

15. INTERACTIONS

15.1 Introduction

All environmental factors are inter-related to some extent. As defined in the Environmental Protection Agency "*Guidelines on the Information to be contained in Environmental Impact Statements*", a cumulative effect is defined as "*the addition of many small impacts to create one larger, more significant impact*". A synergistic impact occurs where "*the resultant impact is of greater significance than the sum of its constituents*". Cumulative and synergistic effects are, therefore, those which result from the incremental effect of an action when added to other past, present, and reasonably foreseeable actions. The European Communities Environmental Impact Assessment (Amendment) Regulations, 1998, requires that an EIAR describes the impacts and likely significant effects on the interaction between any of the following principal elements of the environment media:

- Population & Human Health
- Biodiversity
- Soil and Water
- Traffic
- Air and Climate
- The Landscape

Ultimately, all of the effects of a development on the environment impinge upon human beings, directly and indirectly, positively and negatively. Direct effects include such matters as air and water quality, noise and landscape quality. Indirect effects pertain to such matters as biodiversity, services and road traffic.

The purpose of this Chapter is to identify and draw attention to significant interactions and interdependencies in the existing environment and sets out the likely interactions of and between effects predicted as a result of the proposed development.

Impact interactions and inter-relationships have been considered throughout the EIA process and in the preparation of the individual, topic specific EIAR chapters so that it can take into account the broader picture of how the proposed scheme may affect the various environmental media.

All environmental topics are interlinked to a degree such that interrelationships exist on numerous levels. A summary matrix has been developed to identify key interactions that exist with respect to this specific project.

The matrix that has been developed is presented in Table 15.1 below.

The matrix is set out in such a fashion whereby receptors that are likely to be affected are listed in the top row across the table. Elements that are likely to impact upon these receptors (impactors) are identified in the first column of the matrix. By cross referencing the relevant receptor with the relevant impactor an indication is provided by a relevant symbol at the intersection point, which provides an indication of the potential impact and its weighted significance.

The remainder of this chapter under Section 15.2 provides a description of the interactions identified in the Matrix.

Table 15.1 Matrix of Interactions

Receptor:		Population & Human Health	Soils & Geology	Water: Hydrology & Hydrogeology	Noise & Vibration	Air & Climate	Biodiversity	Landscape & VIA	Material Assets: Transport	Material Assets: Water, Drainage & Utilities	Cultural Heritage
Impactor:		Population & Human Health	Soils & Geology	Water: Hydrology & Hydrogeology	Noise & Vibration	Air & Climate	Biodiversity	Landscape & VIA	Material Assets: Transport	Material Assets: Water, Drainage & Utilities	Cultural Heritage
Population & Human Health					x - (SL)	x (SL)	x (SL)	x (NS)	✓ (SIG)	-	x (NS)
Soils & Geology			-			x (SL)	-		-	-	x (SL)
Water: Hydrology & Hydrogeology			-				-	-		-	
Noise & Vibration		x - (SL)					-		x (SL)		
Air & Climate		x (SL)	x (SL)						x (SL)		
Biodiversity		x (SL)	-	-	-			-			
Landscape & VIA		x (NS)		-			-				
Material Assets: Transport		✓ (SIG)	-		x (SL)	x (SL)					
Material Assets: Water Supply; Drainage & Utilities		-	-	-							
Cultural Heritage		x (NS)	x (SL)								
Key	Potential Impact										
-	Neutral or No Interaction	An interaction which does not affect the quality of the environment or there is no interaction									

✓	Positive	An interaction change which potentially improves the quality of the environment
✗	Negative	An interaction change which potentially reduces the quality of the environment
Key	Likely Significance	
I	Imperceptible	Capable of measurement but without noticeable consequences
NS	Not Significant	Causes noticeable changes in the character of the environment but without significant consequences.
SL	Slight	Causes noticeable changes in the character of the environment without affecting sensitivity
M	Moderate	Alters character of environment consistent with existing and emerging trends
SIG	Significant	By its character, magnitude and duration or intensity alters a sensitive aspect of the environments
VS	Very Significant	By its character, magnitude, duration or intensity significantly alters most of a sensitive aspect of the environment.
P	Profound	Obliterates sensitive characteristics

The above matrix demonstrates that most inter-relationships are neutral or moderately positive in nature. In the interest of clarity all identified interactions are set out and discussed in Tables 15.2 to 15.9 below.

All residual impacts are described with reference to the implementation of the mitigation measures described in this EIA document. The comprehensive assessments undertaken as part of this EIA has revealed that the proposal will not result in any significant adverse effects on the environment. Mitigation measures have been proposed to avoid, remedy or reduce identified impacts.

15.2 Description of Interactions and Interrelationships and its Significance

This section provides a description of the interactions identified within the Matrix above and provides a rationale for the identified impact, be it neutral, positive, negative or not applicable and the significance of the impact, be it imperceptible, slight, moderate, significant or profound. All the impacts described below are residual impacts described with reference to and having regard to the implementation of relevant mitigation measures, as identified within individual topic specific chapters of this EIA.

The consideration of impact interactions has been addressed during the preparation of the EIA in each of the individual impact chapters. The following section provides a series of tables identifying the key impact interactions and interrelationships.

15.2.1 Population & Human Health

The following table provides an overview of the receptor interactions and interrelationships with Population & Human Health.

Table 15.2 Population & Human Health - Key Impact Interactions and Interrelationships

Interaction Nature & Significance of Interaction	Description of Key Impact Interactions and Interrelationships
Air & Climate Negative (Slight)	The air and climate impact on human health receptors relates to emissions, including aspergillus, dust and particulate matter and nuisance impacts associated with dust. This interaction is described as negative and quantified as not significant
Noise & Vibration Negative (Slight)/Neutral	The impact of noise on human beings living in the area of the proposed development has been addressed above for both the construction and operational phase of the proposed development. The impact assessment shows that the noise impacts that will be experienced by human beings in the vicinity of the proposed development are all within the prescribed criteria. This interaction is described as negative for the construction phase and neutral for the operational phase and is quantified as not significant for both phases.
Landscape & Visual Negative (Not Significant)	<p>Potential visual impacts during the construction phase are related to temporary works, site activity and vehicular movement within and around the boundaries of the subject site.</p> <p>The impact during construction phase will be mitigated through appropriate site management measures and work practices to ensure the site is kept tidy and that public areas are kept free from building materials and site rubbish.</p> <p>The potential visual impacts of the proposed development are markedly reduced primarily because of the modest building heights in the designed scheme coupled with the screening effect of the existing retained hedgerows and the existing screen planting.</p>
Material Assets Transport Positive (Significant)	<p>The scale of construction traffic in parallel with the implementation of the construction management plan will not generate any traffic concerns or impeded existing traffic movements.</p> <p>The operational phase of the development will facilitate improved access between the Kilcock and Celbridge Roads and will result in significant improvements to existing traffic conditions in Clane town centre which will be a moderate, positive impact on the wider area.</p>
Biodiversity	Biodiversity has a direct and indirect impact on population and human health by influencing the quality of the environment and by providing habitats and enhancing

Interaction Nature & Significance of Interaction	Description of Key Impact Interactions and Interrelationships
Negative (Slight)	<p>biodiversity as an important indirectly role in ecosystem services.</p> <p>The proposed landscaping of the site will offset impact to biodiversity due to habitat loss by creating compensatory habitat which will attract birds and insects. The proposed development will facilitate improved access from the surround area to natural habitats retained within the scheme and new habitats and open spaces. Access to and contact with natures has considerable benefit for human mental health and wellbeing.</p>
Material Assets: Utilities Neutral	<p>There is adequate capacity in existing infrastructure for construction and operational stages of the proposed development subject to appropriate phasing. A risk to the human health of the installer from built services can occur as a result of any excavation work in areas where built services exist, through coming into contact with live electricity lines or damaging live gas or water mains. With the implementation of appropriate mitigation measures, the impact of the proposed built services on human health is likely to be negligible.</p>
Cultural Heritage Negative (Not Significant)	<p>There are no recorded monuments or protected structures situated within or the immediate vicinity of the site boundary. Extensive archaeological assessment comprising a geophysical survey (18R0041) and machine-assisted test-trenching was undertaken at this site. No features of archaeological interest were identified.</p> <p>Therefore, it is considered that while the potential impact of loss of cultural heritage to the existing population would be 'negative', it is considered that this impact would be 'not significant'.</p>

15.2.2 Soil and Geology

The following table provides an overview of the receptor interactions and interrelationships with Soil and Geology.

Table 15.3 Soil and Geology - Key Impact Interactions and Interrelationships

Interaction Nature & Significance of Interaction	Description of Key Impact Interactions and Interrelationships
Water: Hydrology & Hydrogeology Neutral	<p>Stripping of topsoil will result in exposure of the underlying subsoil layers to the effects of weather and construction traffic and may result subsoil erosion and generation of sediment laden surface water runoff.</p> <p>Mitigation measures include limiting the extent of topsoil strip (and consequent exposure of subsoil) to the immediate vicinity of active work areas and ensuring that</p>

Interaction Nature & Significance of Interaction	Description of Key Impact Interactions and Interrelationships
	topsoil stockpiles will be protected for the duration of the works and not located in areas where sediment laden runoff may enter existing surface water drains. It is not anticipated that there will be any significant impact on the geology or hydrogeology environments.
Air & Climate Negative (Slight)	Dust generation can occur during extended dry weather periods as a result of construction traffic. Dust suppression measures (e.g. dampening down) will be implemented as necessary during dry periods Vehicle wheel wash facilities will be installed in the vicinity of any site entrances and road sweeping implemented as necessary in order to maintain the road network in the immediate vicinity of the site. Such dust generation will be short-term and will remain insignificant due to the mitigation measures employed.
Biodiversity Neutral	Removal of the existing topsoil layer will be required across the site as well as removal of some trees, hedgerows etc. Damage may occur to retained hedges by construction machinery and storage of materials compacting soil and damaging root structures and other vegetation.
Material Assets: Traffic Neutral	<p>Delivery of materials to site (e.g. aggregates for road construction, concrete for foundations, delivery of construction plant to site) will lead to potential impact on the surrounding road network.</p> <p>This impact will be short term and will be ameliorated through the re-use of soils for fill, levelling and landscaping works result in a neutral impact.</p>
Material Assets: Utilities Neutral	Trench excavations to facilitate site service installation will result in exposure of subsoils to potential erosion and subsequent sediment generation. Mitigation measures are outlined in Chapter 8 Land & Soils (i.e. service trenches to be backfilled as soon as practicable to minimise potential erosion of subsoils).
Cultural Heritage Negative (Not Significant)	<p>The greatest threat to unrecorded, buried archaeological sites/ features occur during the construction stage which includes all ground disturbance works undertaken at this stage (excavations and other groundworks including the provision of access roads and service trenches), movement of machines and storage of material in sensitive areas.</p> <p>Extensive archaeological assessment comprising a geophysical survey (18R0041) and machine-assisted test-trenching was undertaken at this site. No features of archaeological interest were identified. Therefore there should be no archaeological impact during the construction phase.</p>

15.2.3 Water: Hydrogeology & Hydrology

The following table provides an overview of the receptor interactions and interrelationships with Water.

Table 15.4 Water - Key Impact Interactions and Interrelationships

Interaction Nature & Significance of Interaction	Description of Key Impact Interactions and Interrelationships
Soil & Geology Negative (Slight)	This interaction has been described in Table 15.3
Biodiversity Neutral	<p>One of the key and more direct interactions is between biodiversity and water. Surface-water run-off of untreated, or poorly treated surface water can result in the release of pollutants (e.g. Particulates and hydrocarbon compounds) into local water courses.</p> <p>The incorporation of Sustainable Urban Drainage Systems (SUDS) principles on site will contribute towards cumulative neutral impacts to water quality and will ensure a neutral impact over the existing drainage situation.</p>
Landscape & Visual Neutral	Subject to the implementation to water and landscaping mitigation measures described in the relevant Chapters of this EIAR, the impact of landscaping and SUDS principles on water quality should be neutral.
Material Assets: Utilities Neutral	The proposed development is design to comply with the recommendations of the Greater Dublin Strategic Drainage Strategy (GDSDS) including the provision of SUDS and is therefore unlikely to have any residual impacts in terms of surface water drainage.

15.2.4 Noise and Vibration

The following table provides an overview of the receptor interactions and interrelationships with Noise and Vibration.

Table 15.5 Noise and Vibration - Key Impact Interactions and Interrelationships

Interaction Nature & Significance of Interaction	Description of Key Impact Interactions and Interrelationships
Population & Human Health Negative (Slight)/Neutral	This interaction has been described in Table 15.2.

Interaction Nature & Significance of Interaction	Description of Key Impact Interactions and Interrelationships
Biodiversity Neutral	In relation to the interaction of noise from the proposed development with biodiversity, the noise generated by the development will not have a significant adverse impact on the local birdlife and wildlife. Local birdlife and wildlife will quickly accustom to any change in the noise climate of the area as typically occurs for projects of this type. This interaction is described as neutral and quantified as Not Significant
Material Assets: Transport Negative (Slight)	Development of the site will result in a short-term increase of construction traffic related noise and vibration. Post construction development traffic will contribute to increased noise levels on the surrounding network. This interaction is described as negative and quantified as not significant.

15.2.5 Air, Dust & Climatic Factors

The following table provides an overview of the receptor interactions and interrelationships with Air and Climatic factors.

Table 15.6 Air and Climate - Key Impact Interactions and Interrelationships

Interaction Nature & Significance of Interaction	Description of Key Impact Interactions and Interrelationships
Population & Human Health Negative (Slight)	This interaction has been described in Table 15.2.
Soils & Geology Negative (Slight)	This interaction has been described in Table 15.3.
Material Assets Transport Negative (Slight)	Impacts associated with creation of dust during construction and generation of vehicle emissions associated with increased traffic volumes on the surrounding road network. This interaction is described as negative and quantified as not significant.

15.2.6 Biodiversity

The following table provides an overview of the receptor interactions and interrelationships with Biodiversity.

Table 15.7 Biodiversity - Key Impact Interactions and Interrelationships

Interaction Nature & Significance of	Description of Key Impact Interactions and Interrelationships
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Interaction	
Population & Human Health Negative (Slight)	This interaction has been described in Table 15.2.
Soils & Geology Negative (Moderate)	This interaction has been described in Table 15.3.
Water Neutral	This interaction has been described in Table 15.4.
Noise & Vibration Neutral	This interaction has been described in Table 15.5.
Landscape & Visual Neutral	To offset the loss of higher significance hedgerow and treelines it is proposed to create new, biodiversity planting within areas of public open space and along both margins of the new link road. The species to be planted include a wide range of native trees and shrubs while the maintenance plan is intended involve minimal interference – i.e. no use of herbicide sprays, no cutting or mowing - effectively allowing for new linear woodlands to emerge. This planting will effectively create a new biodiversity corridor which will provide connectivity for the species which are currently recorded in this location. While this woodland will take time to mature it will ultimately compensate for the loss of hedgerows and green infrastructure arising from the development

15.2.7 Landscape and Visual Impact Assessment

The following table provides an overview of the receptor interactions and interrelationships with Landscape and visual impacts.

Table 15.8 Landscape and Visual Impact - Key Impact Interactions and Interrelationships

Interaction Nature & Significance of Interaction	Description of Key Impact Interactions and Interrelationships
Population & Human Health Neutral	This interaction has been described in Table 15.2.
Water Neutral	This interaction has been described in Table 15.4.
Biodiversity	This interaction has been described in Table 15.7.

Interaction Nature & Significance of Interaction	Description of Key Impact Interactions and Interrelationships
Neutral	

15.2.8 Material Assets (Traffic & Transport)

The following table provides an overview of the receptor interactions and interrelationships with material assets: Traffic & Transport.

Table 15.9 Material Assets: Transport- Key Impact Interactions and Interrelationships

Interaction Nature & Significance of Interaction	Description of Key Impact Interactions and Interrelationships
Population & Human Health Positive (Significant)	This interaction has been described in Table 15.2.
Soils & Geology Neutral	This interaction has been described in Table 15.3.
Noise & Vibration Negative (Slight)	This interaction has been described in Table 15.5.
Air Quality Negative (Slight)	This interaction has been described in Table 15.6.

15.2.9 Material Assets (Water Supply, Drainage & Utilities)

The following table provides an overview of the receptor interactions and interrelationships with material assets including water supply, drainage and utilities.

Table 15.10 Material Assets - Key Impact Interactions and Interrelationships

Interaction Nature & Significance of Interaction	Description of Key Impact Interactions and Interrelationships
Population & Human Health Neutral	This interaction has been described in Table 15.2.

Interaction Nature & Significance of Interaction	Description of Key Impact Interactions and Interrelationships
Soils & Geology Neutral	This interaction has been described in Table 15.3.
Water Neutral	This interaction has been described in Table 15.4.

15.2.10 Cultural Heritage (Architectural Heritage & Archaeological Heritage)

The following table provides an overview of the receptor interactions and interrelationships with cultural heritage.

Table 15.11 Cultural Heritage - Key Impact Interactions and Interrelationships

Interaction Nature & Significance of Interaction	Description of Key Impact Interactions and Interrelationships
Population & Human Health Negative (Not Significant)	This interaction has been described in Table 15.2.
Soil and Geology Negative (Not Significant)	This interaction has been described in Table 15.3.

15.3 Conclusion

In summary, it is concluded that the proposed development will not result in any significant synergistic or cumulative adverse impacts on the environment. Accordingly, and as the comprehensive assessments undertaken as part of this EIAR has revealed, the proposal will not result in any significant singular adverse effects on the environment, it is considered that the environmental impact of the proposed development is acceptable.