15. INTERACTIONS OF THE FOREGOING

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:

i. Population & Human Health
ii. Biodiversity
iii. Soil and Water
iv. Traffic
v. Air and Climate
vi. 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. This matrix has been prepared having regard to Figure 3.6 of the EPA's draft 'Guidelines on the Information to Be Contained in Environmental Impact Assessment Reports' 2017.

This matrix is presented in Table 15.1 below. 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

Interaction **Con: Construction Phase** **O.P.: Operational Phase**		**Population & human Health**	**Biodiversity**	**Land, Soil & Geology**	**Water: H & H**	**Air, Dust & Climatic Factors**	**Noise & Vibration**	**M.A. Traffic & Transport**	**M.A. Water Supply, Drainage and**	**Cultural Heritage & Archaeology**	**Landscape & V.A.**
Population & Human Health	Con.					**NS**	**X/NS**	**NS**	**I**	**-**	**X/M**
	O.P					**NS**	**-**	**I**	**I**	**-**	**-**
Biodiversity	Con.			**NS**	**-**	**-**	**-**		**NS**		**-**
	OP.			**NS**	**-**	**-**	**-**		**NS**		**-**
Land, Soils & Geology	Con.		**NS**		**I**	**-**	**M**	**X/NS**	**-**		
	O.P		**NS**		**I**				**-**		
Water: H & H	Con.		**-**	**I**					**X/SL**		
	OP.		**-**	**I**					**-**		
Air, Dust & Climatic Factors	Con.	**NS**	**-**	**-**				**SL**			**X/SL**
	O.P	**NS**	**-**					**I**			**-**
Noise & Vibration	Con.	**X/NS**	**-**	**M**				**NS**			**X/M**
	OP.	**-**	**-**					**I**			**-**
M.A. Traffic &Transport	Con.	**NS**		**X/NS**		**SL**	**NS**				
	O.P	**I**				**I**	**I**				
M.A. Water Supply, Drainage & Utilities	Con.	**I**	**NS**	**-**	**X/SL**						
	OP.	**I**	**NS**	**-**	**-**						
Cultural Heritage & Archaeology	Con.	**-**									
	O.P	**-**									
Landscape & V.A.	Con.	**X/M**	**-**			**X/SL**	**X/M**				
	O.P.	**-**	**-**			**-**	**-**				

Key	Potential Impact	Definition
-	Neutral or No	An interaction which does not affect the quality of the environment or there is no interaction

	Interaction	
✓	Positive	An interaction which potentially improves the quality of the environment
X	Negative	An interaction which potentially reduces the quality of the environment
Key	Likely Significance	Definition
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

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 and Human Health

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

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

Interaction Nature & Significance of Interaction	Description of Key Impact Interactions and Interrelationships
Air, Dust & Climatic Factors **Not Significant**	Mitigation measures to reduce the impact of the construction and operation of the development are addressed in Chapter 9 'Air, Dust and Climatic Factors' and include the implementation of a Construction Management Plan. It is stated in Chapter 9 that the interaction between Air, Dust and Climate Factors and human beings will not be outside the prescribed criteria and is quantified as being not significant for both construction and operational phases of the development.

Interaction Nature & Significance of Interaction	Description of Key Impact Interactions and Interrelationships
Noise and Vibration **Negative / Not Significant** **Neutral**	Mitigation measures to reduce the impact of noise and vibration on nearby residents during the construction of the proposed development are discussed in Chapter 10 'Noise and Vibration'. Compliance with the various Limits and Standards for the Construction and Operational Phases of the proposed Project will mitigate against adverse impacts occurring. Construction noise is temporary in nature and is usually experienced over a short- to medium-term period. This characteristic requires it to be considered differently to other longer-term noises. Although construction activities will inevitably result in noise being generated, the predicted noise levels associated with each phase of construction works are predicted to be well below the assessment criteria at the closest Noise Sensitive Receptor (NSR) locations. NSRs that are much further removed than the named NSRs will experience a lower noise impact than those named. 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 quantified as Not Significant. For the operational phase this interaction is described as neutral.
Material Assets: Traffic & Transport **Not Significant** **Imperceptible**	Section 11.7 of Chapter 11 'Material Assets: Traffic & Transport' states that temporary negative impacts to human health may be likely during the construction phase due to noise, dust, and air quality which are discussed in Chapters 9 and 10 of this EIAR. Traffic impacts are detailed in Section 11.5.3 and these impacts will be temporary in nature and are not considered to be significant. During the operational phase the increased traffic as a result of the proposed development has been shown to have an imperceptible impact in terms of traffic. Accordingly, the associated impact on Human Beings will be limited.
Material Assets: Water Supply, Drainage & Utilities. **Imperceptible**	Chapter 12 identifies that the implementation of the proposed mitigation measures would ensure that the residual impacts on these aspects of the environment arising from proposed water supply, drainage and utilities would be imperceptible.
Cultural Heritage & Archaeology **Neutral**	The assessment undertaken in Chapter 13 'Cultural Heritage and Archaeology' states that Archaeological features which will be excavated in advance of construction activity therefore no negative interactions are anticipated.
Landscape & Visual Assessment **Negative / Moderate** **Neutral**	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. Measures to screen/reduce the visual impact of the scheme on neighbouring residents have been built into the design, with all measures detailed in Chapter 11. During construction the development works will generate employment although this may not all be local, however post construction various community and socio-economic benefits will typically emerge – not only in terms of employment, but also in terms of new open spaces, cycleways and play parks combining to create public amenity and connectivity.

Interaction Nature & Significance of Interaction	Description of Key Impact Interactions and Interrelationships
	During the construction phase potential interactive impacts would be Negative, with likely significance considered Moderate. Post construction potential interactive impacts would be Neutral.

15.2.2 Biodiversity

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

Table 15.3 Biodiversity - Key Impact Interactions and Interrelationships

Interaction Nature & Significance of Interaction	Description of Key Impact Interactions and Interrelationships
Land, Soils & Geology **Not Significant**	Section 7.10.5 of Chapter 7 'Land, Soils and Geology' states that the removal of the existing topsoil layer will be required across the site as well as removal of some trees, hedgerows etc. Chapter 6 'Biodiversity' identifies that the removal of hedgerow habitats will result in some mortality to species and that there will be a loss of ecological corridors and semi-natural habitats until such time as new planting becomes established. However, these interactions are not considered to be significant.
Water: Hydrology & Hydrogeology **Neutral**	The key environmental interactions with biodiversity include water and landscaping. A series of mitigation measures are proposed in Chapter 8 'Water, Hydrology and Hydrogeology' to ensure the quality (pollution and sedimentation) and quantity (surface run-off and flooding) is of an appropriate standard. Contamination of water receptors has the potential to affect aquatic ecology. With the implementation of the aforementioned mitigation measures, the likelihood of such events occurring would be local and not significant and consequently the interaction between Biodiversity and water is considered to be neutral.
Air, Dust & Climatic Factors **Neutral**	Section 9.10 of Chapter 9 'Air, Dust & Climatic Factors' states that in relation to the interaction of emissions to atmosphere from the proposed development with biodiversity, the emissions released from the development will not have a significant adverse impact on the local birdlife and wildlife. This interaction is described as Neutral.
Noise and Vibration **Neutral**	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.
Material Assets: Water Supply, Drainage & Utilities. Not Significant	Contamination of water receptors has the potential to affect aquatic ecology. With the implementation of the mitigation measures proposed in this EIAR the likelihood of such events occurring would be local and not significant.
Landscape & Visual Amenity	With the exception of a number of existing hedgerows through the site the biodiversity value associated with the site is relatively limited.

Interaction Nature & Significance of Interaction	Description of Key Impact Interactions and Interrelationships
Neutral	The proposed landscape plan offers opportunities to improve the biodiversity through habitat creation within proposed opens space and peripheral boundary areas. A series of mitigation measures are proposed in Chapter 6 'Biodiversity'. With these mitigation measures in place, the interaction between biodiversity and landscaping is considered to be neutral.

15.2.3 Land, Soils and Geology

The following table provides an overview of the receptor interactions and interrelationships with Land, Soils and Geology.

Table 15.4 Land, Soils and Geology - Key Impact Interactions and Interrelationships

Interaction Nature & Significance of Interaction	Description of Key Impact Interactions and Interrelationships
Biodiversity Not Significant	See Table 15.3 above.
Water: Hydrology & Hydrogeology **Imperceptible**	Stripping of topsoil will result in exposure of the underlying subsoil layers to the effects of weather. Surface water runoff during the construction phase may lead to erosion and contain increased silt levels (e.g. runoff across areas stripped of topsoil) or become polluted by construction activities. Runoff from exposed soils or contaminated leachate has the potential to affect water receptors Increased impermeable surface area will reduce local ground water recharge and potentially increase surface water runoff (if not attenuated to greenfield runoff rate). Surface water run-off may have the potential to infiltrate into underlying soils. Implementation of appropriate mitigation measures as outlined in the Preliminary Construction Management Plan (CMP) (Appendix A) and Chapter 8 of this EIAR will eliminate the potential for infiltration of surface contaminants into the underlying geology and hydrogeology. Consequently, the interaction between Soils, Land & Geology and Hydrology & Hydrogeology is considered to be imperceptible.
Air, Dust & Climatic Factors **Neutral**	There is a potential for soil excavation activity to impact on air quality in terms of dust generated. Dust generation can also occur during extended dry weather periods as a result of construction traffic. However, the implementation of suitable mitigation measures as outlined in Chapter 9 Air Quality and Climate and the CMP for the site will ensure a neutral impact. The interaction between Soils, Land & Geology and Air Quality is considered to be short term and neutral.
Noise and Vibration **Moderate**	Development of the site will result in a level of noise and vibration related effects on the environment during the construction phase. The interaction between Soils, Land & Geology and Noise and Vibration is considered to be moderate and temporary in nature.

Interaction Nature & Significance of Interaction	Description of Key Impact Interactions and Interrelationships
Material Assets: Traffic & Transport **Negative / Not Significant**	Delivery of materials to site during the construction phase (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. The interaction between Soils, Land & Geology and Material Assets: Traffic and Transportation is considered to be short term, negative and not significant.
Material Assets: Water Supply, Drainage & 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 7 'Land & Soils' (i.e. service trenches to be backfilled as soon as practicable to minimise potential erosion of subsoils). This interaction is described as neutral.

15.2.4 Water Hydrology and Hydrogeology

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

Table 15.5 Water Hydrology and Hydrogeology - Key Impact Interactions and Interrelationships

Interaction Nature & Significance of Interaction	Description of Key Impact Interactions and Interrelationships
Biodiversity Neutral	See Table 15.3 above.
Land, Soil & Geology Imperceptible	See Table 15.4 above
Material Assets: Water Supply, Drainage & Utilities **Negative / Slight** **Neutral**	Surface water runoff during the construction phase may lead to erosion and contain increased silt levels (e.g. runoff across areas stripped of topsoil) or become polluted by construction activities. Runoff from exposed soils or contaminated leachate has the potential to affect water receptors. Increased impermeable surface area will reduce local ground water recharge and potentially increase surface water runoff (if not attenuated to greenfield runoff rate). During the construction phase this interaction will be negative and is quantified as slight. During the operational phase the interaction will be neutral.

15.2.5 Air, Dust and Climatic Factors

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

Table 15.6 Air, Dust and Climatic Factors - Key Impact Interactions and Interrelationships

Interaction Nature & Significance of Interaction	Description of Key Impact Interactions and Interrelationships
Population & Human Health Not Significant	See Table 15.2 above.
Biodiversity Neutral	See Table 15.3 above.
Land, Soil & Geology Neutral	See Table 15.4 above.
Material Assets: Traffic & Transport **Slight / Imperceptible**	Temporary negative interactions may be likely during the construction phase due to dust, and air quality with the traffic impacts are detailed in Section 11.5. The likely interaction of the construction works will be short-term and slight. The interaction with air, dust and climatic factors will be imperceptible.
Landscape & Visual Assessment **Negative / Slight** **Neutral**	Potential air quality impacts are generally most prevalent during construction phases. Whilst these would have no visual impacts, they can alter people's perception of the areas landscapes character. Measures to minimise air quality impacts will reduce perceived landscape character impacts. During the construction phase potential interactive impacts would be Negative, with likely significance considered Slight. Post construction noise and air quality impacts would diminish and would be limited to typical traffic and day to day usage and human occupation and typical of this peripheral development site. Post construction potential interactive impacts would be Neutral.

15.2.6 Noise and Vibration

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

Table 15.7 Noise and Vibration - Key Impact Interactions and Interrelationships

Interaction Nature & Significance of Interaction	Description of Key Impact Interactions and Interrelationships
Population & Human Health Negative / Not Significant / Neutral	See Table 15.2 above.
Biodiversity Neutral	See Table 15.3 above.
Land, Soil & Geology Moderate	See Table 15.4 above.

Interaction Nature & Significance of Interaction	Description of Key Impact Interactions and Interrelationships
Material Assets: Traffic & Transport Not Significant / Imperceptible	Temporary negative interactions may be likely during the construction phase due to noise, with the traffic impacts are detailed in Section 11.5. These interactions will be temporary in nature and are not considered to be significant. The operational phase impact on noise will be imperceptible.
Landscape & Visual Assessment **Negative / Moderate** **Neutral**	Potential noise and air quality impacts are generally most prevalent during construction phases. Whilst these would have no visual impacts, they can alter people's perception of the areas landscapes character. Measures to minimise noise and air quality impacts will reduce perceived landscape character impacts. During the construction phase potential interactive impacts would be Negative, with likely significance considered Moderate. Post construction noise and air quality impacts would diminish and would be limited to typical traffic and day to day usage and human occupation and typical of this peripheral development site. Post construction potential interactive impacts would be Neutral.

15.2.7 Material Assets: Traffic and Transport

The following table provides an overview of the receptor interactions and interrelationships with Material Assets: Traffic and Transport

Table 15.8 Material Assets: Traffic and Transport - Key Impact Interactions and Interrelationships

Interaction Nature & Significance of Interaction	Description of Key Impact Interactions and Interrelationships
Population & Human Health Not Significant / Imperceptible	See Table 15.2 above.
Land, Soil & Geology Negative / Not Significant	See Table 15.4 above.
Air, Dust & Climatic Factors Slight / Imperceptible	See Table 15.6 above
Noise and Vibration Not Significant / Imperceptible	See Table 15.7 above

15.2.8 Material Assets: Water Supply, Drainage and Utilities

The following table provides an overview of the receptor interactions and interrelationships with Material Assets: Water Supply, Drainage and Utilities.

Table 15.9 Material Assets: Water Supply, Drainage and Utilities - Key Impact Interactions and Interrelationships

Interaction Nature & Significance of Interaction	Description of Key Impact Interactions and Interrelationships
Population & Human Health Imperceptible	See Table 15.2 above.
Biodiversity Not Significant	See Table 15.3 above.
Land, Soil & Geology Neutral	See Table 15.4 above
Water: Hydrology & Hydrogeology Negative / Slight Neutral	See Table 15.5 above

15.2.9 Cultural Heritage and Archaeology

Archaeological features will be excavated in advance of construction works commencing. Therefore, no adverse interactions are anticipated or envisaged, and the impact of this interaction is considered neutral. For further information refer to Table 15.2.

15.2.10 Landscape and Visual Assessment

The following table provides an overview of the receptor interactions and interrelationships with Landscape and Visual Assessment.

Table 15.10 Landscape and Visual Assessment - Key Impact Interactions and Interrelationships

Interaction Nature & Significance of Interaction	Description of Key Impact Interactions and Interrelationships
Population & Human Health Negative / Moderate Neutral	See Table 15.2 above.
Biodiversity Neutral	See Table 15.3 above.
Air, Dust & Climatic Factors Negative / Slight Neutral	See Table 15.6 above
Noise and Vibration Negative / Moderate Neutral	See Table 15.7 above

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.