

This memo has been cleared for submission to the Board by the Programme Manager F. Clinton  
 Signed: M. Buckley Date: 28-10-10



**OFFICE OF LICENSING & RESOURCE USE**

Máire Buckley

**INSPECTORS REPORT ON A LICENCE APPLICATION**

<b>To:</b>	Directors
<b>From:</b>	Úna O'Callaghan - LICENSING UNIT
<b>Date:</b>	22/10/2010
<b>RE:</b>	Application for review of an IPPC Licence from Endesa Ireland Limited, (Great Island) Reg. Number P0606-03

Application Details	
Class of activity:	<i>The operation of combustion installations with a rated thermal input equal to or greater than 50MW</i>
Category of Activity under IPPC Directive (2008/1/EC):	1.1. Combustion installations with a rated thermal input exceeding 50 MW.
Review Section 90(1)(b) notice sent:	25/03/2010
Licence application received:	10/05/2010
EIS received:	10/05/2010
Supplementary material submitted by applicant	18/05/2010, 04/10/10, 11/10/10
Notices under Article 90 issued:	02/07/2010, 15/09/2010
Information under Article 90 received:	23/07/2010, 29/09/2010
Submissions received:	02/07/2010 (HSE)
Site visit:	17/08/2010

**Company**

Endesa Ireland Limited, Great Island generation station is located in the town land of Great Island, 3.5km west of Campile village, which is approximately 15km south of New Ross, Co. Wexford. It is located on the confluence of the River Suir and the River Barrow estuary. (See map on page 19)

The existing station has a generating capacity of 240MWe (megawatts of electrical output), comprising three conventional steam generating units. The station is fired on heavy fuel oil (HFO) which is shipped directly to the site and stored in the station's own oil tank farm area. Since 2004, the power stations annual running hours have decreased year on year due to reduced efficiency and age of the plant. In 2009, the plant ran for 1,665 hours and this is reflected in the consumption of Heavy Fuel Oil (HFO) of 20,632 tonnes.

This application for a revision of the licence has been made to allow for the operation of a modern gas fired, combined cycle gas turbine power plant (CCGT). The proposed location of the new CCGT power plant is within the boundaries of the current licensed (P0606-02) site. The new plant will have a thermal input of 741 MW and achieve a 58% efficiency rating with an output of 430 MWe. The plant will normally operate at full load on a continuous 24 hour basis, using natural gas as a fuel, with gasoil stored as backup fuel in the event of a gas supply failure. The proposed CCGT and existing HFO plant will not operate in parallel. Once the proposed CCGT is fully commissioned the existing plant will be decommissioned. The demolition of the old plant and auxiliary buildings will be subject to planning permission from Wexford County Council as this was not included in the original planning application for the new CCGT installation.

Planning permission for the new CCGT installation was sought from An Bord Pleanála under section 37A of the Planning and Development (Strategic Infrastructure) Act 2006 on the 3<sup>rd</sup> December 2009 and was granted on the 29<sup>th</sup> July 2010. An EIS was submitted in support of the planning application and is also provided in support of the IPPC licence review application.

Endesa Ireland expects to commence operation in Quarter 1, 2013, subject to the granting of a revised IPPC licence. The plant will have a life expectancy of at least 25 years. The applicant estimates the total cost of the development at approx €250 million. It is expected that the number of personnel working at the installation will be 38.

### **Process Description**

The plant will normally operate on natural gas. In accordance with the requirements of the Commission for Energy Regulation (CER), gasoil will be stored on site as a back-up fuel to be used in the event of an interruption to the gas supply. The gas oil used will have a sulphur content of less than 0.1% in accordance with the Sulphur Content of Heavy Fuel Oil, Gas Oil, and Marine Fuels Regulations 2008 (S.I. No. 119 of 2008). Gasoil storage of approximately 11,000 m<sup>3</sup> (enough for five days operation) will be provided on site.

The CCGT plant incorporates the following processes:

- A gas turbine, burning natural gas, or gasoil as a backup fuel, which drives a generator for electricity production;
- Exhaust gases from the gas turbine pass through a Heat Recovery Steam Generator (HRSG) to generate high pressure steam;
- The steam generated in the HRSG drives a steam turbine, providing additional electrical power; and
- The steam is condensed back to water via a condenser for re-use in the HRSG. This condenser is cooled by the once-through cooling water system.

The main emission to air from the proposed installation will be the emission of combustion gases, to be emitted through the main stack (A2-1). In addition there will be emissions to atmosphere from an auxiliary boiler and fire fighting pump.

Waste water from the existing installation discharges to the Barrow Estuary. Effluent discharges from the proposed plant will be of similar composition to discharges from the existing plant; however, the volumes will be reduced. The proposed new plant will utilise the existing discharge points which include the cooling water intake and outfall systems. Process water will comprise of HRSG blow down, condensate drain waste and waste water from the onsite water demineralisation plant.

### **Emissions**

The main emissions from the proposed installation will be to air, surface water and noise emissions.

### Emissions to Air

The most significant air emission from the proposed installation is the emission of combustion exhaust gases from the gas turbine. This emission will be through a purpose built single flue stack (emission point A2-1) which will have a height of 60 metres above ground level and a diameter of six metres.

The existing HFO fired power plant will continue to operate within the emission limit values as set in the current IPPC licence (Reg. No. P0606-02) until the new CCGT becomes operational, whereupon it will be decommissioned. The existing 137.5m flue stack will also be decommissioned.

The proposed plant will operate in accordance with the requirements of the Reference Document on Best Available Techniques for Large Combustion Plants, 2006, BAT Guidance Note on Best Available Techniques for the Energy Sector (Large Combustion Plant Sector), EPA, 2008, and the Large Combustion Plant Regulations 2003 and 2010.

**Table 1: Proposed emissions to air from main stack and emission limit values identified in BAT Guidance and in the LCP Directive.**

<b>Emission Parameter(mg/Nm<sup>3</sup>)</b>	<b>NO<sub>x</sub></b>	<b>SO<sub>2</sub></b>	<b>Particulate</b>	<b>CO</b>
<b>Proposed Emissions</b>				
Gas Fuelled	50	Note 1	5	100
Gasoil Fuelled	120	50	50	100
<b>BAT</b>				
Gas Fuelled	50	10-35	5	
Gasoil Fuelled	120	120	-	100
<b>LCP Directive</b>				
Gas Fuelled	50	35	5	
Gasoil Fuelled	120	-	-	-

Note 1: Negligible sulphur content in the natural gas fuel.

The main atmospheric pollutant of concern from gas fired CCGT power plants is NO<sub>x</sub>. The gas turbine generator will be fitted with a dry low NO<sub>x</sub> burner, to optimise the air/fuel ratio producing a uniform low temperature flame in the combustion chamber to minimise the production of NO<sub>x</sub>. Dry low NO<sub>x</sub> burners are identified in the BAT Guidance Note as BAT for new gas turbines. When the gas turbine is fired on gasoil, water injection will be employed. Injection of water reduces the flame temperature and results in a reduction in NO<sub>x</sub> production and is considered BAT for liquid fuel fired gas turbines. The RD requires the licensee to prepare a test program for abatement equipment including the dry low NO<sub>x</sub> burner and water injection system.

Endesa Ireland Limited proposes to operate the installation at full load (100%). However, the installation is capable of operating at partial load, down to 50% load. Operation at less than full load reduces the overall installation efficiency of the plant. The Large Combustion Plant Directive provides for NO<sub>x</sub> emissions up to 75mg/m<sup>3</sup>, where the average overall electrical efficiency is greater than 55%, the licensee has not sought this provision.

The auxiliary boiler will be required to provide heat during start-up of the CCGT. The boiler will operate infrequently and will be limited to three to four events per year depending on the dispatch pattern of the CCGT. The auxiliary boiler will operate on gasoil for short durations and will not operate in conjunction with the CCGT plant. The emissions from the auxiliary boiler will be emitted to atmosphere through stack (A3-1). The boiler will be less than 5 MW thermal input and, due to its limited use, no ELVs shall be set for the boiler. The RD, however, requires the impact of the boiler to be assessed prior to commencement.

Minor emissions will infrequently be emitted to atmosphere from a diesel powered fire fighting pump. This unit will have an electrical output of 1MWe. The unit will only operate in emergency situations and for test purposes and for approximately 30 minutes per week. Other minor emission points include a gasoil fuel tank vent, an acid tank vapour trap vent, a laboratory fume hood and an air conditioning unit.

Fugitive and potential emissions may occur from leaks from valves, flanges, seals etc., and breathing and working losses from diesel storage tanks, heat recovery steam generator pressure release valves and the above ground installation (AGI) creep release valve. The RD includes measures which the licensee will be obliged to take to avoid, minimise and control the occurrence of such emissions.

It is not anticipated that there will be odour emissions of significance from the proposed activity.

### **Impact of Air Emissions on Receiving Environment.**

The applicant undertook an assessment of the emissions from the main stack (A2-1).

The assessment involved

- Establishing the ambient concentration (AC) from consideration of local air quality monitoring data.
- Quantitative assessment of the effect on local air quality from stack emissions using an air dispersion model.
- Assessment of process contributions (PC) from the proposed plant in isolation and resultant predicted environmental concentrations (PEC) taking into account cumulative effects through incorporation of the ambient concentration.

The air dispersion model used was the Atmospheric Dispersion Modelling System (ADMS) and the following data was used in the assessment: meteorological data for Rosslare Harbour (2003-2007); terrain data; surface roughness; and building downwash (movement of air over and around buildings). The Great Island power station is located in a rural area and falls under Zone D rural Ireland as defined under the Air Quality Standards Regulations 2002 (as amended). The ambient air quality monitoring data used in the air dispersion modelling assessment was taken from an average of all the monitoring locations in Zone D. The values obtained for PM<sub>2.5</sub> were taken as an average from Old Station Road (Zone B) as PM<sub>2.5</sub> is not currently measured in Zone D. The predicted ground level concentrations in the tables consist of the predicted contribution from emissions at the installation plus the relevant background concentration.

The air dispersion model was run for two scenarios:

**Scenario 1:** Proposed 430 MW CCGT operating continuously at full load firing natural gas. Includes consideration of the long term and short term averaging air quality standards for NO<sub>x</sub>, PM<sub>10</sub>, and PM<sub>2.5</sub>.

**Scenario 2:** proposed 430 MW CCGT operating at full load firing on gasoil. Includes consideration of short term air quality standards for NO<sub>x</sub>, SO<sub>2</sub>, and PM<sub>10</sub>.

Scenario 1 represents the most likely operating situation which is expected to occur for most of the year, therefore short and long term averaging periods are considered. Scenario 2 is only likely to occur for limited periods of time. On this basis, the effects are not considered to be significant and in practice, such events are unlikely and represent the absolute upper limits for short term effects from the installation. It is envisaged that the firing on back up fuel will occur for less than 2% (seven days per year) of the total firing time, predominantly to test that systems are functioning correctly, this is required by the CER. Long term averaging periods were not considered for scenario 2 as it did not represent long term operational mode.

**Table 2a: Predicted Ground Level Concentrations from CCGT running on natural gas (including background concentrations)**

<b>Scenario 1 (Natural Gas)</b>
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<b>Full Load (100%)</b>				
<b>Parameter</b>	<b>Modelled Impact</b>	<b>Background Concentration</b> Note 1	<b>Predicted Ground Level concentration</b> $\mu\text{g}/\text{m}^3$	<b>Air Quality Standards</b> Note 2 $\mu\text{g}/\text{m}^3$
<b>Nitrogen Oxides (as NO<sub>2</sub>)</b>	99.8%ile 1 Hour	14	31.6	200
	Annual Average	7	9.5	40 30 <sup>Note 3</sup>
<b>PM<sub>10</sub></b>	90.4%ile 24 Hours	36	36.7	50
	Annual Average	18	18.1	40
<b>PM<sub>2.5</sub></b>	Annual Average	9	9.1	25

Note 1: Background Concentrations for short term parameters taken as twice the annual average background concentration. Background concentration taken as an average of Zone D monitoring.

Note 2: Air Quality Standards Regulations (SI No. 271 of 2002) and 2008/50/EC.

Note 3: Annual limit value for the protection of human health is  $40\mu\text{g}/\text{m}^3$  NO<sub>2</sub>, annual limit value for the protection of vegetation is  $30\mu\text{g}/\text{m}^3$  NO<sub>x</sub>.

**Table 2b: Predicted Ground Level Concentrations from CCGT running on gasoil (including background concentrations)**

<b>Scenario 2 (Gasoil)</b>				
<b>Full Load (100%)</b>				
<b>Parameter</b>	<b>Modelled Impact</b>	<b>Background Concentration</b> Note 1	<b>Predicted Ground Level concentration</b> $\mu\text{g}/\text{m}^3$	<b>Air Quality Standards</b> Note 2 $\mu\text{g}/\text{m}^3$
<b>Nitrogen Oxides (as NO<sub>2</sub>)</b>	99.8%ile 1 Hour Average	14	59	200
<b>SO<sub>2</sub></b>	99.7%ile 1 Hour	6	54	350
	99.2%ile 24 hours	6	35	125
<b>PM<sub>10</sub></b>	90.4%ile 24 Hour	36	39.7	50

Note 1: Background Concentrations for short term parameters taken as twice the annual average background concentration. Background concentration taken as an average of Zone D monitoring.

Note 2: Air Quality Standards Regulations (SI No. 271 of 2002) and 2008/50/EC.

In the air dispersion model the licensee made the conservative assumption that all the PM<sub>10</sub> generated and emitted from the plant was also PM<sub>2.5</sub>.

The results of the air dispersion model indicate that the maximum ground level concentrations (including background concentrations), for each scenario do not exceed any Air Quality Standards.

The emission limit values included in the RD and in the air dispersion model assessment are as proposed by the licensee, which is presented in Table 1. One exception exists, for particulates/dust (when operating on gasoil), the licensee modelled  $50\text{mg}/\text{m}^3$ . However; the RD limits the ELV for

dust to 20mg/m<sup>3</sup>. This ELV is in line with limit specified for liquid fuel plants in the LCP BAT Note.

The monitoring requirements and interpretation included in the RD are based on the requirements of the Large Combustion Plant Directive and BAT for the Combustion Sector. The RD also requires records to be maintained of the frequency of start-up and shut down, occasions when gasoil is used as fuel and occasions when the installation is operated at less than full load.

### Emissions to Sewer

There are no emissions to sewer from the proposed installation.

### Emissions to Waters

Effluent discharges from the site will be of a similar composition to discharges from the existing plant. However, the volume will be significantly reduced. It is considered therefore, that the proposed development will have a reduced impact on the receiving water when compared to the existing situation.

Currently there are 12 existing discharge points into the estuary, consisting of both process and surface water discharges through the water outfall system into the Barrow Estuary.

Proposed new discharges SW1, SW2, SW3, SW4, SW12 and SW13 will use the existing outfall system into the estuary. The number of process waste water discharges will be reduced from six to three (SW2, SW3 and SW13). The number of storm water discharges will also be reduced from six to three (SW1, SW4 and SW12), on commencement of commercial operation of the proposed CCGT plant. There are no new outfall locations planned as part of the proposed CCGT plant.

Four distinct waste water streams will be discharged from the site; cooling water, process waste water, treated foul water (from sanitary facilities) and surface water runoff.

### Cooling Water

The main emission to water from the installation is cooling water. Cooling water will be abstracted from the Barrow Estuary, utilising the existing water intake and outfall system. The overall demand for cooling water will be reduced by approximately 50% from the current maximum demand of 50,170m<sup>3</sup>/hr to approximately 25,000m<sup>3</sup>/hr.

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 pump house to the steam turbine condenser and to the coolers of the closed cooling water systems. The cooling water will then be discharged to the estuary via the existing outfall culvert **SW2**.

In accordance with existing operations, cooling water will be chlorinated at the cooling water inlet by direct injection of Sodium Hypochlorite solution, to control biological fouling of, and damage to, the condensers. Chlorine concentrations in the cooling water discharge for the new plant will be reduced from the existing maximum concentration of 0.5mg/l to 0.3mg/l. This is in line with the requirements of the Reference Document on Best Available Techniques for Industrial Cooling systems, for discharge to an estuary.

A by-product of the disinfection by chlorination of water containing organic matter is the formation of trihalomethane (THM). No assessment of the impact of the discharge on the receiving water was carried out for these compounds. The RD requires the licensee to monitor for trichloro-methane in the surface water; this is a priority substance under *Schedule 6* of the European Communities Environmental Objectives (Surface Waters) Regulations 2009. (S.I. No. 272 of 2009).

Hydrodynamic modelling was carried out to show effects of the proposed CCGT discharge on the estuary. The report concludes (based on the analysis of a number of tidal scenarios) that the existing plant is not causing an impact on the estuary. The proposed CCGT will reduce the extent of the thermal plume on the estuary. The RD retains the condition that the discharge shall not cause a

temperature increase at the edge of the mixing zone of greater than 1.5°C in the receiving system. The mixing zone shall not exceed 25% of the estuarine cross sectional area at any point. The RD in *Schedule B and C* sets ELVs and monitoring requirements for the discharge.

#### Process Effluent

The process effluent emissions to water from the new plant will be comprised of effluent from the water treatment plant, boiler blow down from the HRSG and waste water from the condensate drains. The average discharge of process effluent is estimated at 6.55m<sup>3</sup>/hr. This equates to approximately 38% of the effluent discharges from the existing plant and is of similar physicochemical makeup. This reduction in discharge will also result in a reduction in Ammonia emissions from an existing ELV of 34kg/day to less than 1kg/day.

Feed water from the local authority water supply for use in the HRSG and water injection for NOx control (running on gasoil) will be stored on site in a 9,500m<sup>3</sup> reservoir. It will be pumped to the onsite water treatment plant for pH adjustment and demineralisation. The water will be treated by ion exchange and pH adjusted by Sulphuric Acid and Sodium Hydroxide.

To maintain optimum boiler and steam conditions in the HRSG, the demineralised water is thermally de-aerated and dosed with conditioning chemicals including Carbohydrazide, Ammonium Hydroxide and Tri-sodium Phosphate by controlled dosing, to prevent scaling and corrosion build-up in the HRSG.

Boiler blow down comprises of water which has been circulating in the feed water/steam cycle. It is necessary to continuously 'blow-down' approximately 1 % of circulating water from the HRSG (0.5m<sup>3</sup>/hr) in order to remove the build up of salts within the HRSG drums.

The process water will be discharged to a process wastewater settling tank (200m<sup>3</sup>) where the quality and temperature will be monitored prior to a controlled discharge via **SW13**. The pH will be monitored and adjusted as required. The *Schedule B and C* of the RD sets ELVs and monitoring requirements for the discharge.

#### Sanitary Effluent

An existing foul water treatment system currently occupies the area of land proposed for the CCGT plant, therefore a new secondary treatment system is proposed. Sanitary effluent arising on site will be treated to meet a treatment standard of 25mg/l Biological Oxygen Demand (BOD), 35mg/l Suspended Solids (SS), 5mg/l Ammonia (as N) and 2mg/l of Total Phosphorous (as P). Following treatment the effluent will discharge to the Barrow estuary via discharge point **SW3**. The *Schedule B and C* of the RD sets ELVs and monitoring requirements for the discharge.

#### Receiving Waters and Impact

The existing power plant has been operational for over 40 years. The proposed development is consistent with the existing activities on the site. The proposed discharges are of a similar physicochemical nature to the existing waste water however, the volume will be reduced significantly.

The main discharge to the estuary is cooling water, it will be abstracted from the Barrow Estuary, utilising the existing water intake and outfall system. As discussed above the demand for cooling water will be reduced by approximately 50%. Hydrodynamic modelling of the discharge's thermal plume indicates that the discharge will comply with the Shellfish Regulations and will not result in an increase in water temperature at the shellfish waters boundary. The RD limits the both the quantity and temperature of the discharge.



The following table summarises the main considerations in relation to the Barrow, Suir, Nore Estuary and the Lower Suir Estuary

**Table 3.0 Receiving Waters**

Characteristic	Classification	Comment
Receiving water name and type	<ul style="list-style-type: none"> <li>Barrow, Suir, Nore Estuary WFD Code SE_100_0100</li> <li>Lower Suir Estuary (Little Island–Checkpoint) WDF Code: SE_100_0500</li> </ul>	See map of area on page19
Resource use	Shellfish production	~200m from discharge, see map on page 20.
Amenity value	General.	
Applicable Regulations	Shellfish Waters <sup>Note 1</sup>  EU Regulations 854/2004	Waterford Harbour Shellfish area was designated in 2009.  Class C (2010)-Mussels <sup>Note 2</sup> <i>North of a line from Passage East Tower. Relaying for a long period or cooking by an approved method. Based on bacteriological quality.</i>
	Environmental Objectives Regs <sup>Note 3</sup>	See WFD below for details
Tropic Status	<ul style="list-style-type: none"> <li>Lower Suir Estuary-Intermediate</li> <li>Barrow Suir Nore Estuary-Intermediate</li> </ul>	Note 4
WFD status <sup>Note 5</sup> Barrow, Suir, Nore Estuary  Lower Suir Estuary	Moderate  Good	Ecological Status is good but fail due to Chemical Status (discussed below) Objective: Restore by 2021  Objective: Protect
WFD protected areas	SAC (002162)  SAC (002137)	The River Barrow and River Nore SAC  The Lower River Suir SAC

**Note 1: Quality of Shellfish Water, 2006 (S.I. No. 268of 2006) as amended.**

**Note 2: Source: Sea Fisheries Protection Authority Website- 2010/11 Classified Bivalve Mollusc Production Areas in Ireland (15 June 2010).**

**Note 3: European Communities Environmental Objectives (Surface Waters) Regulations 2009. S.I. No. 272 of 2009.**

**Note 4 EPA (2008) Water Quality in Ireland 2004-2006 and EPA (2009) Water Quality in Ireland 2007-2008: Key Indicators of the Aquatic Environment.**

**Note 5: South Eastern RBD Transitional and Coastal Waters action plan 2010.**

The estuary has been divided into water bodies for classification purposes under the Water Framework Directive (WFD). The main volume of discharges is to the Barrow Suir Nore Estuary (Water Body Code IE\_SE\_100\_0100). This water body is categorised as a transitional water body with an overall moderate status (interim classification). The WFD objective to restore to good status has been extended to 2021 under the South Eastern River Basin District Action Plan

The water body passed the specific pollutants (Annex VIII of the Water Framework Directive) criteria but failed in relation to chemical status (Annex X) priority hazardous substances. The failure parameters are, Brominated Diphenyl Ethers (BDE), Mercury, Benzo/Ideno-pyrenes, Endosulfan and Pentachlorobenzene. No existing or proposed discharges from the development



contribute to the above parameters. However, a possible by-product of the disinfection by chlorination of water containing organic matter is the formation of THM. The RD requires the monitoring of the receiving water for trichoro-methane; a priority substance under the Environmental Objectives (Surface Waters) Regulations 2009.

The River Suir and Waterford Harbour area is a designated Shellfish Area. The designated area is approximately 200 metres south of the Great Island power plant. This designated area is classified as Class C meaning that shellfish may be placed on the market for human consumption only after relaying for a long period (2 months) ('relaying' means the transfer of shellfish from restricted areas to areas approved for natural biological cleansing using the marine environment as a treatment system) or cooked by an approved method so as to meet the health standards for bivalve molluscs laid down in the EC Regulation on Food Safety (Regulation (EC) No 854/2004). The shellfish areas are classified using the amount of bacteria found in sampled shellfish, as an index of water quality.

The Waterford Harbour Characterisation Report and Pollution Reduction Programme (PRP) indicate that due to the nature of the IPPC industries in the area and their distance from the shellfish area, it is unlikely that they are affecting shellfish water quality in this shellfish area.

Waste water discharges from the site to both the River Barrow and River Nore SAC (002162) and the Lower River Suir SAC (002137) located adjacent to the Great Island Power plant development boundary.

The EIA indicated that due to the combination of the proposed mitigation measures, the magnitude of the impacts and the positive changes from the current situation, the proposed activity will not have an adverse effect on the integrity of the sites or the qualifying features of the conservation objective of the Natura 2000 sites.

#### Surface Water

Surface water runoff will consist of mainly rainwater. 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 to the existing outfall **SW4** and **SW12**. Surface water runoff from the AGI area and its access road, will also be conveyed to a new collection system and treated via a silt trap unit and bypass oil interceptor prior to discharge via existing outfall **SW1**. The RD requires routine surface water monitoring, as specified in *Schedule C*.

#### Storage/Bunding

Tanks containing potentially polluting substances will be banded. These substances include gas fuel oil, Sulphuric Acid and Sodium Hydroxide. The applicant is required to store 11,000m<sup>3</sup> of gas oil on site as back up fuel. The gasoil will be stored in one of the refurbished heavy fuel oil tanks currently on site. Additional chemicals such as Ammonia, Tri-Sodium Phosphate and Carbohydrazide used for the HRSG feed water chemical dosing will be stored in banded receptacles in a designated area within the water treatment plant. All chemicals will be stored on-site within banded areas. The RD requires all bands to be integrity tested prior to use. Water collected in banded areas will be pumped to an oil interceptor and silt trap prior to discharge to the estuary.

#### Firewater Retention

The current licence (Reg. No. P0606-02) does not specify requirements in relation to fire water retention at the installation. The RD requires the licensee to carry out a risk assessment to determine if the activity should have firewater retention capability and to implement a suitable risk management programme in the event that a significant risk exists for the release of contaminated firewater.

#### Emissions to ground

There will be no emissions to ground at the installation. Due to historical waste disposal on the site (see site history below), as in the existing licence, ground water monitoring for relevant parameters such as total hydrocarbons are retained in the RD.

### *Note on Site History*

*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.*

*In 2005, with the agreement of the Agency, these areas were capped and are managed and monitored in compliance with the current licence conditions. The proposed CCGT layout is not located within the capped area and the proposed development will not impact on these areas.*

### Waste

No new wastes will be generated as a result of the licence review. Hazardous wastes generated by the installation will include waste oil, waste acid and alkali, compressor cleaning waste and waste electrical and electronic waste. Non-hazardous waste includes municipal waste (canteen and office waste) and effluent treatment sludge's. Waste recovery and disposal is controlled by licence conditions which require the waste to be transferred to authorised waste recovery/disposal facilities.

### Noise

The Great Island power plant is located on the Co. Wexford coastline at the confluence of the River Suir and Barrow. The town land of Great Island is made up of predominately 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). The nearest sensitive location is 450m from the installation. There are no schools, hospitals or churches located within one kilometre radius of the installation.

The Great Island power plant is currently operated intermittently. As required under condition 8 of the current IPPC licence, the site carries out an annual noise survey. In 2009 a full noise survey was not carried out as agreed by the Agency due to the infrequent operation of the plant. The proposed CCGT plant will operate continuously and therefore any noise associated with start-up and shut-down of plant will be minimal.

Propagation of noise from the operation of the proposed CCGT plant was predicted using the proprietary modelling software *soundplan*. Modelling of the noise from the proposed CCGT plant is based upon a conceptual layout and plant type. It is expected that the main noise emission points at the proposed CCGT plant will be the inlet filter face, stack exit, turbine compartment vent fans and transformers (x5). It is predicted that the noise level of 45dBA night and 55dBA will not be exceeded at any of the noise sensitive locations and this is in line with the existing activity. The RD sets sound pressure limits at noise sensitive locations and an annual noise survey is required.

### Cessation of Activities

The proposed CCGT and existing HFO plant will not operate in parallel. Once the proposed CCGT is fully commissioned the existing plant will be decommissioned. The RD requires the licensee to submit a revised Closure, Restoration and Aftercare Management plan for the existing plant and have this agreed by the Agency prior to decommissioning the existing power plant. The RD also requires a revised Environmental Liabilities Risk Assessment (ELRA) to be submitted to the Agency every three years.

## **Use of Resources**

### Fuel

Natural Gas will be piped directly to the site via a gaslink/Bord Gáis network through a new gas line developed for the proposed CCGT. The gas will not be stored on site. However, gasoil (11,000m<sup>3</sup>) will be stored as a backup fuel on site in line with CER guidelines.

The proposed CCGT plant will have an efficiency of approximately 58% (for every 100 megawatts of heat input, more than 58 megawatts output, as electricity is achieved) when operating at full load.

CCGT technology is considered an efficient form of conventional thermal power generation. The RD includes a requirement to undertake an energy efficiency and resource use audit within one year of the date of commencement of the new CCGT plant and thereafter as required by the Agency.

### Electricity

While the new CCGT plant at the installation is for the generation of electricity, the electricity required at the installation to power ancillary plant and buildings will be provided by the national grid. Such electrical usage shall be incorporated into the resource use assessments.

### Water

The potable water consumption on site is 20m<sup>3</sup>/hr for the existing plant. The proposed CCGT plant will require less water estimated at 6.5m<sup>3</sup>/hr. Potable water, sourced from the Wexford County Council public supply, will be stored in the existing 9,500m<sup>3</sup> service reservoir prior to treatment in the water treatment plant. High purity demineralised water used as feed water for the HRSG/Steam Turbine water steam cycle, will be produced in the water treatment plant.

Cooling water, for condensing steam, will be abstracted from the Barrow Estuary, in accordance with existing operations, utilising the existing water intake and outfall systems. The overall demand for cooling water will be significantly reduced from the current maximum demand of 50,170m<sup>3</sup>/hr to approximately 25,000m<sup>3</sup>/hr required for the CCGT operation.

### Chemicals

As discussed earlier, Sodium Hypochlorite is added to the abstracted cooling water as an anti fouling agent. (R43). Conditioning chemicals, including Ammonium Hydroxide (R50) (for pH correction), Tri-sodium Phosphate (to prevent scaling) and Carbohydrazide (R52 &R53) (to remove oxygen), will be added to the demineralised water. Their addition will be by a controlled dosing system. Cleaning chemicals used on-site will be biodegradable, except for the cleaner required for the compressor, which is hazardous. Compressor cleaning waste water shall be disposed of at an appropriate facility. The RD requires the licensee as part of the *Schedule of Environmental Objectives and Targets* to undertake an evaluation of practicable options for the use of cleaner technology and cleaner production.

## **Greenhouse gas emissions and Climate Change impact**

With regard to reducing the Climate impact of the installation under IPPC, the RD requires an energy efficiency audit and an assessment of resource use efficiency. The EMP objectives and targets include use of cleaner production (including production related carbon footprint).

The existing installation holds a Green House Gas (GHG) Permit Register Number IE-GHG066-07 in accordance with the European Communities (Greenhouse Gas Emissions Trading) Regulations 2004, (S.I. 437 of 2004 and amendments), from the Agency. The proposed CCGT will require the permit to be reviewed and amended accordingly.

Regulation 23 requires that the Agency shall not have regard to ELVs, BAT, or require a licence review, with respect to greenhouse gases unless it is necessary to ensure no significant local pollution will occur. The RD sets an ELV for nitrogen oxides, which is a specified greenhouse gas, to ensure that air quality standards are observed. The annual emissions (based on the licensed limits) to the environment from the proposed CCGT are estimated at 1258 tonnes of nitrogen oxides.

The total annual emission of CO<sub>2</sub> from the proposed 430 MW Combined Cycle Gas Turbine power station (assuming natural gas as the primary fuel) have been calculated, by the applicant, as 0.3429tCO<sub>2</sub> MW. The applicant also provided the following equivalent figures for generation of CO<sub>2</sub> for alternative generation options:

New modern coal fired power station	0.7560 tCO <sub>2</sub> MW
Oil fired power station	0.6957 tCO <sub>2</sub> MW

Therefore, CCGT power stations are a lower carbon emission means of generating power from fossil fuels. The proposed CCGT power station will have a generation efficiency of approximately 58%. The CCGT plant, when compared to renewable wind energy generation, offers capacity available on a non-intermittent basis. Other low carbon options for providing new (non intermittent) capacity would include biomass generation; however biomass is limited by fuel supply.

## **Compliance with EU Directives**

### IPPC Directive (2008/1/EC)

This installation falls within the scope of category 1.1 (combustion installations with a rated thermal input exceeding 50MW) of Annex I of Council Directive 2008/1/EC concerning integrated pollution prevention and control.

The existing licence for the Great Island Power Generating Station was issued in January 2005 and complies fully with the requirements of the IPPC Directive. The RD will also comply with the requirements of the Directive.

The RD as drafted takes account of the requirements of the Directive. BAT is taken to be represented by the limits set for gas turbines in Directive 2001/80/EC, on the limitation of emissions of certain pollutants into the air from large combustion plant, guidance given in the BAT guidance note on Best Available Techniques for the Energy Sector (Large Combustion Plant Sector, EPA 2008) and guidance given in the IPPC reference document on BAT for Large Combustion Plants, July 2006. The Council Directive 2009/31/EC amended the Annex I of IPPC Directive (2008/1/EC), to include the capture of CO<sub>2</sub> as a new class of activity 6.9. Prior to commencement of this new activity the licence will require a review to accommodate it.

### Large Combustion Plant Directive (2001/80/EC) & Council Directive (2009/31/EC)

The Large Combustion Plant Directive 2001/80/EC, transposed into national legislation in S.I. 644 of 2003 as amended, applies to combustion plants with a rated thermal input of equal to or greater than 50 MW, irrespective of the fuel used (solid, liquid or gaseous). The emission limit values and interpretation specified in the Directive for gas turbines fuelled on natural gas and gasoil (as back up fuel) are included in the RD.

The LCP regulations were updated by S.I. No. 371 of 2010 for the purpose of giving effect to Article 33 of the Council Directive 2009/31/EC on the geological storage of carbon dioxide, amending the LCP Directive 2001/80/EC. Carbon Capture and Storage (CCS) technology is in its infancy and it is not yet clear how this technology will be applied to large gas fired CCGT generation stations. CCGT manufacturers recommend that for a gas-fired power plant of this size an area of 14,000m<sup>2</sup> is left aside for retrofitting of CCS technology and plant. The licensee has identified an area of 14,000m<sup>2</sup> within the site boundary which may be suitable for retrofitting of carbon capture plant in the future. The area currently includes auxiliary buildings associated with the HFO plant. The licensee will require planning permission to demolish these buildings once the HFO plant has been decommissioned. The area identified in their review application by drawing entitled 'Proposed CCS storage location' will be cleared and left undeveloped. The existing jetty could also be used if technology becomes available to allow for the transportation of carbon for storage off site. The RD as drafted requires the licensee to maintain an area of 14,000 m<sup>2</sup> as identified within the site boundary, for retrofit of suitable and adequate carbon capture technology.

### Solvents Directive (96/82/EC)

The proposed activity does not fall within the scope of EU Council Directive 1999/13/EC on the limitation of emission of volatile organic compounds due to the use of organic solvents in certain activities and installations.

### Seveso Directive (96/82/EC) as amended by 2003/105/EC

The installation falls under Regulation 27(1) of S.I 74 of 2006 which implements the Directive. The facility is considered to be a lower tier Seveso site due to the quantity of gasoil (11,000m<sup>3</sup>) stored as back up fuel on the site. The licensee provided in support of its review licence application a copy of A Quantitative Risk Assessment Report which was prepared in consultation with the Health & Safety Authority (HSA). The HSA is the competent authority responsible for the administration and enforcement of these regulations.

### Air Quality Directive (1999/30/EC)

As discussed above the emissions to atmosphere from the proposed installation have been modelled and the results, including background concentrations, have been compared with the National Air Quality Standards which transpose the Air Quality Directive. The predicted ground level concentrations are all below the appropriate standards.

### Emissions Trading Directive (2003/87/EC)

The existing installation holds a Green House Gas (GHG) Permit Register Number IE-GHG066-07 in accordance with the European Communities (Greenhouse Gas Emissions Trading) Regulations 2004, (S.I. 437 of 2004 and amendments), from the Agency. The proposed CCGT will require the permit to be reviewed and amended accordingly.

Regulation 23 requires that the Agency shall not have regard to ELVs, BAT, or require a licence review, with respect to greenhouse gases unless it is necessary to ensure no significant local pollution will occur.

The RD sets an ELV for nitrogen oxides, which is a specified greenhouse gas, to ensure that air quality standards are observed. With regard to reducing the climate impact of the installation under IPPC, the RD requires an energy efficiency audit and an assessment of resource use efficiency. The *Schedule of Environmental Objectives and Targets* include consideration of the use of cleaner production.

### Environmental Liability Directive (2004/35/CE)

The Environmental Liabilities Directive has been transposed into national legislation by European Communities (Environmental Liability) Regulations 2008 (S.I. 547 of 2008). The national legislation came into operation on the 1<sup>st</sup> April 2009.

The RD includes conditions and schedules which require the licensee to control operation of the activity and meet the specified emission limit values. The RD includes, under *Condition 9*, measures to be taken by the licensee in the case of an incident, and under *Condition 10*, the licensee is required to prepare a Decommissioning Management Plan for the proposed CCGT plant.

### Water Framework Directive [2000/60/EC]

The RD, as drafted, transposes the requirements of the Water Framework Directive and provides conditions regulating discharges to water. *Schedule B* specifies emission limit values for the discharges.

The estuary has been divided into water bodies for classification purposes under the Water Framework Directive. The main volume of discharge from the site is to the Barrow Suir Nore Estuary (Water Body Code IE\_SE\_100\_0100). This water body is categorised as a transitional

water body with an overall moderate status (interim classification), objective to restore to good water status by 2021.

The WFD categorisation incorporates the discharges from the existing power plant which has been operational for over 40 years. The proposed development is consistent with the existing activities on the site. The proposed discharges from the new CCGT plant are of a similar physicochemical nature to the existing waste water however, the volume will be reduced significantly.

European Communities Environmental Objectives (Surface Water) Regulations, S.I. No. 272 of 2009

*Condition 5* and the ELVs set in *Schedule B* of the RD satisfy the requirements of the above regulations, in particular, Article 7 and the relevant parameters listed in Schedule 5 of said Regulations. As discussed above the RD requires the monitoring of the receiving water for trichloromethane; a priority substance under the above Regulations.

Habitats Directive (92/43/EC) & Birds Directive (79/409/EEC)

Waste water discharges from the site to both the River Barrow and River Nore SAC (002162) and the Lower River Suir SAC (002137) located adjacent to the Great Island Power plant development boundary.

An environmental impact assessment (EIA) was completed as part of the planning process. Under article 32(2) of the Habitats regulations (S.I. 94 of 1997), an environmental impact assessment shall be an appropriate assessment for the purposes of the regulations.

The assessment indicated that due to the proposed mitigation measures, the magnitude of the impacts and the positive changes from the current situation, the proposed activity will not have an adverse effect on the integrity of the sites or the qualifying features of the conservation objective of the Natura 2000 sites.

Shellfish Waters Directive (2006/113/EC)

The River Suir and Waterford Harbour area is a designated Shellfish Area. The designated area is approximately 200 metres south of the Great Island power plant. The Waterford Harbour Characterisation Report and Pollution Reduction Programme (PRP) indicate that due to the nature of the IPPC industries in the area and their distance from the shellfish area, it is unlikely that they are affecting shellfish water quality in this shellfish area.

Cooling water will be abstracted from the Barrow Estuary, utilising the existing water intake and outfall system. As discussed above the demand for cooling water will be reduced by approximately 50%. Hydrodynamic modelling of the discharges thermal plume indicates that the discharge will comply with the Shellfish regulations.

**Cross Office Liaison**

I have consulted with the Office of Environmental Enforcement inspectors past and present for the installation, Mr. Tony Dolan and Mr. David Matthews, regarding compliance history at the installation. Mr Micheál O'Dwyer, Office of Environmental Assessment assisted in the assessment of ambient air values with regard to the air dispersion modelling. Mr. John Lucey was consulted in relation to water quality in Barrow Estuary.

**Best Available Techniques (BAT)**

I have examined and assessed the application documentation and I am satisfied that the site, technologies and techniques specified in the application and as confirmed, modified or specified in the attached Recommended Decision comply with the requirements and principles of BAT. I consider the technologies and techniques as described in the application, in this report, and in the RD, to be the most effective in achieving a high general level of protection of the environment having regard - as may be relevant - to the way the facility is located, designed, built, managed, maintained, operated and decommissioned.

## **Environmental Impact Statement**

I have examined and assessed the EIS and having regard to the statutory responsibilities of the EPA, I am satisfied that it complies with Article 94 and Schedule 6 of the Planning and Development Regulations 2001 (SI 600 of 2001) and EPA Licensing Regulations (SI 85 of 1994, as amended).

## **Compliance Record**

The licensee has a good compliance record with respect to their current licence. An audit of the facility was carried out in June 2010 of the site. The licensee was found to be in non-compliance with the requirements of the licence in respect of Condition 5.1 and 3.1 (monthly exceedence of ELV of both SO<sub>2</sub> and NO<sub>x</sub> for A1-3) of their current licence, which may be due to the age of the existing plant. The proposed CCGT will be more efficient and will be a cleaner technology compared to the existing plant.

## **Fit & Proper Person Assessment**

The Fit & Proper Person test requires three elements of examination: technical ability; legal standing and financial standing. It is my view that the applicant qualifies under all three criteria and can be deemed a Fit & Proper Person for the purpose of this review.

## **Complaints**

In 2010 the licensee received one complaint regarding noise. The Agency received one complaint relating to noise in 2009 and the licensee received two complaints relating to air emissions (black smoke from the installation). Both issues have since been resolved.

## **Submissions**

The Agency has received one submission in relation to the review IPPC licence application from the Health Services Executive. The submission received has been fully considered in the assessment and consideration of this review licence application. The points raised by the HSE were arranged by reference to the conditions attached to the current licence P0606-02. These points are discussed in turn below but are also addressed under the assessment of the licence application above.

### 1. Submission

#### ***Condition 5: Emissions to Atmosphere***

*It is presumed that this condition will be modified by the imposition of the limit values of Directive 2008/50/EC and that stricter emission limit values will be imposed on commissioning of the new combined cycle gas turbine generating station.*

*It is noted that the Environmental Protection Agency response to An Bord Pleanála stated that the Agency would not grant a licence unless, inter alia, the best available techniques were used to prevent or eliminate or, if this is not practicable, generally to reduce an emission from the activity.*

*Appropriate conditions should also be applied for the commissioning phase of the new plant to ensure that any problems encountered during this period do not give rise to nuisance. Comprehensive air quality monitoring should be carried out at locations on both sides of the estuary to alleviate the concerns expressed by residents in the vicinity.*

*It is noted that Cheekpoint Community Alliance have requested continuous monitoring in Cheekpoint village.*

#### **Comment:**

The air emission limits in the RD are in compliance with BAT for operation of a CCGT power plant on natural gas and gasoil. The licensee has modelled these emissions and the predicted ground level concentrations are within the statutory air quality standards and the Directive 2008/50/EC on ambient air quality and cleaner air for Europe.



The RD applies only to the operational phase of the CCGT power plant. It is not within the remit of the Agency to impose ELVs during the commissioning phase.

No submission on the application was received from the Cheekpoint Community Alliance. As stated above the impact assessment indicates no air quality impacts that would require continuous ambient air monitoring.

## 2. Submission

### **Condition 6: Emissions to Water**

*We would expect that this condition would be revised to reflect the new situation on commencement of the new CCGT Plant to take account of the reduction in volume of discharge and changes to quality of same.*

*In regard to emissions to the estuary it is suggested that consideration be given to sediment sampling as this may give a better indication of the level of pollutants present as these would tend to accumulate in sediment. This would be a matter of concern to the Health Service Executive as there are extensive shell fish layings in the estuary.*

### Comment:

The main emission to water from the installation is cooling water. This will be abstracted from the Barrow Estuary, utilising the existing water intake and outfall system. The overall demand for cooling water will be reduced by approximately 50%.

Hydrodynamic modelling was carried out to show effects of the proposed CCGT discharge on the estuary. The report concludes that both the existing plant and proposed plant will not cause an impact on the estuary. The proposed CCGT will reduce both the extent of the thermal plume on the estuary. The RD sets ELVs based on the proposed emission volumes as modelled.

There is no requirement in the Shellfish regulations for sediment sampling. Samples of shellfish from designated waters are tested for trace metals and organohalogenes specifically polychlorinated biphenyls (PCBs) and organochlorine pesticides (OCPs), by the Marine Institute. There is no significant residual component in the discharge which is contributing to sediment in the estuary.

## 3. Submission Point

*Concern has been expressed regarding the Environmental Impact of the former waste disposal area on site. The applicant states that work on this area was undertaken in consultation and with the approval of the Environmental Protection Agency. We would recommend that the Environmental Protection Agency re-examine this area to ensure that the remediation work carried out meets current standards.*

### Comment:

As discussed above, the new development is away from the site of the former waste disposal area. The proposed development will not impact on the waste disposal areas which were capped with agreement of the Agency in 2005. The RD requires the retention of the existing ground water monitoring points.

## 4. Submission Point

*Condition 8 of the licence specifies that on site activities shall not give rise to noise levels off site at noise sensitive locations which exceed 55 dB[A](daytime) and 45 dB[A] (night time). The Annual Environmental Report for 2009 includes a noise measurement report carried out by Euro Environmental Services. This report includes measurements taken at four locations as follows: main*

gate, jetty gate, cw outfall and "Matter and Platt". The measurements were taken on the 26th November 2009 and most measurements exceeded 70 dB[A]

*It is not clear from the report that the measurements were taken at "Noise Sensitive Locations". If the locations are considered as such the report clearly indicates non-compliance with Condition 8. Alternatively if the locations measured are not "Noise Sensitive" the report is not relevant. It would also appear that sources other than the target source were not excluded in the survey.*

*Appropriate monitoring should be carried out to establish compliance with Condition 8.*

Comment:

In the report referred to above noise monitoring was not conducted at noise sensitive locations. The Proposed CCGT will replace 3 existing HFO units, which operate intermittently. The proposed plant will operate on a continuous basis and thus any noise impact from the start-up or shut-down of the installation will be greatly reduced. As discussed above noise modelling predicted that the noise level of 45dBA night and 55dBA will not be exceeded at any of the noise sensitive locations and this is in line with the existing activity. The RD sets sound pressure limits at noise sensitive locations and an annual noise survey is required.

5. Submission Point

*Section 9.2 deals with ground and groundwater. Monitoring of groundwater during 2008 and 2009 indicates exceedances in aluminium and arsenic. The 2009 Annual Environmental Report states "the critical human health pollutant linkage for groundwater contaminants at this site is the inhalation of groundwater vapours. It is noted that groundwater is not a potable supply given its brackish nature and therefore the impact to human receptors by drinking is not considered a viable pollutant linkage and no risk to human health". We consider that, regardless of the brackish nature, contamination of ground water is not desirable. We would be concerned to ensure that the full extent and source of this groundwater contamination be determined and that, if appropriate, remediation measures are taken.*

Comment:

There are no emissions to ground on site and no new emissions are proposed. The new plant is not expected to have a significant adverse impact on the groundwater quality. There are no proposed changes to the relevant conditions in the existing licence, with annual and biennially monitoring of groundwater for relevant parameters.

6. Submission Point

*We would suggest that where concerns are raised regarding specific pollutants/ contaminants that consideration be given to the inclusion of appropriate monitoring for such pollutants or contaminants in the licence. Concern has been raised regarding heavy metal pollution in the estuary. Sediment monitoring should be considered as a means of determining such pollutants.*

Comment:

The installation does not give rise to a discharge containing heavy metals. The RD requires monitoring of the installation in line with the existing licence.

**Recommended Determination (RD)**

In preparing this report and the Recommended Determination I have consulted with Agency technical and sectoral advisors Ms Marie O'Connor. The RD permits the operation of the proposed 430MWe combined cycle gas turbine subject to the conditions and schedules in the RD. The RD

gives effect to the requirements of the EPA Acts 1992 to 2007. The RD has regard to submissions made.

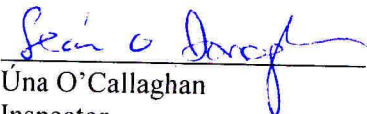
### **Charges**

The proposed annual charge is €12,174.72, this is an increase from the fee paid in 2010. The increase is due to scheduled air monitoring by the Agency. No air monitoring was carried out in 2010.

### **Recommendation**

I recommend that a Proposed Determination be issued subject to the conditions and for the reasons as drafted in the RD.

Signed

  
Una O'Callaghan

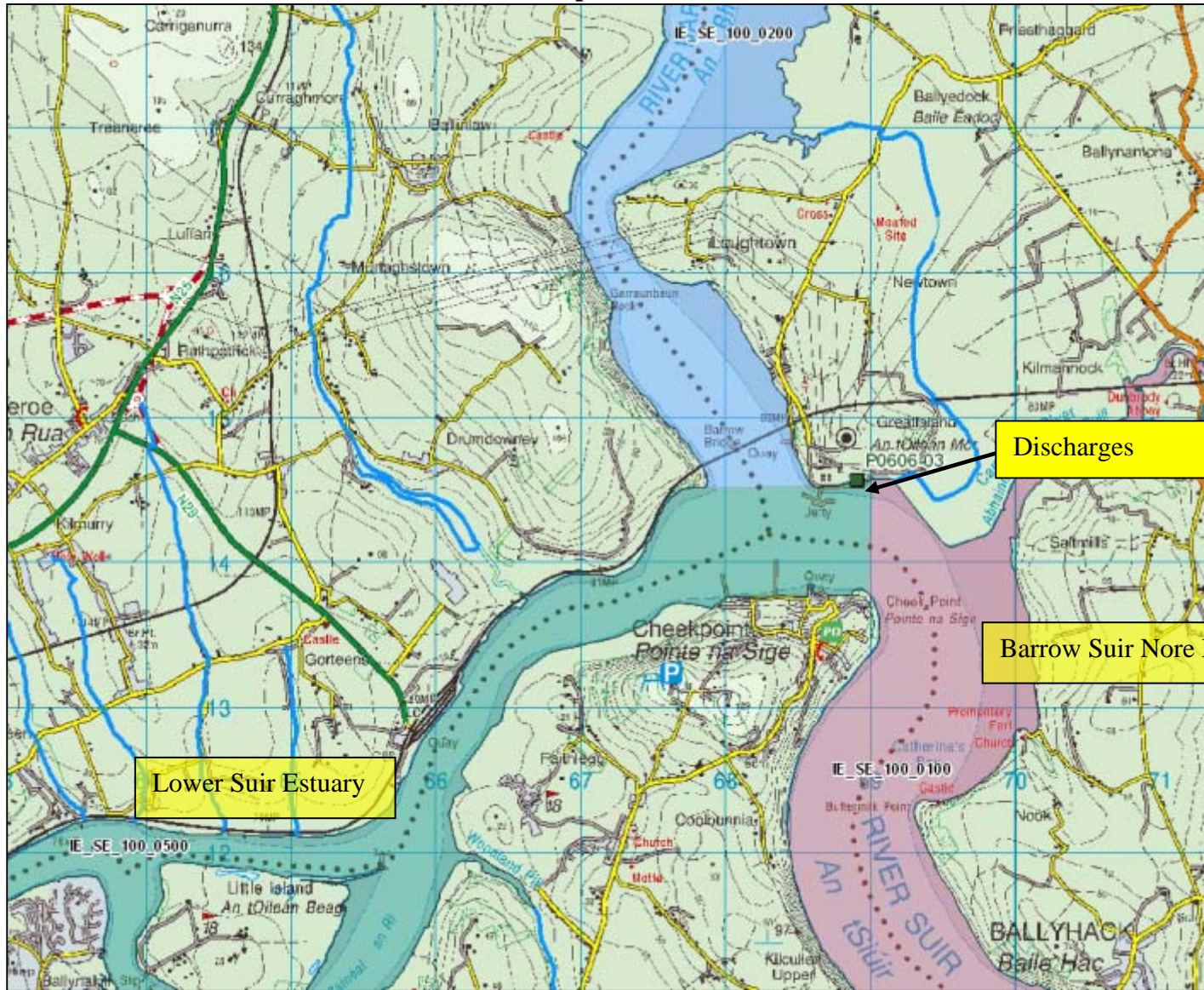
Inspector

Office of Climate, Licensing and Resource Use.

### **Procedural Note**

In the event that no objections are received to the Proposed Determination of the application, a licence will be granted in accordance with Section 87(4) of the Environmental Protection Agency Acts 1992 and 2007 as soon as may be after the expiration of the appropriate period.

Map of Area





**Designated Shellfish area outlined in red.**

