

13 Interactions of the Foregoing

13.1 Introduction

This chapter of the EIS describes the interactions between the various impacts identified in the previous sections of the Environmental Impact Statement (EIS), during both the construction and operational phases of the proposed development at Derrygreenagh, Co. Offaly.

This chapter is structure as follows;

13.1 Introduction

13.2 Human Beings Interactions

- *Human Beings and Landscape and Visual Impacts*
- *Human Beings and Roads and Traffic*
- *Human Beings and Noise and Vibration*
- *Human Beings and Air Quality and Climate*
- *Human Beings and Soils, Geology and Hydrology*
- *Human Beings and Water Quality*

13.3 Landscape and Visual Impact Interactions

- *Landscape and Visual and Roads and Traffic*
- *Landscape and Visual and Flora and Fauna*
- *Landscape and Visual and Soils, Geology and Hydrology*

13.4 Noise Interactions

- *Noise and Roads and Traffic*
- *Noise and Flora and Fauna*

13.5 Air Quality and Climate Interactions

- *Air Quality and Climate and Roads and Traffic*
- *Air Quality and Climate and Flora and Fauna*

13.6 Water Quality Interactions

- *Water Quality and Flora and Fauna*
- *Water Quality and Soils, Geology and Hydrogeology*

13.7 Soils, Geology and Hydrogeology Interactions

- *Soils, Geology and Hydrogeology and Flora and Fauna*

13.8 Cultural Heritage Interactions

13.9 Cumulative Impacts

The project team, in conjunction with the assistance of a variety of specialist environmental consultants, each one an expert in their chosen field, assessed the potential impacts arising from the construction and operation of the proposed development at Derrygreenagh, Co. Offaly. The interaction of environmental aspects was clearly identified, at an early stage in the project, to be an important factor to be considered in the full evaluation of the environmental impact associated with the proposed development.

A simple matrix method has been used, which is derived from “*Introduction to Environmental Impact Statement*”, Glasson, Therivel and Chadwick, 1999, in which the environmental components addressed in the previous sections of this statement have been placed on both axes of a matrix. Interactions between the various components have then been identified and given a significance rating. It must be noted that each impact is therefore identified twice in the symmetric matrix - refer to Table 13.1 *Interaction of Impacts during Construction and Operational Phases*.

Table 13.1: Interaction of Impacts during Construction and Operational Phases

	Human Beings		Landscape & Visual Impact		Roads & Traffic		Noise & Vibration		Air Quality & Climate		Flora and Fauna		Soils, Geology & Hydrogeology		Cultural Heritage		Water Quality	
	Const.	Oper.	Const.	Oper.	Const.	Oper.	Const.	Oper.	Const.	Oper.	Const.	Oper.	Const.	Oper.	Const.	Oper.	Const.	Oper.
Human Beings	Black	Black	Cyan	Red	Cyan	Yellow	Cyan	Green	Green	Yellow			Green	Green			Green	Green
Landscape & Visual Impact	Cyan	Red	Black	Black	Cyan	Black					Red	Cyan	Green	Green				
Roads & Traffic	Cyan	Yellow	Cyan	Black	Black	Black	Green	Green	Green	Green								
Noise & Vibration	Cyan	Black			Green	Black	Black	Black			Red	Green						
Air Quality & Climate	Green	Yellow			Green	Black	Black	Black	Black	Black	Cyan	Green						
Flora and Fauna			Cyan	Cyan		Red	Green	Cyan	Green	Black	Black	Black	Cyan	Yellow			Cyan	Green
Soils, Geology & Hydrogeology	Green	Green	Green	Green							Cyan	Yellow	Black	Black			Cyan	Yellow
Cultural Heritage															Black	Black		
Water Quality	Green	Green									Cyan	Green	Cyan	Yellow			Black	Black

Legend: Significance of Impacts at Construction and Operational Phases (after mitigation):

	Construction	Operation
No Interaction		
Neutral Impact		
Imperceptible Impact		
Slight Impact		
Significant Impact		
Positive Impact		

Definitions of Types of Impact, (EPA 2002):

Neutral Impact: A change that does not affect the quality of the environment;

Imperceptible Impact: An impact capable of measurement but without noticeable consequences;

Slight Impact: An impact, which causes noticeable changes in the character of the environment, without affecting its sensitivities;

Significant Impact: A change, which reduces the quality of the environment, for example lessening species diversity or diminishing the reproductive capacity of an ecosystem;

Positive Impact: A change that improves the quality of the environment, for example by increasing species diversity, improving the reproductive capacity of an ecosystem, removing nuisances or improving amenities.

13.2 Human Beings Interactions

13.2.1 Human Beings and Landscape and Visual

The proposed development will have negative landscape and visual impacts arising from proposed plant and activities on the site.

During the operational phase of development, the introduction of new structures and activity on the site will have adverse impacts upon the quality of views experienced by people living in, working in or visiting the surrounding area. The severity of the impact will gradually diminish, as the planned landscape planting grows and matures. Given the relatively flat topography, and the abundance of intervening vegetation, the views are relatively restricted from sensitive receptors. Visibility of the site is mainly limited to the area within 5 km of the site, with an extended visual envelope to the north of the site of up to 10 km.

13.2.2 Human Beings and Roads and Traffic

It is anticipated that the construction phase of the proposed development will occur in five phases over a 38 month period, beginning in late 2010. Construction activities are expected to peak from Jan 2011 to Oct 2011 and a worst case scenario situation assumes that the highest volumes of traffic are likely to be generated during this period. During this phase the labour force requirement on site will be up to 450 construction workers. However, in the traffic assessment undertaken for this EIS a very conservative approach was taken whereby a workforce during the peak construction phase of 600 construction workers was assumed. It is estimated that this workforce will equate to approximately 480 private cars will travel to and from the site at peak. At peak, there will be approximately 40 HGV movements to and from the site over the course of the working day, however the road network still works well within its optimum design capacity Therefore a slight short-term impact on local traffic will occur in the area during the construction period.

During the operational phase of the power plant, it is estimated that the maximum predicted number of arrivals to, and departures from, the site are 52 arrivals and 7 departures in the morning, and the reverse in the evening. No growth in either staffing levels or delivery requirements to the power plant is predicted over the course of its life cycle. Therefore impacts from traffic volumes during the operational phase are anticipated to be neutral, when compared with current levels.

13.2.3 Human Beings and Noise and Vibration

A baseline noise survey was undertaken to determine the impact of the proposed development during the construction and operational phases of development. Construction phase noise impacts were assessed based on the predicted noise levels for the 'worst-case' situation in each of three phases of construction (where there is significant potential for the generation of noise). The evaluation determined that there would be no exceedance of daytime or evening time construction noise assessment criteria. While construction works are predicted to be audible, the impact is not considered to be significant due to the short-term nature of the activities.

Prediction of road noise levels due to construction traffic were undertaken, and it was determined that noise levels due to construction traffic will not significantly increase on the local roads.

During the operational phase of development, a single exceedance at one of the noise sensitive receptors of the relevant noise assessment criteria is predicted, where the CCGT and OCGT units are running together at night. This will be an infrequent occurrence, due to the fact that the OCGT unit will typically only operate for *c.* 500 hours per annum. In addition, the criterion is only exceeded by 2 dB and an increase of 3dB is required for the typical receptor to perceive any difference. It should also be noted that the level of night time noise experienced by noise sensitive receptor four is significantly less than the LAeq, T 45dB (A) guidance issued by the EPA. A noise level of 37dB(A) outside a bedroom window is equivalent to approximately 27dB(A) inside the bedroom, which is below the WHO guide level of 30dB(A). For these reasons it is not considered that this exceedance results in a significant effect, and it is not necessary to recommend mitigation measures

No significant noise impacts are predicted as a result of operational road traffic.

13.2.4 Human Beings and Air Quality and Climate

Due to the scale of the proposed development, no significant impacts on climate have been identified during the construction phase. During the operational phase, the CCGT unit will have the lowest emissions of greenhouse gases per MWh generated of any thermal generating plant; the OCGT unit will have limited running hours; and both units will operate to support an increasing amount of renewable generating capacity on the Irish grid. Consequently interactions between the regional and local climate and human beings are deemed neutral.

During the construction phase there is a potential for dust to be released from the development site, resulting in a short-term, slightly negative impact. Mitigation measures to be implemented will ensure that dust generation is minimised, resulting in an imperceptible impact. Also, site traffic during the construction phase will lead to levels of emissions which are still significantly below ambient air quality limit values.

The power plant will be designed to the highest standards with an appropriate exhaust stack height, and will include abatement techniques to ensure minimum emissions from the plant. The predicted emissions are within the relevant air quality limit values.

13.2.5 Human Beings and Soils, Geology and Hydrology

Following the discovery of potential contaminants within the “Made Ground” at the proposed development site, during the site investigation survey, the risk to human beings arising from the contaminants has been categorised as low risk following the implementation of mitigation measures. Bord na Móna has initiated a management strategy to mitigate any potential impacts. This strategy is being carried out in consultation with the EPA, under the provisions of the existing IPPC licence, to remove any identified waste materials, including potential sources of contamination. Any further investigations, monitoring or intrusive works to be carried out will be in accordance with an agreed strategy with the Environmental Protection Agency paying due regard to the associated environmental and health and safety risks and implementing the necessary controls.

The operation of the proposed power plant will require the abstraction of water from the aquifer underlying the site. An assessment undertaken identified that there is sufficient water available from the aquifer, with a sustainable yield of 630m³/day at the proposed development site, to supply the maximum possible demand of the proposed power plant. Based on the results of the site investigation and pumping test conducted on site a cone of drawdown would extend up to 300 m from the abstraction well. The cone of drawdown does not extend beyond the site boundary. It is considered as a result that there would not be any change in the effective stress beyond the cone of drawdown, therefore dewatering related settlement would be unlikely to occur beyond this point. It is anticipated that there will be no hydrogeological impact on the R400 road from water abstraction at the proposed pumping well on the site. In addition to this it is considered that the abstraction of water from the groundwater as required by the proposed development will not have a significant impact on the abstraction of groundwater from neighbouring properties or on surface water resources in the area due to the fact these resources are significantly outside the cone of drawdown.

The proposed site has been identified as a high radon area, i.e. more than 20% of houses in the area are predicted to have radon levels in excess of 200 Bq/m³. It is recommended that radon monitoring will be conducted on site during the construction phase in accordance with relevant guidelines. Appropriate mitigation measures will be implemented, based on the findings, to avoid any adverse impacts on human beings arising from high radon levels at the site.

Full implementation of the mitigation measures outlined in Chapter 7 *Soils Geology and Hydrogeology* will ensure that impacts on human beings are imperceptible.

13.2.6 Human Beings and Water Quality

The predicted effects of the construction phase on surface water quality in the locality are expected to be negligible, or at most slight and short term.

Treated process wastewater will be discharged to the Yellow River and surface water run-off will be discharged to the Mongagh River. It is considered that foul wastewater will be percolated to ground. A site suitability assessment, including percolation testing, will be undertaken to determine the suitability of the topsoil and subsoil layers for this purpose. All discharges from the site will be subject to treatment and monitoring to the standards specified in the Integrated Pollution Prevention and Control (IPPC) licence. Full implementation of the mitigation measures outlined in Chapter 6 *Water Quality* will ensure that residual impacts are imperceptible.

13.3 Landscape and Visual Impact Interactions

13.3.1 Landscape and Visual and Roads and Traffic

During the construction period, there will be short term slight landscape and visual impacts, arising from the importation of machinery by road. Also traffic levels will increase significantly due to the transportation of this machinery and plant and construction materials to the site representing a short term slight negative impact.

13.3.2 Landscape and Visual and Flora and Fauna

During the construction phase the permanent removal of vegetation from the site is deemed to be of minor significance, due to the low ecological value of the majority of the site. There will be a loss of a very small extent of foraging habitat for bat species. However, due to the open nature of the surrounding landscape, the lack of optimal roosting habitat for bat species within the site, and the low level of bat activity detected at the site, this is not considered to be a significant impact. Following the maturation of trees planted as part of the landscaping mitigation, there will be enhanced bat foraging habitat around the perimeter of the site.

13.3.3 Landscape and Visual and Soils, Geology and Hydrogeology

There may be a temporary negative impact on soils, arising from the storage of topsoil material for reuse, in the absence of proper mitigation measures. However, effective temporary storage of topsoil will ensure that the soil is not damaged, and hence allow for the full development of the landscaping proposals. It is considered that the visibility of the stored topsoil will have a slight short term negative impact on the landscape.

13.4 Noise Interactions

13.4.1 Noise and Roads and Traffic

It is not predicted that noise levels due to construction traffic will significantly increase on the local roads. As an introduced noise source, construction traffic using the R400 is likely to be audible above the low background levels. However, this increase is not considered to be significant, as it is temporary and will not lead to a noticeably different impact.

No significant impacts are predicted as a result of operational road traffic.

13.4.2 Noise and Flora and Fauna

It is likely that activity on the development site, such as noise and movement created by people and machinery, will generate a certain amount of disturbance to local mammals and birds.

The disturbance, if any, is likely to be limited to the construction phase of the proposed development. The noise impact was assessed with reference to the low level background noise prevalent in the area. It is anticipated that noise levels during the operational phase will be at acceptable levels, resulting in an imperceptible impact on ecology.

13.5 Air Quality and Climate Interactions

13.5.1 Air Quality and Climate and Roads and Traffic

The impact of site traffic on air quality and climate, during the construction phase, will lead to levels which are still significantly below specified ambient air quality limit values. Also, traffic is not anticipated to impact significantly on air quality during the operational phase of the power plant.

13.5.2 Air Quality and Climate and Flora and Fauna

There is potential for significant dust generation, during demolition of the existing structures and the construction of the development, which may adversely affect flora and fauna in the vicinity of the site resulting in minor, negative, short-term impacts on flora and fauna. Dust particles can affect soil moisture and chemistry, and affect flora and the species composition present in an area. However, a dust minimisation plan, as part of a Construction Environmental Management Plan (CEMP) will be implemented during the demolition and construction works, in order to prevent dust emissions impacting on the flora and habitats of the surrounding area.

13.6 Water Quality Interactions

13.6.1 Water and Flora and Fauna

During the construction phase there is a potential for activities to impact negatively on surface water, due to spoil / sediment run-off. The main potential impact on the receiving waters, during the site clearance and construction phase, relate to the release of sediment and other contaminants to the Mongagh River and the Yellow River via drainage channels. However, the mitigation measures proposed, including silt control measures, will minimise the risk of such an occurrence.

Assimilative capacity assessments of the proposed discharge of effluent and foul water to the Yellow River were based on the Salmonid Regulation limits. It was determined that discharges from the site are within the limits specified, resulting in an insignificant impact.

13.6.2 Water and Soils, Geology and Hydrogeology

Run-off from areas of exposed soils during the construction phase can impact significantly on existing waterways. The potential exists for spills occurring during the construction phase in particular. Fuel oils pose a risk to both groundwater, via leaching, and to surface water, via run-off. However, the implementation of mitigation measures will ensure that residual impacts are imperceptible.

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

13.7 Soils, Geology and Hydrogeology Interactions

13.7.1 Soils, Geology and Hydrogeology and Flora and Fauna

There is a potential for soil and groundwater to become contaminated as a result of accidental spillages during the construction phase and operational phases. 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 and the bunding of storage tanks with good management practices will ensure no significant impact during the operational phase.

Given the control measures proposed above, it is anticipated that there will be a slight impact on Flora and Fauna during the construction phase, and a neutral impact during the operational phase of the proposed development.

13.8 Cultural Heritage Impacts

The proposed development will have no direct or indirect impacts on the archaeological or architectural heritage of the area.

There exists the potential for previously unrecorded findings of archaeological value to be discovered during the construction phase of the proposed development. In the event that findings of archaeological value are made, they will be excavated and preserved by record.

13.9 Associated Developments and Cumulative Impacts

The environmental impact associated with the development of the proposed power plant is described in this EIS. The developer is aware that additional environmental impacts will accrue, arising from the construction of a gas pipeline to the site, and also the erection of overhead overhead transmission lines to connect the power plant to the existing transmission infrastructure in the area. At this stage, it is not possible to determine the precise route of either the gas pipeline, or the overhead powerlines. It is also not possible to describe their precise design, as these decisions will be made at a future date by other agencies, namely Gaslink and Eirgrid. Both of these connections are subject to a regulated development process, which are both described in section 2.5 *Connections to the National Grid and Gas Network* of this EIS. Consequently, as discussed in chapter 2, this EIS has not included the impacts of the gas pipeline, or the overhead power lines within its scope.