

20 Cumulative and Interactive Effects

20.1 Introduction

Cumulative effects are changes to the environment that are caused by an action in combination with other actions. They can arise from and this EIAR will look at:

- the interaction between all of the different permitted and planned projects in the same area in combination with this proposed development; and
- the interaction between the various impacts within this proposed development.

Cumulative effects will consider whether the addition of many minor or significant effects of the proposed development itself or the cumulation of effects of other permitted or planned projects have the potential to result in larger, more significant effects when combined with the effects of the proposed development.

Interactive effects will consider the interaction between the various environmental aspects, for example the interaction between noise and ecology.

This chapter summarises the residual effects that have been identified in **Chapters 6 – 19** and determine whether they give rise to cumulative and/or interactive effects based on best scientific knowledge. Accordingly, when a topic is not mentioned, the authors have concluded that there are no likely residual significant effects that could give rise to cumulative and/or interactive effects.

20.2 Assessment Methodology

20.2.1 Overview

The assessment of cumulative effects has been undertaken on a qualitative basis by each of the environmental topic leads based on best scientific knowledge.

The approach has aligned with the overarching EIA guidance as outlined in **Section 1.4.3 of Chapter 1** (including the draft EPA guidance¹ and EC guidance²) as well as per the methodology adopted for each environmental factor as described in **Chapters 6 – 19**. A summary of these effects is provided herein based on best scientific knowledge.

¹ Environmental Protection Agency (2017) Draft Guidelines on the Information to be contained in Environmental Impact Assessment Reports (Draft August 2017)

² European Commission (2017) Environmental Impact Assessment of Projects: Guidance on the preparation of the Environmental Impact Assessment Report

20.2.2 Interactive Effects

The EIAR has considered and assessed the interactive effects arising from the construction and operation of the proposed development based on best scientific knowledge. Interactive effects (or interactions), as defined in Section 20.1 above specifically refer to any direct or indirect effects caused by the interaction of environmental factors as outlined in Part 1(e) in Article 3 of the EIA Directive which states:

“The environmental impact assessment shall identify, describe and assess in an appropriate manner, in the light of each individual case, the direct and indirect significant effects of a project on the following factors:

- (a) population and human health;*
- (b) biodiversity, with particular attention to species and habitats protected under Directive 92/43/EEC and Directive 2009/147/EC;*
- (c) land, soil, water, air and climate;*
- (d) material assets, cultural heritage and the landscape;*
- (e) the interaction between the factors referred to in points (a) to (d).”*

A workshop was held in May 2018 to facilitate discussion between environmental topic leads and enable them to understand the interactions and make recommendations to mitigate significant effects (including interactive effects) where practicable. This workshop also facilitated information exchange between environmental specialists during the preparation of this EIAR.

20.2.3 Cumulative Effects

The EIAR has considered and assessed cumulative effects arising from the construction and operation of the proposed development. A cumulative assessment has been undertaken based on best scientific knowledge in accordance with Part 5 of Annex IV of the EIA Directive:

“e) the cumulation of effects with other existing and/or approved projects, taking into account any existing environmental problems relating to areas of particular environmental importance likely to be affected or the use of natural resources;”

The assessment specifically considers whether any of the proposed and/or recently approved schemes in the local area have a potential to exacerbate (i.e. alter the significance of) effects associated with the proposed development based on best scientific knowledge. The schemes of relevance in the local area are described in detail in **Sections 2.2.6 and 2.2.7 of Chapter 2** and summarised below.

Table 20.1 duplicates **Table 2.1 in Chapter 2** in relation to the developments considered for cumulative effects. Any other existing projects not identified do not have the potential to exacerbate effects. The proposed Arklow Flood Relief Scheme and potential future residential receptors associated with land use zoning outlined in the Arklow LAP have been considered as they are known to be planned in the area, despite not being in the planning system at present.

Table 20.1: Schedule of developments considered for cumulative effects

Planning Reference	Name	Address	Relevance	Description	Status	Decision Date
18/316	Mill Sea Ltd	North Quay, Arklow	Located on Mill Road adjacent to the planning boundary	Demolition of existing disused industrial buildings including gas bottle filling plant, warehouse, administration offices, site office, security office and store of total floor area 2035m ² .	Grant	22 May 2018
18/289	F and S Duffy	7 and 8 Bridge Street, Arklow	Located on Bridge Street approximately 50m from the planning boundary (at its nearest point)	Demolition of two buildings and erection of a retail and commercial building of 160.2m ² and associated site works	Application received	No decision at time of writing
18/251	Gas Networks Ireland	Belarmine Plaza District, Bridgewater Centre	Located on North Quay adjacent to the planning boundary for the proposed development	3m high 'lamp post' style relief vent stack servicing the existing above ground district regulating installation with all ancillary services and associated site works	Grant	7 May 2018
15/857	Joby Developments	North Quay, Arklow	Located on Mill Road adjacent to the planning boundary	Demolition of existing structures and construction of two 5 storey blocks comprising of eight retail units, 50 residential units, an on-site wastewater treatment facility, ancillary parking and all associated site works	Grant	11 October 2015
10/610009	Arklow Sailing Club	North Quay, Arklow	Located on North Quay adjacent to the planning boundary	Alterations & additions to existing clubhouse comprising the construction of a new single storey extension of 50.4m ² , the provision of a new entrance porch, notice board and patio area all to the front, and the construction of a single storey extension	Grant	17 May 2010
08/610068	T and J Dowling	2/3 Lower Main Street, Arklow	Located on Lower Main street approximately 90m from the planning boundary (at its nearest point)	Demolish existing buildings on site and erect a mixed use development comprising two retail units and four apartment to connect to the existing services	Grant	1 October 2008
13/610028					Extension to original permission	26 September 2013
09/610054	J and B Lambert	Innisfail, South Quay, Arklow	Located on South Quay adjacent to the planning boundary	Two storey dwelling (112m ²) with all ancillary site works to include connection to mains services	Grant	16 January 2010
86/10038	K O'Brien	5 Doyle's Lane, Arklow	Located on Doyle's Lane approximately 20m from	The demolition of 11.5m ² existing single storey study, construction of 76.4m ² 2 storey extension with balcony and alterations to existing 78m ²	Grant	17 July 2008

Planning Reference	Name	Address	Relevance	Description	Status	Decision Date
			the planning boundary (at its nearest point)	2 storey house. Demolition of southern and western boundaries and the re-building of same and associated works		

20.3 Interactive Effects

20.3.1 Overview

The assessment of interactive effects has considered likely significant effects that may arise during construction and operation of the proposed development based on best scientific knowledge. A summary of these effects is presented in the matrix in Table 20.2.

If there is the potential for likely significant effects during construction, this is indicated by the 'C' column in the matrix. The 'O' column in the matrix indicates the potential for likely significant effects during operation. If there is considered to be no potential for an effect, this is indicated by '-' in the matrix.

The purpose of the matrix in Table 20.2 is to summarise likely interactive effects of significance. Actual effects and the description of significance are dealt with in the most relevant chapter (Refer to **Chapters 6 – 19** for further detail).

Table 20.2: Interactive effects summary matrix

	Planning and Policy		Traffic and Transportation		Air Quality and Climate		Odour		Noise and Vibration		Biodiversity		Heritage		Landscape and Visual		Land and Soils		Water		Resource and Waste Management		Population and Human Health		Material Assets		Major Accidents and Natural Disasters	
	C	O	C	O	C	O	C	O	C	O	C	O	C	O	C	O	C	O	C	O	C	O	C	O	C	O	C	O
Planning and Policy					✓	✓					✓	✓	✓	✓	✓	✓				✓			✓	✓				
Traffic and Transportation					✓	✓			✓	✓					✓	✓	✓				✓	✓	✓	✓	✓	✓	✓	✓
Air Quality and Climate			✓	✓				✓	✓	✓							✓			✓			✓	✓			✓	✓
Odour						✓																						
Noise and Vibration			✓	✓							✓	✓	✓	✓														
Biodiversity	✓	✓							✓						✓	✓											✓	✓
Heritage	✓	✓							✓	✓							✓	✓	✓				✓	✓				
Landscape and Visual	✓	✓	✓	✓							✓	✓	✓	✓									✓	✓	✓	✓		
Land and Soils			✓		✓								✓	✓							✓	✓						
Water		✓									✓	✓	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓			✓	✓
Resource and Waste Management			✓	✓											✓	✓	✓	✓										
Population and Human Health	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓					✓	✓			✓	✓	✓	✓
Material Assets																				✓			✓	✓			✓	✓
Major Accidents and Natural Disasters											✓	✓								✓	✓							

20.3.2 Interactive Effects during Construction

Likely significant interactive effects during construction that have been identified based on best scientific knowledge are discussed in Table 20.3:

Table 20.3: Interactive effects during construction

Receptor	Environmental factors	Summary of effect	Further information
Properties on River Walk, South Quay and North Quay (including Marina Village)	Air Quality and Climate Noise and Vibration Population and Human Health Landscape and Visual	General disturbance to residential receptors (including noise generation, dust deposition, use of generators, presence of hoarding at working areas etc.) associated with construction at working areas	Local, temporary, short term, slight – significant negative effect. Refer to Chapters 8, 10 and 17.
Arklow town	Landscape and Visual Population and Human Health Heritage	Visual impact of the working areas, plant and equipment on the landscape (including river and coastal views) and resulting impact on tourism, leisure and amenity in the area	Local, temporary, short term, slight – significant negative effect. Refer to Chapters 12, 13 and 17.
Properties on River Walk and South Quay	Noise and Vibration Population and Human Health	Noise and groundborne vibration generated during the tunnelling of the sewers and associated relocation of residents	Slight significant, temporary negative effect. Refer to Chapters 10 and 17.
Properties on River Walk, South Quay, North Quay (including Marina Village) and Seaview Avenue	Air quality and Climate Noise and Vibration Traffic and Transportation Population and Human Health	Generation of additional vehicles (construction traffic) on the road network and associated potential for air and noise emissions and disturbance.	Local, temporary, short term, slight – moderate negative effect. Refer to Chapters 7, 8, 10 and 17.
River Walk Irish Sea	Landscape and visual Traffic and transportation Population and human health	Temporary loss of riverfront pedestrian walkway to accommodate working areas at the Alps	Temporary slight – moderate negative effect. Refer to Chapters 7, 13 and 17.
Road network in Arklow town	Traffic and Transportation Population and Human Health	Effects on traffic flows on the road network and diversion of vehicles and associated	Local, temporary, short term, slight – moderate negative effect.

Receptor	Environmental factors	Summary of effect	Further information
		disturbance to journey patterns and/or severance.	Refer to Chapters 7 and 17.
Avoca River Irish Sea	Biodiversity Water Noise and Vibration Population and Human Health	Potential effects of constructing in the Avoca River and/or Irish Sea on water quality, flood risk and aquatic biodiversity (including underwater noise impacts on marine mammals)	Short term, slight negative effect. Refer to Chapters 8, 11, 14 and 17.
Arklow town Avoca River Irish Sea	Biodiversity Water Land and Soils Population and Human Health	Potential effects of runoff from working areas and/or sediment from exposed ground affecting existing land, water quality and/or sensitive receptors	Slight – moderate, temporary negative effect. Refer to Chapters 11, 14, 15, and 17.
Arklow Bridge	Landscape and Visual Heritage Noise and Vibration Land and Soils Biodiversity	Effects of the underpinning works to Arklow Bridge and associated potential settlement, disturbance to bat species, structural damage from vibration and/or disturbance to local residents	Slight – moderate, temporary negative effect Refer to Chapters 10, 11, 12, 13 and 14.
Trees on River Walk, South Quay and North Quay	Landscape and Visual Biodiversity	Removal of trees to accommodate working areas and construction activities and associated impacts on bats and birds	Slight – moderate, temporary negative effect. Refer to Chapters 11 and 13.
WwTP site Construction employees Local residents	Air quality and Climate Land and Soils Water Population and Human Health	Removal of asbestos containing material and contamination (including soils and groundwater) at the WwTP site, generation of and associated potential human health effects	Imperceptible - slight, negative effect. Refer to Chapters 8, 14, 15 and 17.
WwTP site Waste management facilities	Waste Land and Soils Traffic and Transportation	Generation and associated management and transport of construction, demolition and	Short term, slight, negative effect. Refer to Chapters 7, 14 and 16.

Receptor	Environmental factors	Summary of effect	Further information
		excavation waste (and associated transportation of) to construct the proposed development	

20.3.3 Interactive Effects during Operation

Likely significant interactive effects during operation that have been identified based on best scientific knowledge are discussed in Table 20.4:

Table 20.4: Interactive effects during operation

Receptor	Environmental factors	Summary of effect	Further information
Avoca River Irish Sea	Water Biodiversity Population and human health Planning and Policy	Elimination in so far as possible of the discharge of untreated wastewater to the Avoca River and availability of wastewater treatment in Arklow town.	Positive, permanent effect. Refer to Chapters 11, 15 and 17.
Arklow town	Landscape and visual Planning Heritage Biodiversity Population and Human Health	Potential visual impacts associated with land reclamation and provision of amenity space at River Walk and Quay, replanting at working areas (including the quayside and the Alps) and reinstatement of Seafarers Memorial Garden	Moderate -slight negative, changing to slight positive - neutral as reinstated vegetation and trees become established. Refer to Chapters 6, 12, 13 and 17.
Arklow town	Planning Water Population and Human Health	Potential improvements to water quality and improved opportunities for water based tourism, recreation and amenity	Significant positive – Refer to Chapters 6, 15 and 17
WwTP site	Water Material Assets	Upgrade to the revetment to achieve relevant design standards and reduce coastal flood risk	Positive, permanent effect. Refer to Chapters 15 and 18.

20.4 Cumulative Effects

20.4.1 Overview

The assessment of cumulative effects has considered likely significant effects that may arise during construction and operation of the proposed development.

Cumulative effects were assessed to a level of detail commensurate with the information that was available at the time of assessment based on best scientific knowledge. Where information regarding other schemes in the local area was limited, these gaps were acknowledged within the assessment and the associated uncertainty in these cases is documented in **Section 2.6.6 of Chapter 2**.

20.4.2 Cumulative Effects during Construction

Likely significant cumulative effects during construction of the proposed development that have been identified based on best scientific knowledge in **Chapters 7 – 19** are summarised below.

Whilst a planning application has not yet been submitted, the proposed Arklow Flood Relief Scheme is anticipated in the near future and this may give rise to cumulative effects should the construction of the proposed development and the proposed Arklow Flood Relief Scheme overlap temporally and/or spatially. As outlined in **Section 1.5.3.5 of Chapter 1** and **Section 2.6.7 of Chapter 2**, efforts have been made to consider both proposals and the design team have had regard to the existence of the other scheme and potential for interaction to the extent that this is possible and appropriate given the fact that the proposed Arklow Flood Relief Scheme remains in design stage as at the time of submission of this application.

During the design development, it was recognised that a number of efficiencies and/or benefits could be achieved from each project having regard to the other's design proposals and construction of the overlapping elements of each of the schemes in an integrated manner in so far as possible. On this basis, a number of meetings were held between the design teams and proponents of both schemes to optimise the design development (as described in **Section 1.5.3.5 of Chapter 1**). This particularly focused around Arklow Bridge and South Quay where there will be a physical overlap between both schemes. In summary, the following potential cumulative effects during construction of the proposed development and the proposed Arklow Flood Relief Scheme have been identified herein based on best scientific knowledge:

- **Traffic and Transportation:** The simultaneous construction of both projects will result in greater traffic flows, including HGVs on streets within Arklow and greater effects are likely (should the proposed Arklow Flood Relief Scheme be submitted, receive consent and commence construction in a timely manner).

There is the potential that should the projects be carried out simultaneously (should the proposed Arklow Flood Relief Scheme be submitted, receive consent and commence construction in a timely manner), co-ordinated traffic management plans will need to be prepared and agreed with Wicklow County Council.

- **Noise and Vibration:** The simultaneous construction of both projects has the potential to exacerbate noise and vibration effects (should the proposed Arklow Flood Relief Scheme be submitted, receive consent and commence construction in a timely manner). Should dredging occur simultaneously with the construction of the tunnel shafts, for example, the overall predicted impact would be 71dB ($LA_{eq, 1 \text{ hr}}$), 6dB above the proposed noise limit, i.e. resulting in a temporary significant effect. In relation to construction traffic, simultaneous generation of construction traffic will not add significantly to the noise and vibration effects of the proposed development.
- **Biodiversity:** The Arklow Town Marsh pNHA, mature trees and notable species (including bats, Kingfisher, Atlantic Salmon, River Lamprey and Sea Lamprey, European Eel, Otter, Marine Mammals) are also present within the footprint of the proposed Arklow Flood Relief Scheme, therefore the proposed dredging and construction activities associated with the simultaneous and/or sequential construction of both development proposals may exacerbate effects on biodiversity (should the proposed Arklow Flood Relief Scheme be submitted, receive consent and commence construction in a timely manner). These effects can be mitigated by effective coordination, but not eliminated in their entirety.
- **Archaeology, Architectural and Cultural Heritage:** The likely significant effects associated with the proposed underpinning of the Arklow Bridge (which will be carried out within two arches as part of the proposed development and the remaining arches as part of the proposed Arklow Flood Relief Scheme) may be exacerbated as a result of the construction of both schemes as a greater number of arches in the bridge would be underpinned (should the proposed Arklow Flood Relief Scheme be submitted, receive consent and commence construction in a timely manner). These effects can be mitigated by effective coordination, but not eliminated in their entirety.
- **Landscape and Visual:** As outlined above, significant coordination has been undertaken between both projects. With regards to landscape and visual, the duration of the likely significant effects associated with the proposed development may be extended if simultaneous and/or sequential construction arises (should the proposed Arklow Flood Relief Scheme be submitted, receive consent and commence construction in a timely manner), however the proposed Arklow Flood Relief Scheme will not exacerbate the effects of the proposed development.
- **Water:** It is possible that the construction of the proposed Arklow Flood Relief Scheme may take place in parallel with the construction of the proposed development (should the proposed Arklow Flood Relief Scheme be submitted, receive consent and commence construction in a timely manner). The contemporaneous construction of both developments may exacerbate effects on the hydrology and flooding.

However, where practicable coordination will be undertaken by the contractors appointed to each development to ensure that underpinning of the arches and lowering of the arch included as part of the proposed development is undertaken in advance of the construction of the proposed interceptor sewer to mitigate any significant flood risk during construction of the interceptor sewers in the Avoca River.

The construction of interceptor sewers along South Quay and River Walk, and nearby construction of the proposed Arklow Flood Relief Scheme may generate the potential for direct and indirect short term significant negative effects on the hydrology of the Avoca River during construction for those reasons outlined above.

- **Population and Human Health:** Construction of the proposed development and the proposed Arklow Flood Relief Scheme (should the proposed Arklow Flood Relief Scheme be submitted, receive consent and commence construction in a timely manner) will have negative cumulative effects on aspects of accessibility and amenity for some of the population, including local residents and/or visitors. There will also be related cumulative effects on some businesses due to amenity, for example loss of riverside views or noise. These effects can be mitigated, but not eliminated in their entirety.

None of the other development proposals and/or land use zoning (that have been planned, submitted and/or approved) are considered to give rise to significant cumulative effects on any environmental factors during construction based on best scientific knowledge. The nature and scale of these development proposals are such that construction of these projects at the same time as the proposed development, would not exacerbate significant effects that have been identified in **Chapters 7 – 19** based on best scientific knowledge.

20.4.3 Cumulative Effects during Operation

Likely significant cumulative effects during operation of the proposed development that have been identified in **Chapters 7 – 19** based on best scientific knowledge can be summarised as follows:

- **Biodiversity:** During the operation of the proposed development, it is understood that a public realm design along River Walk and South Quay may be implemented as part of the proposed Arklow Flood Relief Scheme that would include tree planting along the southern and northern banks of the Avoca River and Estuary. This will be a positive effect.
- **Landscape and Visual:** Immediately west of the WwTP site, there is an existing grant of permission (Reference 15857) and given the land use zoning in the Arklow LAP, it is likely that additional mixed use development proposals will be brought forward along North Quay (facing the Avoca River and between Arklow Marina and Mill Road) and around Mill Road. Such development proposals may intensify the built environment of the locality and gradually transform its current derelict and under-utilised industrial appearance to a more intensive and active urban environment.

Such long-term change to the built environment is planned by Wicklow County Council and each individual development proposal would be subject to separate planning applications and an EIAR if appropriate. Based on the current level of information available, significant cumulative effects on landscape and visual resources are not anticipated.

- **Population and Human Health:** The proposed development will reinstate the public realm and facilitate further landscaping likely to be undertaken separately along River Walk and South Quay as part of the proposed Arklow Flood Relief Scheme. A significant positive effect associated with the proposed development and the proposed Arklow Flood Relief Scheme will be evident during operation along River Walk and South Quay and this will be exacerbated by the improved water quality and improvements to water quality and improved opportunities for water based tourism, recreation and amenity as identified in Table 20.3.

20.5 References

EPA (2017) *Draft Guidelines on the Information to be contained in Environmental Impact Assessment Reports (Draft August 2017)*

European Commission (2017) *Environmental Impact Assessment of Projects: Guidance on the preparation of the Environmental Impact Assessment Report*