15 INTERACTIONS

15.1 Introduction

Annex IV, point 5 (e) of the EIA Directive requires that the cumulation of effects with other existing and/or approved Projects are described in the EIA Report.

All environmental factors are inter-related to some extent. As defined in Revised Guidelines on the Information to be Contained in Environmental Impact Statements (Draft), September 2017, a cumulative effect is defined as "*the addition of many minor or significant effects, including effects of other projects, to create larger, more significant effects*". While a single activity may itself result in a minor impact, it may, when combined with other impacts (minor or significant), result in a cumulative impact that is collectively significant.

The European Communities Environmental Impact Assessment (Amendment) Regulations, 1998 (as amended) 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: / Impactor:	Population & Human Health	Biodiversity	Soil, Geology & Hydrogeology	Water: Hydrology	Air & Climate	Noise & Vibration	Material Assets: Transport	Material Assets: Water, Drainage & Utilities	Cultural Heritage (Architecture & Archaeology)	Landscape & Visual
Population & Human Health		× (SL)			-	-	-	-		× (M)
Biodiversity	× (SL)		- (SL)	× (SL)	-					✓ (SL)
Soil, Geology & Hydrogeology		- (SL)		× (SL)	× (SL)		× (SL)	× (M)	× (M)	
Water: Hydrology		× (SL)	× (SL)							
Air & Climate	-	-	× (SL)				-			
Noise & Vibration	-						× (SL)			
Material Assets: Transport	-		× (SL)		- (NS)	× (SL)				
Material Assets: Water Supply; Drainage & Utilities	-		× (SL)	-						
Cultural Heritage (Architecture & Archaeology)										
Landscape & VIA	× (M)	✓ (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 EIAR document. The comprehensive assessments undertaken as part of this EIAR 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 EIAR.

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**
Biodiversity Negative (Slight)	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 biodiversity as an important indirectly role in ecosystem services. The proposed landscaping of the site seeks to retain and enhance existing hedgerows and reinstate or replace where existing hedgerows have been lost. The proposed landscaping plans will minimise habitat loss and will ensure the area continues to 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.
Air & Climate Neutral	An adverse impact due to air quality in either the construction or operational phase has the potential to cause health and dust nuisance issues. The mitigation measures that will be put in place at the proposed development will ensure that the impact of the proposed development complies with all ambient air quality legislative limits and therefore the predicted impact is long term and neutral with respect to human beings.
Noise & Vibration Neutral	There may be some significant impacts in terms of construction noise to residences located at distances of less than 25m from site works. Mitigation measures to reduce the impact of noise and vibration on nearby residents during the construction of the proposed development are discussed in Chapter 8 of this EIAR. Of note are the adjoining residents that may be subjected to noise nuisances due to construction activities and the presence of works vehicles. It is considered, however, that the implementation of the mitigation measures described above will neutralise the potential for interactions between these aspects of the environment.
Material Assets Transport	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.

Interaction Nature & Significance of Interaction	Description of Key Impact Interactions and Interrelationships
Neutral	It is considered that the operational impact of the proposed development on the surrounding road network will be negligible.
Landscape & Visual Negative (Moderate)	The landscape and visual impact associated with human beings focuses on the effects to dwellings. The proposed development generates visual effects. During the construction phase, the community is likely to experience visual impact due to the new buildings in the landscape. In the longer term, the development will alter the perception of the site for both the local and visiting communities.
Material Assets: Utilities Neutral	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 watermains. With the implementation of appropriate mitigation measures, the impact of the proposed built services on human health is likely to be negligible.

15.2.2 Soil and Geology

The primary environmental interactions associated with Soil and Geology is Water with respect to potential contamination and Archaeology in terms of removal or damage / loss of archaeological remains.

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
Biodiversity Neutral (Slight)	Removal of the existing topsoil layer will be required across the site as well as removal of some hedgerows. The proposed development integrates green areas and SUDS features as part of the design that create a positive impact by creating new ecosystems for the enhancement of biodiversity of flora and fauna throughout the site.
Water Negative (Slight)	Stripping of topsoil will result in exposure of the underlying subsoil layers to the effects of weather and construction traffic and may result in subsoil erosion and generation of sediment laden surface water runoff. Surface water runoff during the construction phase may lead to erosion and contain

Interaction Nature & Significance of Interaction	Description of Key Impact Interactions and Interrelationships
	increased silt levels (e.g. runoff across areas stripped of topsoil) or become polluted by construction activities. Increased impermeable surface area will reduce local groundwater recharge and may potentially increase surface water runoff (if not attenuated to greenfield runoff rate). Stripped topsoil will be reused for landscaping of open spaces, back gardens or similar. 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 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 also occur during extended dry weather periods as a result of construction traffic and rock breaking. Dust suppression methods will be applied on site when necessary to minimize the impacts of this temporary effect.
Material Assets (Utilities) Negative (Slight)	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 6 Soils & Geology i.e. service trenches to be backfilled as soon as practicable to minimise potential erosion of subsoils).
Material Assets (Transport) Negative (Slight)	Haulage of excavated material off-site and 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. 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 slight negative impact.
Cultural Heritage Negative (Moderate)	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. It is possible that topsoil stripping associated with the proposed development may have a direct negative impact on isolated archaeological features or deposits that have the potential to survive beneath the current ground level and outside of the footprint of the excavated test trenches. Potential impacts may range from moderate to profound in significance.

Interaction Nature & Significance of Interaction	Description of Key Impact Interactions and Interrelationships
	Sections of three post medieval burgage plots will be impacted upon directly by the proposed development. Due to their relatively recent date the impact is deemed to be moderately negative.

15.2.3 Water

The primary environmental interaction associated with water is biodiversity.

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 Negative (Slight)	Potential contamination of the surface water runoff during the construction and operational phase may cause chemical alterations that can impact on the flora and fauna of the site. Implementation of the mitigation measures described under Section 7.7 will prevent and minimise the potential impacts of this interaction.
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.
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.

15.2.4 Noise and Vibration

Noise and vibration impacts have the potential to affect quality of life. The most prominent interaction between noise and vibration is with human beings and other living organisms in the area or fauna.

In order to assess the likely noise impact associated with the proposed development 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 Neutral	This interaction has been described in Table 15.2.
Material Assets (Transport) Neutral	The projected increase in heavy vehicle traffic during the construction stage may lead to a slight increase in noise and vibration levels along the adopted construction haul route. However, such effects will be temporary in nature. The projected increase in vehicle traffic during the operational stage may lead to a slight increase in noise levels during peak trip generation periods. implementation of the mitigation measures described under Section 12.7 will prevent and minimise the potential impacts of this interaction.

15.2.5 Air and Climate

Air quality in the area is influenced by traffic volumes and to a lesser extent by the fuels used to meet the energy requirements of the buildings and humans for heating purposes. Thus, the most prominent interaction between air and climatic factors is with population and human health. Humans are the most sensitive receptors in the study area and could potentially be affected by the quality of air.

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 Neutral	This interaction has been described in Table 15.2.
Soils & Geology Negative (Slight)	This interaction has been described in Table 15.3.
Biodiversity Neutral	With the appropriate mitigation measures in place it is predicted that any interactions on flora and fauna are neutral.
Material Assets (Transport)	Interactions between air quality and traffic have the potential to be significant. With increased traffic movements and reduced engine efficiency, i.e. due to congestion, the

Neutral (Not Significant)	emissions of vehicles increase. However, in this assessment the impact of the interactions between traffic and air quality are 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 Interaction	Description of Key Impact Interactions and Interrelationships
Population & Human Health Negative (Slight)	This interaction has been described in Table 15.2.
Soils & Geology Neutral (Slight)	This interaction has been described in Table 15.3.
Water Negative (Slight)	This interaction has been described in Table 15.4.
Air & Climate Neutral	This interaction has been described in Table 15.6.
Landscape & Visual Positive (Slight)	The long-term effects of the proposed development will have a positive effect on the tree cover associated with the development and the inclusion of native species of shrub planting.

15.2.7 Landscape and Visual Impact

The key interaction with Landscape is Biodiversity.

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 Negative	This interaction has been described in Table 15.2.

Interaction Nature & Significance of Interaction	Description of Key Impact Interactions and Interrelationships
(Moderate)	
Biodiversity Positive (Slight)	This interaction has been described in Table 15.7.
Water: Hydrology Neutral	This interaction has been described in Table 15.4.

15.2.8 Material Assets (Utilities)

The following table provides an overview of the receptor interactions and interrelationships with material assets utilities.

Table 15.9 Material Assets Utilities - 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.
Soils & Geology Negative (Slight)	This interaction has been described in Table 15.3.
Water: Hydrology Neutral	This interaction has been described in Table 15.4.

15.2.9 Material Assets (Traffic)

The key interaction with Traffic and Transport is Population & Human Health. The following table provides an overview of the receptor interactions and interrelationships with cultural heritage.

Table 15.10 Material Assets Traffic - Key Impact Interactions and Interrelationships

Interaction Nature & Significance of Interaction	Description of 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.
Soil and Geology Negative (Slight)	This interaction has been described in Table 15.3.
Air & Climate Neutral	This interaction has been described in Table 15.6.
Noise & Vibration Negative (Slight)	This interaction has been described in Table 15.5.

15.2.10 Cultural 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
Soil and Geology Negative (Moderate)	This interaction has been described in Table 15.3.

15.3 Conclusion

In summary, it is determined 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.