out between the hours of 07:00 and 10:00 and 16:00 and 19:00 on Tuesday the 8th of September 2009.

Analysis of the traffic counts revealed the AM system peak hour to be between 08:00 and 09:00 and the PM system peak to be between 17:00 and 18:00.

10.3.3.2 Analysis of the Existing Operation and Capacity of the Junctions

Having established the link flows and turning movements on the local road network in the vicinity of the development site, an analysis of the operation and capacity of the junctions surveyed was undertaken. The analysis was undertaken using the computer modelling programme PICADY as produced by the Transport Research Laboratory (TRL) in the UK. This programme is used to predict capacities, queue lengths and delays at priority junctions.

PICADY output files contain tables consisting of demand flows, capacities, queues and delays for each time segment of the peak hour analysis. These tables contain start and finish times, and for each arm of the junction, traffic demand, capacity, Ratio of Flow to Capacity (RFC), start queue length, end queue length and queuing delay. The RFC provides the basis for judging the acceptability of junction designs and the capacity of existing junctions. An RFC of 85% or less is considered to be acceptable. An RFC of this value would indicate that at peak times the junction operates at 85% of its capacity and thus has a reserve capacity of 15%. This level of reserve capacity is considered by traffic engineers to be the level of reserve capacity generally required at a junction to cater for periods of unusually high traffic flows, such as bank holiday weekends etc.

A summary of the PICADY results for the existing surveyed junctions is provided in Table 10.1 hereunder.

Table 10.1: PICADY Results

Assessment Year	Time Period	Junction 01	Junction 02	Junction 03
			RFC Max	
2009	AM Peak	5.8%	9.4%	26.8%
	PM Peak	8.7%	10.1%	24.9%

As can be seen from the above table the junctions are currently operating well within capacity.

10.3.4 Trip Generation

10.3.4.1 Construction Phase Trip Generation

It is proposed to construct a new 430 MW Combined Cycle Gas Turbine (CCGT) power plant which, subject to planning permission being granted, will be commissioned in late 2012.

An assessment of the construction traffic generation has been conducted based on the current construction plan, experience drawn from similar schemes and first engineering principles. For this study, worst case traffic conditions have been based on the following assumptions:

- Maximum of 500 construction workers on site at any one time
- 20 heavy vehicles deliveries to the site during the day
- 28 abnormal loads over the course of the construction programme

For construction workers, trip generation estimates have been based on the assumption that all construction workers arrive by passenger vehicle to the site during the morning peak hour and depart during the evening peak hour. Further it was assumed that the occupancy of these passenger vehicles

is 1.25 persons per vehicle. Estimates for peak hour arrivals for heavy vehicles have been based on first engineering principles and experience drawn from similar developments.

Based on these assumptions, morning peak hour, evening peak hour and daily trip generations have been estimated. A summary of these estimates are shown in Table 10.2.

Table 10.2: Construction Trip Generation Estimates

Traffic Type	Am Peak Hour		Pm Peak Hour		Weekday Daily Total	
	In	Out	In	Out	In	Out
Construction Workforce	400	0	0	400	400	400
Heavy Vehicles	2	2	2	2	20	20
Total	**402**	**2**	**2**	**402**	**420**	**420**

As shown in the table above, the proposed site is expected to generate approximately 404 trips (402 in / 2 out) during the morning peak hour, 402 trips (2 in / 402 out) during the during the evening peak, and 840 weekday daily trips (420 in / 420 out).

10.3.4.2 Abnormal Loads

Due to the complexity of the local road network it is the intention of Endesa to use the existing functional jetty at the power station to deliver selected items of plant and equipment (abnormal loads), to the development site; this will help mitigate the impact on the local roads. Arising from this it is planned to deliver such loads using a combination of shipping and barging due to the coastal location of the proposed development site. Great Island jetty is currently, and has historically, been used for the delivery of bulk Heavy Fuel Oil, and is being maintained as a functional asset.

Consultations have been on-going with shipping companies (Abnormal Load Engineering, Burke Shipping and Allelys Heavy Haulage) and they have confirmed that they are in a position to make such deliveries by use of shipping / barging and a combination of crane and ro/ro pontoon with specialist ramping. These deliveries will not require any works on the foreshore and can be programmed to accommodate tidal and construction programme limitations without affecting the length of the construction programme. It is anticipated that 15 such deliveries would be required. Any deliveries will be planned and programmed in consultation with the relevant port authorities to ensure that the appropriate safety precautions are adhered to.

10.3.4.3 Operational Phase Trip Generation

During the operational phase it is expected that very little traffic will be generated by the site. It is estimated that twenty three full time day employees will work at the site, and 6 deliveries will be made per day. Additional to the twenty three day workers there will be a team of 15 shift workers i.e. 38 permanent employees in total. The shift workers will operate on a three shift basis as follows: Shift 1 from 00:00 to 09:00, Shift 2 from 09:00 to 15:30 and Shift 3 from 15:30 to 24:00. This distribution of shifts over the 24 hour day will result in five shift workers arriving at the site and five departing during the AM peak hour with no arrivals or departures expected during the PM peak hour. For the workers, a conservative occupancy rate of one passenger per vehicle has been estimated. Peak hour trip generation estimates have been formulated from first engineering principles. The morning peak hour, evening peak hour, and weekday daily trip generation estimates are summarised in Table 10.3.

Table 10.3: Operational Phase Trip Generation Estimates

Traffic Type	AM Peak Hour		PM Peak Hour		Weekday Daily Total	
	In	Out	In	Out	In	Out
Full Time Work Force	23	0	0	23	23	23
Shift Workers	5	5	0	0	15	15
Deliveries	2	2	2	2	6	6
Total	**30**	**7**	**2**	**25**	**44**	**44**

10.3.5 Trip Distribution

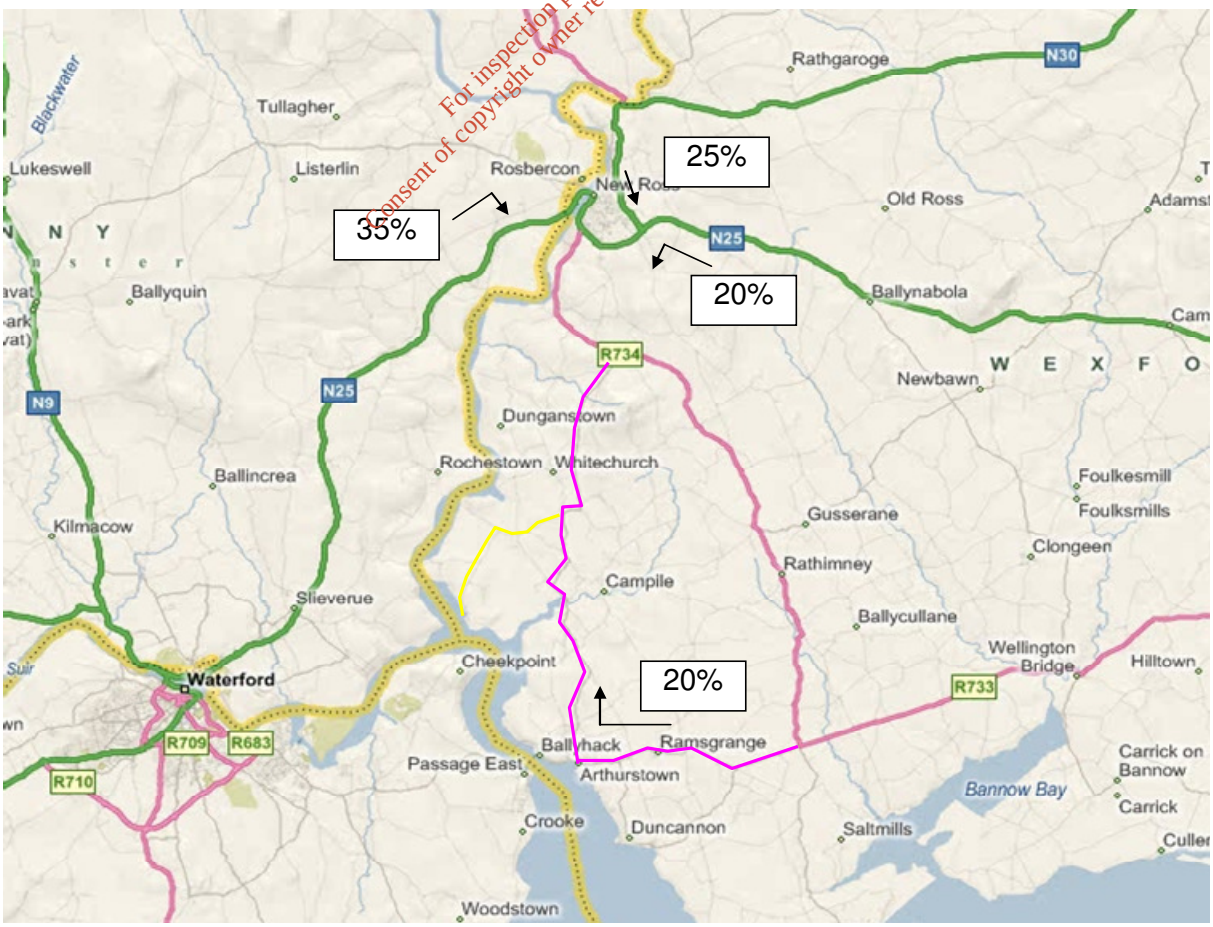
The distribution of trips generated by the development is based on available routing towards the strategic road network and the location of the major urban areas in the vicinity of the development site. The trip distribution profile is detailed in Table 10.4 below.

Table 10.4: Projected Distribution Profile

Roadway	Distribution
N30 & N25 East	45%
N25 West	35%
R733	20%

This distribution of trips to the site is shown graphically in Figure 10.4 below:

Figure 10.4 Trip Distribution



10.3.6 Assessment Years

The peak volumes of construction traffic are expected to occur during the civil works phase, between March 2011 and February 2012. Due to the low volumes of operational traffic it was agreed with Wexford County Council that an operational phase analysis was not required. It was also agreed that junction capacity forecasts, during both the AM and PM peak hours, would be undertaken for the following scenarios:

- Existing Conditions
- Year 2012 Baseline Conditions
- Year 2012 Baseline Conditions plus Construction Traffic

The National Roads Authority (NRA) 2003 publication *Future Traffic Forecasts 2002 to 2040* was used to calculate growth factors for the road network traffic. The following table outlines the calculated growth factors to convert from 2009 to 2012.

Table 10.5: Traffic Growth Factors

	Non-National Roads HGV	Non-National Roads Cars & LGVs
2009	112	115
2012	117	119
Growth Factor	1.045	1.035
Overall Growth Factor Applied	**1.040**	

10.3.7 Highway Capacity Impacts

Developments add traffic to the existing road networks in their immediate vicinity and to a lesser extent further afield from the development location. As mentioned previously the proposed development will impact on the following three junctions:-

- Junction 1 - R733/R683 at Arthurstown
- Junction 2 - R733/Site Access Road
- Junction 3 - R733/R734 at Balinteskin

A junction capacity analysis was therefore undertaken on the above mentioned junctions. Capacity analysis was undertaken for the future years 2012 with and without the proposed development in place. The RFC values obtained for the junctions during the AM and PM peak periods are outlined in the Table 10.6 and Table 10.7 below.

Table 10.6: Ratio of Flow to Capacity at Junction (2012 Do Nothing)

		Junction 01	Junction 02	Junction 03
			RFC Max	
2012 Do Nothing	AM	5.9%	10.1%	28.2%
	PM	8.9%	10.6%	26.1%

Table 10.7: Ratio of Flow to Capacity at Junctions (2012 Do Something)

		Junction 01	Junction 02	Junction 03
			RFC Max	
2012 Do Something	AM	26.8%	71.3%	66.5%
	PM	24.9%	66.0%	68.9%

As can be seen from the above tables both junctions operate well within capacity in 2012 in the Do Nothing scenario (without development in place).

When the peak construction traffic for the Great Island power plant was added to the network it was noted that whilst there were increases in the Ratio of Flow to Capacity (RFC) at all three junctions, all three junctions still operated well within their theoretical capacity of 85%.

10.3.8 Pavement Integrity Impact

Arising from the consultation with Wexford County Council it was decided that given the level of traffic likely to be generated by the development during its construction stage it would be prudent to assess the structural strength of the existing local road accessing the site.

In order to assess the existing structural condition and the residual life of the section of local road accessing the site the services of Pavements Management Services Ltd. (PMS) were engaged to carry out Falling Weight Deflectometer (FWD) testing on behalf of Endesa.

The FWD works on the same principle as all deflection devices; a load of known magnitude is imparted to the pavement, and the resulting deflections of the pavement are measured. For this project, interest centred on deflections under typical HGV wheel loads of 40 kN (kilonewtons). Additionally a coring and dynamic cone pentrometer (DCP) testing programme was carried out by PMS to determine the as-constructed thicknesses of the existing pavement layers.

In order to facilitate PMS in the preparation of their report Mott MacDonald Ireland (MM) provided PMS with the existing Annual Average Daily Traffic (ADDT) and HGV content on the local road and outlined estimated levels of traffic likely to be generated by the proposed development during both the construction and operational phases. The figures developed by MM and outlined to PMS are summarised in the following tables.

Table 10.8: Existing AADT and HGV Content

Existing AADT and Percentage HGV Content on the Local Road	
AADT	%age HGV
831	3.4%

Table 10.9: Construction and Operational Traffic Requirements

Construction Traffic Requirements	
400 Car Trips / Day	20 HGV Deliveries / Day
Operational Traffic Requirements	
30 Car Trips / Day	6 HGV Deliveries / Day

Testing on the local road was carried out by PMS on the 14th October 2009 and a report on the test results and future maintenance requirements was prepared, the full text of this report is contained in Appendix 10.1 of this EIS.

Using the above estimates of HGV movements and the existing AADT and percentage HGV content on the local road PMS have estimated the required maintenance / upgrading on the local road to maintain its structural integrity over a twenty year design period. Their report states that:

"DEHLG guidelines specify that where Surface Curvature Indexes (SCI's) are greater than 250 microns, a hot-mix only overlay is not suitable. Taking into account the design traffic requirement and the fact that the SCI's along the length of each carriageway are generally well in excess of 250 microns, a Clause 804/wet-mix macadam overlay was deemed to be more appropriate than a hot-mix overlay.

A minimum thickness of 150 mm of wet-mix macadam is specified in the DEHLG guidelines for strengthening of Non-National roads. The wet mix/Clause 804 overlay layer should be double surface dressed to seal the unbound material. The thicknesses shown may be superseded by construction requirements.

It should be noted that…..if significantly higher HGV traffic volumes than those shown are anticipated, an overlay consisting hot-mix surface layer over a wet-mix/Clause 804 layer would be more appropriate."

Table 10.10 below shows the Clause 804/Wet-mix macadam overlay requirements, estimated by PMS, by segment for the section of local road based on Non-National Road models (50th% failure curve).

Table 10.10: Overlay Requirements

Lane	Chainage	Overlay Requirements (Wet-mix / Clause 804)
WBCW	0 to 700	200mm
WBCW	700 to 950	150mm
WBCW	950 to 1450	175mm
WBCW	1450 to 1850	150mm
WBCW	1850 to 2400	200mm
WBCW	2400 to 3150	150mm
WBCW	3150 to 4250	150mm
WBCW	4250 to 5000	150mm
EBCW	0 to 625	200mm
EBCW	625 to 1125	150mm
EBCW	1125 to 2325	175mm
EBCW	2325 to 3125	150mm
EBCW	3125 to 4175	200mm
EBCW	4175 to 5000	150mm

10.3.9 Mitigation Measures for HGV Passage

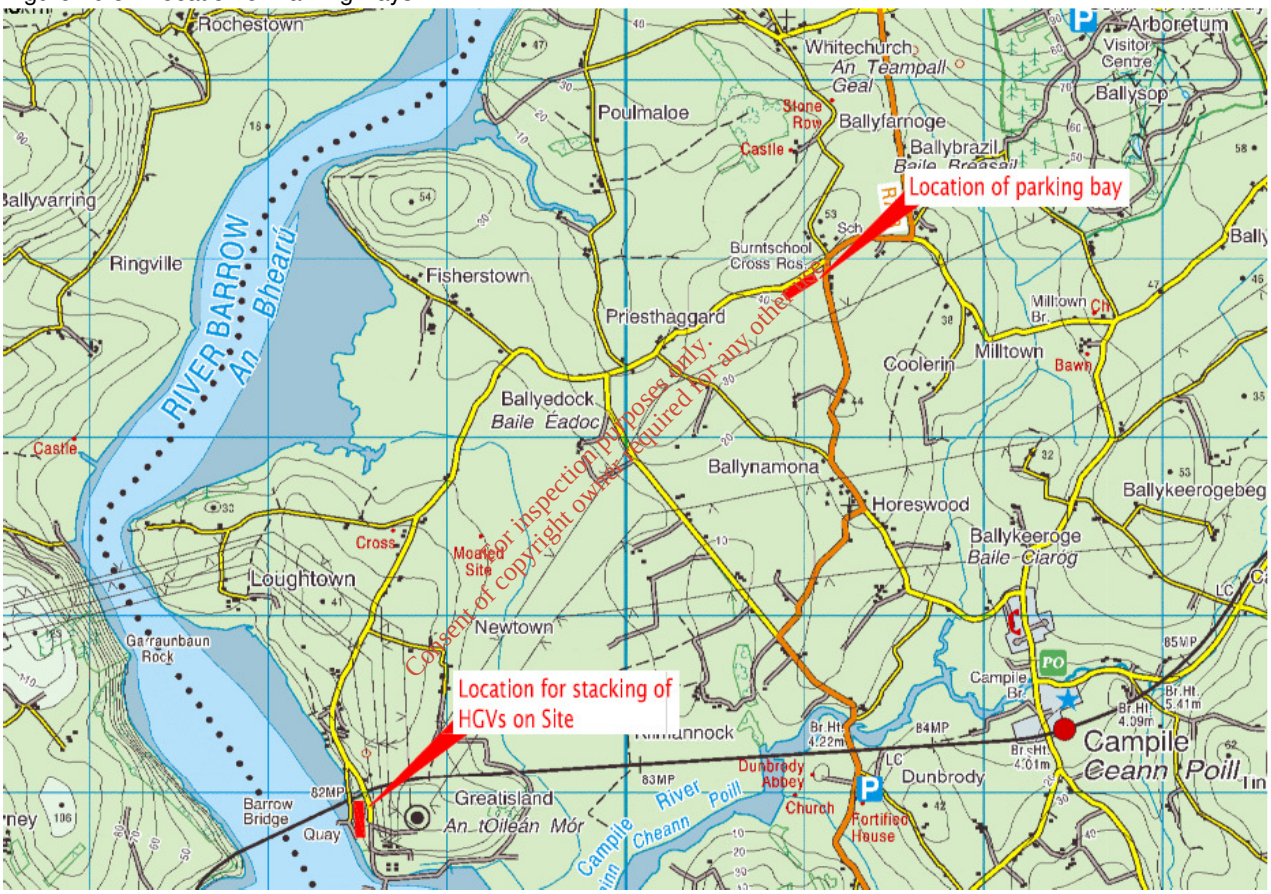
Given that the width and alignment of the majority of the local road accessing the site is not sufficient to allow for two HGVs travelling in opposite directions to pass each other safely a traffic management plan has been developed. The traffic management plan suggests that two parking bays for HGVs should be constructed at appropriate locations at either end of the local road. The parking bays would be of a sufficient size to allow for the "stacking" of a minimum of four HGVs at a time. Each parking bay would be manned by a traffic controller. The traffic controllers on each bay would be in radio contact with each other, when a stream of HGVs had safely passed along the length of the local road the traffic controller at the end of the road which the stream had just passed would release HGVs from

the bay under his control. Whilst this stream passed along the road the controller at the opposing end would "stack" HGV traffic into the bay under his control and vice versa.

A site visit was conducted by MM on 14th October 2009 to assess suitable locations for the proposed parking bays. It was noted that there was sufficient space within the confines of the existing site to cater for the "stacking" of HGVs on site. A potential location for the construction of a temporary parking bay immediately after the junction of the local road and the R733 was identified on agricultural lands located adjacent to the north-east of the affected section of local road.

A portion of land has been acquired and the construction of a parking bay at this location for the duration of the construction phase is anticipated. Figure 10.5 below outlines the proposed locations of the parking bays.

Figure 10.5: Location of Parking Bays



10.4 Summary Conclusion

This assessment identifies the existing, 2009, base traffic conditions at three critical junctions in the vicinity of the proposed development site at Great Island, Co. Wexford. The traffic conditions at these critical junctions have been assessed for the future year 2012 for two scenarios, the Do Nothing Scenario and the Do Something Scenario. The Do Something Scenario assigns the peak construction traffic associated with the development to the traffic carrying network. The analysis indicates that the junctions will operate within capacity in 2012 in the Do Nothing Scenario and also in the 2012 Do Something Scenario.

Pavement integrity testing has been carried out along the entirety of the 5 kilometre section of local road accessing the development site. The current AADT and percentage HGV content along with the

estimated construction and operational phase traffic volumes have been used to determine the quantum of remedial works required along the section of local road to achieve a twenty year residual life. A wet mix / clause 804 overlay varying between 150 to 200 mm has been suggested along the entire length of the local road which will result in an improvement to the structural strength of the existing access road.

Given that the width and alignment of the 5 kilometre section of local road accessing the development site is not sufficient to allow for two HGVs travelling in opposing directions to safely pass each other a traffic management plan has been developed. The traffic management plan proposed the installation of a parking bay at either end of the local road. Sufficient space has been allocated on the Great Island site for the operation of one of the said parking bays. A location for the construction of a temporary parking bay immediately after the junction of the local road and the R733 has been identified on agricultural lands located adjacent to the north-east of the affected section of local road. The acquisition of this portion of land has been negotiated with the affected land owner and the construction of a parking bay at this location for the duration of the construction programme is anticipated.

11. Human Beings – Noise and Vibration

11.1 Introduction

An environmental impact statement (EIS) must contain a description of the aspects of the environment that are likely to be significantly affected by the proposed development. This chapter of the EIS has been prepared in order to help fulfil this requirement with respect to noise and vibration in the area of the proposed development.

Local, regional and national policies and plans, best practice guidance and reports of relevance to the noise environment within, and in the vicinity of, the site of the proposed plant have been reviewed and appropriate information has been fed into Chapter 5 (Policy and Planning Context) and this assessment process.

Power plants are not considered to be a likely source of operational vibration which could give rise to nuisance or damage to properties. Construction of the facility is considered to be the only period where there could be any potential vibration impacts. Given the distance from the proposed location to the closest sensitive receptor (approximately 300 metres from the main gate or approximately 450 metres from the construction area) it is considered unlikely that any construction activity could cause a vibration impact at the sensitive receptors. Imperical studies indicate that vibration impacts from pile driving are typically not detected at distances greater than 100 metres (Hiller DM, Crabb GI, 2000). Therefore, vibration has been scoped out of the impact assessment.

11.2 Methodology

11.2.1 Guidance Used

The section presents the methodology used in assessing the potential noise impacts. As well as considering the relevant EPA guidance with respect to EISs (EPA 2002 and EPA 2003) the scope and methodology for the baseline assessment has been devised with reference to the following guidelines:

- Guidance Note for Noise In Relation To Scheduled Activities, 2nd Edition, 2006, EPA
- BS 4142 – Rating Industrial Noise Affecting Mixed Residential and Industrial Areas
- Guidelines for the Treatment of Noise and Vibration in National Road Schemes, 2004, The National Roads Authority
- British Standard BS 5228-1:2009 A Code of Practice for noise and vibration on construction and open sites – Part 1: Noise
- Advisory Leaflet 72 (1976) Noise control on building sites, UK Department of Environment
- Planning Policy Guidance Note PPG 24 Planning and Noise, UK DoE 1994

Currently noise monitoring is carried out on an annual basis as per Condition 8 of the sites IPPC licence (Reg. No. P0606-02) issued by the EPA. Noise Monitoring Locations (NML) chosen as part of

the licence condition have previously been agreed with the EPA as being representative of the receiving environment.

11.2.2 Study Area

Three NML have been identified as being representative of the surrounding environment and those Noise Sensitive Receptors (NSR) which could be impacted upon by the operation of the existing power plant. The locations are the nearest NSR to the north of the site and two locations in Cheekpoint on the opposite river bank to the south of the site. The NMLs are identified in Figure 11.1: Noise Contours Normal Contours at 1.8m height (refer to Appendix 11.3).

Descriptions of the NMLs are provided in Table 11.3, Description of Monitoring Locations and Noise Sensitive Receptors, and a summary of the results of the monitoring is presented in Table 11.4: Baseline Noise Level Summary dB Free-field. Details of this noise survey can be found in Section 11.3. Additional NSR to those identified in the current IPPC licence were included within the study area (five in total) to give a greater geographical spread. As noise impacts mitigate with distance, the noise sensitive receptors closest to the site were selected as the most appropriate locations to predict future noise levels.

11.2.3 Baseline Evaluation Criteria

The Environmental Protection Agency (EPA) has issued a licence to Endesa Ireland Limited for the "*production of combustion installations with a rated thermal input equal to or greater than 50MW*" – IPPC Licence P0606-02. The licence stipulates noise emission limit values, which state that daytime (08:00 – 22:00) and night-time (22:00 – 08:00) noise levels should not exceed the levels below at noise sensitive locations as a result of the activities on site:

Daytime	$L_{Aeq,30min}$	55dB(A) free-field
Night-time	$L_{Aeq,30min}$	45dB(A) free-field

Annual monitoring is carried out by the applicant / current operator to ensure compliance with these criteria

11.2.4 Impact Assessment Criteria

The source and type of all identified potential impacts is set out in Section 11.4. The mitigation measures that are defined for any potentially significant impacts are set out in Section 11.5. Any likely residual impacts are evaluated in terms of magnitude and significance in Section 11.6.

Magnitude

The magnitude of an impact is assessed in consideration of its intensity, and its extent in space and time. The criteria used to assess the magnitude of impacts from noise are shown in Table 11.1.

Table 11.1: Threshold Criteria for Evaluating the Effects of Noise during Construction

Criteria	Impact Magnitude
The permanent change is greater than or equal to 10dB	High
The permanent change is greater than or equal to 5dB	Medium
The permanent change is greater than 3dB	Low

Significance

The significance of all impacts is considered in consideration of the magnitude of the impact and the importance / sensitivity of the affected area. As the noise assessment is focused on human receptors and in particular those sensitive at night time, which are the most sensitive receptors, the significance of the impact is determined by the magnitude as any change in operational noise will be permanent. Construction noise impacts are anticipated to only impact upon the day time period and will only be experienced over a short period of time (mainly during the civil works phase and when construction traffic is high – anticipated to be approximately 12 months).

Construction

The construction phase of a development is often the period over which any potential for noise impact is greatest. There are difficulties in applying the same noise control measures to temporary construction activities (different phases and activities over the course of the construction project) as are applied to fixed and permanent installations or operations. The reasons for this are as follows:

- For construction work, noise control measures can be restrictive and could unreasonably prolong the site works and construction programme
- Works areas are not fixed and change according to the demands of the construction work
- Work, in the initial stages at least, is conducted outdoors without the benefits of fixed plant housing
- Mobile plant is used which limits the scope for noise control measures

The National Roads Authority's Guidelines for the Treatment of Noise and Vibration in National Road Schemes, 2004 is the only nationally issued Irish guidance available in relation to acceptable noise levels during construction. Advice and guidelines to local planning authorities and developers in the UK can be found in Planning Policy Guidance Note PPG 24 (DoE UK 1994), British Standard BS 5228 and Advisory Leaflet (AL) 72 (DoE UK). AL 72 is out of print, but is referred to in the discussion on the significance of construction noise in Annex E of BS5228-1: 2009 and remains as a paper giving guidance on acceptable levels of noise. PPG24 refers to the guidance in BS 5228 in respect of construction noise. These guidelines are considered as transferable and appropriate for construction projects in the Republic of Ireland and have been applied in several similar assessments.

DoE Advisory Leaflet (AL) 72 gives advice as to maximum levels of construction site noise to prevent conversation being difficult inside occupied buildings with windows closed, during daytime hours (07:00-19:00). The leaflet states that the noise level outside the nearest occupied room should not exceed:

- 75 dB(A) in urban areas near to main roads in heavy industrial areas; or
- 70 dB(A) in rural, suburban and urban areas away from main road traffic and industrial noise.

These levels are generally taken as being facade L_{Aeq} AL 72 also suggests that in the evening period a level of 10 dB(A) below daytime levels may be appropriate. BS 5228 Part 1 also reinforces the use of the levels described above as significant noise level thresholds.

The NRA guidance suggest that noise levels of 70 dB(A) L_{Aeq} between daytime hours (07:00-19:00) and 60 dB(A) L_{Aeq} between evening (19:00-22:00 hours) would be acceptable. The NRA guidance

also put forward levels for weekend and holiday periods as set out in Table 11.2 Threshold Criteria for Evaluating the Effects of Noise during Construction.

A summary of the relevant criteria for the assessment of the effects of construction noise is set out in Table 11.2. The noise levels set out are not aimed at providing noise limits for construction activities, but are the threshold criteria used for the assessment of construction noise effects. A night-time noise criterion level has been included. However, no night-time construction work is anticipated to be carried out, except in exceptional circumstances.

The criteria are based on the project team's experience of standard practice on a wide range of relevant projects. The approach that has been adopted in the assessment to determine the potential noise effect from construction activities compares predicted noise levels for each construction phase with the noise criteria in Table 11.2. In cases where predictions show that these criteria will be exceeded for more than very brief periods, a significant potential effect has been reported.

Table 11.2: Threshold Criteria for Evaluating the Effects of Noise during Construction

Period	Building/Location	Criteria for Assessment LAeq, 1 hour	Purpose
Daytime (0700 – 1900)	Dwellings/Offices (façade)	70 dB	To maintain speech intelligibility
	Schools	65 dB	To maintain speech intelligibility in classrooms
Evening (1900 – 2200)	Dwellings (façade)	60 dB	To avoid disturbance
Night-time (2200 – 0700)	Dwellings (façade)	45 dB	To avoid sleep disturbance
Saturday (08:00 - 16:30)	Dwellings (façade)	65 dB	To avoid disturbance
Sundays and Bank Holidays (08:00 - 16:30)	Dwellings (façade)	60 dB	To avoid disturbance

Increases in road traffic noise of 3 dB(A) or more have been considered potentially significant for construction traffic. Changes, that are only above the criterion by a small amount and which are likely to apply for a short period, have not been considered significant.

Operation

The power plant currently in operation on site is licensed by the Environmental Protection Agency (EPA) – IPPC Licence P0606-02. Noise emission limit values as outlined below have been stipulated in Condition 8 of the licence and are in line with the guidance issued by the EPA, Guidance Note for Noise In Relation To Scheduled Activities, 2nd Edition, 2006, which suggests that daytime (08:00 – 22:00) and night-time (22:00 – 08:00) noise levels should not exceed the levels below at noise sensitive locations:

Daytime	$L_{Aeq,30\ min}$	55dB(A) free-field
Night-time	$L_{Aeq,30min}$	45dB(A) free-field

The proposed Combined Cycle Gas Turbine (CCGT) power plant will have a capacity of approximately 430 MW for export to the national grid. The plant will operate principally as a base load plant, with a high annual factor, at or near 100% load during the weekday daytime hours and reduced load or shut down during the night and at weekends, when necessary.

As the plant is likely to operate during the night-time hours, the plant will have to be able to achieve the night-time criteria at full load. Therefore the primary assessment criteria will be:

$L_{Aeq,30min}$ 45dB(A) free-field

11.3 Baseline Description and Evaluation

11.3.1 Description

The Great Island power plant is located on the Co. Wexford coastline at the confluence of the River Suir and Barrow. The townland of Great Island is made up predominately of agricultural land with a number of scattered residential properties. Cheekpoint, to the south of the site on the opposite side of the river, is the closest town (C. 700M). Cheekpoint is a quiet tourist location with little traffic passing through it and surrounded by agricultural land.

In such rural settings the predominant noise sources are typically traffic, agricultural vehicles and associated activities. In this case the Great Island power plant is currently in operation and there are a number of industrial activities located at Waterford Harbour, 2 kilometres to the west of the site, so industrial noise currently forms a part of the environmental noise character of the wider area.

As required under Condition 8 of the IPPC licence the site carries out an annual noise survey. The monitoring locations are described in Table 11.3 below.

Table 11.3: Description of Monitoring Locations and Noise Sensitive Receptors

Ref.	Ref.	Location	Description
NML1	NSR 1	Last Bungalow on Approach Road to Station and in line of sight of the Station. Approx 300M from Main gate.	Station clearly audible. Occasional passing traffic and wildlife.
	NSR 2	Next bungalow north of NSR 1 on Approach Road to Station and in line of sight of the Station. Approx 400M from Main gate.	No baseline monitoring carried out at this point. The noise environment would be similar or the same as NML 1.
NML2		"Cheekpoint" on Coast Road 1/3 distance from Main Pier to old pier	Station clearly audible. Occasional passing traffic and wildlife.
	NSR 3 & 4	Residential properties to the west of this location were selected to be representative of NSR in the area.	No baseline monitoring carried out at these points. The noise environment would be similar or the same as NML 2.
NML3		"Cheekpoint" on "Board of Works" ground in line with Unit 3 Chimney	Station clearly audible. Occasional passing traffic and wildlife.
	NSR 5	Residential property to the east of NML 3 was selected to be representative of NSR in the area.	No baseline monitoring carried out at these points. The noise environment would be similar or the same as NML 3.

The information provided in the table above has been extracted from IPPC noise monitoring reports submitted to the EPA

11.3.2 Evaluation

The noise environment within the study area has been evaluated in consideration of the factors detailed above and the criteria detailed in Table 11.2. The results of this evaluation are shown in Table 11.4.

Table 11.4: Baseline Noise Level Summary dB Free-field

NML	Daytime Noise Levels 0800 – 2200 (dB)		Night-time Noise Levels 2200 – 0800 (dB)	
	LAeq	LA90	LAeq	LA90
2008				
1	50	42	41	36
2	44	37	41	35
3	42	38	45	37
2007				
1	44	41	47	43
2	41	36	41	36
3	41	38	45	39
2006				
1	45	38	39	36
2	39	35	38	35
3	43	38	38	36
2005				
1	39	-	36	33
2	45	43	44	41
3	48	46	47	45

The information provided in the table above has been extracted from IPPC noise monitoring reports submitted to the EPA

The plant was off load during the night time monitoring in 2007 and 2008, only Unit 3 was on load in 2006 (35 MW) and Unit 1 (27 MW), Unit 2 (27 MW) and Unit 3 (35 MW) were on load in 2005. The results and observations indicate that the plant is compliant with their licence conditions. Noise levels in the area, during both the day and night, are low due to the rural nature of the area. The station is clearly audible during all the day time samples and it is noted that all but one sample was at or below the night-time criteria of 45dB(A). The reason for the higher night-time levels measures at NML1 in 2007 are not known.

11.4 Identification of Potential Impacts

11.4.1 Construction

11.4.1.1 Construction Noise Prediction Methodology

Noise levels are predicted using the methods set out in British Standard 5228. Predictions are made based on indicative plant teams representing what are considered to be the noisiest phases of the works.

For specific construction activities the exact plant details will not be known prior to the detailed design and construction phase programming of the project. However, an indicative assessment has been undertaken by assuming a general plant team based upon experience of the activities required and discussions with the design engineers. Construction noise has been predicted for the 'worst-case' situation in each of the three phases of construction, as outlined in Table 11.5: Construction Phases, and is considered to be a snap-shot of concurrent construction activities where numerous construction plant items for multiple activities are operating simultaneously. Information on the expected construction schedule can be found in Chapter 3 (Description of the Development). Construction plant teams associated with relevant activities are summarised in Appendix 11.1 (Construction Plant Teams and Associated Sound Power Levels).

Predictions have been undertaken using the proprietary modelling software SoundPlan. Together with associated sound power levels for construction plant equipment, equivalent noise levels at receptors will also depend upon the expected percentage of usage or on-time, distance from the source, air and ground absorption, and any potential screening from buildings or topography. Location of construction equipment within the site for the noise assessment is based upon assumption of a typical case, where plants items are located arbitrarily, unless associated with a location-specific activity.

11.4.1.2 Predicted Noise Levels during Construction Phase and Impacts

Three phases, each considering concurrent construction activities, have been modelled and assessed. A summary of these three phases is shown below in Table 11.5. Construction Plant Teams and Associated Sound Power Levels are presented in Appendix 11.1.

Table 11.5: Construction Phases

Construction Phase	Concurrent Activities
1 – Site Clearance	Site Clearance Grading
2 – Civil Works	Excavation Piling Pouring Foundations
3 – Plant Installation	Backfilling Excavation Structural Steelwork

Noise levels for 'worst-case' scenarios in each of the three phases of construction have been predicted at the nearest NSR and are shown below in Table 11.6. Normal working hours during the construction period are expected to be Monday to Friday 0800 – 2000 and Saturday 0800 – 1700. Most of this work thus falls into the daytime noise assessment category. An hour of the daily duration of construction activities falls into the evening assessment period, and as such predicted noise levels have also been compared with this criterion. The evening criterion is a three hour averaged noise level, between 19:00 – 22:00. No night-time works are scheduled for the construction phase. Construction traffic will also exit the site during the evening period and will be assessed against this criterion.

Table 11.6: Predicted Unmitigated Construction Noise Levels

NSR	Location	Predicted Noise Level for Construction Scenario (LAeq, T dB, facade)			Exceedance of Daytime Construction Noise Criterion (dB)	Exceedance of Evening Construction Noise Criterion (dB)
		1	2	3		
NSR 1	**NML 1**	37	41	36	0	0
NSR 2	**Residential property just north of NSR 1**	37	40	37	0	0
NSR 3	**Residential Properties in Cheekpoint represented by NML 2 and 3**	50	50	48	0	0
NSR 4		47	48	46	0	0
NSR 5		50	50	49	0	0

Table 11.6 above indicates that no exceedance of the day-time or evening-time construction noise assessment criterion ($L_{Aeq,T}$ 70 dB and 60 dB) is predicted at the closest NSRs and consequently no impacts are expected at these or any other location.

Construction Traffic

During the 30 month construction period employees are anticipated to travel to and from the site by personal means. At its peak it is anticipated that there will be 500 people working on the site (month 15 of the construction period) which would equate to 400 light vehicle movements, assuming 1.25 persons per vehicle. Traffic movements associated with the construction personnel will occur primarily in the hour prior to construction starting and after construction ceases each day. In a worst case scenario 500 construction workers equating to 400 light vehicles would travel to the site. This would result in an increase in traffic volumes on the local road system and the larger local road, the R733, during the hours of 07:00 – 08:00 and 20:00 – 21:00. The magnitude of change in noise levels due to construction traffic would be greater than 5 dB(A).

The worst case scenario was modelled (400 vehicles) for the evening period of 20:00 – 21:00. The CRTN guidelines were followed and the results are predicted in terms of an L_{A10} noise level, whereas the evening noise criterion is in L_{Aeq}. Assumptions for the modelling were that vehicles travel at 50kph, on a bituminus road, with 0% gradient and there is soft ground between the road and receptor. It does not allow for any additional mitigation which may be obtained from road side ditches or walls which could reduce noise levels at particular receptors. To convert from L_{A10} to L_{Aeq} a generally accepted correction of -2dB was applied to the predicted noise levels.

Using the approach outlined above, the predicted noise level was calculated for each of the 30 months of construction. Indicative modelling demonstrates that the evening noise criteria of 60 dB(A) $L_{Aeq, 1\text{-hour}}$ would be exceeded from month 13 to month 18 (six months) of the construction phase due to the predicted increase in traffic volumes during one hour of the three hour evening period. The predicted levels, during the hour the construction traffic exit the site (20:00 – 21:00), were 61, 62, 63 62, 62, and 61dB L_{Aeq} respectively. As the magnitude of change from 60dB L_{Aeq} to 63dB L_{Aeq} is considered low and the period of six months is considered to be short term, the significance of this impact would be considered low.

If the noise levels are averaged over the three hour evening period, the average hourly L_{Aeq} would be below the criterion of 60dB(A) $L_{Aeq, 1\text{-hour}}$.

11.4.2 Operation

11.4.2.1 Noise Propagation Model

Propagation of noise from operation of the proposed CCGT plant was predicted using the proprietary modelling software SoundPlan. Noise predictions were made using this software according to guidelines specified in *ISO 9613-2: Attenuation of Sound Propagation Outdoors: General Method of Calculation, International Organisation for Standardisation, 1996*. This methodology considers the strength and size of the noise sources, screening effects due to local topography and intervening buildings, dispersion of sound energy over distance, and attenuation due to ground and air absorption.

Topographical data for the area of the proposed development has been supplied digitally, in the form of elevation contours and spot-heights. Buildings in the area are included in the model and have been identified through site visits, consultation with plant personnel and review of mapping information. Information on the site layout for the proposed power plant and auxiliary buildings is detailed in Chapter 3 (Description of the Development).

Noise source strengths for the proposed power plant items for the steady-state operation of the facility are summarised in Appendix 11.2 (Operational Plant, Noise Source Levels Used in Noise Prediction Model). Sound power levels for individual equipment were provided by a number of potential suppliers. These levels provide an accurate representation of the noise levels likely to be associated

with each plant item. As the area to the north of the development site consists primarily of agricultural land and to the south is water, appropriate soft and hard ground attenuation has been included for all predictions of noise at noise sensitive receptors.

11.4.2.2 Noise Impacts during the Operational Phase

Incorporation of the above information into the noise model has enabled predictions of operational noise levels at receptors to be made. Additionally, predicted operational noise contours have been produced to give an indication of the contribution of the proposed power plant to environmental levels. Table 11.7 summarises the predicted noise levels at the closest NSRs. Appendix 11.3 (Operational Plant Noise Contours) presents the predicted noise contours at 1.8 metres above ground level.

Table 11.7: Night time Operational Noise Levels at Receptors

NSR	Impact Assessment Criterion	Existing background night time levels	Predicted Level (LAr, T dB) arising from plant	Combined noise levels	Exceedance of Noise Criterion (dB)	Magnitude of change
1	45	43	39	45	0	+2
2	45	43	39	45	0	+2
3	45	43	40	45	0	+2
4	45	43	37	44	0	+1
5	45	43	38	44	0	+1

As can be seen from Table 11.7 the predicted noise levels from the operation of the plant are lower than the 45 dB(A) criterion. The predicted noise from the plant was added to the average existing background noise levels. The results indicate that the noise criterion will not be exceeded at any of the noise sensitive receptors and the predicted magnitude of change is low.

Operational Traffic

Traffic levels associated with the operation of the power plant are predicted to decrease marginally. Therefore, a positive but imperceptible impact will be experienced.

11.5 Mitigation Measures

11.5.1 Construction

As indicated by the noise modelling it is predicted that there will be no significant impact on the noise environment during the construction phase of the project as the impact assessment criteria is not normally exceeded. However, it is noted that the noise environment will change during this period as a result of increased traffic volumes. The implementation of a Construction Environmental Management Plan (CEMP) will ensure that good practice for construction will be used on site and is predicted to reduce noise levels even further. These practices include ensuring that:

- Plant will be used in an appropriate manner with respect to minimising noise emissions
- Inherently quiet plant will be selected where appropriate
- Local screening is used wherever practical and / or considered necessary to achieve the construction noise target
- Noisy plant will be located as far as possible from sensitive receptors

- Construction contractors will be required to adhere to the codes of practice for construction working given in British Standard BS 5228, and the guidance given therein, for minimising noise emissions from the site

- Construction contractors will be required to comply with the requirements of the European Communities (Construction Plant and Equipment) (Permissible Noise Levels) Regulations, 1988 as amended in 1990 and 1996 (S.I. No. 320 of 1988, S.I. No. 297 of 1990 and S.I. No. 359 of 1996), and the Safety, Health and Welfare at Work (Control of Noise at Work) Regulations, 2006 (S.I. No. 371 of 2006)

- Notification procedure to notify residents of particularly noisy activities

- The Traffic Management Plan will look at ways of minimising the potential impacts from construction traffic which could include reduced speed limits, car pooling, bus transfers or commitment to agreed driving behaviours on local roads

11.5.2 Operation

The operation of the power plant will be licensed by the EPA. Noise limits as described in Section 11.2.3 will be applicable to the site. As demonstrated in Section 11.4, predicted noise levels are not expected to exceed the noise assessment criteria at any of the noise sensitive receptors. Modelling of noise from the proposed power plant is based upon a conceptual layout and plant type. It is noted that screening has been incorporated around the HRSG to minimise potential noise impacts from the plant. During detailed design the noise model can be refined and detailed mitigation, if necessary, will be identified and incorporated into the design to ensure compliance with the required IPPC licence conditions.

11.6 Residual Impact

11.6.1 Construction Stage

Construction is likely to be audible in the vicinity of the development, although due to the temporary and transient nature of works, this will not result in any significant long term impacts. Construction traffic will result in a significant change in the noise environment but will not exceed the assessment criteria. No significant residual impacts are predicted to occur at the noise sensitive receptors.

11.6.2 Operational Phase

Predicted noise levels at the noise sensitive receptors during operation do not exceed the assessment criteria. As part of the detailed design process detailed modelling of the plant layout and operation will be carried out and will incorporate mitigation measures as necessary to ensure the criteria are met. No significant residual impacts are predicted to occur at the noise sensitive receptors.

11.7 Summary Conclusion

Power plants are not considered to be a likely source of operational vibration which could give rise to nuisance or damage to properties. Construction of the facility is considered to be the only period where there could be any potential vibration impacts. Given the distance from the proposed location to the closest sensitive receptor (approximately 300 metres from the main gate or approximately 450 metres from the construction area) it is considered unlikely that any construction activity could cause a vibration impact at the sensitive receptors. Imperical studies indicate that vibration impacts from pile driving are typically not detected at distances greater than 100 metres (Hiller DM, Crabb GI, 2000). Therefore, vibration has been scoped out of the impact assessment.

A noise impact assessment of the construction phase and operational phase of the project was completed. This assessment took into consideration the existing baseline noise environment and assessed the potential impacts against nationally and internationally accepted criteria and noise limits likely to be enforced by the EPA as part of the operational plants revised IPPC licence.

Construction is likely to be audible in the vicinity of the development, although due to the temporary and transient nature of works, this will not result in any significant long term impacts. Construction traffic will result in a significant change in the noise environment but will not exceed the assessment criteria. No significant residual impacts are predicted to occur at the noise sensitive receptors.

Predicted noise levels at the noise sensitive receptors during operation do not exceed the assessment criteria. As part of the detailed design process detailed modelling of the plant layout and operation will be carried out and will incorporate mitigation measures as necessary to ensure the criteria are met. No significant residual impacts are predicted to occur at the noise sensitive receptors.

12. Flora and Fauna

12.1 Terrestrial

12.1.1 Introduction

An environmental impact statement (EIS) must contain a description of the aspects of the environment that are likely to be significantly affected by the proposed development. This section of the EIS presents a terrestrial Ecological Impact Assessment (EcIA) of the proposed development.

The principal objectives of assessment are to identify the habitats and species present in the study area, determine their nature conservation value and assess and mitigate any impacts associated with the development. The terrestrial ecology surveys, conducted by Mott MacDonald Ireland Ltd. and Wildlife Surveys Ireland, were undertaken to identify habitats and species present within the development site and assess the potential impacts of the construction and operational phases of the proposed development on terrestrial flora and fauna.

An ecological assessment of the marine environment is provided in Section 12.2.

12.1.2 Methodology

12.1.2.1 Guidance Used

The ecological assessment was prepared in accordance with legislative requirements including *Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora,* commonly referred to as the Habitats Directive and *Council Directive 85/337/EEC on the assessment of the effects of certain public and private projects on the environment* and amended by *Council Directive 97/11/EC of 3 March 1997 amending Directive 85/337/EEC on the assessment of the effects of certain public and private projects on the environment*. These directives were transposed into Irish law by the Statutory Instruments (S.I.) No. 94/1997 - *European (Natural Habitats) Regulations 1997* and subsequent amendments, No. 349 of 1989 - *European Communities (Environmental Impact Assessment) Regulations, 1989*; S.I. No. 92 of 1999 - Local *Government (Planning and Development) Regulations, 1999*; S.I. No. 93 of 1999 - *European Communities (Environmental Impact Assessment) (Amendment) Regulations, 1999*.

This assessment was also conducted in accordance with the *Guidelines on the Information to be contained in Environmental Impact Statements* (Environmental Protection Agency, 2002), *Advice Notes on Current Practice in the Preparation of Environmental Impact Statements* (Environmental Protection Agency, 2003), *Guidelines for Assessment of Ecological Impacts of National Road Schemes* (National Roads Authority, 2006, 2009) and the Institute of Ecology and Environmental Management (IEEM) *Guidelines for Ecological Impact Assessment.*

The methodology for the assessment was based on the following:

- Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes (NRA, 2009)

- Guidelines for the treatment of otters prior to the construction of national roads schemes; (National Roads Authority, 2006)

- Best Practice Guidelines for the Conservation of Bats in the Planning of National Road Schemes; (NRA, 2006)

- Guidelines for the Treatment of Bats during the Construction of National Roads Schemes (NRA, 2006)

- Guidelines for Ecological Impact Assessment (National Roads Authority, 2006 and 2009)

- Guidelines for Ecological Impact Assessment (Institute of Ecology and Environmental Management (IEEM), 2008)

- A Guide to Habitats in Ireland (Fossit, 2000)

- Habitat Survey Guidelines: A Standard Methodology for Habitat Survey and Mapping in Ireland; (The Heritage Council, 2005)

12.1.2.2 Study Area

The proposed development is located at Great Island, County Wexford, on the eastern shore of the River Barrow and just north of the confluence of the River Barrow and River Suir. The extent of the survey area includes the development site and laydown area and a section of hedgerow along the access road to the site. The desktop study area encompassed a wider area up to 15 kilometres from the development site boundary. Figure 12.1: Designated Conservation Sites illustrates the extent of the desk-top study area identifying the location of designated conservation sites within a 15 kilometres radius of the proposed development site.

The generating station was constructed in the 1960s and the proposed development site for the new CCGT power station is located within the existing site, Grid Reference E 268907, N 114574. The study area comprises an area of recolonising bare ground, sewage treatment unit and storage buildings to the south of the site. In addition, a laydown area is proposed in the densely planted wooded area to the northeast of the site. A parking bay is also to be provided within private lands adjacent to the access road to the site (Refer to Figure 3.1) to facilitate movements of Heavy Goods Vehicles (HGVs) during the construction phase. It is intended to use the existing gates for entry and exit, however, for the purposes of this assessment it was assumed that hedgerows may be removed in part. In addition, a stacking area for HGVs has been identified within the site boundary of the power plant facility.

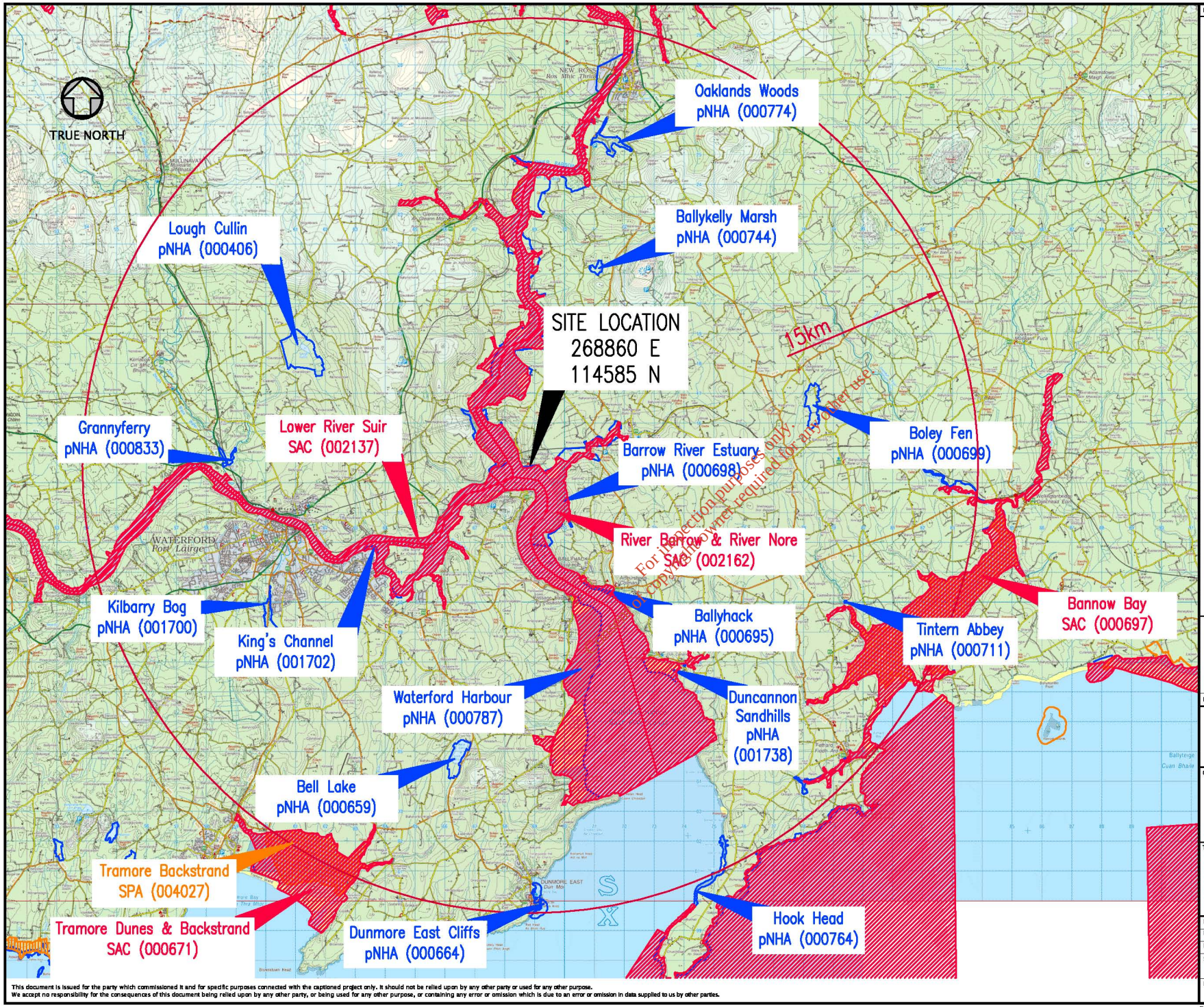
12.1.2.3 Desktop Study and Consultation

The desk study comprised consultation with relevant authorities. The National Parks and Wildlife Service (NPWS) database was researched to determine if any protected species occur on or in the vicinity of the site. Following a meeting between Endesa, ERM and NPWS on 25th June 2009, the NPWS requested that a bat and badger survey be conducted at the site.

The principal sources of information that were referred to include:

- The Wildlife Act 1976

- The Wildlife (Amendment) Act 2000



Notes

1. Ordnance Survey Ireland Licence No. EN0034509 ©Ordnance Survey Ireland/Government of Ireland
2. All co-ordinates shown in metres to Irish National Grid

- Natural Heritage Area (NHA)
- Proposed Natural Heritage Area (pNHA)
- Special Area of Conservation (SAC)
- Special Protection Area (SPA)

Rev	Date	Drawn	Description	Chk'd	App'd
P1	02/11/09	SK	For Information Only	BK	PK

Mott MacDonald

Mott MacDonald Ireland Ltd.
South Block, Rockfield,
Dundrum, Dublin 16,
Ireland
Tel +353 (1) 291 6700
Fax +353 (1) 291 6767
Web www.mottmac.com

Client

endesa ireland

Endesa Ireland Ltd.
5th Floor,
3 Grand Canal Plaza,
Grand Canal Street Upper,
Dublin 4,
Ireland
Tel +353 (1) 552 8300
Fax +353 (1) 552 8301

Title

Combined Cycle Gas Turbine (CCGT)
Great Island, Co. Wexford
Designated Conservation Sites

Designed	SK		Eng.Chk.	-	
Drawn	SK		Coordination	BK	
Dwg.Chk.	DH		Approved	PK	
Scale	NTS	Project	257554	Status	INF
		CAD file	Figure 12.1		
Drawing No	Figure 12.1			Rev	P1

- S.I. No. 94/1997, European (Natural Habitats) Regulations 1997 and subsequent amendments
- Curtis, T.G.F., McGough, H.N., *The Irish Red Data Book*, Wildlife Service Ireland, 1988
- S.I. 94 of 1999 Flora Protection Order 1999
- NPWS database and map viewer – www.npws.ie

12.1.2.4 Terrestrial Ecological Surveys

Field surveys, carried out to inform the ecological baseline assessment, are set out below. These surveys were undertaken in order to verify the information gathered during the desktop exercise and to identify, map and evaluate the habitats located within and adjacent to the proposed site. A terrestrial and botanical survey of the site was conducted on 22nd July 2009 and the area for the proposed parking bay was surveyed on 9th November 2009. A mammal survey was conducted on 4th and 5th August 2009.

Habitat and Flora Survey

The terrestrial habitat survey was conducted on 22nd July 2009. The survey was conducted during the flowering season which is the optimum period for botanical surveying. Weather conditions on the day of survey were generally good, with the occasional shower.

Habitats present were classified according to *A Guide to Habitats in Ireland* (Fossitt, 2000) and in accordance with *Draft Habitat Survey Guidelines: a Standard Methodology for Habitat Survey and Mapping in Ireland* (Heritage Council, 2005). Habitats within the survey area were mapped and the extent of each habitat was determined. The habitats or species of ecological interest are indicated on the habitat map (Figure 12.2: Habitat Map) by target notes, denoted by T (e.g. T1 – Target Note 1).

The flora present within the different habitats encountered is listed under the habitat category and Latin names are used at first mention. Flora listed in the Flora Protection Order (1999) and by Curtis and McGough (1988) in the *Irish Red Data Book* are of high conservation importance and when encountered the following records are made:

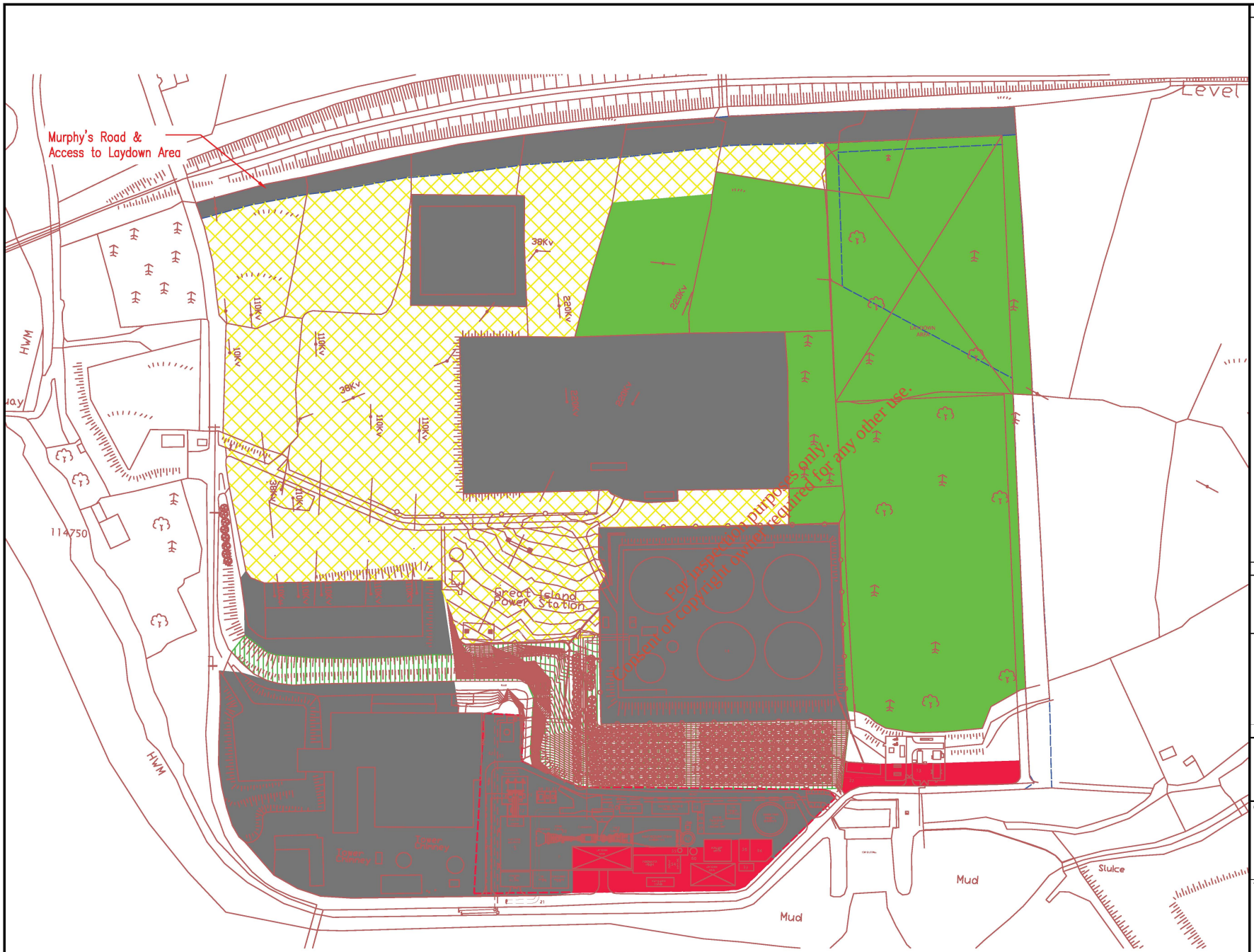
- Sketches illustrating the location of the species are drawn
- GPS co-ordinates recorded where possible
- Description of the population including an estimate of population size
- Habitat description qualifying the habitat extent, management regime and threats

Fauna Survey

Badger Survey

A walkover survey of the proposed construction site, laydown area and the R733 access road was conducted on 4th and 5th of August, 2009. Signs of badger activity were searched for.

Badger presence was determined by:



Notes

1. Ordnance Survey Ireland Licence No. EN0034509
   ©Ordnance Survey Ireland/Government of Ireland
2. All co-ordinates shown in metres to Irish National Grid
3. All site levels refer to mean sea level vertical datum at Malin Head
4. General site level is +6.60m OD

- GS1 Dry Calcareous & Neutral Grassland
- ED3 Recolonising Bare Ground
- BL3 Building & Artificial Surfaces
- WS2 Immature Woodland
- WD2 Mixed Broadleaved/Conifer Woodland
- Site Boundary
- Laydown Area

Scale:

Rev	Date	Drawn	Description	Ch'k'd	App'd

Mott MacDonald

Mott MacDonald Ireland Ltd.
South Block, Rockfield,
Dundrum, Dublin 16,
Ireland
Tel +353 (1)291 6700
Fax +353 (1)291 6747
Web www.mottmac.com

Client

endesa ireland

Endesa Ireland Ltd.
5th Floor,
3 Grand Canal Plaza,
Grand Canal Street Upper,
Dublin 4,
Ireland
Tel +353 (1)552 8300
Fax +353 (1)552 8301

Title

Combined Cycle Gas Turbine
Great Island, Co. Wexford

Habitat Map

Designed	SK		Eng.Chk.	-	
Drawn	SK		Coordination	DH	
Dwg.Chk.	DH		Approved	PK	
Scale 1:1250		Project 257554			Status INF
		CAD file Figure 12.2			
Drawing No Figure 12.2					Rev P1

1. The discovery of setts or structures likely to be setts (some animal burrows may require further checking to rule out (or confirm) as badger setts)

2. Badger tracks (and paw prints)

3. Badger digging

4. Badger dung

5. Discussions with staff encountered at the power plant

All hedgerow, drains, plantations of broadleaf and conifer and also built land within the Great Island site were examined for the presence of badger setts or other animal burrows. The hedgerows adjacent to the proposed parking bay were surveyed on the 9th November 2009.

Identified setts are normally considered in terms of the number of entrances, signs of activity, location relative to the construction area and laydown area and the likelihood of alternative setts in the vicinity.

Discussions with staff at the power plant included a question on the presence of badgers and other mammals and the most recent observations and sightings.

Bat Survey

All buildings on site were examined externally and, where possible, internally for evidence of bats. This included the rooftop area of the main generator building, a toilet block adjacent to the proposed construction area and a number of buildings in close proximity to the toilet block. Staff members were questioned regarding any incidents of bats entering buildings, being heard within buildings or being found within buildings.

A bat detector assessment commenced at 21:15 on August 4th 2009 and continued until 00.00 and re-commenced at 04.00 until 06.00 on August 5th 2009. The two surveyors chose two separate sites at which to commence the assessment. One surveyor was based at and around the buildings adjacent to the proposed power plant site. The second surveyor was positioned to the south east of the site, approximately 80 metres from the access road and proposed laydown area.

In addition bat activity was assessed from the perimeter of the trees to the east of the existing storage tanks and proposed laydown area (south-western corner), the roads leading to the power plant and along an access track to the north of the site, on the right of way made available to the neighbouring land owner and also along the woodland / plantation that will be partially cleared to make way for the laydown area.

Prior to dawn, all efforts were concentrated upon the structures that will be removed to make land available for the proposed power plant.

A QMC Mini 3 heterodyne bat detector and a Pettersson D240X bat detector were employed for the bat survey on August 4th and 5th, 2009. A 1 million candela light and an Olympus SP550UZ digital camera were also employed as well as Petzl headlamps.

Other Fauna

Otter

Signs of otters were sought in a similar fashion to badgers with most emphasis being placed on sites wherein paw prints might be preserved and along the estuarine shoreline. The study area was surveyed and otter prints and spraints were searched for.

The presence of other mammal species was determined both by examining for signs as for badgers and by visual scanning for the presence of mammals likely to be active by day and again at night. Fox and rabbit may be seen by day in addition to their signs being in evidence. They were also searched for at night using a 1 million candela lamp.

Species such as squirrel may be located occasionally by sight but more often by feeding signs such as stripped cones, hazelnuts, bark-stripping and by the presence of dreys.

Deer may be determined by hoof prints and less commonly by direct sighting. Generally evidence of deer is anecdotal and based on evidence from locals. However, the presence of deer was not of concern at the Great Island site.

Signs of fauna were recorded with an Olympus SP550UZ digital camera and images were edited with Microsoft Picture It 7.0 or Microsoft Office Picture Manager.

Survey Constraints

The habitat survey was undertaken during the flowering plant season, which is the optimum time for habitat and flora surveys and therefore no seasonal constraints were encountered.

The mammal survey was undertaken at a period of the year when bats are at their most active and when badger young are fully active and moving from the sett independently. It is not typically a period when setts are easily located given the density of vegetation cover. However, the nature of much of the site allows a more thorough examination than in most wooded sites.

The plantation (of broadleaved trees) is especially dense and has not been properly thinned to date. This ensures that undergrowth is particularly and atypically scarce. Passage through the wood was easy and it was possible to examine large tracts at any one transect through the wood.

There is one area within the proposed laydown area where a high tension cable cuts through the wood and where trees have consequently been cleared. This contains the densest undergrowth with almost unbroken bramble for the entire width of the wood. This is the only area within the proposed development area where it is impossible to be categorical on the presence or absence of badgers.

There are also areas along the existing track (along the edge of the right of way) that cannot be easily or thoroughly examined but these lie outside of the proposed construction area.

12.1.2.5 Baseline Ecological Evaluation Criteria

The existing ecological conditions are described and evaluated according to the NRA (2006) and in accordance with standard guidelines (EPA, 2002; IEEM, 2006). Table 12.1 below details the NRA evaluation scheme (NRA, 2009).

Table 12.1: Site Evaluation Criteria

Ecological Valuation	
Internationally Important	Sites designated (or qualifying for designation) as an SAC* or SPA* under the EU Habitats or Birds Directives; Undesignated sites that fulfil criteria for designation as a European Site; Features essential to maintaining the coherence of the Natura 2000 network; Sites containing 'best examples' of the habitat types listed in Annex I of the Habitats Directive; Resident or regularly occurring populations of birds listed in Annex I of the Birds Directive and species listed in Annex II and/or Annex IV of the Habitats Directive; Ramsar Site; World Heritage Site; Biosphere Reserve; Site hosting significant species populations under the Bonn Convention; Site hosting significant populations under the Berne Convention; Biogenetic Reserve; European Diploma Site; Salmonid water.
Nationally Important	Sites or waters designated or proposed as an NHA*; Statutory Nature Reserve; Refuge for fauna and flora protected under the Wildlife Acts; National Park; Undesignated sites fulfilling criteria for designation as a NHA; Statutory Nature Reserve; Refuge for Fauna and Flora protected under the Wildlife Act and/or a National Park; Resident or regularly occurring populations (assessed to be important at the national level) of species protected under the Wildlife Acts and/or species listed on the relevant Red Data list; Site containing viable areas of the habitat types listed in Annex I of the Habitats Directive.
County Importance	Areas of Special Amenity; Area subject to a Tree Preservation Order; Area of High Amenity, or equivalent, designated under the County Development Plan; Resident or regularly occurring populations (assessed to be important at the County level) of species of birds listed in Annex I of the Birds Directive, species listed in Annex II and/or IV of the Habitats Directive, species protected under the Wildlife Acts and/or species listed on the relevant Red Data list; Site containing area(s) of the habitat types listed in Annex I of the Habitats Directive that do not fulfil criteria for valuation as of International or National Importance; County important populations of species, or viable area of semi-natural habitats or natural heritage features identified in the National of local BAP; Sites containing semi-natural habitat types with high biodiversity in a county context and a high degree of naturalness, or populations of species that are uncommon within the county; Sites containing habitats and species that are rare or are undergoing a decline in quality or extent at a national level.
Local Importance (higher value)	Locally important populations of priority species or habitats or natural heritage features identified in the Local BAP; Resident or regularly occurring populations (assessed to be important at the Local level) of species of birds listed in Annex I of the Birds Directive, species listed in Annex II and/or IV of the Habitats Directive, species protected under the Wildlife Acts and/or species listed in the relevant Red Data list; Sites containing semi-natural habitat types with high biodiversity in a local context and a high degree of naturalness, or populations of species that are uncommon in the locality; Sites or features containing common or lower value habitats, including naturalised species that are nevertheless essential in maintaining links and ecological corridors between features of higher ecological value.
Local Importance (lower value)	Sites containing small areas of semi-natural habitat that are of some local importance for wildlife; Sites of features containing non-native species that are of some importance in maintaining habitat links.

Source: *Guidelines for Assessment of Ecological Impacts in National Road Schemes* (NRA, 2009)

*SAC = Special Area of Conservation; SPA = Special Protection Area; NHA = Natural Heritage Area.

12.1.2.6 Impact Assessment Criteria

The significance of the potential impacts on the receiving environment are discussed in Section 12.1.4 according to the *Criteria for assessing significance of impacts,* NRA (2006) as detailed in Table 12.2. Mitigation measures are proposed in Section 12.1.5 to avoid, reduce or compensate for the impacts identified and any residual impacts are discussed in Section 12.1.6.

Table 12.2: Impact Assessment Matrix

Impact Level	A Sites Internationally Important	B Sites Nationally Important	C Sites High Value, Locally Important	Sites Moderate value, Locally Important	E Sites Low Value, Locally Important
Severe Negative	Any permanent impacts	Permanent impacts on a large part of a site.	-	-	-
Major Negative	Temporary impacts on a large part of a site	Permanent impacts on a small part of a site	Permanent impacts on a large part of a site	-	-
Moderate Negative	Temporary impacts on a small part of a site	Temporary impacts on a large part of a site	Permanent impacts on a small part of a site	Permanent impacts on a large part of a site	-
Minor Negative	-	Temporary impacts on a small part of a site	Temporary impacts on a large part of a site	Permanent impacts on a small part of a site	Permanent impacts on a large part of a site
Neutral	No Impacts	No Impacts	No Impacts	No Impacts	Permanent impacts on a small part of a site
Minor Positive	-	-	-	Permanent beneficial impacts on a small part of a site	Permanent beneficial impacts on a large part of a site
Moderate Positive	-	-	Permanent beneficial impacts on a small part of a site	Permanent beneficial impacts on a large part of a site	-
Major Positive	-	Permanent beneficial impacts on a small part of a site	Permanent beneficial impacts on a large part of a site	-	-

Source: *Guidelines for Assessment of Ecological Impacts in National Road Schemes* (NRA, 2006)

12.1.3 Baseline Description and Evaluation

The NPWS database was accessed for information on rare species and designated conservation sites. The proposed development site is partially contained within the Barrow River Estuary proposed Natural Heritage Area (pNHA) and to the south is the River Barrow and River Nore Special Area of Conservation (SAC). Figure 12.1: Designated Conservation Sites illustrates the location of conservation sites within a 15 kilometre radius of the site. A brief description of each of the sites within this radius is presented below and full site synopses are provided in Appendix 12.1 (Designated Conservation Sites – Site Synopses). The distance from the proposed development site to the

designated conservation sites are detailed in Table 12.3. There are no records of protected species from within the proposed development site.

Table 12.3: Distance to Designated Conservation Sites

Designated Conservation Site	Distance (km)	Designated Conservation Site	Distance (km)
Barrow River Estuary pNHA	0.0	Boley Fen pNHA	9.5
River Barrow and River Nore SAC	0.04	Tramore Dunes and Backstrand SAC	13.0
Lower River Suir SAC	1.1	Tramore Backstrand SPA	13.0
Ballykelly Marsh pNHA	6.7	Tintern Abbey pNHA	11.4
Lough Cullin pNHA	7.6	Oaklands Woods pNHA	10.8
King's Channel pNHA	6.1	Dunmore East Cliffs pNHA	14.0
Ballyhack pNHA	4.1	Hook Head pNHA	14
Duncannon Sandhills pNHA	7.6	Kilbarry Bog pNHA	9.5
Belle Lake pNHA	9.4	Grannyferry pNHA	9.9
Waterford Harbour pNHA	4.6	Bannow Bay SAC Bannow Bay pNHA Bannow Bay SPA	11.1 13.2 11.5

Barrow River Estuary pNHA (Site Code: 000698)

The tidal river and estuary supports populations of the protected (EU Habitats Directive 92/43/EEC) Twaite Shad (*Alosa fallax fallax*) which spawn in selected areas. Along the mid and southern side of the estuary, saltmarshes and saltmeadows have developed on the sediment which has accumulated at the mouths of incoming streams and inlets. The Rare plant species Divided Sedge (*Carex divisa*) was considered extinct in Ireland until 1990 when it was recorded from several sites along the Barrow estuary.

Borer's Salt-marsh Grass (*Puccinellia fasciculata*), a species legally protected under the Flora Protection Order is found within the site. Meadow Barley (*Hordeum secalinum*), occurs at several locations on this site. At the northern end of the site the legally protected Nettle-leaved bellflower (*Campanula trachelium*) is found in two locations.

The Lower River Barrow is a regionally important site for wintering wildfowl and waders. Peregrine falcon (*Falco peregrinus*), a species listed in Annex 1 of the EU Birds Directive and in the Red Data Book as being threatened in Ireland, breeds within the site (West side).

River Barrow and River Nore SAC (Site Code: 002162)

The site is a candidate SAC selected for alluvial wet woodlands and petrifying springs, priority habitats on Annex I of the E.U. Habitats Directive. The site is also selected as a candidate SAC for old oak woodlands, floating river vegetation, estuary, tidal mudflats, *Salicornia* mudflats, Atlantic salt meadows, Mediterranean salt meadows, dry heath and eutrophic tall herbs, all habitats listed on Annex I of the E.U. Habitats Directive. The site is also selected for the following species listed on Annex II of the same directive - Sea Lamprey, River Lamprey, Brook Lamprey, Freshwater Pearl Mussel, Nore Freshwater Pearl Mussel, Crayfish, Twaite Shad, Atlantic Salmon, Otter, Desmoulin's Whorl Snail *Vertigo moulinsiana* and the Killarney Fern.

Lower River Suir SAC (Site Code: 002137)

The site is a candidate SAC selected for the presence of the priority habitats on Annex I of the E.U. Habitats Directive - alluvial wet woodlands and Yew Wood. The site is also selected as a candidate SAC for floating river vegetation, Atlantic salt meadows, Mediterranean salt meadows, old oak

woodlands and eutrophic tall herbs, all habitats listed on Annex I of the E.U. Habitats Directive. The site is also selected for the following species listed on Annex II of the same directive - Sea Lamprey, River Lamprey, Brook Lamprey, Freshwater Pearl Mussel, Crayfish, Twaite Shad, Atlantic Salmon and Otter.

Ballykelly Marsh pNHA (Site Code: 000744)

This site combines an arable field with a high quality wetland site. The arable field contains a rare arable weed community including the protected flora species *Fuckria elatine*. Adjacent to this field is a small species rich lake and fen area. Such small wetlands are characteristic of the South-East of Ireland but are decreasing rapidly due to drainage and land reclamation.

Lough Cullin pNHA (Site Code: 000406)

Lough Cullin is the only natural lake in south Kilkenny and occupies a low-lying depression 6 kilometres north of Waterford. Generally the area consists of wet grassland. The main interest of the site lies in its flowering plants some of which are rare in the Kilkenny and Waterford region. There is also a high population of snipe in winter as well as smaller numbers of curlew, lapwing and mallard. In summer, sedge warbler and reed bunting breed.

King's Channel pNHA (Site Code: 001702)

King's Channel is an offshoot of the Suir Estuary below Waterford which surrounds the triangular Little Island. It is relatively deep and at low water retains a broad channel between mudbanks. The channel itself is not of significant interest except to a few cormorant and other seabirds but the southern shore is lined in places by a flat saltmarsh. The saltmarsh is best developed in Grantstown north east of St. Thomas's Church where there is a nice sequence of communities up from the channel.

Ballyhack pNHA (Site Code: 000695)

Ballyhack encompasses, in a small area, a variety of habitats which are not frequent in south-east Ireland. The site is also rich in species and contains one of only two stations known for the Clustered Clover in the country.

Duncannon Sandhills pNHA (Site Code: 001738)

This site is one of a series of sites on the estuary of the River Barrow which demonstrates a variety of coastal types. The Duncannon Sandhills site comprises Duncannon Strand and the freshwater marsh in the valley to the east in Shanacloon Townland. Wild Sage (*Salvia verbenaca*), a rare species listed in the Irish Red Data Book is found in the dunes.

Belle Lake pNHA (Site Code: 000695)

The south east of Ireland has comparatively few lakes; Belle Lake is one of the larger of them. It is an attractive lake which lies at about 50 metres above sea level, 7 kilometres south east of Waterford city. The water of the lake is clear and quite rich in calcium, which makes the occurrence of two rare aquatic plant species; Quillwort, (*Isoetes lacustris*) and Waterwort (*Elatine hexandra*) all the more notable. The lake is used by regionally important numbers of Whooper swan. This is one of the few extensive water bodies in south east Ireland and as such is of great importance within the region. It has a varied aquatic and wetland flora that is of scenic as well as scientific interest.

Waterford Harbour pNHA (Site Code: 000787)

This site is of conservation importance for the extensive and good quality intertidal sand and mudflats, a habitat listed under Annex I of the EU Habitats Directive.

The shore itself is generally stony and backed by low cliffs of glacial drift. At Woodstown there is a sandy beach, now much influenced by recreation pressure and erosion. Behind it, a lagoonal marsh has been impounded which runs westwards from Gaultiere Lodge along the course of a slow stream. An extensive reedbed occurs here into which willows (*Salix* spp.) are slowly spreading. This area supports populations of typical waterbirds including Mallard, Snipe, Sedge Warbler and Water Rail. The intertidal habitats are used by important numbers of wading birds during winter, as well as by small numbers of wildfowl. The populations of Oystercatcher (939), Lapwing (2,141) and Bar-tailed Godwit (216) are of national importance (figures are for winter 1994/95 to 1996/97). Other species which occur include Golden Plover, Sanderling, Dunlin, Black-tailed Godwit, Curlew and Redshank.

Boley Fen pNHA (Site Code: 000699)

Boley Fen is located at Rathumney, approximately 5 kilometres east of Campile. It comprises intermediate fen with wet grassland and tall sedge (*Carex* spp.) communities with encroaching scrub, mainly willows (*Salix* spp.). Areas of the site have been afforested.

The site is of interest due to its location; fens are uncommon in south east Ireland. More importantly, it is noted as nationally important for the following rare species of Diptera (flies): *Anasimyia lunulata, Psacadina zernyi, Parhelophilus consimilis, Pteromicra angustipennis* and *Tetanocera punctifrons*.

Tramore Dunes and Backstrand SAC (Site Code: 000671)

Tramore is of major ecological importance for the range of good quality coastal habitats which occur, including fixed dunes, which are listed as a priority habitat on Annex I of the European Habitats Directive. Salt marsh, another habitat on Annex I of the EU Habitats Directive, is well developed and fairly extensive in the sheltered inner part of the site. It is the lagoon type of salt marsh, which is the rarest type in Ireland. The intertidal mud flats and sand flats are another important habitat listed on Annex I of the EU Habitats Directive. Several rare plants have been recorded from Tramore. It is the only site in the country where the Red Data Book plant Sea Knotgrass (Polygonum maritimum) has grown, though it is sporadic in appearance. Other Red Data Book species which have been reported include Lesser Centaury (Centaurium pulchellum) and Cottonweed (Otanthus maritimus), both of which are listed on the Flora (Protection) Order, 1999. The site has a remarkably rich flora, featuring a number of rare and protected species, and the intertidal area is important for wintering waterfowl.

Tramore Backstrand SPA (Site Code: 004027)

The Back Strand is an important site for wintering waterfowl, providing both feeding and roosting areas. Of particular importance is that the site supports an Internationally Important population of Brent Geese (393). A further seven species occur in Nationally Important numbers: Golden Plover (2,924), Grey Plover (299), Lapwing (3,308), Dunlin (1,723), Sanderling (46), Black-tailed Godwit (289) and Bar-tailed Godwit (367). The regular occurrence of Little Egret, Golden Plover and Bar-tailed Godwit is of particular note as these are listed on Annex I of the E.U. Birds Directive.

Bannow Bay SAC, SPA and pNHA (Site Code: 000697)

Bannow Bay is a relatively large estuarine site, approximately 14 kilometres long, on the south coast of Co. Wexford. Eleven coastal habitats listed on Annex I of the E.U. Habitats Directive occur within the site. The estuary, including the saltmarshes, makes up approximately 83% of the site. Salt

marshes of exceptional species diversity and rarity are found above the sand and mudflats, particularly at the south of the site. Halophilous scrub, another Annex I habitat, occurs in four of the larger saltmarsh areas. It is characterised by the presence of the legally protected plant Perennial Glasswort (*Arthrocnemun perenne*) which occurs in only a few sites in the country.

A mosaic of sand dune habitats which are listed on Annex I of the E.U. Habitats Directive occur in three areas at the edge of the estuary. Embryonic shifting dunes and White dunes are present and the priority habitat fixed grey dune is also present. Most of the estuary has been designated a Special Protection Area (SPA) under the E.U. Birds Directive, because of its significant bird interest, particularly during the winter. Parts of this area have also been designated a Wildfowl Sanctuary. There are large numbers of wintering wildfowl and waders who feed on the mudflats and sandflats and use the fringing vegetation of reedbed and saltmarsh for roosting and feeding. The site is of considerable conservation significance for the large number of E.U. Habitats Directive Annex I habitats that it contains, including the priority habitat fixed grey dune. The legally protected Red Data Book plant species Perennial Glasswort also occurs. The site is also an SPA because of the important numbers of wintering wildfowl it supports, including an internationally important population of Light-bellied Brent Goose.

Oaklands Woods pNHA (Site Code: 000774)

The site is a mixed coniferous and deciduous wood located approximately 2 kilometres south of New Ross.

Oak (Quercus spp.) is the dominant species in parts of these woods, although coniferous species have been widely planted. Beech (Fagus sylvatica) also occurs and is regenerating. The trees reach about 15 m and create a closed canopy above abundant Holly (Ilex aquifolium). The site is of interest as it is a representative area of broadleaved woodland and associated flora.

Dunmore East Cliffs pNHA (Site Code: 000664)

Sandstone cliffs surround Dunmore East harbour rising to 20 - 30 metres in places. All these cliffs are listed because they are nesting colonies of a large population of Kittiwake. There are between 1000 - 2000 nests grouped closely on vertical parts of the cliffs.

Hook Head pNHA (Site Code: 000764)

The site of conservation interest at Hook Head comprises an area of marine subtidal reefs to the south and east of the Hook Head Peninsula and includes the sea cliffs from Hook Head to Baginbun and Ingard Point. Hook Head itself is composed of Carboniferous limestone overlain by Devonian Old Red Sandstone and is palaeontologically of international importance. The site contains three habitats listed under the EU Habitats Directive, i.e. large shallow inlets and bays, reefs and sea cliffs. In summary, this site is of conservation importance for its subtidal reef and shallow bay communities, and their diversity of species, as well as for the vegetated sea cliffs. These habitats are listed under the EU Habitats Directive. The rocky coastline is also important for breeding Ravens, Choughs and Peregrines. The latter two are listed on Annex I of the EU Birds Directive.

Kilbarry Bog pNHA (Site Code: 001700)

Kilbarry Bog is the only remaining wetland of its type of significance in the vicinity of Waterford City; it supports a variety of wetland vegetation types and plant species; it is the site of records for the scarce Summer Snowflake; it supports a good diversity of birds, including an important breeding population of Reed Warbler; a range scarce invertebrate species has been recorded from the site.

Grannyferry pNHA (Site Code: 000833)

This site consists of reedswamp, marshes and wet fields with a salt influence which declines from south to north. At the southern end there are saltmarsh communities. There is also a little Meadow Barley (*Hordeum secalinum*) which is now a protected species because of its marked decline this century, caused by drainage and grassland improvement. Small numbers of Mallard and Water Rail occur within the area and in summer there are, most probably, Sedge Warbler and Reed Bunting nesting.

Tintern Abbey pNHA (Site Code: 000711)

A nursery colony of whiskered bats (Myotis mystacinus) were recorded in the roof of a building in the grounds of Tintern Abbey in 1987. As the national population of this species is only several hundred, all nursery colonies are of national importance.

NPWS Records of Protected Species:

Records of protected flora were identified from the NPWS map viewer. In the 10 kilometres grid in which the proposed development site is located, S61, there are ten records for Meadow Barley (*Hordeum secalinum*), one record for Opposite Leaved Pondweed (*Groenlandia densa*), one record for Tufted Salt-marsh Grass (*Puccinellia faciculata*) and two records for Betony (*Stachys officinalis*). The closest record for a protected species is for Meadow Barley at Fisherstown.

12.1.3.1 Habitat Survey

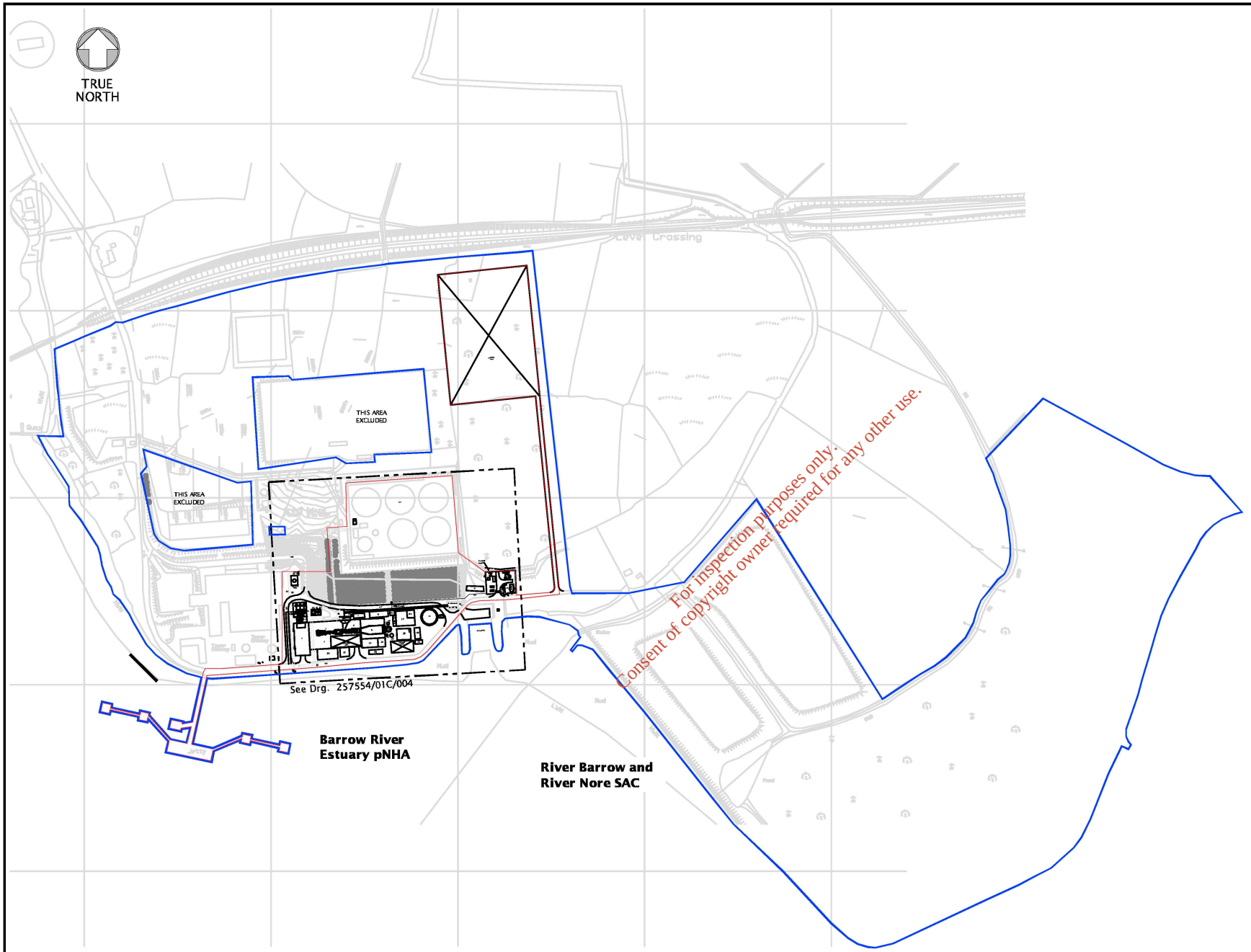
Figure 12.2, Habitat Map, illustrates the habitats present within the site. No protected or rare species were identified within the site during the survey.

An area of ground on the southern section of the Great Island site is contained within the Barrow River Estuary pNHA. This section of the site consists of reclaimed land from the estuary, which was reclaimed circa 1966 when the original plant was constructed. The site of the proposed CCGT consists of a number of existing built structures and paved areas and an area of recolonising bare ground. This area is not of any conservation value and no terrestrial habitats of ecological value are present.

Following discussions with NPWS it is understood that the proposed designation relates to a historical mapping issue whereby the old shoreline boundary, prior to the area being reclaimed, was incorporated into current maps. NPWS has therefore advised that they have no reason to secure designation of this area of land. Figure 12.3, Proposed Development Site, illustrates the location of the proposed development site (red line boundary) and ownership boundary (blue line boundary). Figure 3.4, Existing Site layout (Chapter 3 - Description of the Development), illustrates the existing structures and paved areas within the proposed development site.

Recolonising Bare Ground (ED3)

Plate 1 illustrates the area of recolonising bare ground. Species present in this area include small patches of willow herb (*Epilobium montanum*), scarlet pimpernel (*Anagallis arvensis*), yellow wort (*Blackstonia perfoliata*), hawkbit (*Leontodon autumnalis*) and thistles (*Cirsium* spp.). This area is evaluated as *Low Value, Locally Important* (refer to Table 12.1: Site Evaluation Criteria).



Notes

1. ORDNANCE SURVEY IRELAND LICENCE NO. EN0034509 © ORDNANCE SURVEY IRELAND/GOVERNMENT OF IRELAND
2. ALL CO-ORDINATES SHOWN RELATE TO IRISH NATIONAL GRID CO-ORDINATES.
3. ALL SITE LEVELS REFER TO MEAN SEA LEVEL VERTICAL DATUM AT POOLBEG.
4. GENERAL SITE LEVEL IS +7.00M O.D.

Legend:

Development Site Boundary

Site Ownership Boundary

Scale:

1:2500 0 125m 250m

Rev	Date	Drawn	Description	Ch'k'd	App'd
P7	11/11/09	AV	Issued with Planning Application	KMcC	DMcR
P6	05/11/09	AV	Revised as per Endesa Comments	KMcC	DMcR
P5	13/10/09	AV	Revised as per Endesa Comments	KMcC	DMcR
P4	22/10/09	AV	Revised as per Endesa Comments	KMcC	DMcR
P3	30/09/09	AV	Revised as per Endesa Comments	DC	DMcR
P2	28/08/09	AV	Issued for Approval	DC	DMcR
P1	30/07/09	VF	Issued for Approval	DC	DMcR

Mott MacDonald

Mott MacDonald Ireland Ltd.
South Block, Rockfield,
Dundrum, Dublin 16,
Ireland

Tel +353 (1) 291 6700
Fax +353 (1) 291 6742
Web www.mottmac.com

Client

endesa ireland

Endesa Ireland Ltd.
5th Floor,
3 Grand Canal Plaza,
Grand Canal Street Upper,
Dublin 4,
Ireland

Tel +353 (1) 552 8300
Fax +353 (1) 552 8301

Title

Combined Cycle Gas Turbine
Great Island, Co. Wexford

Development Site Boundary

Designed	D. McRandal		Eng.Chk.	D. Carr	
Drawn	C. Cunningham		Coordination	D. McRandal	
Dwg.Chk.	C. Cunningham		Approved	D. McRandal	

Scale 1:2500 | Project 257554 | CAD file Figure 12.3 | Status APR

Drawing No Figure 12.3 | Rev P7

Filename: Figure 12.3.dwg, Plotted by kmc40313, on Nov 25, 2009 - 8:56pm

Plate 1 Recolonising Bare Ground

Buildings and Artificial Surfaces (BL3)

To the south of the area of recolonising bare ground is a road and located to the west are a number of buildings and paved areas (see Plate 2). Buildings and artificial surfaces are not of ecological importance.

Plate 2 Buildings and Artificial Surfaces

Immature Woodland (WS2)

To the north east of the site, the proposed laydown area consists of mixed beech and sycamore woodland (see Plate 3). This area was planted heavily at 2 metre intervals. The canopy is dense and the ground layer generally consists of leaf litter.

Occasional openings in the canopy give rise to an understorey of ground ivy (*Glechoma hederacea*), lesser celandine (*Ranunculus ficaria*), and bracken (*Pteridium aquilinum*) and nettle (*Urtica dioica*).

The biodiversity of this planted woodland area is quite low, due to the reduced ground flora present in the woodland and is therefore evaluated as *Lower Value, Locally Important*.

Plate 3 Beech and Sycamore Woodland

Adjacent Habitats

The surrounding land use is agricultural. To the north and east of the site, improved grassland and arable lands predominate. To the south of the site is the River Barrow estuary. To the north of the site there are fields of neutral grassland and improved agricultural grassland.

As part of the works, a parking bay will be required along the access road to the site. The location of this parking bay is illustrated on Figure 3.1. The habitats present along this section of the road include hedgerows and grassy verges.

The hedgerow is composed of bramble (*Rubus fruticosus* agg.), bracken (*Pteridium aquilinum*) and blackthorn (*Prunus spinosa*).

The grasses present along the verge include false oat grass (*Arrhenatherum elatius*), Yorkshire fog (*Holcus lanatus*), bents (*Agrostis* spp.), cocksfoot (*Dactylis glomerata*) and sweet vernal grass (*Anthoxanthum odoratum*). Broadleaved species include hogweed (*Heracleum sphondylium*), nettle (*Urtica dioica*), dock (*Rumex* spp.), sorrel (*Rumex acetosa*), creeping buttercup (*Ranunculus repens*), kidney vetch (*Anthyllis vulneraria*), bloody cranesbill (*Geranium sanguineum*), clover (*Trifolium* spp.), hawkbit (*Leontodon autumnalis*), hedge woundwort (*Stachys sylvatica*), herb robert (*Geranium robertianum*), thistles (*Cirsium* spp.), knapweed (*Centaurea nigra)*, cleavers (*Galium aparine*), hedge bindweed (*Calystegia sepium*).

Hedgerows and grassy verges are important wildlife corridors and provide food and shelter for a variety of small mammals and bird species and are evaluated as being of local importance.

12.1.3.2 Mammal Surveys

Mammal surveys were conducted at the proposed construction site, laydown area and the R733 access road on 4th and 5th of August, 2009.

Badger Survey

Badger signs were not identified anywhere in or around the power plant and proposed development site. No badger signs were identified within the proposed laydown area, however, one area of scrub

within the laydown area was not accessible. This area of scrub was examined on either side and was devoid of any evidence of badgers.

No evidence of badgers was identified in the road leading from the R733 to the power plant. One track that was examined was noted to contain dog paw prints, shoe prints and livestock prints (a cow hoof print).

Otter Survey

There was no evidence of otters within the proposed development site or in the adjacent lands examined. The river to the south is a feeding site but this is outside the construction area.

Bat Survey

Roosting Bats

No bat roosts were identified within the proposed development site during the survey.

A single common pipistrelle record was noted prior to dawn at 04:15 commuting through the proposed construction area. The destination of this bat was unclear but was outside of the site of the proposed development.

Bat Feeding Activity

The most commonly encountered bat species feeding in and around the site was the common pipistrelle. This bat was noted feeding to the southeast of the site at the gate leading to the capped landfill area, along the woodland edge within and outside of the proposed laydown area footprint as well as along this entire track and along the R733 leading to the main gate (refer to Figure 12.4: Mammal Activity and Signs*)*.

Less abundant within and around the site was the soprano pipistrelle. There were two encounters with this species; once in the south-western corner of the power plant lands and once along the woodland edge along the perimeter of the laydown area.

Equally infrequent were records of the third and final species; Leisler's bat. This bat was first heard at 22:10 above the point where the internal road through the power plant site crosses the cooling water output channel. It was heard at 22:15, 150 metres to the east of this point towards the south east of the site. Finally, a Leisler's bat was heard at 22:58 feeding towards the north-eastern corner of the storage tanks.

Leisler's bats entered into the site relatively late as this species would have emerged in most circumstances prior to 21:30. As this is a rapid flier, it is possible that this bat arrived from several hundred metres to several kilometres from the site.

Overall, there was low bat activity around the power plant with higher levels of activity along the woodland edge and the roadways, including close to the main entrance.

There were no bats roosting within the site and no evidence of roosts in recent days or weeks.

Other Fauna

Fox scats were noted within the laydown area. Fox scent marking was detectable in several places within the wood and a fox was seen at 22:45 on August 4th within the wood.

A fox track leading under a fence into the power plant was identified and a fox hair was retrieved from the fence. Digging in the woodland was also attributable to foxes.

There are a number of rabbit warrens within the wood and rabbits were abundant in the area adjoining the right of way and the main road through the power plant (refer to Plate 4).

A young hedgehog was noted to the east of the proposed construction site at 04:30 on August 5th 2009. This is a widespread and common species. The individual was repeatedly in close proximity to the Condenser Cooling Water pond and was at risk of falling into this.

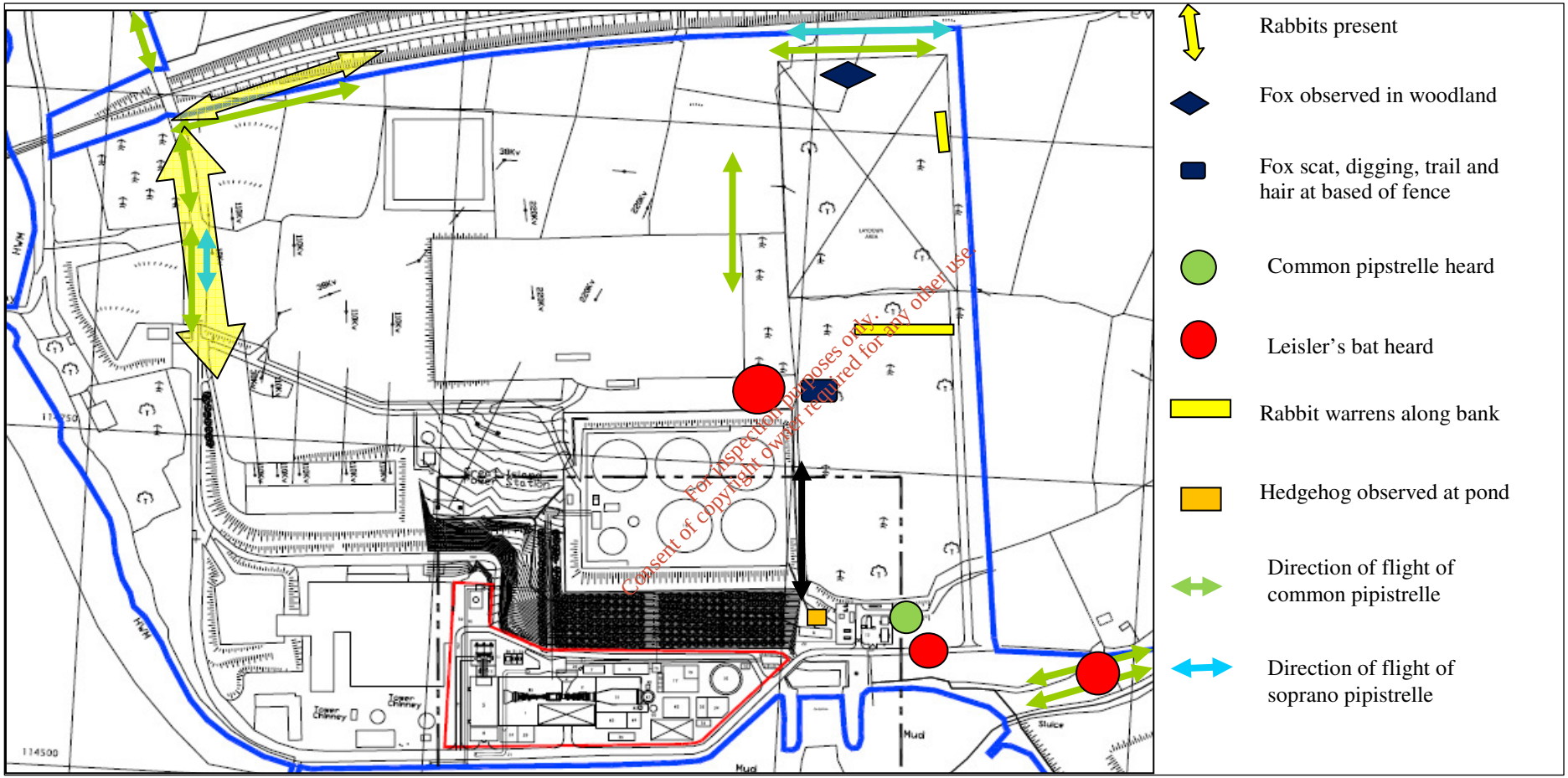
Rodent species likely to be present within the site include the wood mouse, house mouse and brown rat.

12.1.4 Ecological Evaluation

Overall, the proposed development site and proposed parking bay are evaluated as being of local importance (lower value). The proposed turbine site consists of made ground and is not of any ecological value. However, the proposed laydown area has some ecological value in terms of feeding areas for bats and as a refuge for foxes, bats and other small mammals and is evaluated as *Lower Value, Locally Important.*

Plate 4: Buildings with roost potential but no bats and sites in the woods with rabbit warrens

Figure 12.4: Mammal Activity and Signs



12.1.5 Identification of Potential Impacts

12.1.5.1 Construction Phase

The southern section of the site is within the boundary of the Barrow River Estuary pNHA. However, the habitats present within this section of the site are not of conservation interest. This section of the site consists of made ground that was reclaimed during the construction of the existing generating station in the 1960s. There will be no impacts on the integrity of the Barrow River Estuary pNHA or any other designated conservation site as a result of the proposed development.

The majority of the site consists of made ground. To the north east of the site, the proposed laydown area will result in the removal of immature beech and sycamore woodland and along the access road to the site a small section of hedgerow and grassy verge may be removed for the provision of a parking bay. This removal of vegetation will have a minor negative impact on ecology. No habitats protected under the Habitats Directive are present within the site and no protected flora were identified within the site. Therefore there will be no impact on protected habitats or flora species as a result of the development.

Arising from construction of the new CCGT, noise from machinery and vehicles is likely to cause temporary minor negative impacts to bird species and mammals in the area and in the designated conservation sites adjacent to the site.

There will be impacts on the rabbit warrens within the wood that will be cleared for the laydown area. Rabbits are not of any conservation significance and the impact is a welfare issue rather than a conservation issue as rabbits may be present in the warrens when clearance commences.

The removal of immature woodland in the laydown area will result in the loss of feeding areas for mammal species within the site and in surrounding areas. The immature woodland provides shelter and foraging habitat for rabbits and other animals and the presence of invertebrates provides food for bats (flies, moths, beetles). The replacement of woodland with exposed soil or concrete will reduce the availability of foodstuffs or prey items and is considered to be a minor negative impact on fauna, however, a seven metre boundary of trees will be retained around the laydown area

There may be a risk to hedgehogs from any newly introduced trenches (such as ponds, drains, pipe channels). Hedgehogs are susceptible to being trapped in pits and drowning. Hedgehogs will often fall into trenches (cattle grids, roadside drains, swimming pools, ponds etc.) as they do not appear to fear falling possibly due to their protection from damage due to the spines. There should be no significant impacts on hedgehogs following the implementation of mitigation measures.

Most of the buildings within the proposed site are of little use to bats but there are a small number of buildings with roost potential (the toilets have a felt covered roof that has a number of obvious holes whereby bats might enter the roof). The impact of roost loss is therefore only a potential for this site as there are no confirmed roosts that will be demolished. Roost loss is a long-term negative impact of a severe degree in local terms in some circumstances. In the current situation, there is no roost loss and hence there will be no impact from roost loss.

During construction there is the potential for fuel leakages from heavy plant machinery on site which may impact on the soils, groundwater and the adjacent River Barrow estuary. This would result in a minor negative impact on ecology, refer to Chapter 13 (Soils, Geology and Groundwater).

Dust emissions during construction have the potential to impact on flora in the surrounding area. These impacts would be temporary / short-term in nature, refer to Chapter 15 (Air Quality and Climate).

Overall, the impacts on flora and fauna will be minor.

12.1.5.2 Operational Phase

The operation of the CCGT power plant will have permanent minor negative impacts on ecology due to the permanent removal of planted deciduous woodland from the site.

The storage of fuel and oils on site has the potential to impact on soils, groundwater and the adjacent River Barrow estuary if a leakage occurs which may impact on adjacent habitats. These impacts would be minor in nature, refer to Chapter 13 (Soils, Geology and Groundwater).

Air quality dispersion modelling was conducted to assess the potential impacts from air borne emissions on designated sites within a 20 kilometre radius of the proposed development, refer to Chapter 15 (Air Quality and Climate). As all process contributions are well below 1% of the AQS with the exception of the Lower River Suir, and the predicted environmental concentrations are well below the relevant AQS, effects on designated sites are concluded to be negligible. The relevant air quality standard is 30 µg/m^3, which is the limit value for the protection of ecosystems set by *Council Directive 1999/30/EC (relating to limit values for sulphur dioxide, nitrogen dioxide and oxides of nitrogen, particulate matter and lead in ambient air)*. The predicted environmental concentration at the Lower River Suir is 12.88 µg/m^3.

12.1.6 Mitigation Measures

12.1.6.1 Construction Phase

There is an area of scrub in the laydown area which could not be assessed adequately due to the density of the vegetation and this area will be examined for badger setts prior to tree felling and clearance operations. This survey will be carried out in a period of the year when scrub is reduced (December - March). Any setts encountered will be humanely and legally excluded and excavated and will be subject to a licence from NPWS. The presence of a sett is unlikely but cannot be ruled out.

The removal of hedgerows, trees and scrub will take place outside of the bird nesting season (1st March to 31st August) to prevent impacts on nesting birds. Due to the presence of active rabbit warrens within the immature woodland, care should be taken when clearing vegetation and the banks should be gently disturbed at first and adequate time should be allowed for rabbits to escape from the area prior to the removal of trees or scrub in the area.

Bats principally feed close to mature vegetation, hedgerow and woodland. The maturing trees of the site will be removed and this loss will be compensated by the planting of hedgerow and trees once all construction has ceased. The proposed landscaping mitigation specified in Chapter 16 (Landscape and Visual) will use native species of local provenance where possible. The planting of native species which are present in the general area will enhance the biodiversity around the perimeter of the site. Species composition should reflect the native species present in the general area, including oak (*Quercus petraea* and *Q. robur)* and ash (*Fraxinus excelsior*) and shrubs such as hawthorn (*Crataegus monogyna*), blackthorn *(Prunus spinsoa)* and bramble (*Rubus fruticosus* agg.).

Any soils excavated from the site during construction will be re-used on site where possible for landscaping. The soils shall be stored in low mounds (maximum height of 2 metres) and will be reinstated as soon as possible to minimise adverse impacts on soil structure.

Areas of long grass will be retained where possible to provide shelter for moths and other invertebrates and feeding for bats and other animals (in addition to the biodiversity created by the moths and other invertebrates).

Ramps will be placed within any trenches constructed on site to allow the exit of hedgehogs. A mesh ramp would allow any trapped hedgehogs to climb out of such accidental traps. This may be the equivalent of

expanded mesh as used in construction or an inflexible “chicken wire” with diamonds of no greater than 4 centimetres in width to allow hedgehogs to climb out. The ramp shall be at an angle of 45^{o} for easy escape.

During the excavation and removal of soil for construction works, oil interceptors and silt traps or sedimentation ponds will intercept surface water run-off. The Contractor will establish a maintenance schedule and operational procedure for silt and pollution control measures during the construction period and will be incorporated into the Construction Environmental Management Plan (CEMP) for the proposed development.

Oil, petrol and other potentially polluting substances will be stored in bunded containers. Bund specification shall conform to the current best practice for oil storage such as Enterprise Ireland’s *Best Practice Guide BPGCS005 Oil Storage Guidelines*. All waste oil, empty oil containers and other hazardous wastes shall be disposed of in conjunction with the requirements of the *Waste Management Act 1996-2008.*

Pouring of concrete will take place in designated areas, washings will not be discharged to surface water and poured concrete will be allowed to cure for 48 hours in the dry.

A Dust Minimisation Plan will be implemented during construction works in order to prevent dust emissions impacting on the flora and habitats of the surrounding area.

12.1.6.2 Operational Phase

The operation of the power plant will adhere to air quality limits set by *Council Directive 1999/30/EC relating to limit values for sulphur dioxide, nitrogen dioxide and oxides of nitrogen, particulate matter and lead in ambient air*, in order to protect ecosystems and vegetation from excessive nitrogen oxides or sulphur oxides.

12.1.7 Residual Impacts

Residual impacts on flora and fauna will be the permanent removal of habitats and flora from the site and is deemed to be of minor significance due to the low ecological value of the site. No protected habitats or flora were identified within the proposed development site and therefore there will be no residual impacts on protected habitats or flora species.

Minor impacts on fauna are anticipated and are principally related to disturbance during construction. There will be no residual impacts for protected bat species and there will be no impact on the status of other mammal species.

Following the correct implementation of all mitigation measures, no significant residual impacts with respect to flora and fauna are anticipated as a result of the proposed development.

12.1.8 Summary Conclusion

A habitat survey and protected mammal surveys were conducted at Great Island. An area of ground on the southern section of the Great Island site is contained within the Barrow River Estuary pNHA. This section of the site consists of reclaimed land from the estuary, which was reclaimed circa 1966 when the original plant was constructed. The site of the proposed CCGT consists of a number of existing built structures and paved areas and an area of recolonising bare ground. This area is not of any conservation value and no terrestrial habitats of ecological value are present. Following discussions with NPWS it is understood that the proposed designation relates to a historical mapping issue whereby the old shoreline boundary, prior to the area being reclaimed, was incorporated into current maps. NPWS has therefore advised that they have no reason to secure designation of this area of land.

On the northern boundary of the site an area of immature planted woodland will be partially impacted by the works as it will be used as a laydown area during construction. A small section of hedgerow and grassy verge along the access road to the site may be removed for the provision of a parking bay.

Overall, the proposed development site and proposed parking bay are evaluated as being of local importance (lower value). The proposed turbine site consists of made ground and is not of any ecological value. However, the proposed laydown area has some ecological value in terms of feeding areas for bats and as a refuge for foxes, bats and other small mammals and is evaluated as *Lower Value, Locally Important.*

No rare or protected habitats or flora were identified during the survey. No bat roosts, badger setts or otter holts were identified within the site. Mitigation measures are proposed to prevent impacts on breeding birds, hedgehogs and water quality.

12.2 Marine Ecology

12.2.1 Introduction

An environmental impact statement (EIS) must contain a description of the aspects of the environment that are likely to be significantly affected by the proposed development. This section of the EIS has been prepared in order to establish the marine ecology baseline of the study area and assess the impacts of the proposed development on the marine ecology. In addition, an Appropriate Assessment Screening Report has been prepared and is included in Appendix 12.2.

Local, regional and national policies and plans, best practice guidance and reports of relevance to the marine environment within, and in the vicinity of, the site of the proposed plant have been reviewed and appropriate information has been fed into Chapter 5 (Policy and Planning Context) and this assessment process. Where more specific legislation and guidance is appropriate this has been highlighted in the text of this chapter.

Water Quality (with regards to the Water Framework Directive) is assessed in Chapter 14 (Surface Water), although reference is also made in this section to impacts on water quality and the marine environment, where appropriate.

12.2.2 Methodology

12.2.2.1 Guidance Used

As there is no statutory guidance on the evaluation of significance it is necessarily subjective, although existing industry or national standards will inform this judgement. It is recognised that judgements may vary between parties in the assessment and decision making process. The evaluation of impacts presented in this EIA is based on the judgement of the EIA team, informed by reference to the baseline studies, legal standards and current good industry practice. In addition the following recognised publications and guidelines have been used:

- Environmental protection Agency (EPA), 2002. Guidelines on the information to be contained in Environmental Impact Statements. EPA, Ireland;
- Tyler-Walters, H. & Jackson, A (1999) *Marine Life Information Network for Britain and Ireland (MarLIN) – Assessing seabed species and ecosystems sensitivities. Rational and user guide*. Plymouth: Marine Biological Association of the UK; and
- Tyler-Walters, H., Hiscock, K., Lear, D.B. and Jackson, A. (2001) *Identifying species and ecosystem sensitivities. Report to the Department for Environment, Food and Rural Affairs from the*

Marine Life Information Network (MarLIN).Marine Biological Association of the United Kingdom. Plymouth: marine Biological Association of the UK.

12.2.2.2 Study Area

The Great Island Power Plant is located at the confluence of the River Suir and River Barrow, on the shores of the Barrow in Co. Wexford. The estuary flows into the Celtic Sea and its fauna and flora are typical of an estuary in Ireland. For the purposes of this study, the dimensions of the study area for examining the impacts to marine ecology are set out in Table 12.4.

Table 12.4: Study Area

Aspect Under Study	Dimensions of the Study Area
Marine ecology	1 km radius around the development site
Designated conservation areas	15 km radius around the development site

The 1 kilometre radius for the marine ecology study area was chosen based on the expected extent of the existing plume and the relatively rapid mixing known to occur after release into the estuary. In addition the plume from the new development will be greatly reduced due to decreases in the volume of the discharge (see Chapter 3, Description of the Development). However, in the case of some receptors, such as habitats of conservation concern, the desk study encompassed a wider area up to 15 kilometres from the existing power plant site boundary.

Designated sites

There are a number of designated sites in the area. These are further detailed in Section 12.2.3. In addition to the relevant ecology in the area, the designated sites which are 'relevant' to the marine scope of the EIA, in general those within 15 kilometres of the proposed development were considered in the assessment. Designated sites that were too distant to be affected were not considered and any designated sites in the terrestrial environment are considered in Section 12.2.3.5.

12.2.2.3 Sources of Information

The data used to compile this chapter was obtained by means of the following activities:

- Desktop review of relevant databases and documentation. The main sources include:
  - Marine Institute Harmful Algal Blooms database. Website: http://www.marine.ie/home/publicationsdata/data/Habs+Search+Database/
  - Central Fisheries Board 2006. Investigation of Salmon Smolt Impingement at six ESB Thermal Generating Stations
  - Bird Watch Ireland Wetland Bird Surveys (I-WeBS) publications Website http//www.birdwatchireland.ie/Default.aspx?tabid=281
- Consultation with interested parties and relevant authorities at scoping stage (full details of consultation included in Chapter 6, Scoping and Consultation).

The National Parks and Wildlife Service (NPWS) database was researched to determine the location of designated sites within the study area and to establish if any protected species occur within or in close proximity to the development site. Designated sites are defined as sites of ecological importance which are designated under the EU Habitats Directive (92/43/EEC) or the EU Habitats Directive (92/43/EEC). In addition, on June 25th 2009, a meeting was held with the NPWS on site to introduce the scheme and

obtain baseline data and any feedback from the NPWS regarding possible concerns and their professional judgement.

12.2.2.4 Baseline Evaluation Criteria

According to the EPA Guidelines (2002), the description of the baseline environment should include a description of the context and character of the existing environment and an evaluation of that environment in terms of importance and sensitivity. Important and sensitive aspects of the marine environment are deemed to include the following:

- Designated sites protected under the EU Habitats Directive (92/43/EEC);
- Species and habitats protected under Annex I and II of the EU Habitats Directive (92/43/EEC) and the Birds Directive (79/409/EEC);
- Wild fauna protected under the Wildlife Act, 1976 and the Wildlife (Amendment) Act, 2000;
- Species protected under the Flora (Protection) Order, 1999;
- European Communities (Natural Habitats) Regulations, 1997 as amended, and
- Birds and habitats protected under the Ramsar Convention on Wetlands are considered to be very important and sensitive.

For this assessment, the importance / sensitivity of the marine ecology will be defined according to habitats and species. Based on professional knowledge and experience of the sensitivity of habitats and the guidance detailed above, the criteria evaluation for habitats is determined as being 'low', 'medium' or 'high' extent.

Habitats

Criteria have been developed to determine the overall values of different habitats in the study area are listed below. Not all are necessarily applicable to all habitats but those that are will apply to a 'low', 'medium' or 'high' extent from which an overall evaluation can be made as shown in Table 12.5.

Table 12.5: Habitats Evaluation Criteria

Criteria	Low value	Medium value	High value
1. Protection Status- the extent to which the habitat is protected: internationally, nationally or locally. **2. Naturalness**- the 'naturalness' of the habitat must be assessed. Modified environments are environments in which human activity has modified the area's primary ecological functions, for example, through fishing or the introduction of alien species. **3. Fragility** - the fragility and sensitivity of the habitat and its ability to recover (either naturally or with assistance) from disturbance, including invasion by alien species must be assessed. **4. Representativeness** - the extent to which the habitat is considered to be an excellent example of valued natural or semi-natural vegetation types in terms of the flora communities (and their associated fauna) that it contains. **5. Ecosystem Function** - the extent to which the habitat serves an important ecosystem function. This includes: comprising an ecological corridor between other isolated habitats of ecological importance; importance in the context of faunal migrations; or importance in the context of lifecycles (breeding, nursery or feeding grounds). **6. Regulating Services** - the extent to which the habitat is important to and/or provides regulating services (i.e. functions and regulatory processes) such as coastal protection, regulation of floods. **7. Species Association or Reliance** - the extent to which the habitat contains and is relied upon by concentrations of species that are: endemic or restricted range; nationally or locally rare (particularly Red Book species or those protected under national or international legislation or listed by IUCN); keystone species, upon which other species may be reliant for their survival; suffering serious reduction nationally or locally; at the edge of their ranges; present in notably large populations; or uncommon or threatened in a wider context. **8. Diversity** - the diversity of the habitats and their individual species richness and diversity (including genetic diversity) are important. In general, the greater the total number of species recorded, the greater the conservation interest of the area. **9. Research and Education** - the research value and education potential of the site or the recorded history of the site (e.g. surveys, scientific studies, published papers). The loss of an irreplaceable biological record would be particularly significant. **10. Active Management** - the extent to which the habitat is being actively managed with nature conservation in mind.	The evaluation for each criterion will present descriptions of what would constitute low, medium and high values. For each criterion the habitat value will be evaluated based on factual baseline data, scientific knowledge, professional judgement and stakeholder perspective. Based on this evaluation a value will be allocated for that criterion and highlighted accordingly with additional information and brief rationale for the decision. In the absence of data, insufficient data or where there is significant uncertainty, the precautionary principle will be applied.		
Overall Habitats Evaluation	The overall habitat evaluation will be based on an aggregate of the individual ratings for each criterion. This process will involve an application of professional judgement in terms of weighting some criteria higher than others where appropriate.		

Species

Species value is assessed according to accepted criteria such as rarity and the extent to which they are under threat. The importance of species to wider ecological communities and the ecosystem (e.g. predator/prey relationships) is also considered and the degree of protection of species under Irish and EU legislation is also taken into account. Table 12.6 presents some criteria for deciding on the value of individual species.

Table 12.6: Species Evaluation Criteria

Criteria	Importance/ Sensitivity
Protected specifically under Irish legislation	High
Listed as Rare, Threatened or Endangered by International Union for Conservation of Nature (IUCN)	
Listed under Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)	
Critical ('keystone species') to ecosystem function	
Culturally iconic species for local and/or indigenous people	
Not protected or listed but:	Medium
A species common globally but rare in this part of Ireland	
Rare or population in decline	
Endemic or locally distinct sub-populations	
At the limits of its range	
Has a commercial value and is being exploited	
Provides an important subsistence resource	
Species subject to an active management programme	
Groups that have been or are under active scientific study	
Not protected or listed and:	Low
Common/ abundant	
Not critical to other ecosystem functions	

12.2.2.5 Impact Assessment Criteria

The source and type of all impacts is set out in Section 12.3.4. The mitigation measures that are defined for any potentially significant impacts are set out in Section 12.3.5. Any likely residual impacts are evaluated in terms of magnitude and significance in Section 12.3.6.

Magnitude

The impact assessment will describe what will happen by predicting the magnitude of impacts and quantifying these to the extent practicable. The term 'magnitude' is used as shorthand to encompass all the dimensions of the predicted impact. The magnitude of impacts for the marine ecology is described according to habitats and species.

Habitats

Magnitude of impact to habitats is a combination of several factors, including:

- The spatial extent over which the impact is experienced;
- The duration of the impact and/or the extent to which it is repeated;
- Whether it is total loss to Project footprint or temporary occupation that can be remedied;

- For other physical changes (e.g. to the hydrological cycle, water quality or noise), the extent of the change; and
- The size of the footprint in the context of the wider area of habitat that exists.

Table 12.7: Magnitude Criteria for Habitats

Criteria	Impact Magnitude
The Project (either on its own or together with other projects) may adversely affect the integrity of a habitat, by substantially changing in the long term its ecological features, structures and functions, across its whole area, that enable it to sustain the habitat, complex of habitats and/or population levels of species that makes it important.	High
The habitat's integrity will not be adversely affected in the long term, but the effect is likely to be significant in the short or medium term to some, if not all, of its ecological features, structures and functions. The habitat may be able to recover, through natural regeneration and restoration, to its state at the time of the baseline study.	Medium
Neither of the above applies, but some Low impact of limited extent, or to some elements of the habitat, are predicted to be evident but readily recover through natural regeneration.	Low

Species

The magnitude of impact to species is a combination of several factors, including:

- The spatial extent over which the impact is experienced;
- The extent to which the habitat relied upon by the species is impacted (as evaluated under 'Habitats' above);
- The population or proportion thereof affected;
- The duration of the impact and or the extent to which it is repeated;
- The magnitude of the aspect (noise, light, volume of vessel movements);
- The size of the footprint in the context of the wider range over which a species lives;
- The scale of change induced e.g. to water quality; and
- The extent to which a new physical or chemical feature is introduced to the environment e.g. the size of a barrier or the toxicity of a chemical.

Determining magnitude is typically a combination of quantifying the change and applying professional judgement / past experience.

However, seasonal variations and species lifecycle stage also need to be considered. For example some waterbirds are more sensitive when they are confined to the sea surface during the late summer moult of their primary flight feathers. Fish species might be deemed more sensitive during their spawning period than at other times of year. Species' sensitivities to different effects of the Project, and how for some they may change seasonally, are therefore important considerations in deriving impact magnitude.

Criteria that have been used to assess the magnitude of ecological impacts (based on Duinker and Beanlands, 1986) are presented in Table 12.8.

Table 12.8: Magnitude Criteria for Species

Criteria	Impact Magnitude
Affects an entire population or species in sufficient magnitude to cause a decline in abundance and /or change in distribution beyond which natural recruitment (reproduction, immigration from unaffected areas) would not return that population or species, or any population or species dependent upon it, to its former level within several generations*. A high magnitude impact to a species may also adversely affect the integrity of a site, habitat or ecosystem. A high magnitude secondary impact may also affect a subsistence or commercial resource use (e.g. fisheries) to the degree that the well being of the user is affected over the long term.	High
Affects a portion of a population and may bring about a change in abundance and / or distribution over one or more generations*, but does not threaten the integrity of that population or any population dependent on it. A Medium magnitude impact may also affect the ecological functioning of a site, habitat or ecosystem but without adversely affecting its overall integrity. The size of the consequence is also important. A Medium magnitude impact multiplied over a wide area would be regarded as major. A short term effect upon the well being of resource users may also constitute a secondary Medium impact.	Medium
Affects a specific group of localised individuals within a population over a short time period (one generation* or less), but does not affect other trophic levels or the population itself.	Low

*These are generations of the animal/plant species under consideration not human generations.

Significance

The significance of the potential impacts to habitats and species will be assessed according to the value of the habitat and species involved and the magnitude of the impacts it is predicted to experience. Criteria for assessing the significance of impacts stem from the following key elements.

- Status of compliance with relevant government legislation, policies and plans and any relevant company or industry policies, environmental standards or guidelines.
- The magnitude (including duration, scale and intensity) of the change to the natural environment (e.g. loss of, or damage to habitats, an increase in noise, an increase in employment opportunities), expressed, wherever practicable, in quantitative terms.
- The nature of the impact receptor (physical, biological or human). Where the receptor is physical (e.g. the seabed) its quality, sensitivity to change and importance are considered. Where the receptor is biological, its importance (e.g. its local, regional, national or international importance) and its sensitivity to the impact are considered.
- The likelihood (probability) that the predicted impact will occur. Particularly for accidental events or receptors that have a transitory presence in the study area, this is estimated based upon experience and/or past evidence that such an event has previously occurred.

For this assessment, significance has been defined based on four levels described below and the latter three shown in Table 12.9.

- ***Not significant***: An impact occurs but is indistinguishable from the background / natural level of environmental and socio-economic change.

- ***Low significance***: Impacts of low magnitude, within standards, and / or associated with low or medium value / sensitivity receptors / areas, or impacts of medium magnitude affecting low value / sensitivity receptors / areas.

- ***Medium significance***: Broad category within standards, but impact of a low magnitude affecting high value / sensitive receptors / areas, or Medium magnitude affecting medium value / sensitive receptors, or of high magnitude affecting Medium sensitive receptors / areas.

- ***High significance***: Exceeds acceptable limits and standards, is of high magnitude affecting high or Medium value / sensitive receptors / areas or of medium magnitude affecting high value / sensitive receptors / areas.

Table 12.9: Overall Significance Criteria for EIA

	Low Magnitude Impact	Medium Magnitude Impact	High Magnitude Impact
Low value / low sensitivity receptor or site, within standards	Low	Low	Medium
Medium value / sensitivity receptor or site, within standards	Low	Medium	High
High value / sensitivity receptor or site, exceeding standards	Medium	High	High

12.2.3 Baseline Description & Evaluation

12.2.3.1 Plankton

Plankton includes all organisms that are carried by water movements rather than their own ability to swim, and includes plants and plant-like unicellular organisms (phytoplankton) and animals (zooplankton).

Phytoplankton monitoring is carried out on a regular basis by the Marine Institute of Ireland. The closest sampling point is located approximately 2-3 kilometres south of the Great Island Power Plant at Arthurstown, Co. Wexford. The phytoplankton standing stock is highest in the summer from May to September, however transient phytoplankton blooms also occur in this estuary during the spring when phytoplankton concentrations can exceed 1 million cells / litre (observed in Arthurstown in February 2009 and reported by the Marine Institute on their website, accessed 3rd August 2009). The phytoplankton assemblage is dominated by dinoflagellates and diatoms. Greatest species diversity is observed in summer blooms, for example in May 2009, 13 species were recorded. Summer blooms are typically comprised of the *Scrippsiella* sp, *Skeletonema* sp., and *Thalassiosira* sp. The prevalence of *Skeletonema* spp. is typical of estuaries. The dinoflagellates *Pseudo-nitzschia* spp. and *Alexandrium* sp. are associated with producing toxins that can cause paralitic shellfish poisoning (PSP) and amnesic shellfish poisoning (ASP) in consumers of shellfish. Both of these species have been recorded in the Barrow Estuary in June 2009 (observed in Arthurstown in February 2009 and reported by the Marine Institute on their website, accessed 3rd August 2009).

The centric diatom, *Chaetoceros* sp. and the diatom *Odontella rhombus* are generally present in Arthurstown throughout the winter period. Other species often observed, include *Gymnodinium* sp, *Heterocapsa* sp, Naked Dinoflagellate sp., *Paralia sulcata*, *Prorocentrum micans*, and *Torodinium robustum* (observed in Arthurstown in February 2009 and reported by the Marine Institute on their website, accessed 3rd August 2009).

The zooplankton assemblage consists of holoplankton, which spend their entire lives in the water column and meroplankton, which are the seasonally abundant planktonic larvae of larger animals. In the general region, the dominant holoplankton species are copepods, dominated by calanoids. Meroplankton include the larvae of benthic organisms (e.g. crabs and molluscs), as well as fish eggs and fish larvae.

12.2.3.2 Benthic Communities

Overview

The composition of the intertidal and subtidal nearshore communities are to a large extent determined by the environmental conditions of the area. The intertidal zone along the shorelines of the Barrow Estuary largely consists of fine sediments.

Intertidal Ecology

The shoreline in the immediate vicinity of Great Island Power Plant consists of boulders, rocks, stones, pebbles and gravel, with some mud or sand near low tide mark. The vegetation of the shoreline is typical of rocky shores and consists of washed up *F. vesiculosus, A. nodosum, F. serratus, L. digitata* and sea lettuce (*Ulva lactuca).*

Good quality intertidal sand and mudflats have developed north of Passage East to Creadaun Head on a linear shelf on the western side of Waterford Harbour. Mudflats are not found along the shores in the immediate vicinity of Great Island Power Plant. The sediments of the mudflats adjacent to the power plant mostly comprise firm sands, though grade into muddy sands towards the upper shore (NPWS. 2006. Site Synopsis. River Barrow and River Nore SAC). They have a macro-invertebrate fauna typical of estuarine mudflats, characterised by polychaetes (*Arenicola marina, Nephtys hombergii, Lanice conchilega, Scoloplos armiger* and *Cerastoderma edule)* and bivalves (NPWS. 2006. Site Synopsis. River Barrow and River Nore SAC).

Figure 12.5: Intertidal to the West of Great Island Power Plant

The vegetation of salt marshes varies considerably depending on the degree of submersion of the waterbody and on the salinity of the substratum or of the water (estuarine or lagoonal salt marshes). Common glasswort, *Salicornia* is found in the Barrow Estuary which is common in saltmarshes around the Irish coastline.

In the vicinity of Great Island, Atlantic and Mediterranean salt meadow sub types are generally present. The legally protected species borrer's saltmarsh-grass (*Puccinellia fasciculata*) and meadow barley (*Hordeum secalinum*) (Flora Protection Order, 1987) are found in the upper extent of the saltmarsh along with the rare divided sedge (*Carex divisa*) and sea rush (*Juncus maritimus*) is also present. Other plants associated with salt meadows within the Barrow and Nore SAC include sea aster (*Aster tripolium*), sea thrift (*Armeria maritima*), Sea Couch (*Elymus pycnanthus*), Spear-leaved Orache (*Atriplex prostrata*), lesser sea-spurrey (*Spergularia marina*), sea arrowgrass (*Triglochin maritima*) and sea plantain (*Plantago maritima*).

Salicornia and other annuals colonising mud and sand are found in the creeks of the saltmarshes and at the seaward edges of them. The habitat also occurs in small amounts on some stretches of the shore free of stones.

Subtidal Infauna and Sessile Epifauna

Infauna are animals that live within the sediment, while epifauna are animals that live on the surface of the seabed. There has been no recent work on the benthic fauna of the River Suir and Waterford Harbour area directly adjacent to the Great Island power plant site and therefore little information is available on the species that are present. However, the Mapping European Seabed Habitats (MESH) project indicates what benthic habitats and communities are likely to be present in a particular locality throughout the seas and coastal areas of Europe. According to MESH (www.searchmesh.net, accessed 1st August, 2009) the habitat in the vicinity of Great Island are formed of infralittoral mixed sediments, particularly sand and mud. According to the classifications of marine habitats provided by Connor *et al*. (2004) and due to the variable nature of the sediment type, a widely variable array of communities may be found, including those characterised by bivalves (e.g. *Ostrea edulis*, *Tellimya ferruginosa* and *Cerastoderma edule*) and polychaetes (e.g. *Anaitides mucosa*, *Syllidia armata*, *Aphelochaeta marioni*, *Mediomastus fragilis*, *Notomastus latericeus*, *Melinna palmata*). Other groups that may be found in this biotope are hydroids (e.g. *Hydrallmania falcata*), sponges (*Alcyonium digitatum*), oligochaete worms (e.g. *Tubificoides benedii*), ribbon worms, nematodes and sea squirts (Ascideans).

Estuarine environments along the south and south-west coast of Ireland are likely to show great similarities as are the species assemblages that are found in them. The species of Cork Harbour have been characterised previously and a number of biotopes have been found there which may also be in the vicinity of the Great Island development site. Species found there include polychaetes (e.g. *Capitella capitata*, *Chaetozone* sp., *Nephtys hombergii*, *Aphelochaeta marioni*), bivalves (e.g. *Abra alba*, *Mysella bidentata* and *Thyasira* spp.), crustaceans (e.g. *Ampelisca* spp.) and oligochaetes (e.g. *Tubificoides* spp.). Communities similar to those described above are likely to be present in the vicinity of Great Island and in the absence of recent survey data from these areas this data provides the best source of information on the species likely to be present in the study area.

Mobile Subtidal Epifauna

A number of epifauna, particularly crustacean species were identified in the vicinity of Great Island in a study carried out by the Central Fisheries Board in 2006 (Central Fisheries Board, 2006). These include prawn (*Palaemon serratus*), shrimp (*Crangon crangon*) and shore crab (*Carcinus maenas*). Chinese mitten crab (*Eriocheir sinensis*) was also identified at Great Island during the 2006 study. This invasive species was first recorded in Ireland in Waterford Estuary in 2005 and has subsequently been recorded from the lower reaches of the River Suir (Central Fisheries Board, 2007).

Commercially Exploited Shellfish

Bottom mussels (*Edulis edulis*) and Pacific oyster (*Crassostrea gigas*) are cultivated in the Barrow Estuary as shown in Figure 12.6. A large area of the River Suir and Waterford Harbour, approximately 200 metres to the west and south of the Great Island Power Plant has recently been designated as a New Shellfish Area under the *Shellfish Waters Directive, 2006/113/EC*. The Directive requires waters to be designated in order to support shellfish life and growth. In Ireland, the Directive is implemented by the *European*

Communities (Quality of Shellfish Waters) Regulations 2006 (SI No 268 of 2006). In 2009, this was amended by the *European Communities (Quality of Shellfish Waters) (Amendment) Regulation 2009*, SI 55 of 2009 and allowed for the provision of an additional number of important shellfish growing areas of which Waterford Harbour is one (Figure 12.7). Pollution Reduction Programmes (PRP's) have not yet been established for the designated shellfish waters in Waterford Harbour. There is currently a bottom mussel farm at Arthurstown, less than one kilometre south of the Great Island Power Plant.

Figure 12.6: Location of Shellfish Farms in Waterford Harbour

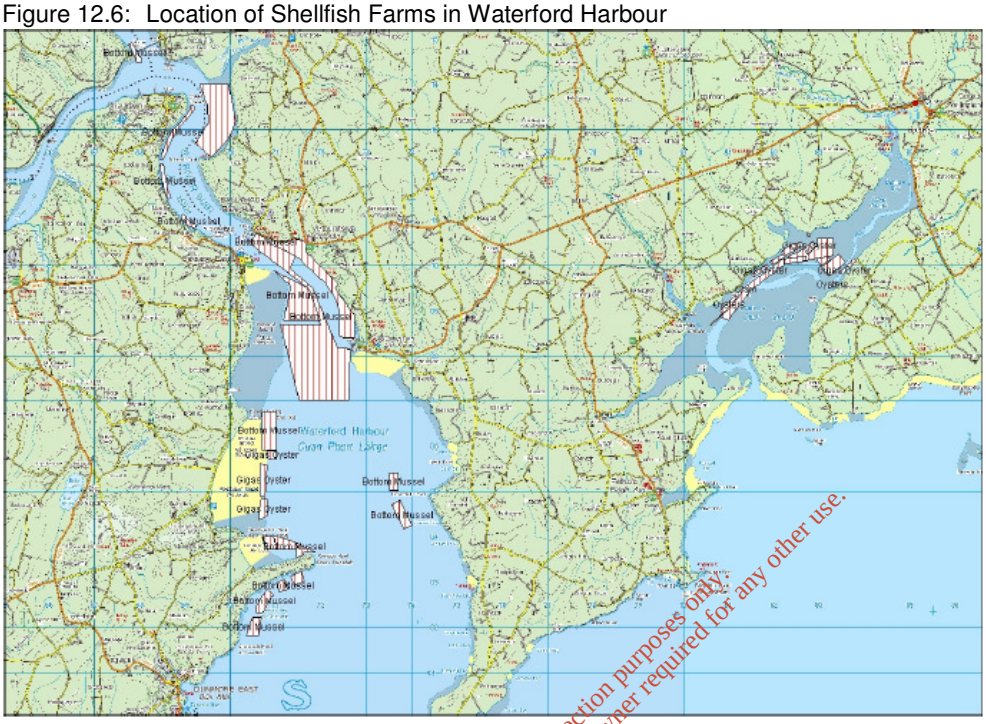


Figure 12.7: Designated Shellfish Waters

12.2.3.3 Fish

Sublittoral sediment, intertidal mud flats and saltmarshes associated with estuaries provide a rich source of benthic food for fish and act as nursery grounds for juvenile fish.

A number of diadromous species pass through the Great Island study area on their way to or from fresh water spawning grounds. Diadromous fish are species that migrate from fresh water to the sea, or vice versa, to feed or breed. These include Atlantic salmon (Salmo salar), sea trout (Salmo trutta), European eel (Anguilla anguilla), twaite shad (Alosa fallax fallax), allis shad (Alosa alsoa L.), river lamprey (Lampetra fluviatilis), and sea lamprey (Petromyzon marinus).

Adult Atlantic salmon spawn upstream in freshwaters between November and December. The freshwater upper stretches of the Rivers Barrow and Nore are very important for spawning. Atlantic salmon smolt

have been observed in the waters adjacent to Great Island Power Plant (Central Fisheries Board, 2006). Parr spend up to three years in the river before migrating to the sea.

Sea lamprey are found in the Barrow catchment area. There is evidence of substantial accumulation of gravels and larger alluvial material in the downstream areas of the Suir and Nore weirs further north of the study area, where spawning of sea lamprey is known to take place (King, 2006). Such gravelled areas are not present to the same extent in the Barrow and it is considered that this may reduce areas available for spawning (King, 2006).

Waterford Harbour and the Barrow Estuary provides an important habitat for the European eel (Anguilla anguilla) and it has been regarded as one of the most important eel habitats in the country (Moriarty, 1999). In spring glass eels and elvers enter the estuary. Some migrate upstream, whilst others remain in the estuary to feed prior to their upward migration. Eels use eddies for passive transport and active swimming during upstream migration. Eels rest in sediments during ebb tides and the extensive tidal flats along Waterford Harbour and the Barrow Estuary are important resting points for this species. Adult eels begin their migration downstream in late autumn (Moriarty, 1999).

Shad spend most of their lives at sea but move into the estuaries of large rivers to breed. There are very few spawning areas of shad in Ireland. Twaite shad (Alosa fallax fallax) have been observed in the Barrow and typically spawn near the tidal limits. Spawning grounds comprise deep pool areas and backwaters for adults to rest and gravelled areas where eggs are laid. In 2005, fish of a 0+ age group were found in the Barrow (Allis shad (Alosa alosa) (1102) & Twaite shad (Alosa fallax) (1103) Conservation Status Assessment Report. Website http://www.npws.ie/en/media/Media,6272,en.pdf Date accessed 3rd August 2009) suggesting that in some years successful spawning may occur in the waters of the study area. The waters downstream of each of these sites are considered to constitute good habitat for nursery function for a 0+ and a 1+ shad (Allis shad (Alosa alosa) (1102) & Twaite shad (Alosa fallax) (1103) Conservation Status Assessment Report. Website http://www.npws.ie/en/media/Media,6272,en.pdf, Date accessed 3rd August 2009). It has not yet been established, if allis shad breed in Ireland but if it is occurring it is possible that they are spawning in the Barrow and / or Nore rivers.

In addition to diadromous species, the rivers Nore and Barrow host a number of resident species, comprising rich species diversity. Marine species largely make up the fish community. A survey carried out by the Central Fisheries Board 2006 'Investigation of Salmon Smolt Impingement at six ESB Thermal Generating Stations' included surveys at Great Island Power Plant, formerly owned by the ESB. Twenty fish species were observed during the surveys of the Great Island Power Plant. The most common fish species observed in this survey was flounder (Platichthys flesus). Other species which accounted for a large proportion of the biomass include Atlantic herring (Clupea harengus), cod (Gadus morhua), whiting (Merlangius merlangius), pogge (Agonus cataphractus) and seabass (Dicentrarchus labrax).

Substantial numbers of spawning smelt (Atherina presbyter) have been recorded in the Suir, Nore and Barrow rivers (Doherty & McCarthy, 2004). It has been suggested that the most likely spawning site of the Barrow Estuary smelt was in the upper reaches of the River Suir (Quigley, 1996), however young smelt are present in the study area (Doherty & McCarthy, 2004) . Smelt in the Barrow Estuary feed almost exclusively upon the marine mysid Praunus neglectus (Doherty & McCarthy, 2004).

Species of Nature Conservation Importance

There are several species of nature conservation interest known to occur in the study area. Atlantic salmon (*Salmo salar*), sea trout (*Salmo trutta*), twaite shad (*Alosa fallax fallax L.*), allis shad (*Alosa alosa*) and smelt (*Atherina presbyter*) are all listed on Annex II of the *Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora* (EU Habitats Directive). Smelt (*Osmerus eperlanus*) are one of the rarest fish in Ireland and are listed in the Irish Red Data Book.

All three species of lamprey found in Ireland, the sea lamprey (*Petromyzon marinus*), brook lamprey (*Lampetra planeri*) and river lamprey (*Lampetra fluviatilis*) are found in the river Barrow. They are listed on

Annex II of the EU Habitats Directive and are identified as qualifying species of interest for the River Barrow and River Nore Special Area of Conservation, site number 002162 (SAC).

Fisheries

The River Nore is important for salmonid fish and is a designated Salmonid River under is designated under the Salmonid Water Regulations, transposing the EU Freshwater Fish Directive. Populations of salmonoids in the rivers feeding the Barrow Estuary have decreased in recent years (David Mc Inerney (The Southern Regional Fisheries Board) pers comm) and the River Barrow is 80 % below its conservation limit for salmon and sea trout, and the Rivers Nore and Suir are both 20 % below their conservation limit (David McInerney (The Southern Regional Fisheries Board) pers comm.). The reasons for the decline are complex and due to a combination of factors - degradation of the fish habitat, pollution, obstruction to the passage of fish including dams, over exploitation at sea and inland and the survival at sea (Eamon Cusack, The Shannon Regional Fisheries Board, 2005, *Submission to the Joint Committee on Communications, Marine & Natural Resources, Re: Commercial Salmon fishing and Salmon Angling*).

The Waterford Harbour / Barrow Estuary is regarded as an important commercial fishery for the European eel. There are two significant eel fisheries in the Barrow / Nore / Suir catchment, the River Barrow silver eel fishery and the baited eel pot fishery in Waterford Harbour. The brown eel catch is predominantly taken in tidal estuarine waters. Glass eels (post larval stage of an eel) and elvers (a young eel) are currently not exploited in these rivers (Southern Regional Fisheries Board and Eastern Regional Fisheries Board, 2009). The eel population of the three rivers that enter the Barrow Estuary, Nore, Barrow and Suir and the Estuary itself is considered to be highly at risk from depleting numbers (David Mc Inerney (The Southern Regional Fisheries Board) pers comm.).

12.2.3.4 Birds

Overview

The River Barrow (Cheekpoint to New Ross) and Waterford Harbour support a wide variety of birds including more than 1,000 waterbirds. As a consequence both areas are recognised as nationally important sites (Bolan & Crowe, 2007). Saltmarsh and mud flats in close proximity (within 1 kilometre) to the Great Island Power Plant are important feeding areas for wading birds such as golden plover (*Pluvialis apricaria*). There are no Special Protection Areas (SPAs) or Important Bird Areas (IBAs) designated for the protection of birds in the study area.

Wintering Birds

Wintering flocks of migratory birds are seen along the Barrow Estuary utilising the suitable feeding and roosting habitats. The study area falls adjacent to the River Barrow and River Nore SAC (see Section 12.2.3.5). This designated site is of ornithological importance for a number of wintering birds. Species listed in Annex I of the Council Directive of 2 April 1979 on the conservation of wild birds (79/409/EEC), the Birds Directive include white-fronted goose (*Anser albifrons*), whooper swan *(Cygnus Cygnus)*, bewick's swan (*Cygnus columbianus*), bar-tailed godwit (*Limosa lapponica*). Nationally important numbers of golden plover (*Pluvialis apricaria*) and bar-tailed godwit (*Limosa lapponica*) are found in the SAC feeding on the rich benthic community during the winter.

Wigeon (*Anas penelope*) occur along the Wexford shore and up to several hundred black-tailed godwits (*Limosa limosa*) are found wading in shallow water on the tidal mudflats, outside of the existing power plant site boundary in winter (Waterford Birds. Website accessed 31 July 2009. http://www.waterfordbirds.com/index.html). Concentrations of grey herons (*Ardea cinerea*) are known to occur within the site boundary of Great Island Power Plant (Waterford Birds. Website accessed 31 July 2009. http://www.waterfordbirds.com/index.html). These are regularly found feeding within the study area.

Salt marsh vegetation, such as the annual *Salicornia europaea agg.*, frequently fringe the mudflats and this provides important high tide roost areas for the wintering birds.

Breeding Birds

The estuarine habitats around Great Island Power Plant provide breeding habitat for a range of both, seabirds and terrestrial birds. Peregrine falcon (*Falco peregrinus*) and kingfisher (*Alcedo atthis*) occur along some of the many tributaries throughout the River Barrow and River Nore SAC. Kingfisher is a species that is listed on Annex I of the EU Birds Directive.

During summer months sites around the Power Plant also support a range of both breeding seabirds and passerine species. There is also an extensive autumnal roosting site in the reedbeds of the Barrow Estuary used by swallows before they leave the country (NPWS. Site Synopsis. River Barrow and River Nore SAC), however reedbeds are not found in close proximity to the Power Plant.

Mute swans (*Cygnus olor*) and moorhen (*Gallinula chloropus*) are permanent residents along the Barrow and most likely breed in the wider study area.

12.2.3.5 Nature Conservation Designations

There are a number of designated Natura 2000 sites found in the immediate vicinity of the Great Island Plant. However, apart from the jetty, the power plant does not fall within any of the designated Special Areas of Conservation (SAC) which are protected under the European Habitats Directive. An area of ground on the southern section of the Great Island site is contained within the Barrow River Estuary pNHA. This section of the site consists of reclaimed land from the estuary, which was reclaimed circa 1966 when the original plant was constructed.

Designated sites within 15 kilometres of the Power Plant are shown in Figure 12.2. The important marine species and habitats for which the sites were designated are detailed in Table 12.10: Designated Sites in vicinity of Great Island Power Plant. This is provided only for the sites in close proximity (15 kilometres) to the study area.

Table 12.10: Designated Sites in Vicinity of Great Island Power Plant

Name of site	Site Code	Key Features for designation
River Barrow and River Nore SAC	002162	The River Nore and River Barrow comprise of the upstream freshwater, tidal and estuarine systems of the Nore and Barrow rivers. The site comprises numerous Annex I habitats- the marine habitats include estuary, tidal mudflats, Salicornia mudflats, Atlantic salt meadows, Mediterranean salt meadows. The site is also selected for the following marine Annex II species-Sea Lamprey, River Lamprey, Brook Lamprey, Freshwater Pearl Mussel, Twaite Shad, Atlantic Salmon.
Lower River Suir SAC	002137	The Lower River Suir SAC consists of the freshwater stretches of the River Suir south of Thurles, the tidal stretches as far as the confluence with the Barrow/Nore immediately east of Cheekpoint in Co. Waterford. The site is of major importance for the two habitats listed on the EU Habitats Directive that it contains (Mediterranean salt meadows and Atlantic salt meadows), as well as for its important numbers of wintering waders and wildfowl, including Annex I (EU Birds Directive) Greenland White-fronted Goose, Golden Plover, Whooper Swan and Kingfisher. The site provides habitats for the following Annex II species, Sea Lamprey, River Lamprey, Brook Lamprey, Twaite Shad, and Atlantic Salmon.

Name of site	Site Code	Key Features for designation
Barrow River Estuary pNHA	000698	The tidal river and estuary supports populations of the protected (EU Habitats Directive 92/43/EEC) Twaite Shad which spawn in selected areas. Along the mid and southern side of the estuary, saltmarshes and saltmeadows have developed on the sediment which has accumulated at the mouths of incoming streams and inlets. Borerr's Salt-marsh Grass (Puccinellia fasciculata), a species legally protected under the Flora Protection Order is found within the site. Meadow Barley (Hordeum secalinum), occurs at several locations on this site. The Lower River Barrow is a regionally important site for wintering wildfowl and waders. Peregrine falcon a species listed in Annex I of the EU Birds Directive and in the Red Data Book as being threatened in Ireland, breeds within the site (West side).
Ballyhack pNHA	000695	Ballyhack encompasses, in a small area, a variety of habitats which are not frequent in south-east Ireland.
Waterford Harbour pNHA	000787	This site is of conservation importance for the extensive and good quality intertidal sand and mudflats, a habitat listed under Annex I of the EU Habitats Directive. This area supports populations of typical waterbirds including Mallard, Snipe, Sedge Warbler and Water Rail. The intertidal habitats are used by important numbers of wading birds during winter, as well as by small numbers of wildfowl. The populations of Oystercatcher (939), Lapwing (2,141) and Bar-tailed Godwit (216) are of national importance (figures are for winter 1994/95 to 1996/97). Other species which occur include Golden Plover, Sanderling, Dunlin, Black-tailed Godwit, Curlew and Redshank.

12.2.3.6 Baseline Evaluation

The habitats and species that comprise the marine ecology within the study area have been evaluated in consideration of the criteria detailed in Section 0 and the factors detailed in the baseline description.

Baseline Value of Habitats

- **Nature conservation designations**

  Habitats within designated SACs and pNHAs under the European Habitats Directives and the Irish Wildlife (Amendment) Acts 1976 and 2000 respectively are regarded as habitats of **high** value.

- **Subtidal and intertidal habitats**

  Much of the species that make up the intertidal and subtidal habitats are considered opportunistic species that readily recover following disturbance in an area. The diversity of the intertidal benthic habitat is high within the mudflats surrounding the Power Plant, containing many species which are dependent upon the habitat for survival and is therefore regarded as being of **medium** value. The rocky intertidal area surrounding the Power Plant and the subtidal benthic community are regarded as being a habitat of **low** value.

- **Manmade foreshore**

  The manmade foreshore habitat is regarded as being of low value. This habitat is not representative of the natural habitats surrounding it and provides little importance in the functioning of the surrounding ecosystem.

Baseline Value of Species

- **Plankton**

  Plankton populations are highly dynamic. They vary spatially, in response to nutrient concentrations, climatic conditions and currents and also exhibit significant cyclical changes in response to seasonal variations in sunlight and temperature.

  Phytoplankton, as primary producers is important to other ecosystem functions as they provide the basis of the productivity of higher trophic levels (zooplankton, fish, etc) including commercially important fish species. This could result in plankton having a high species value, however due to the tidal dynamics of the estuary, and the large scale dispersal characteristics and abundance of plankton throughout the estuary the value of plankton is regarded as **low** to **medium**.

- **Benthic Communities**

  The benthic community present is typical of estuaries in Ireland. The populations of representative species of this community are not declining. Many of the species present are considered opportunistic species that readily recover in an area following disturbance. In addition, to the criteria set out in Section 0 the sensitivity of the benthic communities present depends on the type of impact being considered. Species present are not particularly mobile and necessarily move away to avoid the impact, their natural ability to recover is high. Overall, the species value of the benthic community is considered to be **low**.

- **Shellfish**

  Mussels and pacific oysters are regarded as commercially valuable and are exploited in the Barrow Estuary. Shellfish are therefore regarded to be of **low** to **medium** value.

- **Fish**

  There are many species of nature conservation interest found within the study area. Sea lamprey, river lamprey, smelt, twaite shad and Atlantic salmon are all listed on Annex II of the EU Habitats Directive. Smelt (*Osmerus eperlanus*) are one of the rarest fish in Ireland and are listed in the Irish Red Data Book. These species of conservation interest are regarded as **medium** to **high** value species. Twaite shad are regarded as a hearing specialist, and are particularly sensitive to noise.

  The hearing of salmon is poor, with narrow frequency span, a poor ability to discriminate signals from noise and low overall sensitivity. This species is sensitive to increased turbidity and heat change. Salmon smolts are particularly sensitive to fish impingement at outfalls. Salmon is considered as a keystone species. Based on this and its conservation status and declining population in the Ireland, (see Section 12.2.3.3) salmon are regarded as a **medium** to **high** value species.

  Common species such as Atlantic herring, cod and whiting are found within the study area. Based on the baseline evaluation criteria in Section 12.2.2.4 these species are regarded as having a **low** species value on account of their widespread distribution and abundance in the Barrow Estuary, and throughout rivers and estuaries in Ireland and their ability to avoid areas of increased turbidity and noise.

- **Birds**

  Birds are highly mobile and will be able to avoid the areas of disturbance. Breeding birds and wintering birds, present in the study area include a number of species that are protected under EU legislation and are regarded of national importance (e.g. Greenland white-fronted goose, peregrine

falcon and kingfisher). Consequently, the populations of these species are considered particularly vulnerable, or highly sensitive, during the seasons that they pass through or breed in the area. These are considered as species of **medium** to **high** value.

Resident species commonly found in the area include mute swan and moorhen. These species are not particularly critical to other ecosystem functions and are classified as having **low** species value.

Several passerine species are found adjacent to the study area (e.g. swallow), are listed on the Amber List as threatened and are considered as species of **medium** to **high** value. However in general, the community of passerine species present in the study area are not protected and common species and therefore considered as of **low** value.

- **Nature Conservation Designations**

  Species selected for designation of SACs and pNHAs, under the European Habitats and Bird Directives and the Irish Wildlife (Amendment) Acts 1976 and 2000 respectively are regarded as species of **high** value.

12.2.4 Identification of Potential Impacts

The proposed development is anticipated to have impacts on various aspects of the marine environment, including habitats, flora, fauna and birds. Potential types and sources of impact associated with the proposed scheme are set out in Table 12.11: Potential Types and Sources of Impact. The mitigation measures that will be required to manage impacts are discussed in Section 12.2.5.

Table 12.11: Potential Types and Sources of Impact

Project phase	Potential Impact Type	Potential Impact Source
Construction	Loss of feeding / nesting areas for birds	Removal of vegetation
	Habitat and community disturbance in designated conservation areas e.g. SAC adjacent to development site boundary	Noise, vibration and visual impact from machinery, vehicles and construction related activities such as pile driving. Removal of vegetation
	Direct and secondary contamination of habitats and species particularly birds	Accidental spillage of vehicle fluids during construction onshore
	Direct and secondary contamination of habitats and species particularly birds	Accidental spillage of fuel-oil onshore and into water environment from transport of fuel or storage facilities
Operation	Changes in marine water quality, with secondary effects on habitats, flora and fauna	Atmospheric pollutants
	Contamination of habitats and species in intertidal and subtidal	Accidental spillage of fuel-oil onshore and into water environment from transport of fuel or storage facilities
	Damage and disturbance to fauna and planktonic fauna such as fish and their larvae	Potential effects of water abstraction from Barrow Estuary
	Habitat or community alteration	Potential effects of a thermal plume from outfall
	Effects on subtidal fauna and flora	Potential effects of chlorine and other chemicals contained in cooling water discharged to surrounding environment Potential effects of effluent discharge and run-off

12.2.5 Mitigation Measures

This section focuses on the mitigation measures that will be implemented specifically for the protection of marine habitats and associated community and the conservation areas designated for these species and habitats.

12.2.5.1 Construction

- The footprint of the development is confined to the southern terrestrial area of the existing power plant's site boundary. No construction activity will take place below high water ensuring that the effects on the estuarine environment are minimised and avoided to a large extent.
- Unnecessary clearing and grading on site will be avoided.
- Soils will be stabilised as soon as practicable to prevent elevated levels of suspended solids in surface water run-off during the construction phase.
- A Construction Environmental Management Plan (CEMP) will be prepared to incorporate mitigation measures identified to minimise the impacts of the proposed development on the marine ecology. This CEMP will focus on detailed measures to protect the Barrow River Estuary pNHA and the River Barrow and River Nore SAC.

- Construction activities known to produce higher levels of noise such as pile driving will be avoided where possible during the winter, between October and March to minimise disturbance to birds feeding on the intertidal mudflats surrounding the development site.

- Construction activities will be phased to minimise soil exposure. Large areas of grading will be avoided in order to minimise erosion potential. Airborne dust arising from construction activities will be minimised by employing the mitigation measures described in Chapter 15 (Air Quality and Climate).

- Clearing adjacent to the estuary will be minimised. Silt control measures will be installed along the perimeter of trench excavations, where considered necessary. Particular care will be taken inside of the development site boundary in accordance with NPWS to ensure that disturbance to habitats and species of particular importance in the River Barrow and River Nore SAC and Barrow River Estuary pNHA can be avoided. Method statements for each construction activity will be developed in consultation with NPWS and included in the CEMP.

- All run off from areas of exposed soil will be diverted to a sediment trap on site during the construction phase. Water from the sediment trap will be discharged to the estuary via the drainage channel network, where practicable. Details of these measures will be developed in the CEMP.

- Potentially polluting substances and chemicals including oils, fuels, residues and wastes shall be stored at least 15 metres distance from watercourses or areas at risk of flooding and site ponding. Potentially polluting substances shall be located in a bunded area. Bund specification will conform to the current best practice for oil storage such as Enterprise Ireland's Best Practice Guide BPGCS005 Oil Storage Guidelines. The bunded areas will have a capacity that is the larger of either:

  - 25% of the total volume of materials in the bund; or
  - 110% of the volume of largest container in the bund

- Draw-off points and pipework associated with potentially polluting substances will be located entirely within bunded areas on site. Drainage from the bunded areas will be diverted for collection and safe disposal. Liquid contained within the bund will be tested once significant volumes have been retained. Once the results have been assessed the liquid will be pumped to the surface water drainage network or removed from the bund for off-site recovery or disposal by an appropriately permitted contactor in accordance with the requirements of the Waste Management Act, 1996 as amended.

- On-site refuelling will be avoided where possible. Where this is unavoidable refuelling will be carried out in designated bunded areas.

- Adequate stocks of hydrocarbon absorbent materials (e.g. spill-kits and / or booms) will be held on-site in close proximity to the chemical store in order to facilitate response to accidental spills and thus the possibility of contaminants entering estuarine environment, impacting the intertidal community. Spill response materials will also be stored on all construction vehicles. Competent personnel will be available to use the spill-kits in the case of a spill.

- Equipment will be regularly maintained and leaks repaired as soon as possible. If the equipment cannot be repaired it will be removed from the development site. Accidental spillages will be contained and cleaned up immediately. Spill-kits will be provided on-site during the construction phase, as required.

- Contained chemical portaloo toilets will be used on site during the construction phase. All sewage will be removed from the site to an authorised treatment plant.

- In addition, an intrusive 'contaminated land assessment' will be undertaken prior to any construction works being undertaken. Any contaminated land encountered, which is considered to be at risk of mobilisation during the construction phase, will be removed to an appropriately authorised facility prior to construction activities commencing with prior agreement from the EPA.

12.2.5.2 Operation

- Atmospheric emissions, during the operational phase of the project will comply with air quality limits and standards as described in Chapter 15 (Air Quality and Climate). In addition, Continuous Emission Monitoring (CEM) will be carried out for emissions of substances as specified by the Environmental Protection Agency in the IPPC licence for the facility. The proposed height of the stack, 60 metres will ensure good dispersion of atmospheric emissions and modelling suggests emissions will be below their relevant AQS and nitrogen critical load values. Ecological impacts, associated with operational phase atmospheric emissions, on the Lower River Suir SAC are predicted to be negligible as the maximum total nitrogen deposition is well below the critical load and the predicted NO_x concentration is well below the relevant AQS standard, this is discussed in detail in Section 12.1.5. Distillate oil will be used for standby fuel for the gas turbine in addition to fuel for the emergency generator set: use of this oil will therefore be very limited (see Chapter 3, Description of the Development).

- Cooling water will be dosed at the cooling water inlet by direct injection of Sodium Hypochlorite (NaOCl) solution as required in order to control biological fouling, of and damage to the condensers. Chlorine concentrations in the cooling water discharge will be maintained at a maximum concentration of 0.5 mg/l as per the current IPPC licence. Due to the high dispersal capacity of the receiving water body and the low concentrations of chlorine present no further mitigation measures are required as the proposed concentrations will not exceed current discharge concentrations. However, a water quality monitoring programme will be developed for process waste water and surface water run-off. Appropriate limits for waste water discharges will be determined by the EPA under the IPPC licence which will be revised with due regard to the WFD. Refer to Chapter 14 (Surface Water).

- A water conservation plan will also be implemented for the proposed power plant during the operational phase in order to reduce the amount of water used.

- In compliance with Best Available Technology (BAT), a mechanical screening system will be used to screen cooling water abstracted from the estuary. A series of fixed, coarse screens and travelling fine screens will be used. Endesa Ireland will use BAT. Endesa Ireland is committed to working closely with the Southern Regional Fisheries Board (SRFB) to determine the most appropriate and effective technology to mitigate against entrainment of fish species into the cooling water system, to ensure that impacts to smolts and other fish are minimised to an acceptable level. In particular this is expected to take place after commissioning of the new plant, circa 2013.

- The thermal load of the water discharged from the outfall will be reduced below the levels currently experienced under the current IPPC licence. Under the current licence thermal load is a maximum of 352 MWth and will be reduced to a maximum of 291 MWth under the proposed application.

- As for the construction phase, oil, petrol and other potentially polluting substances will be stored in UN approved containers. Bund specification will conform to the current best practice. Hydrocarbon interceptors and silt traps will be included at the downstream ends of proposed collection systems to remove oil and silt / grit from general plant washings and surface water runoff during the operational phase. This will then be discharged via existing outfalls where possible. It is assumed that the existing drainage system would be re-utilised as much as possible and that the existing invert levels and pipe capacities would allow this. Refer to Chapter 14 (Surface Water).

- Potentially polluting substances and chemicals including oils, fuels, residues and wastes will be stored according to IPPC licensing conditions.

- All bunds and chemical containers will comply with the appropriate standards and will be leak tested prior to commencement of operations and every five years thereafter, or as otherwise agreed with the EPA.

12.2.6 Residual Impacts

12.2.6.1 Construction Phase

Loss of feeding / nesting areas for birds

To the north east of the development site, the proposed laydown area will require the removal of immature beech and sycamore woodland. In addition, the proposed parking bay may require the removal of some sections of hedgerow along the existing local road leading to the development site. The removal of this vegetation will result in reduced feeding and possibly nesting areas for passerine bird species. With the implementation of the mitigation measures mentioned above these impacts will be of short term duration and will return to pre-impact state once the introduced vegetation establishes. The planting of new vegetation on site will provide new breeding and nesting areas for passerine species affected. Without mitigation the disturbance will be of low magnitude to a low value receptor, resulting in an impact of *Low* significance. However, with mitigation the disturbance to birds is expected to be minimal. Therefore, with mitigation, the impact is likely to be Low.

Habitat and community disturbance in designated conservation areas e.g. SAC adjacent to development site boundary

Noise and vibration and visual disturbance from the presence of increased machinery, vehicles and construction related activities will have temporary impacts on birds using the site and the surrounding areas, in particularly the salt marshes, near to the development site. Waterfowl and waders of international importance and others birds particularly those sensitive to noise such as the white-fronted goose (*Anser albifrons*) and peregrine falcon (*Falco peregrinus*) are likely to be displaced from these areas during construction. Monitoring studies undertaken during piling activity on the Humber Estuary in England have shown that disturbance from piling activity was effectively reduced by visual screening from birds, with bird numbers and distribution similar during periods with or without piling. Construction activities which were not screened caused disturbance comparable to recreational activities with birds maintaining a stand off distance of around 200 metres (ERM, 1996).

Effort will be taken to minimise noise emitted during construction (see Chapter 11, Noise and Vibration) during sensitive periods for birds, the disturbance to birds is expected to be minimal. Without mitigation the disturbance will be of low magnitude to a high value receptor, resulting in an impact of Medium significance. However, with mitigation the disturbance to birds is expected to be minimal. Therefore, with mitigation, the impact is likely to be reduced to Low.

Direct and secondary contamination of habitats and species particularly birds

Spillage of vehicle fluids onshore during construction is expected to be unlikely and volumes of fuel oil possibly involved are expected to be relatively low and machinery will be contained within the development site boundaries. In the unlikely event that some vehicle fluids accidentally spill and enter the intertidal area, they will dissipate relatively quickly and not have a lasting impact on the intertidal flora and fauna. During the excavation and removal of soil for construction works, fuel / oil interceptors and silt traps or sedimentation ponds will intercept surface water run-off. This will also reduce the possibility of such contaminants entering the marine environment. Without mitigation the disturbance will be of low magnitude to a high value receptor (both birds and habitats), resulting in an impact of Medium significance. With mitigation the impact is likely to be reduced to Low.

12.2.6.2 Operational Phase

Changes in marine water quality, with secondary effects on habitats, flora and fauna

The River Barrow and River Nore SAC support numerous bird species of national and international importance / concern. As described in Section Birds in addition to seabirds, passerine species including swallow (*Hirundo rustica)* are observed within the power plant site boundary. Air emissions from the proposed development are expected to improve from the current situation (see Chapter 15, Air Quality and Climate). Results from dispersion modelling carried out show concentrations of all relevant pollutants are predicted to remain well below the relevant air quality standards when the plant is firing on either natural gas or distillate fuel oil. Consequently, ecological impacts, associated with operational phase atmospheric emissions, on the Lower River Suir SAC are predicted to be negligible.

Contamination of habitats and species in intertidal and subtidal

Accidental spillage of fuel-oil onshore and into the water environment from transport of fuel or storage facilities may occur during the operational phase. Impacts expected are similar to those from the construction phase (see Section 12.2.6.1). Therefore, with mitigation the impact is likely to be reduced to Low.

Damage and disturbance to fauna and planktonic fauna such as fish and their larvae

Abstraction of cooling water from the Barrow Estuary has the potential to impact on marine plankton and other fauna such as fish and their larvae.

The cooling water will be extracted via the existing cooling water intake culverts. A study carried out by the Central Fisheries Board at Great Island power plant in 2006 concluded that the existing system on the intake culverts have not had a significant impact on migrating salmon smolts (Central Fisheries Board, 2006). However, the existing system does cause large numbers of fish to be impinged in the cooling water intake culverts. In accordance with the recommendations of the study, Endesa will develop a technical solution in consultation with the relevant authorities and in line with current best practice to ensure that migrating salmon smolts are not impacted and that impacts to smolts and other fish are minimised and the impingement of fish is reduced to an acceptable level.

It is anticipated that mortalities of plankton will result from the passage of planktonic species through the cooling water system. This biomass will however be returned into the estuary through the discharge of cooling water at the outfall. The regenerative capacity of the species concerned will ensure that the overall proportion of the population affected in the Barrow Estuary will be minimal.

The impacts expected from the refurbished cooling water intake system are expected to be lower than that of the current system. Without the mitigation measures listed above the plankton community, a low to Medium value receptor, will be subjected to a low magnitude impact, resulting in an impact of *Low* significance. The low magnitude impact to common fish species, a low value receptor, will also result in an impact of *Low* significance. However, fish species of conservation interest (egg Atlantic salmon) are medium to high value receptors and the low magnitude impact is likely to result in an impact of *Low* to *Medium* significance. With mitigation the overall impact is likely to be reduced to *Low*.

Habitat or community alteration

The effects of discharged water from the outfall will result in a thermal plume. Such a plume can affect estuarine flora and fauna including diadromous fish in the following ways:

- Thermal influence caused by a short term or long term exposure to higher than ambient temperatures in the discharge area

- Mechanical damage caused by the screens at the intake (impingement), and by the flow through the cooling system (entrainment)

- Hindrance of river passage of diadromous fish by 'blocking' the water way through the creation of a barrier of water with a temperature sufficiently above ambient to cause behaviour change or discomfort in the fish

- Toxic damage caused by a detrimental water quality of cooling water

- To understand the impacts the discharged elevated temperatures may potentially have on the local environment, it is important to understand the plume characteristics at the outfall

Under the new proposals, the allowable temperature rise through the cooling water system i.e. the difference between outlet and inlet) will remain unchanged at 12.0^{o}C above estuarine water temperature. However, as the volume of discharge is anticipated to decrease from 50,170m^{3}/hr to 20,000m^{3}/hr the maximum thermal load is anticipated to decrease from the existing 352 MWth to 291 MWth.

The impact of this 'new' plume in the Barrow Estuary is not considered to have any negative effects on the estuarine flora and fauna and diadromous fish populations above and beyond the effects that may be currently occurring. If it would, it would only be at a small area and with a temperature difference that is similar to current temperatures discharged from the existing power plant. The main considerations for this conclusion are as follows:

1. Subtidal and intertidal benthic communities will not be affected. Owing to its elevated temperature above the estuarine conditions, the plume will be buoyant. Temperatures rapidly drop with increasing depth. As currently is the case, temperatures will be higher in surface waters at the outfall. At the seabed therefore the temperatures should be near ambient and thus are not a reason for concern.

2. Intertidal communities will not be affected. The intertidal substrate in the Barrow Estuary Bay is largely soft sediment inhabited by marine benthos. Any plume that under adverse wind conditions would be directed onshore will have lost much of its heat at the land interface. Temperature increases on these intertidal substrates are not considered harmful in view of the fact that the species in such habitat are physiologically adapted to natural fluctuations in seawater temperature that are characteristic of these exposed environments.

3. Diadromous fish species, including Atlantic salmon (*Salmo Salar*), are not physically blocked from migrating up the river.

4. Reproduction capacity of the fauna in the Barrow Estuary will not be affected. The volume of water where temperature is elevated and the number of eggs and larvae that become trapped and suffer as a result are but a fraction of the total volume and number present in the estuary. Intake of water from the Barrow Estuary would result in the entrainment of fish larvae and other plankton. Because of the reduction of the intake rate, it can be expected that fewer larval fish and eggs will become entrained than during the former operation.

5. Estuarine productivity is not affected. Warmer temperatures are thought to result in lower phytoplankton biomass during the winter-spring bloom period as a result of increased grazing related to greater metabolic activity of both zooplankton and the benthos. The fact that phytoplankton and zooplankton are continuously redistributed in the estuary by currents and a limited extent of the plume renders it unlikely that productivity will be noticeably affected.

6. Water quality will not deteriorate. Higher temperatures often exacerbate low dissolved oxygen level problems in water bodies through the microbial breakdown of organic matter. Thus, persistent warm conditions may in principle lead to a depletion of dissolved oxygen in the water body. However, the

Barrow Estuary is simply too dynamic and the plume is expected to be too small for such conditions to prevail.

7. No evidence of negative effects arising from current discharge exist.

Effects on subtidal fauna and flora

Potential environmental consequences may result from high levels of chlorine contained in discharges from marine and estuarine power plants however, chlorine concentrations in the cooling water discharge will be maintained at a maximum concentration of 0.5 mg/l as per the current IPPC licence. Chlorine decay in seawater depends on the environmental factors including salinity and pH. The current concentration of chlorine discharge appears not to be adversely impacting on any of the species in the study area. Mobile species such as fish are known to avoid areas where elevated chlorine is present so that as a group they are unlikely to suffer any significant adverse impacts.

The volume of cooling water that will be abstracted is relatively small in comparison to the expected volume of each tidal exchange in this part of the estuary and will be significantly reduced as part of the proposed development. Therefore it is anticipated that the concentrations discharged from the outfall will not be significant in terms of toxicity effects on subtidal marine organisms. Impacts to the benthic communities, a low value receptor, will be of low magnitude before mitigation resulting in an impact of *Low* significance. Common fish species in the area are also of low value and the low magnitude impact will again result in an impact of *Low* significance before mitigation. However, fish species of conservation interest (e.g. Atlantic salmon) are medium to high value receptors and the low magnitude impact is likely to result in an impact of *Low* to *Medium* significance. Therefore, with mitigation (i.e. the lower volumes of water extracted and discharged) the impact is likely to be reduced to *Low*.

12.2.6.3 In-combination Impacts

There are no other known plans or projects in the vicinity of Great Island Power Plant which may act in-combination with the proposed development to impact on intertidal and benthic communities. Waterford Container Terminal lies approximately 2 kilometres upstream of the Power Plant on the River Suir at Belview Port. However it is not anticipated that potential impacts from the proposed development will act in-combination with the Belview Port development.

12.2.6.4 Summary of Residual Impacts

Increased noise emitted from construction activities is likely to cause disturbance to breeding and wintering birds. There is a potential that birds may temporarily avoid their normal breeding / wintering areas during periods of loud noise activities. With the exception of birds, intertidal and subtidal marine flora and fauna are not likely to be adversely affected from construction activities.

During the operational phase, it is expected that impacts on marine ecology and birds are likely to be improved from current conditions, with the installation of the Combined Cycle Gas Turbine (CCGT). The decrease in the volumes of water abstracted for cooling purposes will result in a reduction in the impingement of planktonic fauna and fish, and will ensure current impacts are improved.

Under the new proposals, the thermal load and extent of the thermal plume created form the discharge at the existing outfall will be reduced. Associated impacts on the existing water quality and marine ecology is not expected to deteriorate or be further disturbed from the effects of the current plume.

A summary of the residual impacts associated with the proposed development is detailed in Table 12.12.

Table 12.12: Summary of Residual Impacts

Impact Type	Impact Source	Value / Sensitivity of the Receptor	Impact Significance	Residual Impact Significance
Construction				
Loss of feeding/ nesting areas for birds	Removal of vegetation	Passerine bird species- Low	Low	Low
Habitat and community disturbance in designated conservation areas e.g. SAC adjacent to development site boundary. Disturbance of local fauna including marine mammals and birds	Noise and vibration from machinery, vehicles and construction related activities	Birds - High	Medium	Low
Direct and secondary contamination of habitats and species particularly birds	Spillage of vehicle fluids during construction onshore	Habitats – High Birds - High	Medium	Low
Operation				
Changes in marine water quality, with secondary effects on habitats, flora and fauna	Atmospheric pollutants	Bird - High	Medium	Low
Contamination of habitats and species in intertidal and subtidal	Spillage of fuel-oil onshore and into water environment from transport of fuel or storage facilities	Benthic habitats – Low- High Benthic communities - Low Common fish species - Low Conservation interest fish species Medium to High	Benthic habitats – Low to Medium Benthic communities - Low Common fish species - Low Conservation interest fish species Low to Medium	Low
Damage and disturbance to fauna and planktonic fauna such as fish and their larvae	Potential effects of water abstraction from Shannon Estuary	Plankton communities - low to Medium Common fish species - Low Conservation interest fish species Medium to High	Plankton communities - Low Common fish species - Low Conservation interest fish species Low to Medium	Low
Habitat or community alteration	Potential effects of a thermal plume from outfall	Benthic habitats – Low Benthic communities - Low Common fish species - Low Conservation interest fish species Medium to High	Benthic habitats – Low Benthic communities - Low Common fish species - Low Conservation interest fish species Low to Medium	Low
Effects on subtidal fauna and flora	Potential effects of chlorine contained in cooled water discharged to surrounding environment	Benthic communities - Low Common fish species - Low Conservation interest fish species Medium to High	Benthic communities - Low Common fish species - Low Conservation interest fish species Low to Medium	Low

12.2.7 Summary Conclusion

Great Island power plant is located in close proximity to several designated areas of conservation:

- River Barrow and River Nore Special Area of Conservation (SAC);
- Lower River Suir SAC;
- Barrow River Estuary proposed Natural Heritage Areas (pNHA);
- Ballyhack pNHA; and
- Waterford Harbour pNHA.

These designated areas of conservation are regarded as high value as they have been designated to protect and conserve species and habitats of concern or importance. There are no Special Protection Areas (SPAs) or Important Bird Areas (IBAs) designated for the protection of birds in the project area. It is not expected that project activities will impact the marine flora and fauna of the Barrow River Estuary proposed Natural Heritage Areas (pNHA). Much of the benthic species known to exist in the intertidal and subtidal area surrounding the power plant are common in Irish estuaries. However, the mudflats surrounding the power plant contain many species which are dependent upon such a habitat for survival and are therefore regarded as being of medium value. The rocky intertidal area surrounding the power plant and the subtidal benthic community are regarded as being a habitat of low conservational value. Impacts to these communities from the construction phase are expected to be minor as works will be restricted to within the power plant site boundary.

Cooling water will be extracted via the existing cooling water intake culverts. The potential for fish to be impinged (damaged by the screens at the intake) by the fine screens employed by the proposed system will remain, however, Endesa will develop a technical solution in consultation with the Southern Regional Fisheries Board (SRFB) to determine the most appropriate and effective technology to mitigate against entrainment of fish species into the cooling water system, to ensure that impacts to smolts and other fish are minimised to an acceptable level. In particular this is expected to take place after commissioning of the new plant, circa 2013. The temperature of the cooling water discharged from the power plant will remain unchanged during operation, however as the volume of water discharged will decrease substantially, the maximum thermal load is anticipated to also decrease from current conditions. Associated impacts on the existing water quality and marine ecology are not expected to deteriorate or be further disturbed from the effects of the current plume.

Due to combinations of the proposed mitigation measures, the magnitude of impacts and the positive changes from the current situation, the proposed activities will not have an adverse effect on the integrity of the sites or the qualifying features of the conservation objectives of the Natura 2000 sites. Therefore significant impacts are not likely to occur.

13. Soils, Geology and Groundwater

13.1 Introduction

An environmental impact statement (EIS) must contain a description of the aspects of the environment that are likely to be significantly affected by the proposed development. This chapter of the EIS has been prepared in order to help fulfil this requirement with respect to soils, geology and groundwater as well as any contaminated land, if present, in the area of the proposed development.

The methodology and the following assessment sections are set out for soil, geology and groundwater.

13.2 Methodology

13.2.1 Guidance Used

The section presents the methodology used in assessing the baseline soils, geology and groundwater environment. As well as considering the relevant Environmental Protection Authority (EPA) guidance with respect to EISs (EPA, 2002, 2003). The scope and methodology for the baseline assessment has been devised with reference to the following guidelines and previously undertaken investigations.

- Geology in Environmental Impact Statements – A Guide (Institute of Geologists of Ireland, 2002)
- Greater Dublin Strategic Drainage Study (Dublin Drainage Consultancy, 2005)
- Phase 1 and 2 Environmental Site Assessment, ESB Great Island Power Generating Station, URS, November 2009. Refer to Appendix 13.1.

Historical mapping and other existing data sources were also reviewed.

13.2.2 Study Area

The dimensions of the study areas for this topic are set out in Table 13.1.

Table 13.1: Study Area

Aspect Under Study	Dimensions of the Study Area
Soils and Geology	All soils and geology within the direct footprint of the scheme and adjacent areas
Groundwater	Development area and its immediate environs including the estuary area in the vicinity of the development

13.2.3 Baseline Evaluation Criteria

13.2.3.1 Soils and Geology

Soils and sediments, including the bedrock from which it is sourced and by which it is supported, are important natural resources that perform many functions. These functions include:

- Biomass production: support of vegetation

- Filtering, buffering and transforming action: cycling of major elements required by biological systems, regulation and partition of water flow, provision of nutrients and minerals to groundwater, sorption reactions and microbial and biochemical transformations

- Biological habitat and gene reserve: soil biomass, supporting biological habitat and gene reserve, retention of water for use by vegetation

- Physical medium: support for built structures, waste disposal and recreation activities

- Protecting and preserving cultural heritage: protects archaeological and paleontological sites and contributes to the appearance of the landscape

All soils have different characteristics and play a role in supporting varying environments and chemical processes. Soils and sediment with a high clay and organic matter content provide nutrients and minerals to groundwater and habitats and therefore play an important role in nutrient cycles and vegetation support. These soils and sediments are recognised to be important. Soils and sediment that support areas of natural vegetation are also recognised to be important because the importance of natural habitats and biomass is recognised.

In some cases, the potential for soils and sediment to perform environmental functions (e.g. support of ecological communities) is reduced due to existing pollution resulting from anthropogenic activities, leaching or physical degradation, such as erosion. This is also therefore taken into consideration when defining the importance and sensitivity of soils and sediments.

Table 13.2: Criteria for Baseline Assessment of Soils and Geology

Criteria	Importance/ Sensitivity
Soils / Geology that support areas of natural or semi-natural vegetation and habitats Undisturbed and uncontaminated soils / sediment	High
Soils / Geology that support non-natural vegetation or habitats Soils / Geology that contains minor contamination but does not represent a significant risk	Medium
Areas where soils or sediment are absent (i.e. exposed bedrock) or paved areas Soils or Geology that is highly contaminated and / or represents a significant risk	Low

13.2.3.2 Groundwater

Groundwater performs a number of important functions including:

- Assimilation and transportation of nutrients and minerals required by biological systems

- Transport of water as part of the water cycle

- Support of habitats and species (springs, marshes)

- Baseflow provision to rivers and streams

- Potential supply of potable water

Geological Survey of Ireland (GSI) has defined Source Protection Zones (SPZs) in Ireland and these areas are recognised to be particularly important in terms of protection of potable water use and pollutant control. If groundwater resources support designated ecological sites or protected species they are also recognised to be particularly important and sensitive.

The importance of any groundwater resource is also dependent on the presence and productivity of aquifers. GSI has identified bedrock aquifers in Ireland and classified them in terms of productivity (groundwater yield, based upon porosity and permeability characteristics). The following classification system is used by GSI:

- Regionally important aquifers: good (100 to 400 m^3/day) to excellent (>400m^3/day) productivity
- Locally important aquifers: moderate (40 to 100 m^3/day) productivity
- Poor aquifers: poor (<40 m^3/day) productivity

GSI have produced guidelines as to how aquifer vulnerability can be calculated (GSI, 1999). These guidelines are summarised in Table 13.3 below

Table 13.3: GSI Guidelines for Aquifer Vulnerability Rating

Groundwater Depth	Soil Permeability High (sand/gravel)	Moderate (e.g. sandy soil)	Low (e.g. clayey subsoil, clay, peat)
0.0 – 3.0	Extreme	Extreme	Extreme
3.0 – 5.0	High	High	High
5.0 – 10.0	High	High	Moderate
>10.0	High	Moderate	Low

Note: Release point of contaminants is assumed to be 1-2m below the ground surface

In addition to these parameters, existing groundwater quality also needs to be taken into account when evaluating the importance and sensitivity of groundwater resources. Clean groundwater resources are recognised to be important and their quality shall be preserved and protected. Groundwater resources that are significantly contaminated are considered to be sensitive to further contamination and degradation. However, they are generally considered to be of lower sensitivity than groundwater bodies of pristine or near pristine quality. Exceptions may exist in cases where, for example, habitats and / or users are dependent on groundwater resources.

The criteria set out in Table 13.4 have been devised to evaluate baseline conditions in light of the considerations set out in this section.

Table 13.4: Criteria for Baseline Evaluation of Groundwater

Criteria	Importance/ Sensitivity
Source Protection Zones are present	High
Groundwater resources that support ecological designated sites, proposed designated sites or protected species	
Some wells in the area are used, or are proposed to be used, for potable water supply	
Regionally important aquifer with good (100 to 400m3/day) to excellent (>400m3/day) groundwater yields	
Aquifer of high to extreme vulnerability	
Groundwater quality is likely to be good	
Potable water supply abstraction wells are not present	Medium
Aquifer of moderate vulnerability	
Locally Important Aquifer with moderate groundwater yields (40 to 100m3/day)	
Groundwater quality is likely to be moderate – some limited existing sources of current or historic pollution have been identified	

Criteria	Importance/ Sensitivity
Potable water supply abstraction wells are not present Aquifer of low vulnerability. Poor aquifer with poor groundwater yields (<40m3/day) Groundwater quality is likely to be poor – extensive existing sources of current and/or historic pollution have been identified	Low

13.2.4 Impact Assessment Criteria

The source and type of all potential impacts is set out in Section 13.4. The measures developed to avoid, mitigate, or where no other option exists, compensate for adverse impacts are reported in Section 13.5. Potential residual impacts that are identified are described in terms of magnitude and significance in Section 13.6.

Magnitude

The magnitude of an impact is assessed in consideration of its intensity, and its extent in space and time. The criteria used to assess the magnitude of development impacts on soils, geology and groundwater are shown in Table 13.5.

Table 13.5: Criteria for Assessment of Impact Magnitude

Criteria	Impact Magnitude
Impact is of long-term or permanent duration (>5 years) Impact on the soil/sediment has a clearly noticeable and substantial impact on soil/sediment function e.g. biomass production or potential to support ecological systems The soil/sediment/affected area has limited or no potential to recover A large volume of soil/sediment/groundwater is affected and alternative resources performing similar functions are not available in the area Impact on the groundwater has a clearly noticeable and significant impact on environmental functionality	High
Impact is of medium-term duration (1-5 years) Impact on the soil/sediment has a moderate and noticeable impact on soil/sediment function e.g. biomass production or potential to support ecological systems The soil/sediment/affected area has the potential to recover A moderate volume of soil/sediment/groundwater is affected and alternative resources performing similar functions are not available in the area Impact on the groundwater has a moderate and noticeable impact on environmental functionality	Medium
Impact is of temporary (weeks) or short-term (months) duration Impact has only slight or no noticeable consequences for the functionality of the soil/sediment/groundwater A small or insignificant volume of soil/sediment/groundwater is affected or alternative resources performing similar functions are available in the area Impact has only slight or no noticeable consequences for the environmental functionality The affected area has the potential to recover	Low

Significance

The significance of all impacts is assessed in consideration of the magnitude of the impact and the importance / sensitivity of the affected area. Impact significance is described as being Not significant, of Low significance, of Medium significance or of High significance.

13.3 Baseline Description and Evaluation

13.3.1 Geology

13.3.1.1 Regional Geology

According to the Geological Survey of Ireland (GSI, 2009) and Sleeman (1994), the geology underlying the site comprises Ordovician Volcanics consisting of the Campile Formation with undifferentiated felsic volcanics. The Campile Formation is described as pale coloured rhyolites in grey and brown slaty mudstones with occasional andesites.

13.3.1.2 Encountered Geology

A Phase 1 and Phase 2 assessment undertaken by URS in 2009 (Phase 1 and Phase 2 Environmental Site Assessment, ESB Great Island Power Generating Station, URS, 2009) identified the following geology at the site:

The overburden of the upper tier of the Station Grounds comprised a thin (less than 0.5 m thickness) layer of fine-grained sandy and silty topsoil overlying weathered bedrock. The geology of the parking bay areas is likely to be similar to that encountered in the upper tier.

Near the 220 kV switching yard 1.75 m thickness of loose brown clay was encountered overlying bedrock.

On the lower tier (see section 13.3.3.2 for further details specific to the proposed development area), up to 6.5 metres of fill material was encountered along the southern margin, comprising a lower layer of clays with occasional boulders, underlying an upper layer of boulders. Near the northern margins of this lower tier, up to 3 metres of natural clays overlying bedrock were encountered.

13.3.2 Site Evaluation

13.3.2.1 Site History

The following section describes the entire site of the existing power plant including the proposed area for development based on information provided by the site.

The existing power station was constructed in two stages, over agricultural lands. The first stage involved the commissioning of two 60 MW Units, in 1967 and 1968. Stage 2 involved the commissioning of a 120 MW Unit, in 1972.

Two areas of the site were subject to waste disposal operations. These were developed during the two main phases of construction of the Great Island Generating Station in the mid-1960s and early 1970s and were developed for the deposition of excess rock fill, building materials and spoil.

The northern segment of cell 1 (“station dump”) was additionally used for general waste disposal during operation of the generating station between mid-1960s and mid-1990s. The wastes deposited in this area included fuel oil, boiler washings, laboratory waste, building rubble, canteen waste and asbestos removed during turbine overhauls and other maintenance activities. In 2005, with the agreement of the EPA, the landfill was capped.

13.3.2.2 Potential Current Contamination Sources

Primary sources of contamination are man-made activities that have the potential to introduce contamination into the ground. The potential primary sources of potential impact at the site have been identified based on the information provided by the site (current site activities, history of the site, surrounding area, etc).

Current on-site sources of contamination include: power generating units, water treatment plant, cooling water pumping house, oil stripping tank, underground storage tanks with heavy and light fuel wastes, HFO Tank Farm, 220 and 110 kV switching yards.

Historical on-site sources of contamination include the former waste disposal areas, particularly the northern half of the eastern cell (Cell 1) which received a variety of operation related wastes until the mid-1990s.

Current and historic off-site sources of contamination are considered to be limited to agricultural activities.

13.3.2.3 Contamination Site Assessment

This section refers to the Phase 1 and Phase 2 Environmental Site Assessment undertaken by URS and finalised in November 2009. This assessment addressed the entire site. The following works were completed as part of this assessment:

- Drilling of seven boreholes (BH201 to BH207) using air rotary drilling technique including overburden sampling. Monitoring wells were installed into each borehole
- Groundwater samples were obtained from the newly installed and ten previously installed groundwater wells: BH201 to BH206 (BH207 was not sampled as it was dry), BH2, BH3, MW101, MW102, MW107, MW104, MW106, MW200, MW201 and MW202
- Seventeen shallow trial pits (TP101 to TP117) with soil sampling
- Hand augered samples (three samples) from the bund walls around the HFO Tank Farm
- Sediment sampling (seven samples - SS01 to SS04 and SS10 to SS12) from the foreshore areas to the west of the former landfill cells and to the west of the Station Grounds
- Hand augered samples (eight samples) from across the 220 kV compound
- One additional trial pit from the 110 kV compound
- 'Bracketing' sampling (four samples) around hand augered sample HA04

Samples were analysed for a range of inorganic and organic parameters, however, not all samples were analysed for the complete suite of analytical parameters. Further investigation will be undertaken prior to construction.

The URS report drew the following conclusions based on the site works undertaken:

- Overall the site is considered suitable for the continued industrial use from the perspective of human health implications to site users.
- Risks to surface water and groundwater from a number of metals, fluoride, polycyclic aromatic hydrocarbons (PAH) and hydrocarbon indicator compounds were identified. However, URS concluded that the potential risks were not significant across the majority of the site.
- Samples collected from within the 220 kV compound located in the northern section of the site identified exceedances for hydrocarbons (mineral oil), arsenic, copper and zinc which may represent a risk to human health receptors. This area is upgradient of the proposed development area.

- Arsenic exceedances which may represent a risk to human health receptors were identified in two soil samples. One of these locations is upgradient of the proposed development area.

- PAH exceedances were identified adjacent to the proposed development area along the southern boundary of the site.

- Coliforms were detected in the groundwater and surface water at the site. URS conclude that this is likely to be as a result of local upgradient agricultural practices but may also be related to on-site activities.

- Elevated concentrations of ammonia were detected in groundwater. The origin was attributed to the former waste disposal area.

URS conclude that based on existing data, no remedial action was considered necessary at the site assuming a continued industrial land use scenario. However, it was identified that further assessment was required in some areas to confirm this conclusion, including areas where intrusive investigation was not possible due to the operational nature of the site.

It should be noted that the exceedances identified in the URS report are in comparison with generic assessment criteria which are conservative by nature. A site specific assessment, using site specific assessment criteria, may indicate that there are no risks to receptors associated with the exceedances identified.

13.3.2.4 Proposed Development Area Contamination Assessment

This development area is located in an area referred to as the Station Grounds - Lower Tier, which is generally flat.

This lower tier contains the main building, associated chimney stacks, cooling water pump house and process water treatment (steam purification) facility located adjacent to the proposed development area. The assessment also identified three excess / waste underground fuel storage tanks. These tanks are reportedly contained within below-ground vaults.

The above assessment involved the drilling of boreholes in the proposed development area: BH201 and BH202, and the monitoring of the existing groundwater well, BH3. A sediment sample, SS01, and a surface water sample, SW05, were also taken adjacent to the proposed development area.

Geology encountered in BH201 consisted of Made Ground comprising loose gravel to a depth of 0.4 metres below ground level (m bgl) overlying stiff, brown-grey, silty, sandy clay with boulders to a depth of 5.1m bgl. The clay was underlain by bedrock. Geology encountered in BH202 consisted of Made Ground comprising dense gravel to a depth of 0.3m bgl overlying boulders to a depth of 3.6m bgl overlying some clay with boulders to 6.4m bgl at which depth bedrock was encountered.

Two soil samples were analysed from BH201 for VOCs, TPH, PAHs, TOC and other inorganic parameters. Exceedances for a number of metals and fluoride were identified from the controlled water quantitative risk assessment in comparison to Generic Assessment Criteria (GAC) however, there were no exceedances for hydrocarbons or PAHs.

There were exceedances of groundwater assessment criteria for samples collected from locations MW201, MW202 and BH3 for anions, cations and coliforms. There was also an exceedance in BH202 for arsenic and in BH3 and MW202 for ammonia. There were no exceedances for any other metals, hydrocarbons or PAHs. These identified exceedances may be indicative of groundwater quality locally within the aquifer as similar exceedances are repeated across the entire site.

There was also one sediment sample (SS01) taken, with results showing exceedances above the screening criteria for hydrocarbons, metals and fluoride. The only exceedance recorded for the surface water sample, SW05, was for total phenols.

13.3.2.5 Designated Ecological Sites and Protected Species

According to the National Parks and Wildlife Service (NPWS), the River Barrow Estuary is a proposed Natural Heritage Area (pNHA). The River Barrow and the River Suir are designated as Special Areas of Conservation (SAC).

Groundwater resources within the study area are considered likely to be in hydraulic continuity with the River Barrow (at west) and Suir (at south). The surrounding area is predominantly agricultural. To the north of the site is a railway track and some agricultural lands beyond it. More agricultural lands are located to the east.

Both rivers water quality are reported by the EPA as “at risk of failing to meet good status in 2015” under the WFD (according to information given on the EPA web-site, accessed August 2009).

13.3.2.6 Groundwater Depth

The URS 2009 investigation confirmed the presence of groundwater in the fractured bedrock (Campile Formation) in each of the wells drilled in the lower tier of the site, at depths ranging between 7 and 17 m bgl. No groundwater was encountered in boreholes advanced on the upper tier, although the maximum depth drilled was19 m bgl.

13.3.2.7 Direction of Groundwater Flow

Based on groundwater elevations monitored by URS, groundwater flow was inferred to flow through the bedrock aquifer in a south-to-south-eastwards direction beneath the southern portion of the site towards the estuary. Tidal influences have not been assessed to the best of our knowledge.

13.3.2.8 Aquifer Productivity

The GSI classify the aquifer beneath the site (Campile Formation, rhyolithic felsic igneous rock) as “Regionally Important Aquifer - Bedrock which is Extremely Productive”; with known well yields ranging from 400 – 2,000 m^3/d (according to information given on the EPA web-site, accessed August 2009).

The GSI currently report that there is one recorded groundwater abstraction within approximately 3 kilometres of the site. This well is used for domestic supply and is located 2.7 kilometres to the southwest of the site, across the estuary.

13.3.2.9 Groundwater Vulnerability, Sensitivity and Water Management

The GSI has not identified any SPZs in this area (according to information given on the EPA web-site, accessed August 2009). In light of the information available and the criteria detailed in Table 13.3, the groundwater general vulnerability is considered to be ‘Extreme’, particularly at the west side of the site, where bedrock is near the surface. In accordance with the criteria detailed in Table 13.4, the groundwater general sensitivity is considered to be ‘Medium’ to ‘High’.

Since 2000, Water Management in the EU has been directed by the Water Framework Directive (WFD). The key objective of this Directive is that all water bodies in a Member State achieve (or retain) good status by 2015. In 2005, all water bodies were assessed and given a score based on the likelihood of them achieving this environmental objective. The potential scores are defined as follows.

- 1a - water body is at risk of failing to meet good status in 2015;

- 1b - water body is thought to be at risk of failing to meet the objective pending further investigation;
- 2a - water body is expected to meet good status in 2015, pending further investigation; and
- 2b - the water body is expected to meet good status in 2015.

The groundwater in the site area was classified as 2a in 2005, i.e. groundwater body is expected to meet good status in 2015, pending further investigation (according to information given on the EPA web-site, accessed August 2009).

13.4 Identification of Potential Impacts

Contaminant impact as a result of site operations has been identified by existing site investigation data. The likelihood of its presence in other areas not currently investigated is also considered high. In terms of a source-pathway-receptor relationship, the following is considered:

- Source category – as there is a long history (>25 years) of contaminative use, the presence of underground storage tanks and information from available data, the risk of a source being present is considered to be high.
- Pathway category – as groundwater is likely to be in continuity with the surface water body (Barrow Estuary) and flow directly to this receptor, the risk of a pathway being present is considered to be very high.
- Receptor category – as the estuary water quality is currently reported by the Environmental Protection Agency (EPA) as unpolluted (High status), and is adjacent to the site, the receptor has a very high rating.
- Severity category – the severity category can only be estimated but given the contamination in the area the severity is likely to be moderate (long term chronic risk likely) to severe (acute / short term risk and / or serious harm likely).

Various elements of both, the construction and operational phases have the potential to impact on soils and geology in the area of the proposed scheme. Potential types and sources of impact associated with the proposed scheme are set out in Table 13.6, below

Table 13.6: Potential Types and Sources of Impacts

Project Phase	Potential Impact Type	Potential Impact Type
Construction	Soil and sediment excavation during construction works	Materials potentially contaminated - cross contamination potential
	As above	Removal of uncontaminated soils and sediment
	Infiltration of surface water to new areas of open stripped, contaminated ground	Mobilisation of contaminant by infiltrating waters Creation of new pollution pathways through which contamination can cause further contamination of soils and sediment
	Leaks/spills of hazardous materials from construction equipment, storage areas etc	Contamination of soils and sediment
	Transport and disposal of spoil	Traffic and associated air and noise pollution
	Direct and indirect contact between human beings (including construction personnel) and contaminated land and / or associated hazardous vapours	Human health impacts
	Direct and indirect contact between flora and fauna and contaminated land	Ecological impacts

Project Phase	Potential Impact Type	Potential Impact Type
	Excavations carried out during the construction Piling	Ground settlement
	Contaminant releases / spills and subsequent infiltration into ground	Contamination of groundwater (e.g. oil)
	Changes in site drainage systems	Mobilisation of contamination through infiltration changes relating to site drainage
	Installation of foundations	Mobilisation of contamination through excavation/drilling works Creation of new pollution pathways through which contamination can cause further contamination of soils and sediment
	Dewatering	Localised disruption of existing groundwater levels
	Removal or remediation of contaminated overburden	Improvements in groundwater quality
	Parking bay area construction	Temporary compaction of natural soils
Operational		
	Chemical attack of subsurface structures Rainwater infiltration of, and leaching / migration from, any remaining areas of contamination Incorrect maintenance of drainage systems and SUDS	Contamination of soils and sediment
	Contaminant releases / spills and subsequent infiltration into ground	Contamination of groundwater (e.g. effluents and oils)
	Alteration of infiltration patterns due to creation / removal of hardstanding areas and alterations of existing drainage systems	Disruption of existing groundwater recharge patterns and mobilisation of soil/sediment contamination
	Corrosion / deterioration of concrete subsurface structures and drainage systems	Contamination of groundwater due to opening up of new transmission pathways for contaminants

13.5 Mitigation Measures

Soils, geology, groundwater, surface water and marine ecology are all closely interlinked such that the mitigation measures that relate to surface water and marine ecology are also relevant to this environmental topic and will help ensure that soils, sediments and groundwater are protected in an appropriate manner. In the interest of brevity, these mitigation measures are not repeated in this chapter and can instead be reviewed in:

- Chapter 14 (Surface water)
- Chapter 12 (Flora and Fauna)

This section therefore focuses on the mitigation measures that are to be implemented specifically for the protection of soils, sediment and groundwater.

13.5.1 Construction

- A 'Foundation Works Risk Assessment Report' will be prepared as part of the detailed design phase in accordance with appropriate guidelines.
- Hazardous materials and chemicals including oils, fuels, residues and wastes will be stored at least 15 metres distance from watercourses or areas at risk of flooding and site ponding. Hazardous materials will be located in a bunded area. The bunded areas will comply with best practice.

- Adequate stocks of hydrocarbon absorbent materials (e.g. spill-kits and/or booms) will be held on-site in order to facilitate response to accidental spills. Spill response materials will also be stored on all construction vehicles and vessels used. Competent personnel will be available to use the spill-kits in the case of a spill.

- All waste will also be stored within appropriate temporary areas prior to removal and treatment / recycling / disposal by appropriately authorised waste contractors in accordance with all relevant waste legislation. Waste will not be retained on site for more than six months unless consent from the relevant authority has been obtained.

- The location of plant, materials and the introduction of construction traffic management measures will include consideration of those that seek to minimise site compaction / erosion.

- Excavation will be restricted in times of high winds and heavy rainfall to minimise the potential for uncontrolled dust generation which has the potential to be contaminated.

- Refuelling of all plant will be conducted off site or in a designated appropriately contained secondary area on-site.

- Reuse of uncontaminated spoil will be encouraged and undertaken where possible as part of the waste management strategy for the project.

- Disposal of unused spoil will be undertaken at all times in accordance with all relevant legislation and in consideration of any contamination levels detected.

- Only uncontaminated soil is to be used in the construction of the scheme.

- Compaction of areas will be avoided where possible. Hoarding and signposting will be used in this regard to clearly demarcate haulage routes and other areas being used during construction. Landscaping and restoration will be undertaken with areas reinstated to their original condition, where possible.

In addition to those mitigation measures identified above, the following groundwater specific mitigation measures are also recommended:

- Draw-off points and pipework associated with hazardous materials will be located entirely within bunded areas. Drainage from the bunded areas will be diverted for collection and safe disposal.

- Any lubricants will be handled, stored and managed in accordance with all relevant legislation and best practice and will be reconditioned and reused where possible.

- In light of the fact that the intrusive works are likely to be located in areas of potential contamination, a Method Statement and Risk Assessment Report for excavation works (and any dewatering works required) will be prepared as part of the detailed design phase, in accordance with the guidelines produced by the Environment Agency (2000) and National Groundwater and Contaminated Land Centre (2001).

- Dewatering and excavation works will be carried out by trained, competent personnel (Competency to perform tasks is determined in consideration of appropriate education, training or experience).

- Water collected by means of any site drainage system and excavation / dewatering will be strictly controlled in accordance with all relevant legislation and in consultation with the relevant authority. Controls will include the use of silt / sediment traps and oil interceptors prior to the release to surface water bodies, surface water drains or foul sewers.

- Discharge of drainage / extracted waters to any water body will only be undertaken subject to approval by the relevant authorities and will be discharged in accordance with the conditions of any relevant consent granted in this regard.

- Any foul water generated by welfare facilities at the construction compounds will be contained and collected in portaloo facilities. Portaloo facilities will be maintained in an appropriate manner at all times.

- Best practice guidance as detailed by the Construction Industry Research and Information Association (CIRIA, 2001) will be adhered to at all times.

A Spoil Management Plan and a Contamination Management Plan will be developed during the detailed design phase as part of a wider CEMP prepared in accordance with best practice guidelines (DoEHLG, 2006). This plan will address any issues associated with contaminated soils and / or sediment, if present. It will be prepared in consultation with the relevant authorities and will include the following measures, as a minimum:

- Sampling of soils and sediments will be carried out where necessary in areas to be excavated. The necessity for such sampling will be determined by means of risk assessment exercises undertaken during preparation of the Spoil and Contamination Management Plan. Any sampling that is required will be undertaken prior to excavation taking place. Where necessary, a foreshore licence will be obtained in advance of any geotechnical investigations within the foreshore area.

- The results of any sampling will be used to develop and maintain a risk-based model of any potential hazards associated with the construction and operation of the proposed development.

- Any contaminated soils, sediment or groundwater that is encountered will be managed in accordance with best practice guidelines and all relevant legislation in consultation with EPA and any other relevant authorities.

- Spoil will be classified in consideration of the results of any sampling undertaken in order to identify the most appropriate route for disposal.

- Storage of contaminated material if encountered on-site will be avoided where possible. If storage on site is necessary, contaminated material, if present, will be strictly segregated into designated bunded areas where contaminants cannot leach into the underlying ground. If spoil is to be stored on site, consultation with the EPA will be undertaken, prior to commencing storage, to ensure that any relevant authorisations are obtained and that spoil is managed, at all times, in accordance with all relevant legislation.

- Piling of potentially contaminated terrestrial areas, if present, will be carried out in accordance with best practice guidelines such as those produced by National Groundwater and Contaminated Land Centre Report NC/99/77(2001).

13.5.2 Operation

- Measures will be taken to ensure that the concrete used to construct all below ground structures, including concrete piles and abutments in foundations, is sulphate resistant and resistant to corrosion to prevent degradation and decomposition of the concrete and potential long term contamination. Pre-cast concrete structures will be used wherever practicable.

In addition to those mitigation measures identified above, the following groundwater specific mitigation measures are also recommended:

- Hazardous chemicals and effluents will be stored and treated in accordance with all relevant legislation and best practice and will be reconditioned and reused where possible.

- Due to the volume of distillate oil required to be stored on site operations will be conducted in accordance with site specific requirements from the HSA and agreed with Wexford County Council and the EPA.

- Discharge of drainage / extracted waters to any water body will only be undertaken subject to approval of by the relevant authorities and will be discharged in accordance with the conditions of any relevant consent granted in this regard.

- A drainage strategy will be prepared as part of the detailed design for the project. As part of this strategy, measures will be undertaken to ensure that all drainage systems are of suitable capacity and design to ensure that increased infiltration of groundwater does not occur in areas at risk from contamination, if present. The drainage strategy will be prepared in consideration of all relevant legislation and best practice (as set out in the Greater Dublin Strategic Drainage Study (2005), BS EN 858-1 (Separator systems for light liquids) (2002), the UK Environment Agency's (2000) Pollution Prevention Guideline No. 3 (PPG3) and any other relevant best practice guidelines).

- Pipelines will be designed with adequate corrosion resistant materials, suitable for use and location.

13.6 Residual Impacts

13.6.1 Construction Phase

13.6.1.1 Removal of Potentially Contaminated Soils or Sediment

The potential of contaminated soils being present in the terrestrial and foreshore areas associated with the development is considered to be high and potential existing 'pollution linkages' have been identified. The proposed development will entail the remediation of the land where necessary to 'fit for use' standards and the breaking of 'pollution linkages'. Appropriate remediation is to be ensured, through the preparation of and adherence to, a Spoil and Contamination Management Plan, in consultation with the relevant authorities and as detailed in Section 13.5.1. Remediation of contamination and breaking of 'pollution linkages' has a positive impact, however, in the absence of any detailed information overstatement of this positive impact is avoided and the impact is deemed to be of low magnitude and significance.

The impact associated with the disposal of any contaminated spoil, if present, off-site is considered to be a negative impact of low significance. Disposal of spoil will take place in accordance with all relevant legislation. In light of these considerations, any impacts in this regard are considered to be of low significance.

13.6.1.2 Removal of Uncontaminated Soils and Sediment

In light of the area affected, removal of uncontaminated soils is considered to be an impact of low magnitude and significance. Reuse of soils where possible as part of a wider waste management strategy and as detailed in Section 13.5.1 has the potential to reduce the significance of this impact further.

The potential for removal of sediment via site run-off to impact on surface water is considered in Chapter 14 (Surface Water).

13.6.1.3 Creation of New Pollution Pathways through which Potential Contamination can generate further Contamination of Soils and Sediment

Removal of existing impermeable ground surface, such as tarmac or concrete hardstanding, could potentially lead to increased rainwater infiltration and leaching of contaminants, if present, to greater depths within the soil. If this is the case, the construction contractor will ensure that the duration for which soils are left open and exposed is minimised and that all reasonable mitigation measures have been pre-planned within the contractors work plans and method statements.

At this stage, the potential impacts associated with this activity are considered to be of low significance based on existing ground condition information.

Therefore, general mitigation measures to minimise or eliminate the potential impact from contaminants in ground during groundworks or hardstanding removal should include:

- Review of the existing information on ground conditions specifically with respect to the detailed scope of groundworks. This is to enable the planning of mitigation or remediation of known areas of soil contamination, and to highlight areas where further data will be required prior to construction.

- Where known contamination will be potentially encountered, the groundworks plan should contain pre-planned mitigation and remediation plans for this, dependant on the types, concentrations, ground conditions etc. of contaminants.

- Targeted soils investigations or sampling during the groundworks, when this is reasonably practicable to do so, as made possible / enabled by the groundworks or other construction phase work.

- General measures for the prevention of contaminant migration or leaching due to removal of impermeable cover or excavation and stockpiling. Specifically this should include the placing of temporary or permanent replacement impermeable cover, or of planned and controlled remediation or excavation, with associated control of waste disposal or temporary stockpiling of soils on site. The requirement for these measures will, in part, be determined by the application of contaminated land risk assessment in line with Irish Regulatory Guidance at that time, as well as the known requirements of the construction project at this time.

13.6.1.4 Contamination of Soils and Sediment

Management of hazardous material will be undertaken in compliance with the measures detailed in Section 13.5.1 in order to ensure that through good site and operational maintenance practice, no significant impacts occur with respect to contamination of soils.

13.6.1.5 Human Health Impacts

Impacts on public health will be avoided through careful control of access to the site as detailed in Section 13.5.1. Impacts relating to the health and safety of all construction personnel will be assured through implementation of the safety measures detailed in Section 13.5.1 and control measures as required under relevant Health and Safety Regulations. In light of this, no significant impacts are envisaged in this regard.

13.6.1.6 Contamination of Groundwater

Contamination of surface water and soils due to construction of the proposed scheme may lead to indirect impacts on groundwater as migration and infiltration of contaminants released to surface water, soils or sediment, if present, to underlying groundwater resources may occur. The mitigation measures that have been developed to minimise the potential risk of impacts on surface water are set out in Chapter 14 (Surface water). As described in Section 13.5.1, the mitigation measures are considered to reduce the

potential for secondary impact to groundwater quality to occur. Any impacts to groundwater due to transmission of contaminants originally leaked to surface water and soils are therefore envisaged to be of low significance.

13.6.1.7 Removal of Potentially Contaminated Overburden

Removal of contaminated overburden, if present, is likely to have a positive impact on groundwater quality. This positive impact is considered to be of low significance.

13.6.1.8 Exposure of Subsurface Soils and Disturbance of Hardstanding Areas

Changes in surface water run-off and groundwater infiltration patterns are likely to occur in localised areas in light of the fact that the several development works are to temporarily expose subsurface soils and disturb hardstanding areas. In light of the mitigation measures set out in Section 13.5.1 regarding the design strategy to be developed as part of the detailed design and other measures, the impact that will occur is considered to be of low significance.

13.6.1.9 Dewatering

Significant impacts on existing groundwater levels due to dewatering during excavation works are not considered likely. Excavations and dewatering works are likely to be limited to the shallow soil levels and not affect the near surface bedrock aquifer. A relatively small area will therefore be affected. In light of the mitigation measures set out in Section 13.5.1 regarding method statements and other measures, any impacts that will occur are considered to be of no or low significance.

13.6.1.10 Compaction

Compacted areas will occur at the parking bay areas. The magnitude of the impact associated with the compacting of an area during construction is high as the soil is compressed and disturbed. A relatively small area will therefore be affected. When the mitigation measures are taken into consideration, the impact is considered to be of low significance.

13.6.2 Operational Phase

13.6.2.1 Soils and Sediment

Deterioration of subsurface concrete structures can occur due to chemical attack by existing ground conditions. Implementation of the mitigation measures detailed in Section 13.5.2 (i.e. the use of sulphate-resistant concretes for subsurface structures) will ensure that no significant impacts occur in this regard.

The potential for ongoing migration of any remaining ground contaminants during the operational phase of the development is considered to be low in light of the fact that the relevant areas will be paved over and drainage will be controlled as detailed in Chapter 14 (Surface Water). In light of this, any impacts that will occur are envisaged to be of no or low significance.

13.6.2.2 Changes in Surface Water Run-off and Groundwater Infiltration Patterns

Changes in surface water run-off and groundwater infiltration patterns are likely to occur only in localised areas in light of the fact that relevant areas will be paved over and drainage will be controlled as detailed in Chapter 14 (Surface Water). In light of the mitigation measures set out in Section 13.5.2 regarding the design strategy to be developed as part of the detailed design and other measures, the impact that may occur is considered to be of low significance.

13.6.2.3 Changes in Shallow Surface Drainage Patterns or Migration and Infiltration of Contaminants

Impacts due to changes in shallow surface drainage patterns or migration and infiltration of contaminants, if present, from surface water, soils or sediment to underlying groundwater resources are likely to be of low significance in light of the mitigation measures to be put in place as described in Section 13.5.2 and Chapter 14 (Surface Water).

13.6.2.4 Creation of New Transmission Pathways

Creation of new transmission pathways for contaminants, if present, (e.g. via corrosion of foundations) will be mitigated through the use of adequate materials (e.g. sulphate resistant concretes) as detailed in Section 13.5.2. In light of this, any impacts that may occur are likely to be of no or low significance.

13.7 Summary of Residual Impacts

A summary of the residual impacts associated with the proposed development is detailed in Table 13.7

Table 13.7: Summary of Residual Impacts

Impact Type	Impact Type	Importance / Sensitivity of the Receptor	Residual Impact Magnitude	Residual Impact Significance
Construction				
Sediment excavation during in-stream works Soil excavation during terrestrial works	Removal of potentially contaminated soils or sediment	Low	Positive – Low - medium	Positive – Low - medium
As above	Removal of uncontaminated soils and sediment	Low	Low	Low
Infiltration of surface water to new areas of open stripped ground	Creation of new pollution pathways through which contamination can generate further contamination of soils and sediment	Low	Low	Low (short term)
Leaks/spills of hazardous materials from construction equipment, storage areas etc.	Contamination of soils and sediment	Low	Low	Not significant
Transport and disposal of spoil	Traffic and associated air and noise pollution	Low	Low	Low
Direct and indirect contact between human beings (including construction personnel) and contaminated land and/or associated hazardous vapours	Indirect human health impacts	High	Low	Not significant
Localised contaminant releases/spills and subsequent infiltration into ground	Contamination of groundwater	Medium to High	High	Low
Removal of contaminated overburden	Improvements in groundwater quality	Medium to High	Positive Low	Positive Low

Impact Type	Impact Type	Importance / Sensitivity of the Receptor	Residual Impact Magnitude	Residual Impact Significance
Alteration of infiltration patterns due to removal of soil and/or hardstanding areas	Disruption of natural groundwater recharge patterns and mobilisation of soil/sediment contamination	Medium to High	Low to Medium	Low
Dewatering	Disruption of existing groundwater levels	Medium to High	Low	Not significant to Low
Compaction	Compaction of soils at parking bay areas	Medium	Medium	Low
Operation				
Chemical attack of subsurface structures Rainwater infiltration of, and leaching/migration from, any remaining areas of contamination Incorrect maintenance of drainage systems and SUDS	Contamination of soils and sediment	Low	Low	Low – Not Significant
Localized contaminant releases/spills and subsequent infiltration into ground	Contamination of groundwater	Medium to High	High	Low
Alteration of infiltration patterns due to removal of soil and/or hardstanding areas	Disruption of natural groundwater recharge patterns and mobilisation of soil/sediment contamination	Medium to High	Low to Medium	Low
Corrosion/ deterioration of subsurface structures (e.g. foundations)	Contamination of groundwater due to opening up of new transmission pathways for contaminants	Medium to High	Low	Not significant to Low

13.8 Summary Conclusions

The baseline assessment included a desktop study and a review of the findings of an intrusive environmental assessment. Baseline soils identified included fine-grained sandy and silty topsoil, loose brown clay, stiff silty sandy clays with boulders and Made Ground consisting mainly of gravel. Bedrock geology included rhyolites in grey and brown slaty mudstones with occasional andesites. Soil samples were taken during the intrusive environmental assessment and exceedances of the screening criteria were determined in a number of the samples collected.

Once the baseline was completed, an impact assessment was made on the identified constraints. Impacts can be split into two different phases, construction impacts and operation impacts.

The principal source of construction impacts are removal of soils and sediment, contamination mobilisation, contamination of groundwater and settlement. The removal of contaminated soils and sediment is a positive impact as contamination sources are removed. Mitigation measures involve the reuse of materials where possible, a waste management plan and appropriate material storage areas. In general the residual impacts are low to not significant.

The principal source of operational impacts is related to degradation of below ground structures by ground conditions. The residual impacts, once mitigation measures are implemented, are low to not significant.

14. Surface Water

14.1 Introduction

An environmental impact statement (EIS) must contain a description of the aspects of the environment that are likely to be significantly affected by the proposed development. This chapter of the EIS describes the baseline surface water quality and hydrology of the receiving environment in the vicinity of the proposed development, the predicted and potential impacts of the proposed development and the mitigation measures needed, if any, to address any significant impacts with respect to water consumption, waste water discharge and flood risk.

Marine ecology is assessed in Chapter 12 (Flora and Fauna) and groundwater is assessed in Chapter 13 (Soils, Geology and Groundwater), although reference is also made in this Chapter to impacts on hydrogeology and the marine environment, where appropriate.

14.2 Methodology

14.2.1 Guidance Used

This section presents the methodology used in assessing the baseline surface water environment. As well as considering the relevant EPA guidance with respect to EIS's, this desk-based assessment was undertaken with reference to the following sources and publications:

- European Communities Environmental Objectives (Surface Waters) Regulations, 2009 (S.I. 272 of 2009)
- Draft River Basin Management Plan for the South Eastern River Basin District (SERBD, December 2008)
- Water Matters Report for Waterbody Barrow Suir Nore Estuary (*Water Maps* Map Viewer www.wfdireland.ie)
- Explanatory Note: Interim Classification of Irish Coastal and Transitional Waters for the Purposes of the EU Water Framework Directive, (EPA, June 2009)
- Trace Metal Concentrations in Shellfish from Irish Waters, 2003 (Marine Institute, September 2006)
- Water Quality in Ireland - Key Indicators of the Aquatic Environment (EPA, 2005)
- Water Quality in Ireland 2001 - 2003 (EPA, 2005)
- Water Quality in Ireland 2004 - 2006 (EPA)
- Planning Guidelines; The Planning System and Flood Risk Management - Consultation Draft Guidelines for Planning Authorities, (Department of Environment Health and Local Government (DEHLG) and Office of Public Works (OPW) September 2008)
- Flood Relief and Risk Management; Assessment of Potential Future Scenarios for Flood Risk Management - Draft Guidance, (OPW, 2009)

- Coastal Flooding and Tidal Surges (Department of Communications, Marine and Natural Resources (DCMNR), 2005)

- Ireland at Risk – The Impact of Climate Change on the Water Environment (DCMNR, 2007)

14.2.2 Study Area

The study area for this assessment encompasses the direct footprint of the development site and adjacent areas and the Barrow Suir Nore Estuary in the vicinity of the development.

14.2.3 Scope of Work

This is a desk-based assessment of the impacts of the development on the receiving environment in relation to water consumption, process waste water (mainly comprising boiler blowdown), cooling water (which is used to condense steam), foul water (comprising sewage and domestic type waste water), surface water run-off and flood risk.

14.2.4 Baseline Evaluation Criteria

Directive 2000/60/EC (the Water Framework Directive) was adopted by the European Parliament and Council in 2000. The Water Framework Directive (WFD) establishes a legal framework for the protection, improvement and sustainable management of inland surface waters, transitional waters, coastal waters and groundwater.

The aim of the WFD is to prevent the deterioration in the existing status of waters (including the maintenance of "High Status" where it exists) and to ensure that all waters, with some limited exceptions, achieve at least "Good Status" by 2015.

The *European Communities (Water Policy) Regulations 2003 (S.I. No. 722 of 2003)*, as amended by the *European Communities (Water Policy) (Amendment) Regulations, 2005*, transposed the WFD into Irish law establishing eight River Basin Districts (RBDs) on the island of Ireland for the co-ordinated management of water resources. Water bodies were delineated into groundwater, river, lake, transitional and coastal water bodies and, in accordance with the requirements of the WFD, an analysis of the characteristics and impact of human activity on each RBD was undertaken. This analysis provided an assessment of the likely condition of all water bodies and established a baseline for identifying future priority actions for subsequent stages in the river basin planning approach.

The *European Communities Environmental Objectives (Surface Waters) Regulations, 2009* (S.I. 272 of 2009) give effect to the criteria and standards to be used for classifying surface waters in accordance with the ecological objectives approach of the WFD. In accordance with the regulations waters classified as 'High' or 'Good' must not be allowed to deteriorate. Waters classified as less than good must be restored to at least good status within a prescribed timeframe. In addition, the regulations address certain shortcomings identified by the European Court of Justice in relation to Ireland's implementation of the Dangerous Substances Directive (76/464/EEC, as amended).

The regulations set standards for biological quality elements and physico-chemical conditions, supporting biological elements (e.g. temperature, oxygen balance, pH, salinity, nutrient concentrations and specific pollutants), which must be complied with. These parameters establish the "**ecological status**" of a water body.

The "**chemical status**" of a water body is assessed based on thresholds set for certain chemical pollutants, known as priority and priority hazardous substances.

A water body must achieve both "good ecological status" and "good chemical status" before it can be considered to be at "'good status".

The regulations also state that, for the purpose of classification, a status of less than good is assigned in the case of a body of surface water where the environmental objectives for an associated protected area requiring special protection by virtue of obligations arising from specific national legislation for the protection of water, or for the conservation of habitats and species directly dependent on water, are not met.

14.2.4.1 Intercalibration of Q-Rating and WFD Status

In Ireland a Q-rating system has been used to assess the sensitivities, abundance and diversity of macro-invertebrates and their relation to water quality. The Q-Rating system measures the effects of pollution by condensing biological information into a readily understandable form by means of a 5-point biotic index (Q-Values), an arbitrary system in which biodiversity and water quality are related where a Q-Value of Q5 indicates that conditions are close to reference conditions and a Q-Value of Q1 indicates the presence of serious pollution. The Q-rating system has been inter-calibrated with the WFD status values as detailed in Table 14.1.

Table 14.1: Q-Rating and WFD Status

Q-value Rating System	WFD Status
Q5, Q4-5	High Status
Q4	Good Status
Q3-4	Moderate Status
Q3, Q2-3	Poor Status
Q2, Q1-2	Bad Status
Q1	Bad Status

Source: www.epa.ie

The Barrow Suir Nore Estuary is classified as a Transitional Water Body (Water Body Code IE_SE_100_0100) of Moderate status (interim classification) and is within the South Eastern River Basin District (SERBD). The physico-chemical quality elements (ecological status) and the chemical pollutants (chemical status) thresholds applicable for transitional waters, as specified in the *European Communities Environmental Objectives (Surface Waters) Regulations, 2009* (S.I. 272 of 2009) are presented in Appendix 14.1 (Classification Criteria (Transitional Water Bodies)).

14.2.5 Impact Assessment Criteria

The source and type of all impacts is set out in Section 14.6 (Identification of Potential Impacts). The mitigation measures that are defined for any potentially significant impacts are set out in Section 14.7 (Mitigation Measures). Any likely residual impacts are evaluated in terms of magnitude and significance in Section 14.8 (Residual Impacts).

Magnitude

The magnitude of an impact is assessed in consideration of its intensity, and its extent in space and time. The criteria used to assess the magnitude of the developments impacts on surface water and the objectives of the WFD are presented in Table 14.2.

Table 14.2: Criteria for Assessment of Impact Magnitude

Criteria	Impact Magnitude
Impact is of long-term or permanent duration (>5 years);	High

Criteria	Impact Magnitude
Impact on surface water has a clearly noticeable and significant impact on the objectives of the WFD and the SERBD River Basin Management Plan; and The affected area has limited or no potential to recover.	
Impact is of medium-term duration (1-5 years); Impact on surface water has a clearly noticeable and significant impact on the objectives of the WFD and the SERBD River Basin Management Plan; and The affected area has the potential to recover.	Medium
Impact is of temporary (weeks) or short-term (months) duration; Impact on surface water has a clearly noticeable and significant impact on the objectives of the WFD and the SERBD River Basin Management Plan; and The affected area has the potential to recover.	Low

Significance

The significance of all impacts is assessed in consideration of the magnitude of the impact and the importance / sensitivity of the affected area.

Impact significance is described as being *Not significant,* of *Low* significance, of *Medium* significance, or of *High* significance.

14.3 Baseline Description and Evaluation

14.3.1 Water Body Status

In 2008 the Barrow Suir Nore Estuary (Water Body Code IE_SE_100_0100) was categorised as a Transitional Water Body of overall **Moderate** Status (interim classification) with an overall risk result of **1a At Risk**. The water body passed the Specific Pollutants (Annex VIII of the WFD) criteria but failed in relation to Chemical Status (Annex X). Integrated Pollution Prevention and Control (IPPC) Point Risk Sources and Waste Water Treatment Plant Point Risk Sources were classified as **1a At Risk**. The Barrow River Estuary is classified as a proposed Natural Heritage Area (pNHA). The River Barrow and River Nore are classified as Special Areas of Conservation (SACs).

The overall objective for the Barrow Suir Nore Estuary is to restore it to Good status by 2015.

The estuary was considered to be of Good conservation status by the National Parks and Wildlife Service (NPWS) and at least Good overall protected areas status. The estuary failed in the chemical status category (Priority Hazardous Substances) only, the failure parameters were Brominated Diphenyl Ethers (BDE), Mercury, Benzo/Indeno-pyrenes, Endosulfan and Pentachlorobenzene, (it should be noted that there are no known discharges from the proposed development which would introduce these elements into the receiving environment).

Details of the criteria used by the EPA in determining the interim WFD classification for the Barrow Suir Nore Estuary are re-produced in Table 14.3 hereunder.

Table 14.3: EPA Interim Classification Criteria for the Barrow Suir Nore Estuary

General Conditions	Biological Quality Elements	Specific Pollutants (Annex VIII)	Chemical Status (Annex X)	Ecological Status	Surface Water Status	Conserv-ation Status (NPWS)	Overall Protected Area Status	Rivers Likely Status
High/Good/ Moderate[1]	Good	Pass	Fail[2]	Good	Moderate	Good	At Least Good	Not Specified

Source: Environmental Protection Agency

Notes:

1. High or Good status was achieved for Molybdate Reactive Phosphorous (MRP), Dissolved Oxygen (DO) and Biological Oxygen Demand (BOD). Moderate status was achieved for Dissolved Inorganic Nitrogen (DIN). The European Communities Environmental Objectives (Surface Waters) Regulations does not include a DIN threshold for transitional water bodies. DIN is therefore not applicable for the purposes of WFD classification for the Barrow Suir Nore Estuary.

2. The water body failed both Maximum Allowable and Annual Average Concentrations – Analysis based on National Screening Exercise.

A copy of the report for the estuary is presented in Appendix 14.2 (Full Report for Water Body Barrow Suir Nore Estuary).

14.3.2 Existing Operations

The existing power generation plant comprises three conventional steam generating units (Units 1, 2 and 3) operating on Heavy Fuel Oil (HFO). Units 1 and 2 each have operating capacities of 60 MW. Unit 3 has an operating capacity of 120 MW.

Each Unit operates independently and comprises a boiler, steam turbine / condenser and auxiliary plant. Seawater, used for cooling of the steam turbine condensing plant, is dosed with Sodium Hypochlorite, as required. Boiler treatment chemicals currently in use on site include aqueous Ammonia, aqueous Hydrazine and Tri-sodium Phosphate.

Units 1 and 2 have been operational since 1967/1968 whilst Units 3 has been in operation since 1972, with an established record of environmental compliance. The existing plant is regulated under IPPC licence Registration Number P0606-02, which will be required to be revised to include the proposed development.

14.3.2.1 Potable Water Consumption

Potable water, for use in the canteen, welfare facilities, water treatment plant (i.e. feedwater for the existing Units) and for general site cleaning is sourced from the Wexford County Council mains supply. Potable water consumption from the mains supply is approximately 177,161m^3/annum or 20m^3/hr, when all three Units are operating.

Approximate potable water consumption rates for the existing plant are presented in Table 14.4.

Table 14.4: Existing Potable Water Demands

Use	Average Demand (m3/hr)
Operation of Existing Units 1, 2 and 3	19.36
Domestic Water (welfare facilities, canteen, general site cleaning)	0.86
Total	**20.22**

14.3.2.2 Effluent Discharges

Typical effluent discharge volumes from the existing three Units amount to 17.36m^3/hr, approximate values for each Unit are provided hereunder:

- Unit 1: 4.48m^3/hr
- Unit 2: 4.48m^3/hr

- Unit 3: 8.40m^3/hr

Table 14.5 below presents the permitted discharges to water as specified in the existing IPPC licence (Registration Number P0606-02).

Table 14.5: Permitted Emissions to Water

Wastewater	Emission Point Reference No.	Max/Day (m3)	Max/Hr (m3)	Emission Limit Values (mg/l unless otherwise specified)
Condenser Cooling Water	SW2	1,204,080	50,170	Temperature 15°C above estuarine water 12.0°C (98%ile of hourly values over a year) Thermal Load 352 MWth (Maximum) 335 MWth (98%ile of hourly values over a year) Chlorine 0.5
Boiler Blowdown (Prior to dilution with surface water)	SW5	40	-	pH 6-10
Boiler Blowdown/Engine Room Drains (Prior to dilution with surface water)	SW6	-	-	pH 6-10 Mineral Oil 20
Engine Room Drains (Prior to dilution with surface water)	SW7	-	-	Mineral Oil 20
Cooling Water Screen Wash Water	SW8	1,970	-	Chlorine 0.5
Water Treatment Neutralisation Tank	SW13	150	-	pH 6-9 Ammonia 34 kg/day Suspended Solids 100

Source: IPPC licence (Registration Number P0606-02)

14.4 Proposed Development

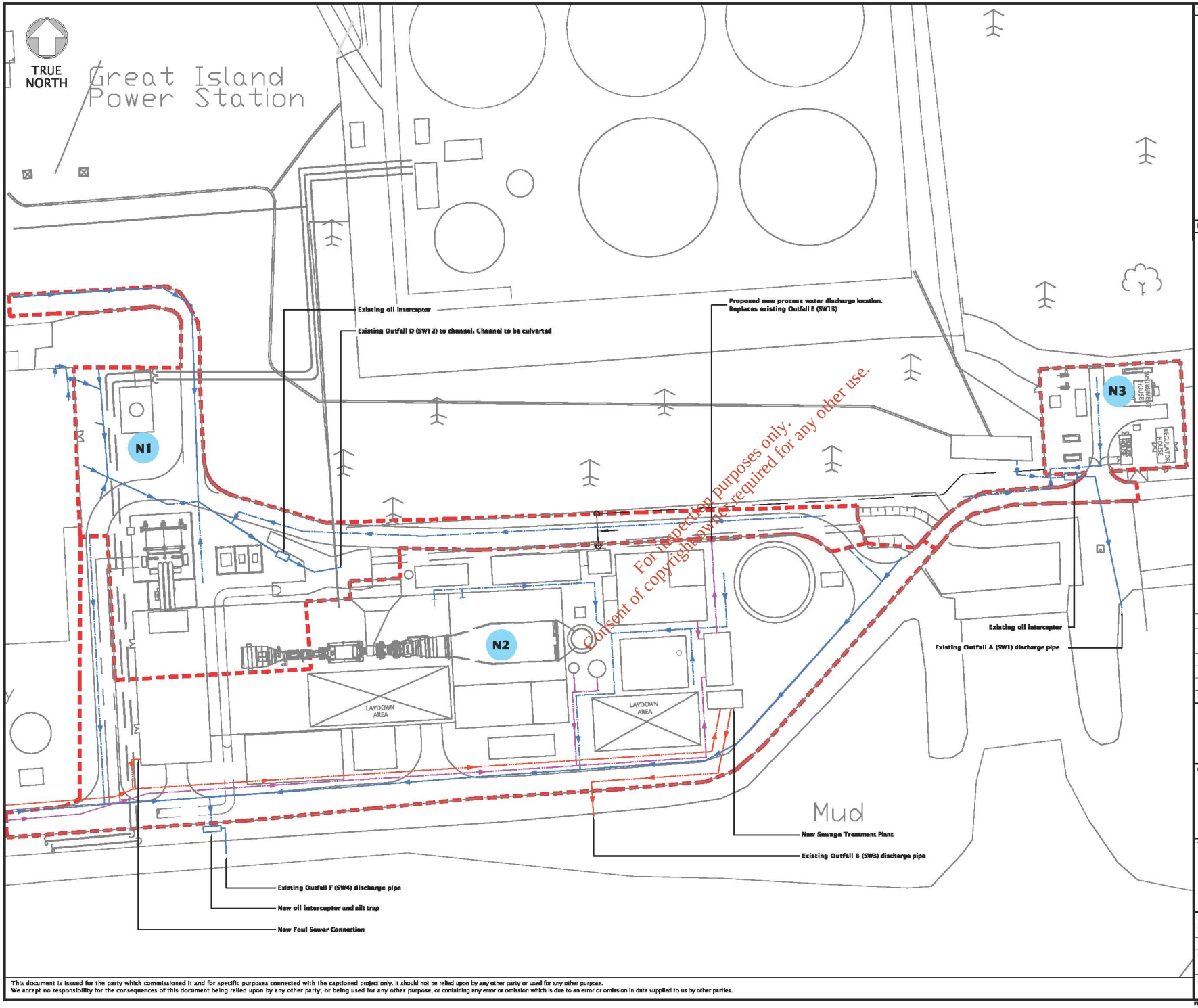
It is proposed to construct a 430 MW natural gas fired Combined Cycle Gas Turbine (CCGT) power plant within the confines of the existing site. Subject to planning permission being granted, it is anticipated that the proposed development will be commissioned in 2012.

Details of the anticipated water consumption requirements and resultant waste water are provided in Sections 14.4.1 to 14.4.5 below, a summary of the flood risk assessment is provided in Section 14.4.6, the flood risk assessment report is presented in Appendix 14.3 (Flood Risk Assessment).

A full description of the development is provided in Chapter 3 (Description of the Development). Figure 14.1: Site Drainage Plan illustrates the existing and proposed drainage systems for the site.

14.4.1 Potable Water

A supply of feedwater is required to generate superheated steam in the Heat Recovery Steam Generator (HRSG). This feedwater initially enters the HRSG at its inlet and is then heated to produce high pressure / temperature superheated steam. The steam is expanded through the steam turbine, where it exits at low pressure and temperature, this low pressure steam is then condensed in the condenser back to feedwater.



Notes

1. ORDNANCE SURVEY IRELAND LICENCE NO. EN0034509 © ORDNANCE SURVEY IRELAND/GOVERNMENT OF IRELAND
2. ALL CO-ORDINATES SHOWN RELATE TO IRISH NATIONAL GRID CO-ORDINATES.
3. ALL SITE LEVELS REFER TO MEAN SEA LEVEL VERTICAL DATUM AT POOLBEG.
4. GENERAL SITE LEVEL IS +7.00M O.D.
5. THE DRAINAGE LAYOUT SHOWN IS SUBJECT TO CONFIRMATION OF INVERT LEVELS AND CAPACITIES OF THE EXISTING COLLECTION AND OUTFALL PIPES.
6. WHERE POSSIBLE, EXISTING COLLECTION SEWERS AND OUTFALLS WILL BE RE-UTILISED BY ADOPTING THEM INTO THE COLLECTION SYSTEM FOR THE PROPOSED NEW PLANT.
7. FOR CLARITY, ONLY EXISTING SEWERS WHICH ARE PROPOSED TO BE ADOPTED OR ALTERED ARE SHOWN. EXISTING COLLECTION SYSTEMS WHICH WILL NOT BE ALTERED HAVE BEEN OMITTED.
8. TEMPORARY DIVERSION SEWERS MAY BE REQUIRED IN ORDER TO MAINTAIN EXISTING PROCESS AND WASTE FLOWS DURING THE CONSTRUCTION AND PERIOD FOR THE PROPOSED PLANT.

Legend:

Drainage Key

- Existing Surface Water Drainage
- Proposed Surface Water Drainage
- Existing Foul Drainage
- Proposed Foul Drainage Diversion
- Area Boundary
- Surface Water Drainage Catchment Reference (N)
- Direction of Flow
- Existing Process Water Drainage
- Proposed Process Water Drainage Diversion

0 25m 50m

Scale 1:500

Rev	Date	Drawn	Description	Ch'k'd	App'd
P5	05/11/09	AV	Issued with Planning Application	KMc	DMc
P4	23/10/09	AV	Revised as per Endesa Comments	KMc	DMc
P3	30/09/09	AV	Revised as per Endesa Comments	KMc	DMc
P2	28/08/09	AV	Issued for Approval	KMc	DMc
P1	11/08/09	SK	Issued for Approval	MB	DMc

Mott MacDonald

Mott MacDonald Ireland Ltd.
South Block, Rockfield,
Dundrum, Dublin 16,
Ireland
Tel +353 (1) 291 6700
Fax +353 (1) 291 6747
Web www.mottmac.com

Client

endesa ireland

Endesa Ireland Ltd.
5th Floor,
3 Grand Canal Plaza,
Grand Canal Street Upper,
Dublin 4,
Ireland
Tel +353 (1) 552 8300
Fax +353 (1) 552 8301

Title

Combined Cycle Gas Turbine
Great Island, Co. Wexford

Site Drainage Plan

Designed	D. Murphy		Eng.Chk.	M. Beuchaust	
Drawn	S.Kennedy		Coordination	K. McCarvey	
Dwg.Chk.	K. McCarvey		Approved	D. McRandal	

Scale 1:500 | Project: 257554 | CAD file Figure 14.1 | Status APR

Drawing No Figure 14.1 | Rev P5

The feedwater is then returned to the HRSG where the cycle is repeated. During this process there is a small amount of feedwater lost, due mainly to boiler blowdown and other losses. Under normal operation the total amount of boiler water losses from the steam / feedwater cycle amounts to approximately 6.05m^3/hr.

The make-up water supply, to overcome the above losses, will be produced in a new water treatment plant. The product water from the new water treatment plant is usually defined as demineralised water. The water treatment process will consist of filtration and a resin based treatment system. The potable water required for the water treatment plant will be supplied from the existing 9,500m^3 potable water reservoir which in turn is sourced from Wexford County Council mains supply. The reservoir also holds capacity for fire fighting purposes, approximately 1,140m^3, an additional 500m^3 will be provided from the existing fire water storage tank. The water treatment plant in itself produces waste water which, on average, will amount to 0.5m^3/hr.

Thus the total amount of make-up water required during normal operation i.e. when firing on natural gas will amount to approximately 6.55m^3/hr.

Prior to use, the treated (demineralised) water, produced in the new water treatment plant, will be stored in a 6,000m^3 capacity on-site demineralised water storage tank. The capacity of the tank and the throughput of the water treatment plant have been determined to allow for the provision of 94m^3/hr demineralised water injection to the gas turbine for NO_x emissions control purposes for a continuous period of 120 hours (as required by Commission for Energy Regulation (CER)) whilst firing on distillate fuel oil and for normal HRSG make-up water as described above. Firing on distillate will only occur very rarely for periodic testing or if an interruption in the natural gas supply occurs. Distillate oil firing has, therefore, not been considered for the purpose of analysing the amount of water consumed under normal, as opposed to abnormal, operation.

Water for general use on site (i.e. canteen, welfare facilities etc.) is not expected to exceed the existing average flow of 0.86m^3/hr. Therefore it is anticipated that the total amount of potable water required on site under normal operation will amount to 7.41m^3/hr. This equates to approximately 37% of the current demand of 20.22m^3/hr, once the CCGT plant has been fully commissioned.

Where necessary, supply of water from the mains supply will take place during low demand periods in order to minimise any potential impact on water supply in the area. It is also proposed to actuate the fill valve so it can be remotely isolated at periods of low system pressure.

14.4.2 Process Waste Water Discharges

14.4.2.1 Water Treatment Plant

Process waste water includes waste waters arising from the water treatment plant. Approximately 0.5m^3/hr of waste water, generated by the regeneration process of the resins in the water treatment plant, will be discharged to the proposed process waste water discharge pit. Waste water from the water treatment plant will comprise the salts removed from the potable water formed during the backwash of the resins from the demineralisation process.

14.4.2.2 HRSG

Process waste water arising from the HRSG includes boiler blowdown and waste waters from condensate drains and boiler water sampling. Prior to re-entry to the HRSG the feedwater will be thermally de-aerated and pH controlled by addition of aqueous Ammonia (NH_3), as required. Tri-sodium Phosphate (Na_3PO_4) will also be added to prevent scaling and an oxygen scavenging chemical, dilute Carbohydrazide ($CO(NHNH_2)_2$), will be added, as required, to achieve the water quality required for optimum operation of the

boiler. The purpose of this treatment is to prevent corrosion of the HRSG and thus to extend its commercial life.

Boiler blowdown comprises water which has been circulating in the feedwater / steam cycle. In order to remove the build up of salts from the HRSG drums, (which remain in the drum once the water has evaporated off) it is necessary to continually "blow-down" approximately 1% of the total 500m^3/hr of circulating water (i.e. 5 m^3/hr). Boiler blow-down will discharge from the boiler to a flash / blowdown vessel and collect in a new process waste water discharge pit

On occasion there may be a requirement to increase the blowdown rate from the HRSG. This is an intermittent operation which will last for a very short period of time, a typical flow rate is in the order of 45.5m^3/hr, for a period of up to four hours. The new 200m^3 process waste water discharge pit has been sized to accommodate this intermittent blowdown.

In principle, the volume of blowdown water reduces the longer the plant is operational as less and less "fresh" demineralised water is being added to the system. Consequently the salt build-up in the drums is reduced. However, abnormal plant operations such as shutdowns, start-ups or excessive load cycling result in the addition of "fresh" demineralised water resulting in necessary blowdown. While blowdown water may have a high enough saline content to require removal from the HRSG drums, it should be noted that the saline content is generally much lower than that of the initial potable water supply.

Although not a normal flow rate, on occasion there will be some additional process discharges from the system to account for leaks and for boiler water sampling. A typical flow rate for these waste waters will be 1.05m^3/hr.

14.4.2.3 Process Waste Water Discharge Pit

All process waste water, including water treatment plant effluent, arising from the new CCGT power plant will be collected in a process waste water discharge pit of 200m^3 capacity, prior to a controlled discharge to outfall SW13. Refer to Figure 14.1 Site Drainage Plan.

The pit will include pH dosing, monitoring and recirculation units. The pH of the wastewater will be maintained at pH 6-9 by Sulphuric Acid / Sodium Hydroxide dosing, as required, prior to discharge.

The automated system will only discharge if the relevant parameters are within the limits to be specified in the revised IPPC licence. If any of the parameters fail to comply with the set limits the system will automatically switch back to recirculation mode and the waste water will be re-circulated back through the discharge pit. Discharge volumes will be measured via a flowmeter installed on the discharge line. In addition, the discharge pit will be fitted with an automatic sampler which will sample water discharges over a given period as directed by the EPA under the IPPC regime.

The overall average volume of process waste water discharge is estimated to be 6.55m^3/hr. This equates to approximately 38% of the effluent discharges from the existing plant, which are of a similar physico-chemical make-up.

14.4.3 Cooling Water

A continuous flow of cooling seawater will be required to absorb heat from the steam turbine condenser and, depending upon the final design of the plant, from other heat exchangers associated with the proposed CCGT plant.

Cooling water will be abstracted from the Barrow Estuary, utilising the existing water intake and outfall systems, with some upgrade / refurbishment works in the cooling water pump house, as required. However

the overall demand will be significantly reduced from the current maximum demand of 50,170/hr to approximately 20,000m^3/hr, when the CCGT is fully operation i.e. the volume will be reduced by 40%.

Cooling water will be screened through a series of fixed coarse screens and travelling fine screens, in order to remove debris from the cooling water prior to entering the pump chambers.

The screened cooling water will be pumped from the cooling water pumphouse to the steam turbine condenser and to the coolers of the closed cooling water system. The cooling water will then be discharged to the estuary via the existing outfall culvert.

In accordance with existing operations, cooling water will be chlorinated at the cooling water inlet by direct injection of Sodium Hypochlorite solution, as required, in order to control biological fouling of, and damage to, the condensers, principally by mussels which thrive in the conditions of fast flow encountered in warm cooling water systems. It is anticipated that approximately 5 litres per day of Sodium Hypochlorite may be used on occasions. Chlorine concentrations in the cooling water discharge will be maintained at a maximum concentration of 0.5 mg/l Chlorine measured at the cooling water outlet. It should be noted that use of biocides is currently very infrequent and this situation is unlikely to alter once the new CCGT plant has been commissioned.

It is intended to re-use as much of the existing cooling water (CW) system structures as possible (in accordance with Best Available Techniques, BAT). The allowable temperature rise through the cooling water system i.e. the difference between outlet and inlet) will remain unchanged at 12.0^{o}C above estuarine water temperature. However, as the volume of discharge is anticipated to decrease from 50,170m^3/hr to 20,000m^3/hr the maximum thermal load is anticipated to decrease from the existing 352 MWth to 291 MWth.

14.4.4 Foul Water

A new collection system, separate from the surface water system, will be required to connect the proposed CCGT plant to the existing foul collection system and treatment plant. The area of the site containing the Above Ground Installation (AGI) will not generate any foul water.

As the existing foul water treatment system currently occupies the area of land proposed for the CCGT plant a new proprietary secondary treatment system is proposed. The specification of the proposed system will guarantee treatment of the waste water to a treatment standard of 25mg/l Biological Oxygen Demand (BOD), 35mg/l Suspended Solids (SS), 5 mg/l of Ammonia (as N) and 2 mg/l of Total Phosphorous (as P). The proposed system will be subject to maintenance contracts to assure compliance with the above standards. As there will be no net increase in the number of persons employed at the Great Island site over the present manpower levels, it is proposed that the new foul collection system for the CCGT will connect to the existing foul collection system discharging from the site via existing Outfall SW3.

During the construction phase temporary fully contained chemical portaloo toilets will be installed within the designated construction laydown area. It is anticipated that up to 35 portaloos will be required during the peak construction period, with each portaloo servicing approximately 14 construction workers. The contents of the portaloos will be removed from the site to an appropriately authorised facility.

14.4.5 Surface Water Run-off

Surface water runoff will consist mostly of rainwater, but with an allowance for spillages and wash water. As this has the potential to become contaminated with oily substances in some areas, oil interceptors will be included downstream of the proposed collection systems. Bypass oil interceptors will also include silt trap units which will remove any excess silt or grit which may become entrained in the surface water.

The CCGT area will use a new collection system to convey water to the existing drainage network. The surface water will be treated via a Class 1 bypass oil interceptor and silt trap unit, prior to discharge via existing Outfall SW4 and SW12. Surface water runoff from the AGI area, and its access road, will also be conveyed by a new collection system and treated via a silt trap unit and bypass oil interceptor prior to discharge via existing Outfall SW1.

Surface water run-off, process waste water, water treatment plant effluent and treated foul water will be discharged through separate channels prior to discharge to the estuary.

14.4.5.1 Bunds

Tanks containing potentially polluting substances will be bunded. These substances include distillate fuel oil, and Sulphuric Acid and Sodium Hydroxide. Additional chemicals, e.g. Ammonia, Tri-sodium Phosphate and dilute Carbohydrazide used for HRSG feedwater chemical dosing, will be stored in bunded receptacles in a designated area within the Water Treatment Plant.

Certain hardstanding areas (i.e. chemical storage, transformer and tank farm bunds) will require surface water to be pumped, following a visual inspection, into the existing free-flowing channels, thereby mitigating against accidental release of spillages into the drainage network. All surface water runoff will be directed through a hydrocarbon interceptor and silt trap prior to discharge to the estuary.

14.4.5.2 General Site Washings

Cleaning products will be water based of a biodegradable nature, wherever possible, general plant washings will be discharged to the estuary via a hydrocarbon interceptor and silt trap. Compressor cleaning washings, which require the use of hazardous detergents, will be removed from site by an appropriately authorised waste contractor.

14.4.6 Flood Risk

A preliminary flood risk assessment has been undertaken as part of this EIS which concludes that the proposed finished floor level is appropriate for the development site in terms of flood risk. A copy of the report is provided in Appendix 14.3 (Flood Risk Assessment).

14.4.7 Summary of Effluent Discharges

A summary of the proposed discharges from the site are provided in Table 14.6 hereunder.

Table 14.6: Proposed Effluent Discharges

Wastewater	Emission Point Reference No.	Max/Day (m3)	Max/Hr (m3)	Anticipated Max Concentrations (mg/l, unless otherwise specified)
Combined Water Treatment Plant Effluent and Process Water	SW13	1,920	80	25 °C (max) pH 6-9 BOD 20 Suspended Solids 30 Total Dissolved Solids 5,000 Mineral Oil 20 Ammonia (as N) 5 Total Phosphorous (as P) 5

Wastewater	Emission Point Reference No.	Max/Day (m3)	Max/Hr (m3)	Anticipated Max Concentrations (mg/l, unless otherwise specified)
Condenser Cooling Water	SW2	720,000	25,000	Temperature 12.0°C above estuarine water Thermal Load 291 MWth (Maximum) Chlorine 0.5

14.5 Application of Best Available Techniques

The plant has been designed in accordance with *Reference Document on Best Available Techniques for Large Combustion Plants, (adopted July 2006).*

The inherent efficiency of energy transformation is integral to the operation of a CCGT and, when compared with the existing plant, will result in a reduction of resource consumption and emissions of greenhouse gases, which is considered to meet the requirements of BAT.

The main waste water discharges which will be generated on site are:

- Treated process wastewater
- Cooling Water
- Treated foul water
- Surface Water Run-off

A BAT appraisal for each waste water discharge, and for raw materials usage on site, is provided hereunder.

14.5.1 Potable Water Supply

The potable water entering the site, as supplied by Wexford County Council, will be of drinking water quality and will be treated in a demineralisation plant prior to use. The quality of the potable water, and the nature of the closed loop CCGT system, minimises the volume of water and hence the volume of effluent generated on site. Dry cleaning methods will also be employed, wherever practicable, to reduce water consumption.

As detailed previously, it is anticipated that existing potable water demand will be reduced to 37% of the current maximum demand as a direct result of the replacement of the existing plant with the proposed CCGT.

14.5.2 Process Waste Water

The water used in the HRSG will be demineralised and conditioned with supplementary chemicals i.e. Carbohydrazide, Tri-sodium Phosphate and Ammonia. Dosing of boiler feedwater will be carefully controlled and minimised to reduce the impact of the discharges on receiving waters.

Process wastewater will be mixed and pH corrected, as required. The wastewater will be continuously monitored prior to discharge. If the parameters exceed the limits of the IPPC licence the wastewater will be recirculated back through the process waste water discharge pit. Settled solids will be removed from site by

appropriately authorised contractors. Neutralisation and sedimentation are considered to meet the requirements of BAT for process waste water.

In accordance with BAT process waste water drains will run above ground, where practicable, and will be completely segregated from uncontaminated surface water.

14.5.3 Cooling Water

The re-use of the existing cooling water system complies with the principles outlined in the *Integrated Pollution Prevention and Control (IPPC) Reference Document on the application of Best Available Techniques to Industrial Cooling Systems, December 2001* as illustrated in Table 14.7 hereunder:

Table 14.7: Cooling Water System – BAT Assessment

BAT	Proposed Development
Where it involves technological changes, the application may be limited for existing cooling systems. For small cooling towers produced in series, a change in technology is considered to be technically and economically feasible. Technological changes for large systems are generally cost intensive requiring a complex technical and economic assessment involving a large number of factors. Relatively small adaptations to these large systems, changing part of the equipment, may be feasible in some cases. For more extensive changes of technology a detailed consideration and assessment of the environmental effect and the costs may be necessary.	Replacement of the existing cooling water system with a new system would cost in the order of an additional €30M. Detailed technical and economic studies will need to be carried out by the Tenderers for the project to optimise on their tender proposal which will be a balance between capital, cycle efficiency and hence operating cost. These studies will take into consideration unit operational costs especially fuel and will determine the most economic unit cost (€/kWh) to Endesa. It is anticipated however that re-utilising the existing CW system as much as possible for the new CCGT plant will readily achieve the required environmental limits.
Low direct energy consumption by the cooling system is achieved by reducing resistance to water and/or air in the cooling system, by applying low energy equipment. Where the process to be cooled demands variable operation, modulation of air and water flow has been successfully applied and can be considered BAT.	Once through seawater cooling is proposed as this is the most energy efficient cooling system. Sufficient water supply is readily available. Other potential designs include an Air Cooled Condenser (ACC), Wet Type Natural Draught Cooling Towers, Wet Type Forced Draught Cooling Towers and Hybrid Cooling Towers. For the reasons noted above, the project envisages the re-use of the existing CW system structures. The existing CW culverts/circuits are low resistance. It is intended to decrease this resistance further. Endesa are planning to replace three thermal steam turbine generator units (240 MW total capacity) with a 430MW CCGT (having a 120 MW steam turbine generator) thereby reducing the cooling water heat dissipation from the maximum allowable of 335 MWth to approximately 291 MWth. while the velocity, which is a factor of the culvert diameter, can be reduced from the existing 2.5m/s to approximately 2m/s which, in turn, significantly reduces the CW pump electric power requirement.
Recirculation of cooling water, using an open or closed recirculating wet system, is BAT where the availability of water is low or unreliable. In recirculating systems an increase of the number of cycles can be BAT, but demands on cooling water treatment may be a limiting factor. It is BAT to apply drift eliminators to reduce drift to less than 0.01% of the total recirculating flow.	
In an existing installation, optimizing internal and external reuse and reducing the amount and level of heat to be discharged must also precede any change to the potential capacity of applied cooling system. Increasing the efficiency of an existing cooling system by improving systems operation must be evaluated against an increase of efficiency by technological measures through retrofit or technological change. In general and for large existing cooling systems, the improvement of the systems operation is considered to be more cost effective than the application of new or improved technology and can therefore be regarded as BAT.	
Available and applicable options for reuse of heat must have been examined and used to reduce the amount and level of non-recoverable heat, before the dissipation of heat from an industrial process into the environment is considered.	District heating has been considered however its application is not suitable as there are no suitable users in the local area. In addition, the high commercial and energy costs and relatively high ambient air temperatures (mean daily average is 10^{o}C) means that it is generally impractical for situations such as at Great Island.
To achieve a high overall energy efficiency when handling large amounts of low level heat (10-25^{o}C) it is BAT to cool by open once-through systems. In a greenfield situation this may justify selection of a (coastal) site with reliable large amounts of cooling water available and with surface water with sufficient capacity to receive large amounts of discharged cooling water. BAT criteria for low level of	Once through seawater cooling is proposed as this is the most energy efficient cooling system.

BAT	Proposed Development
dissipated heat (<25°C) is to improve overall energy efficiency.	
In the case of rivers and/or estuaries once through can be acceptable if the extension of the heat plume in the surface water leaves passage for fish migration, the cooling water intake is designed aimed at reducing fish entrainment and the heat load does not interfere with other users of receiving surface water.	Screens are incorporated into the CW system.
Prevention and reduction of leakage of process substances into the cooling circuit.	The cooling water system is constructed of concrete, with the mechanical plant constructed of 316L stainless steel, condenser tube are constructed of titanium.
BAT is reducing the need for cooling water conditioning by reducing the occurrence of fouling and corrosion through proper design. In once-through systems, proper design is to avoid stagnant zones and turbulence and to maintain a minimum water velocity (0.8 [m/s] for heat exchangers, 1.5 [m/s] for condensers).	The velocity through the titanium tubes in the condenser will be approximately 1.5 - 1.8m/s. The velocity through the intake and discharge culvert is 2m/s.
For systems where different cooling streams are mixed in the outlet, pulse-alternating chlorination is BAT and can reduce even further free oxidant concentrations in the discharge. In general, discontinuous treatment of once-through systems is sufficient to prevent antifouling. Depending on species and water temperature (above 10-12°C) continuous treatment at low levels may be necessary.	An electrochlorination plant is not considered to be necessary due to limited mussel build-up in the CW system and the high energy and capital costs associated with such plant.
For seawater, BAT-levels of free residual oxidant (FRO) in the discharge, associated with these practices, vary with applied dosage regime (continuous and discontinuous) and dosage concentration level and with the cooling system configuration. They range from ≤ 0.1 [mg/l] to 0.5 [mg/l], with a value of 0.2 [mg/l] as 24h-average.	The proposed dosage rate of 5 litres per day is not considered to be significant. Dosage will be very infrequent.
Preventative maintenance and monitoring measures to prevent leakage e.g. leakage from heat exchangers, storage of chemicals.	Preventative maintenance and monitoring measures are currently, and will continue to be, implemented on site.
The near field is defined in a river as the area in which the mixing of the warm water plume with river water is incomplete. The water temperature in the near field depends upon the mixing of water released by the power plant with the water of the receiving environment. Heating can be reduced in this area by rapidly mixing the effluent with the water of the receiving environment by means of specific devices.	The existing plant has been operating for over 40 years and the new CCGT plant will dissipate considerably less heat to the Barrow Suir Nore Estuary.

14.5.4 Foul water

In accordance with BAT foul water, comprising sewage and domestic type waste water, emanating from the site will be treated in an on-site biological unit prior to discharge.

14.5.5 Surface Water Run-off

Surface water run-off will be discharged from all hardstanding areas via a silt trap and an oil / water interceptor. In general, hardstanding areas of the site will drain by gravity thereby minimising energy consumption. However, water collected in bunded areas (i.e. bulk storage tanks) will be required to be pumped (rather than gravity fed) in order to minimise the potential for contaminated water entering the drainage system. All bulk storage tanks will be fitted with automatic control systems to prevent overfilling.

All chemical conditioning materials required for boiler feedwater (i.e. aqueous Ammonia, Tri-sodium Phosphate and Carbohydrazide) will be stored under cover in UN approved containers. The chemical storage room will incorporate dedicated integral bunds. Spills and leaks will be cleaned by appropriately experienced personnel using absorbent materials. The waste arising will be disposed of off-site by appropriately authorised contractors.

Pipes, bunds and storage facilities will be regularly checked for deterioration, damage and leaks. Integrity testing and the maintenance of all waste water abatement, control and monitoring equipment will be incorporated into the on site maintenance programmes. All equipment will be maintained and calibrated in accordance with manufacturer's specifications.

14.5.6 Raw Material Selection and Use

Where necessary, supply of potable water will take place during low demand periods in order to minimise any potential impact on water supply in the area. It is also proposed to actuate the fill valve so it can be remotely isolated at periods of low system pressure. Feed water will be treated with conditioning chemicals prior to use in the HRSG. HRSG water will be subject to on site testing and monitoring to ensure optimisation.

Carbohydrazide, an oxygen scavenger, has been selected for use when operating the CCGT. Initially continued use of anhydrous Hydrazine was considered but an assessment of the comparative hazardous characteristics determined that Carbohydrazide was a more sustainable option.

The conditioning chemicals selected provide proven optimisation of the HRSG; their use will be optimised through controlled dosing. Cleaning products will be of a water based biodegradable nature, wherever possible. A hazardous detergent will however be required for compressor cleaning. Compressor cleaning waste will be produced on each cleaning occurrence to periodically remove dirt and grease from the turbine blades. It is anticipated that compressor cleaning will take place once per annum. Hazardous compressor cleaning washings will be removed from site by an appropriately authorised waste contractor.

14.6 Identification of Potential Impacts

14.6.1 Construction Phase

Potential construction phase impacts arising from this development are typical of those associated with any civil engineering activity and mainly relate to contamination of water bodies. The potential construction phase impacts of the proposed development on the estuary include:

- Escape of soil and sediment as a result of on-site construction activities. Potential sources include erosion of exposed ground, run-off from stockpiles of spoil and wheel-washing activities
- Escape of soil and sediment during trench excavations of drainage channels
- Release of potentially polluting substances, such as oils, paints, solvents and sanitary waste
- Discharge of cement or uncured concrete during construction
- Encountering contaminated land on site resulting in releases of potentially polluting substances

The risks to the Barrow Suir Nore Estuary, without any mitigation measures being implemented, are considered to be of medium significance in relation to the objectives of the WFD

14.6.2 Operational Phase

The overall operational phase impact of the proposed development on the Barrow Suir Nore Estuary, compared with the existing situation, is considered to be of low significance for the reasons outlined below.

According to the interim 2008 WFD classification the Barrow Suir Nore Estuary is classified as being of **Moderate** status. The WFD categorisation (and the associated Draft River Basin Management Plan for the SERBD) incorporates the discharges from the existing power plant which has been operational for over 40

years, with an established record of compliance. As detailed in Table 14.3, EPA Interim Classification Criteria for the Barrow Nore Suir Estuary, the NPWS considers the estuary to be of good conservation status. The ecological status was considered to be Good, with all relevant general conditions classified as being of either High or Good status.

The interim WFD categorisation was defaulted to Moderate status due to failures in the chemical status category only, specifically BDE, Mercury, Benzo/Indeno-pyrenes, Endosulfan and Pentachlorobenzene. There are no known discharges from the proposed development which would introduce these elements into the receiving environment and it is not considered that the proposed discharges will in anyway cause deterioration in categorisation status for the estuary.

The volumes of discharges proposed during the operational phase, which are of a similar physico-chemical composition to discharges from the existing plant, will be significantly reduced as presented in Table 14.8 below.

Table 14.8: Phased Reduction in Effluent Discharges

Waste Water	Existing 3 Units (m3/hr)	Proposed CCGT (m3/hr)
Boiler Blowdown	17.36	6.55
Condenser Cooling Water	50,170	25,000

Reported analytical data for many Transitional water bodies in Ireland, including the Barrow Suir Nore Estuary, is limited due to the non-implementation of a dedicated monitoring programme for Specific Relevant Pollutants. Data, for the purposes of WFD classification, has therefore been taken from the National Screening Exercise and the Marine Institute's shellfish waters monitoring programme and other related programmes, as appropriate. The level of confidence which can be assigned to these datasets is low to moderate. The reasons for which are outlined in EPA's explanatory note *Interim Classification of Irish Coastal and Transitional Waters for the Purposes of the EU Water Framework Directive* (June 2009) which are reproduced hereunder:

- *The data analysed were collected for the shellfish waters directive and therefore do not adhere to the sampling requirements of the WFD (Sampling points representative of 'status' within a water body, surveillance monitoring and frequency (i.e., considerably less than 12 times per year).*

- *Issues with respect to exceedence of lead (mostly EC MAC-EQS), copper and zinc (mostly SI 12 2001 AA-EQS) standards, which may in part reflect the natural variability of metals in seawater and to some extent uncertainties associated with their sampling measurement as seawater is a difficult matrix for metal analysis.*

- *Further investigation is required to determine whether such exceedence reflects natural variability, artefacts, or anthropogenic inputs within the catchment.*

- *Data on contaminants in shellfish flesh were also available for many of these areas and these provide a good picture of water quality with respect to some metals and organochlorine contaminants, as shellfish act as time integrated samplers for these substances.*

- *For some substances there were issues with Limit of Quantification being higher than the EQS.*

It should also be noted that many of the pollutant and chemical limit values specified in the *European Communities Environmental Objectives (Surface Waters) Regulations, 2009 (S.I. 272 of 2009)* are based on mean annual values. Due to the limited datasets available it is possible that the classification of receiving waters will improve, without any mitigation measures being undertaken, once a body of analytical data becomes available.

All practicable steps will be taken to mitigate the adverse impact of the proposed discharges on the receiving water body i.e. the waste water will be treated to a high standard prior to discharge in accordance with BAT.

The replacement of a Heavy Fuel Oil firing power plant with a natural gas firing CCGT power plant is in accordance with Government policy to replace old and inefficient plant and is of significant overall environmental benefit. Irrespective of whether the proposed discharges take place the SERBD River Basin Management Plan will implement measures which will restore the water body from Moderate to Good status and it is not considered that the proposed development in any way contradicts the measures provided therein.

14.7 Mitigation Measures

Marine ecology and soils, geology and groundwater are all closely interlinked with surface water, such that the mitigation measures provided in this EIS in Chapter 12 (Flora and Fauna) and Chapter 13 (Soils, Geology and Groundwater) will help ensure that surface waters are protected. This section therefore focuses on the mitigation measures that are to be implemented specifically for the protection of surface water.

14.7.1 Construction Phase

An experienced and competent Contractor will be employed by Endesa to manage on-site construction activities. The Contractor will be required to develop a Construction and Environmental Management Plan which will include a Water Management Plan incorporating a comprehensive and integrated plan for erosion and sediment control. The plan will be reviewed regularly and modified as necessary. Regular inspections will take place to ensure measures are effective.

The following conditions will be included:

- Unnecessary clearing and grading will be avoided.
- Clearing adjacent to the estuary will be minimised. Silt control measures will be installed along the perimeter of trench excavations, where considered necessary.
- Construction activities will be phased to minimise soil exposure. Large areas of grading will be avoided in order to minimise erosion potential.
- All run off from areas of exposed soil will be diverted to a sediment trap on site during the construction phase. Water from the sediment trap will be discharged to the estuary via the drainage channel network, where practicable.
- To prevent chemical pollution, all liquid fuels and chemicals stored on site during the construction phase will be contained in suitable containers within bunds in a designated area away from the main construction site activities and at least 15 metres distance from watercourses or areas at risk of flooding and site ponding.
- On-site refuelling will be avoided where possible. Where this is unavoidable refuelling will only be carried out in designated bunded areas.
- Equipment will be regularly inspected and maintained and leaks repaired as soon as possible. If the equipment cannot be repaired it will be removed from the site. Accidental spillages will be contained and cleaned up immediately. Spill-kits will be provided on-site during the construction phase, as required.

- Contained chemical portaloo toilets will be used on site during the construction phase. All sewage will be removed from the site to an authorised treatment plant.

In addition, an intrusive contaminated land assessment will be undertaken prior to any construction works being undertaken. Any contaminated land encountered, which is considered to be at risk of mobilisation during the construction phase, will be removed to an appropriately authorised facility prior to construction activities commencing with prior agreement from EPA.

14.7.2 Operational Phase

Operational Phase mitigation measures are outlined hereunder.

- Appropriate limits for waste water discharges will be determined by the EPA under the IPPC licence which will be revised with due regard to the objectives of the WFD. The conditions of the existing IPPC licence will be complied with throughout the construction phase of the proposed development and any alterations provided in the revised IPPC licence will be complied with in full.

- A water quality monitoring programme will be developed for process waste water and surface water run-off. The parameters, thresholds and frequency required will be set by the EPA under the IPPC regime.

- All bunds and chemical containers will comply with the appropriate standards (e.g. BS:8007 *Code of practice for design of concrete structures for retaining aqueous liquids* (1987), Enterprise Ireland's *Best Practice Guide BPGCS005 Oil Storage Guidelines* etc.) and will be leak tested prior to commencement of operations and every five years thereafter, or as otherwise specified by the EPA.

- A Water Conservation Plan will be implemented for the proposed power plant during the operational phase.

14.8 Residual Impacts

14.8.1 Construction Phase

The implementation of mitigation measures as detailed above during the construction phase will ensure that the impact of the proposed development on water resources will not be significant.

14.8.2 Operational Phase

The existing plant has been in operation since 1967 / 1968 and is a licensed activity under the IPPC regime, as regulated by the EPA and the proposed development is consistent with the existing activities on the site. The proposed discharges are of a similar physico-chemical nature to existing waste water however, the volumes will be significantly reduced. As detailed in Chapter 12 (Flora and Fauna), due to combinations of the proposed ecological mitigation measures, the magnitude of impacts and the positive changes from the current situation, the proposed activities will not have an adverse effect on the integrity of the sites or the qualifying features of the conservation objectives of the Natura 2000 sites. As a consequence the overall residual impact of the proposed development on surface waters during the operational phase is considered to be not significant, when compared with the existing situation.

14.9 Summary Conclusion

A desk-based assessment of the surface water quality and hydrology of the receiving environment in the vicinity of the proposed development, the predicted and potential impacts of the proposed development and

the mitigation measures needed, if any, to address any significant impacts with respect to water consumption, process waste water, cooling water, foul water, surface water and flood risk was undertaken.

As part of the proposed development an on-site water treatment plant will be required, where water for use in the HRSG will be demineralised to achieve a high purity. Wastewater from the demineralisation plant will comprise water containing the salts removed from the raw water or neutralised backwash of the resins from the demineralisation process. The pH of the wastewater will be maintained by acid or alkali addition, as required. The raw feedwater to the water treatment plant, which is of drinking water quality, will be supplied from the existing on-site reservoir which in turn is supplied from the Wexford County Council supply.

The feedwater used in the HRSG will be thermally de-aerated to remove oxygen and chemically treated to prevent corrosion of the tubes and components of the water / steam cycle.

Four distinct waste water streams will be discharged from the site; process waste water, surface water run-off, treated foul water (from sanitary facilities, wash rooms, mess rooms etc.) and cooling water.

The process waste water to be discharged from the site comprises water from the demineralisation plant and boiler blow down comprising water which has been circulating in the water / steam cycle. The process waste water to be discharged contains levels of salts that are considered too high for the HRSG however, the levels are generally lower than that of the original “raw” feedwater. The process waste water will be collected in a process water discharge pit which will include pH dosing, monitoring and recirculation units. The pH of the wastewater will be maintained at pH 6-9 by Sulphuric Acid / Sodium Hydroxide dosing, as required, prior to discharge. The automated system will only discharge if the relevant parameters are within the limits to be specified in the revised IPPC licence. If any of the parameters fail to comply with the set limits the system will automatically switch back to recirculation mode and the waste water will be re-circulated back through the discharge pit. Discharge volumes will be measured via a flowmeter installed on the discharge line. In addition, the discharge pit will be fitted with an automatic sampler which will sample water discharges over a given period as directed by the EPA under the IPPC regime.

All surface water run-off collected on site will be treated via a silt trap unit and bypass oil interceptor prior to discharge. Foul waste water will be treated in a new proprietary secondary treatment system to specified limits prior to discharge. A continuous flow of cooling water will also be required to condense steam from the HRSG. Cooling water will be abstracted from, and discharged to, the Barrow Estuary, in accordance with existing operations, utilising the existing water intake and outfall systems.

The effluent discharges from the site will be of a similar composition to discharges from the existing plant; however, the volumes will be significantly reduced. As a consequence it is considered that the proposed development will not have a significant adverse impact on the receiving environment, when compared with the existing situation.

Potential construction phase impacts arising from this development are typical of those associated with any civil engineering activity and mainly relate to contamination of water bodies. The implementation of mitigation measures during the construction phase will ensure that the impact of the proposed development on water resources will not be significant.