16. Interactions of the Foregoing

16.1 Introduction

An environmental impact statement must contain a description of likely significant impacts on defined environmental aspects (air, soil, water etc.) due to the construction and operation of the proposed development. Some impacts will affect more than one environmental topic because interactions are recognised to occur.

Two types of impact interaction are recognised to exist in this regard:

- **Cross-media impacts**: impacts that affect more than one environmental topic;
- **Cumulative impacts**: impacts which accumulate over space or time to generate a larger overall impact. Cumulative impacts are subdivided into:

  - Intra-project cumulative impacts – impacts relating to the main project; and

  - Inter-project cumulative impacts – impacts relating to the main project and other projects affecting the same environmental media.

Impact interactions and inter-relationships have been considered throughout the EIA process and are described in each of the individual impact chapters. The purpose of this chapter is therefore to provide a brief summary of the main interactions that were considered as part of the assessment.

16.2 Cross-media Impacts

The matrix that is presented as Table 16.1 has been developed to identify cross-media impact interactions. The nature of the environment is such that cross-media interactions between all environmental topics are potentially possible and/or may occur to a certain extent for most projects. The purpose of the matrix is therefore to highlight key interactions that are recognised to be specific to this project and warranting special consideration. In the matrix, a white square indicates no interaction, while a green square indicates that a key interaction exists. The key environmental interactions that have been identified are discussed further in *Section 16.3*.

Table 16.1: Cross-media Impact Interactions Matrix

	Land-use and Material Assets	Socio-economics	Noise and Vibration	Air Quality	Flora and Fauna	Water	Soils, Geology and Hydrogeology	Landscape and Visual	Archaeology, Architectural Heritage and Cultural Heritage	Health and Safety
Land-use and Material Assets										
Socio-economics										
Noise and Vibration										
Air Quality										
Flora and Fauna										
Water										
Soils, Geology and Hydrogeology										
Landscape and Visual										
Archaeology, Architectural Heritage and Cultural Heritage										
Health and Safety										

16.3 Land Use and Material Assets Interaction

16.3.1 Land Use and Material Assets and Socio Economics

During the peak construction period it is anticipated that up to 50 construction workers will be employed on site. As far as practicable local labour will be employed.

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. The local area and economy will also benefit. There will be occasional requirements for personnel to carry out routine operational maintenance. Out of hours security services will also be required to ensure the site is secure.

16.3.2 Land Use and Material Assets and Traffic & Transport

Although traffic and transport is considered within the scope of the Land Use and Material Assets Assessment in this EIS, there are a number of interactions with other land uses which should be identified in this chapter.

Access from the site to the external road network is proposed via an existing simple priority junction on the Dublin Road (R712), approximately 600 metres east of the roundabout at the N10 (Ring Road)/Dublin Road (R712). This priority junction currently serves the Purcellsinch Business and Technology Park. Traffic between this priority junction and the proposed development site will travel 800 metres through the Purcellsinch Business and Technology Park and through a gated entry. Direct access between the site and the private road network is proposed via a new simple priority junction located on the eastern property boundary of the existing Veolia business. This access road, which is proposed to be 6.0 metres wide, will be constructed prior to the commencement of construction.

Of the 50 construction employees which are proposed to be on site during peak construction, it can conservatively be assumed that 80 percent will arrive to the site in the morning peak hour of 08:00 and 9:00 and half will depart the site between 17:00 and 18:00. It is assumed that all construction employees will travel to and from the site via passenger vehicle and that the average car occupancy will be 1.25. As such, it is estimated that 32 vehicles will arrive at the site during the morning peak hour and 32 vehicles will depart the site during the evening peak hour. During peak construction, it is estimated that 15 deliveries, by heavy goods vehicle (HGV), will occur each day. Of these 15 deliveries, it has been assumed that the three deliveries will arrive and depart during both the morning and evening peak hours.

A Construction Traffic Management Plan (CTMP) will be implemented during the construction stage of the proposed development that will ensure that potential impacts resulting from construction traffic on IDA businesses are kept to a minimum at all times.

The movement of abnormal loads are the subject of an application requesting permission to the Garda Síochána. This "Permit for Specialised Vehicles" form, when signed by the Garda Síochána Permits Officer, grants permission to move abnormal loads as defined under *Road Traffic (Permits for Specialised Vehicles) Regulations, SI 147 of 2009*, on inter-urban routes.

It is expected that the power plant will have a small operational workforce and there will be occasional visits for routine maintenance. Out of hours security services will be arranged to ensure the site is secure. Impacts on local traffic are not expected given the small numbers of staff and given that the site will only be accessed from the north through the IDA Business and Technology Park;

16.3.3 Land Use and Material Assets and Noise and Vibration

Noise sensitive locations (NSLs) and other properties around the proposed power plant are as follows:

- There is a row of dwellings west of the site on the southern side of Sion Road. The noise sensitive location "NSL 1" is the closest to the site;
- "NSL 2" is a dwelling lying south of the site across the Sion Road;
- A commercial building "CB" is directly adjacent the northern boundary of the site. This is a commercial/light industrial building which is only occupied during typical daytime working hours; and
- The "Council building" is a vacant property under the ownership of Kilkenny County Council;

During construction at the commercial building, noise levels would exceed the recommended noise levels for commercial buildings as it is located in the immediate vicinity of the boundary of the site. To reduce noise levels to below the permitted level, a 10dB screening correction is proposed which would be provided by a temporary noise screen built along the northern boundary of the site. With this screen, the noise levels at the commercial building would be within the relevant construction noise criteria.

Vibration levels will be insignificant as percussive piling is not expected. The commercial building might experience a small amount of vibration during excavation works very close to the northern site boundary. However, any such vibration would be expected to have a low amplitude, to only last for short periods of time and would therefore not have a significant impact.

Construction vehicles would access the site through the entrance in the northern boundary of the site, using the access roads in the IDA Business and Technology Park to gain access to the N10 to the north. It is not considered that the additional noise created by the construction vehicles would have a significant impact on the amenity of employees located within the industrial estate.

During operation, the noisier elements of the plant will include:

- The main gas turbine system, air inlet filters, heat exchanger and exhaust stack;
- Gas compressors;
- Auxiliary plant such as the lubricating oil pumps; and
- Liquid fuel pumps.

Mitigation measures are proposed to ensure that the proposed development will comply with the EPA's *Guidance Note for Noise in Relation to Scheduled Activities (2006)*. These include the following:

- A new gas turbine enclosure will be designed to replace the enclosure supplied by the gas turbine manufacturer. Mott MacDonald consulted with leading acoustic and noise attenuation specialists IAC, and their sister company IAC BOËT, who are approved packagers for leading power plant manufacturers and have confirmed an acoustic enclosure can be designed to meet typical EPA daytime and night-time noise thresholds at NSLs;
- Placing large structures such as the raw and fire water storage tank, the demineralised water storage tank, the water treatment building and chemical storage room between the main gas turbine and the commercial building CB to provide physical acoustic screening;
- A fitted noise attenuated enclosure will be mounted on the skid around the main gas turbine;
- Acoustic attenuated enclosures will be fitted around all ductwork;
- A splitter-attenuator will be fitted on the air inlet filter;
- A splitter attenuator will be fitted on the exhaust stack; and
- Small acoustic attenuated enclosures will be fitted around the gas compressors, lubricating oil and fuel oil pumps.

With appropriate mitigation, operational noise levels at nearby noise sensitive receptors would not exceed EPA Guideline noise levels and are not expected to be significant.

16.3.4 Land Use and Material Assets and Air Quality

Construction activities associated with the building of the proposed plant have the potential to cause dust nuisance. Potential dust emitting activities include set up and enabling works, roads and Infrastructure, site clearance and ground works and construction of new buildings. Construction traffic flows on local roads are expected to be low and last for approximately 14 months. Existing background pollutant concentrations are very low and therefore emissions of combustion related pollutants on the local road network during the construction phase are expected to be negligible and of less significance than operational emissions from the proposed plant. In order to control potential effects from dust raising activities on site during construction a Construction Environmental Management Plan (CEMP) will be prepared and implemented by the nominated contractor during the construction phase of the project.

The principal air quality issues associated with the operation of the power plant are associated with atmospheric emissions through the exhaust stack. Two scenarios were considered in respect of the operating regime of the proposed power plant:

- Scenario 1: Proposed plant operating at full load firing on natural gas. Includes consideration of long term and short term averaging periods for NO_x, PM_{10} and $PM_{2.5}$; and

- Scenario 2: Proposed plant operating at full load firing on distillate oil. Includes consideration of short term averaging periods for NO_x, SO_2 and PM_{10}.

For Scenario 1 the maximum predicted Process Contributions (PC) to ground level NO_2, PM_{10}, $PM_{2.5}$ and CO concentrations from the proposed plant firing on natural gas were modelled. The results indicate that PCs of relevant pollutants are well within the relevant Air Quality Standards (AQSs). The resultant PECs for all pollutants are well within the relevant AQSs. Overall, the predicted concentrations from the proposed development firing on natural gas are considered to be of negligible significance.

For Scenario 2 the results of modelling maximum predicted PC to ground level SO_2, NO_2 PM_{10} and CO concentrations from the proposed power plant firing on diesel oil were modelled. In order to infer the maximum potential short-term effects, the proposed development is assumed to operate firing on diesel oil with a 100% plant load factor to ensure that plant operation coincides with the worst case meteorological conditions for dispersion. The results indicate that the PCs and resultant PECs for all pollutants are well within the relevant AQSs.

A Control Emissions Monitoring Station (CEMS) will be located on site which will monitor atmospheric emissions from the stack.

No other mitigation measures in addition to those already inherent in project design and considered within the dispersion modelling (compliance with emission limits and air quality standards) are proposed.

The proposed power plant will be licensed by the EPA under the Integrated Pollution Prevention and Control (IPPC) licensing regime. The IPPC licence will state the limits for atmospheric emissions that the proposed plant will be required to comply with.

16.3.5 Land Use and Material Assets and Flora and Fauna

Construction and operation impacts associated with the proposed development will have an insignificant impact on the ecology of the site and surrounding area including the River Barrow and River Nore Special Area of Conservation (SAC) and the River Nore Special Protection Area (SPA).

16.3.6 Land Use and Material Assets and Water

Raw feed water will be sourced from either river water abstracted from the River Nore or Purcellsinch Wastewater Treatment Plant. The power plant will be designed such that it can operate by using either a combination of these sources or alternatively by operating entirely from one supply only, i.e. either abstracted river water or treated 'grey water' from the Wastewater Treatment Plant.

Water supply and treatment is primarily required for three processes as follows:

- Demineralised water primarily for injection into the combustion chamber of the gas turbine for NOx control;

- Make-up to the cooling towers; and

- Services water supply for potable water and sanitary services.

A river abstraction will require the refurbishment of a pumphouse located on IDA lands approximately 130 metres to the west of the main development site along the Sion Rod.

GIL proposes to refurbish this pumphouse such that it can supply the required volume of water to the power plant. In addition, an existing intake pipe from the River Nore will be refurbished. An assimilative capacity assessment of the River Nore was undertaken. It was found that the abstraction of 90m^3/hr (or 0.025m^3/sec) for the operation of the GIL power plant would an overall insignificant impact on the River Nore.

An application for a road opening licence will be submitted to Kilkenny County Council to facilitate pumping river water to the main development site.

A Flood Risk Assessment undertaken for the development concluded that the risk of flooding is within acceptable levels as outlined by the Department of the Environment, Community and Local Government (DoECLG) in *"The Planning System and Flood Risk Management, Guidelines for Planning Authorities"* (2009).

Full implementation of the mitigation measures outlined in Chapter 11 *Water* will ensure that residual impacts are insignificant.

16.3.7 Land Use and Material Assets and Soils, Geology and Hydrogeology

In order to minimise disruption a Construction Environmental Management Plan (CEMP) will be developed and implemented during the construction phase of development.

Prior to construction works, visual surveys will be carried out on all adjacent properties to determine their current condition and identify any cracking/movement cracking/settlement prior to the commencement of any enabling/construction. Where construction is nearest to neighbouring commercial properties, the foundations will be of a shallow nature. The proposed buildings will be set back from the site boundary to allow for adequate gravity retaining structures to be put in place prior to any foundation construction. This will prevent any form of undermining of adjacent properties.

Radon monitoring will be conducted on site prior to and during the construction phase over the prescribed duration in accordance with the current RPII guidelines.

To minimise the potential risk of pollution of the Nore and Pococke Rivers by sediment laden run off, sediment entrainment measures shall be incorporated into the development. These measures may include but not be limited to; blocking of all existing drainage trenches to prevent runoff reaching nearby watercourses, intercepting run off, lining ditches with geotextile and placing hay bales to trap sediment.

Bunds for the storage of chemicals and hydrocarbons will be lined or constructed of materials resistant to damage by the materials stored therein. In addition the capacity of such bunds will be a minimum of 110% of the volume of the largest container stored therein or 25% of the total volume, whichever is the greater.

Where refuelling is to take place on site it will be within a designated impermeable, bunded area, away from all drains.

Portable chemical toilets will be provided for the duration of the works and all waste material will be removed from site and disposed of to an appropriately licensed facility.

Spill kits will be maintained on site at all times and all staff will be trained in their use and know the locations of the spill kits.

During operation, all plant will be inspected at the beginning and end of each shift and if leaks are evident they will be repaired immediately or removed from site and replaced.

16.3.8 Land Use and Material Assets and Landscape and Visual

The primary zone of visual influence extends over a small area which includes the lands south of the site extending to the wooded edge along the Nore River Valley. Views occur mainly from properties located to the south of Sion Road. The principal views from roads occur where the Sion road runs contiguous to the site boundary.

The principal landscape mitigation measures focus on introducing planting along the site boundaries to provide a natural and informal edge. This planting will screen the perimeter fencing and effectively reduce the impact on open views of the site from the south. Given the height of some of the elements in the development, particularly the admin / workshop, water storage tank and exhaust stack, it will not be possible to screen the development in its entirety. Therefore measures that reduce the bulk of the development while also creating a *'green edge'* on the southern boundary, visually linking the mature tree groups either side of the site will provide an integrated approach that ties in with the existing landscape characteristics and features of the area. The objective particularly in regard to treatment of the southern boundary is for an edge that reflects the semi-rural character of the Sion Road.

The principal changes post mitigation planting will be to existing views from the Sion Road and lands to the south of the Sion Road where the higher elements of the proposed development will continue to be visible. Within the context of the existing planning permission (Kilkenny County Council ref: 07/2164), the proposed development would have an imperceptible and neutral visual impact.

16.3.9 Land Use and Material Assets and Archaeology, Architectural Heritage and Cultural Heritage

There are no archaeological recorded monuments (RMPs) within the main development site and no "*new*" (that is unrecorded) archaeological features identified as being extant during the archaeological inspection of the site or test trench excavations. However, the subject site does have the potential to yield archaeological remains subsurface, which at present show no above-ground register. There is also potential to yield archaeological remains subsurface when laying new pipe infrastructure in the Sion Road to facilitate the transfer of water from the existing pumphouse on IDA lands to the main development site.

It is recommended that the site preparation groundworks for the permitted development be archaeologically monitored to mitigate against any potential archaeological impact.

16.3.10 Land Use and Material Assets and Health and Safety

Significant controls have been considered at all stages of the design process to ensure all health and safety concerns raised by members of the public and statutory consultees on the previous 2007 and 2010 planning applications have been considered in this new planning application. These include provisions for:

- Road icing;
- Managing the threat of Legionellosis;
- Providing significant techncial details on proposals for the use of treated wasterwater from Purcellsinch Wastewater Treatment Plant; and
- Providing a Major Accident Risk Assessment (although the priovision of same is not required).

16.4 Noise and Vibration Interaction

16.4.1 Noise and Vibration and Flora and Fauna

The noise impact assessment concluded that noise arising from the construction and operation of the proposed power plant will be below the recommended assessment criteria at all sensitive receptors including the River Barrow and River Nore Special Area of Conservation (SAC) and the River Nore Special Protection Area (SPA).

16.5 Air Quality Interactions

16.5.1 Air Quality and Flora and Fauna

An assessment of emissions from the proposed power plant with reference to critical levels and critical loads for the designated ecological sites within a 10km radius was undertaken. As critical levels and critical loads are based on long term (annual) averaging periods, predicted concentrations at designated sites have not included the contributions from SO_2 emissions as these emissions will be present for very short term periods only.

The maximum modelled increase in annual mean NO_x concentrations at ecological sites within 10km of the plant is at the River Barrow and River Nore SAC and the River Nore SPA due to the fact that this designated site is in very close proximity to the proposed development site. The River Nore SPA is located a similar distance and as such would expect the same potential impacts. As all Process Contributions (PCs) are less than 1% of the AQS, and the Predicted Environmental Concentrations (PECs) are well below the relevant AQS, effects on critical levels at designated ecological sites are considered to be negligible.

16.5.2 Air Quality and Soils, Geology and Hydrogeology

Atmospheric emissions associated with the proposed development will have a negligible impact on the soils, geology and hydrogeology of the study area and surroundings.

16.6 Flora and Fauna Interaction

16.6.1 Flora and Fauna and Water

GIL proposes to refurbish this pumphouse such that it can supply the required volume of water to the power plant. In addition, an existing intake pipe from the River Nore will be refurbished. An assimilative capacity assessment of the River Nore was undertaken. It was found that the abstraction of 90m^3/hr (or 0.025m^3/sec) for the operation of the GIL power plant would an overall insignificant impact on the water quality or flow of the River Nore.

In addition, Mott MacDonald Ireland consulted with Inland Fisheries Ireland (IFI) regarding proposals for the use of a water abstraction from the River Nore. It is proposed, as per confirmation from the IFI that the intake chamber for the river abstraction will be screened so as to preclude entry of juvenile and adult salmonids and cyprinids. The detailed design of this screen will be set out outlined in a Method Statement to be agreed in consultation with the IFI and the NPWS.

16.6.2 Flora and Fauna and Landscape and Visual

The proposed development will retain the most significant section of hedgerow on the eastern side of the southern boundary. No hedgerows will be removed as a result of the development. One mature Poplar tree on the western boundary will be removed to facilitate construction. A young Sycamore Tree will also

be removed from near the northern site boundary. Three young trees will also be removed along the southern boundary during construction of the proposed retaining wall and bank.

16.7 Water Interactions

16.7.1 Water and Soils, Geology and Hydrogeology

There is a potential for soil, groundwater and surface waters to become contaminated as a result of accidental spillages during the construction phase. Potentially polluting substances will be contained in suitable containers within bunds in designated areas. The implementation of good construction management practices will minimise the risk of pollution to soils and groundwater during the construction phase.

Embedded mitigation measures in the plant design, including hardstanding, holding tanks, bunding, monitoring and treatment will mitigate against potential contamination during the operational phase of the development.

16.8 Soils, Geology and Hydrogeology Interaction

16.8.1 Soils Geology and Hydrogeology and Archaeology, Architectural Heritage and Cultural Heritage

There are no archaeological recorded monuments (RMPs) within the main development site and no "*new*" (that is unrecorded) archaeological features identified as being extant during the archaeological inspection of the site or test trench excavations. However, the subject site does have the potential to yield archaeological remains subsurface, which at present show no above-ground register. There is also potential to yield archaeological remains subsurface when laying new pipe infrastructure in the Sion Road to facilitate the transfer of water from the existing pumphouse on IDA lands to the main development site.

It is recommended that the site preparation groundworks for the permitted development be archaeologically monitored to mitigate against any potential archaeological impact.

16.9 Landscape and Visual Interaction

16.9.1 Landscape and Visual and Archaeology, Architectural Heritage and Cultural Heritage

There may be a slight visual impact on a limited number of archaeological features outside of the immediate vicinity of the development site. This impact is expected to be reduced through the landscape mitigation planting and is not considered significant.

16.10 Cumulative Impacts

The potential for other developments in the same area as the proposed GIL power plant to have a cumulative impact has been considered. The assessment of the potential for cumulative impacts are typically limited to projects that are already underway or built, projects that are in the planning system and those which are of a size and nature that warrant consideration. Given the location of the proposed development, the main cumulative impacts are associated with the Purcellsinch Wastewater Treatment Plant. The main cumulative issues are noise, landscape and visual and water.

16.10.1 Noise

The predicted noise level for the Wastewater Treatment Plant is for the proposed upgrade to this plant, as set out in the Environmental Impact Statement (EIS) accompanying the planning application to An Bord

Pleanála (ref: PL10. JA0011). The noise levels predicted from both facilities in operation simultaneously, compared to the background noise is considerably below the noise level where complaints are likely, as outlined in *BS4142, Method for Rating Industrial Noise Affecting Mixed Residential and Industrial Areas, BSi, 1997.*

16.10.2 Landscape and Visual

In terms of landscape and visual impact, the proposed power plant will result in some change to existing views principally from the Sion Road and lands to the immediate south where the south facing slopes of the site are visible. The power plant will be seen as an intensification and extension of the current industrial activities that occur to the north and west of the site, including the Wastewater Treatment Plant. However, overall and within the context of the existing planning permission the proposed development will have an imperceptible and neutral visual impact.

16.10.3 Water

It is proposed to abstract 90m^3/hr (or 0.025m^3/sec) from the River Nore for the operational requirements of the power plant. This will have an overall insignificant impact on the receiving environment of the River Nore to receive discharges from the Purcellsinch Wastewater Treatment Plant as approved by An Bord Pleanála for the upgrade of this plant (ABP ref: PL10.JA0011).