

Chapter 17

Interactions and Cumulative Effects

17.1 Introduction

In addition to the assessment of impacts on individual topics presented in the previous chapters of this Environmental Impact Assessment Report (EIAR), the interactions between these factors have also been considered. In addition, the cumulative effects of the proposed development with those of previous developments and developments for which planning authorisation has been received and development objectives in the development plans for the areas through which the development is proposed to run, have been assessed and are described in this chapter.

17.2 Methodology

17.2.1 Interactions

The determination of interactions was facilitated through an iterative design process that included the holding of a series of workshops, where all designers, environmental specialists and technical specialists discussed their particular topic, the evolving road development and their interactions in detail. The workshops were carried out at several key stages throughout the design process. This allowed for dynamic interaction between all parties/topics. Furthermore, there were several sub-group meetings between designers and small groups of specialists where strong interrelationships exist – e.g. between the designers, biodiversity, hydrology and hydrogeology specialists and between designers, landscape, and biodiversity specialists. In addition, the process was informed by extensive consultation with land and property owners, statutory and non-statutory consultees. Where a potential exists for interaction between two or more environmental topics, the relevant specialists have taken these into account when making their assessment and, where necessary, mitigation measures have been proposed.

17.2.2 Cumulative Effects

In assessing cumulative effects, the following were the principal sources consulted:

- Limerick City and County Council (Planning and Roads Sections);
- Clare County Council (Planning and Roads Sections);
- An Bord Pleanála Website;
- Web search for windfarm developments in County Limerick;
- Web search for major infrastructure developments in County Limerick;
- Limerick County Development Plan 2010-2016 (As Extended);
- Relevant Local Area Plans;
- National Planning Framework;
- Inland Fisheries Ireland (IFI) website; and
- Coillte website.

The search identified a number of proposed and existing large-scale developments within 10km of the proposed road development, as discussed in Section 17.4.

17.3 Interactions

Interactions relate to the interactions /interrelations between the impacts and proposed mitigation for one discipline with another associated discipline. An example of this would be the provision of noise barriers to mitigate the impacts of noise on the surrounding environment which could then have a negative impact in terms of landscape and visual impact.

The impacts and the mitigation provided have been considered by all disciplines to ensure all the potential interactions have been fully considered within this EIAR. Table 17.1 shows the principal interrelationships/ interactions identified for the proposed road development and these are described below.

Table 17.1 Matrix to Summarise Key Inter-relationships

Receptor	Population and Human Health	Biodiversity	Soils & Geology	Hydrogeology	Hydrology	Landscape	Noise & Vibration	Air Quality & Climate	Archaeology, Architecture & Cultural Heritage	Material Assets & Land - Agriculture	Material Assets & Land - Non-Agriculture
Activity											
Population & Human Health											
Biodiversity	✓		✓	✓	✓	✓	✓	✓		✓	✓
Soils & Geology	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓
Hydrogeology	✓	✓			✓					✓	✓
Hydrology	✓	✓								✓	
Landscape	✓	✓					✓		✓	✓	✓
Noise & Vibration	✓	✓							✓	✓	✓
Air Quality & Climate	✓	✓	✓								✓
Archaeology, Architecture & Cultural Heritage	✓		✓								
Material Assets & Land – Agriculture	✓										
Material Assets & Land – Non-Agriculture	✓										

17.3.1 Biodiversity Interactions

Biodiversity will interact / or interrelate with the following:

Population and Human Health

Increased biodiversity is linked with quality of life of those living in the receiving environment. Screen planting and landscape mitigation measures will improve the views of residents and road users having a positive impact.

Soils and Geology

The presence of Invasive Alien Species (IAS) impacts on the movement and treatment of soils during the construction phase. Measures for managing Invasive Species have been included into the EOP (see Appendix 4.1). Interactions between Biodiversity and Soils are not likely to arise during operation stage.

Hydrogeology

The removal of vegetation and changes in ground level or drainage associated with the proposed road development could impact on site run-off levels, having indirect impacts such as drawdown or alteration of the existing hydrological regime during construction and / or operation. Consideration has been given to maintaining existing hydro-geological conditions in the vicinity of the proposed road development to avoid impacting on wetland habitats.

Hydrology

The diversion of a number of streams or watercourses are proposed as part of the proposed road development. Where these occur, mitigation measures have been proposed in the Biodiversity Chapter to ensure that the construction of the diversion will not negatively affect the ecology of the watercourse in question and that the existing flow regime will be maintained so as not to impact on the biodiversity of the watercourse during construction or operation.

Landscape

Proposed biodiversity mitigation measures will have a positive impact on the landscape. Biodiversity mitigation will include additional planting and the connectivity of severed treelines and / or hedgerows and linking existing habitat to faunal passages along the proposed road development. Landscape design along the proposed road development will also serve to void the potential for barn owl mortality as a result of vehicle collisions. These measures have been incorporated into the Landscape drawings within Volume 3 of the EIAR which have been developed by the project ecologist and landscape architect in combination.

Material Assets and Land: Agriculture

Proposed biodiversity mitigation measures such as additional planting will have positive impacts on Material Assets and Land – Agriculture through the planting of replacement hedgerows and additional planting, providing screening for animals during the operation stage.

Material Assets and Land: Non-Agriculture

Proposed biodiversity mitigation measures such as additional planting will have positive impacts on Material Assets and Land Non-Agriculture through additional planting, enhancing the landscape for properties.

17.3.2 Soils and Geology Interactions

Soils and Geology will interact / or interrelate with the following:

Population and Human Health

The removal and excavation of soils and rocks will result in noise and vibration and air quality impacts during construction phase. These impacts have been assessed in chapters 12 and 13 and with the implementation of the mitigation measures outlined, interactions will be short term and will not be significant. As a result of a net earthworks fill deficit, the construction of the proposed development will require the importation of approx. 1.3 million m³ of material, to be supplied from quarries in the region. While this will result in a slight to moderate, negative impact on soils and geology in the study area, it will also give rise to significant positive economic benefits for the businesses in question.

Biodiversity

All construction works involving the movement of soils will consider the identified locations of Invasive Alien Species. A management plan for invasive species has been included in the EOP and will be implemented by the contractor.

Hydrogeology

The interaction of soils and geology and hydrogeology is considered significant as deep cuttings have the potential to affect ground water sources including wells and water supplies. Impacts have been assessed as part of chapters 08: Soils and Geology and Chapter 10: Hydrogeology and mitigation measures have been developed in Chapter 9 Hydrogeology to accommodate for any impacts to hydrogeological sources due to the excavation of soil and rock.

Hydrology

The excavation of soils and rock across the proposed road development has the potential to impact on the hydrology of the area. The design of the road drainage will ensure that existing conditions are not affected. The drainage design and mitigation measures have been developed as described in Chapter 10 Hydrology.

Landscape

The proposed earthworks will affect the landscape of the surrounding area. The proposed change in landform and the visual effects have been taken into account in the design of the proposed development and mitigation measures have been incorporated into the design. The impact of earthworks is assessed fully in Chapter 11: Landscape & Visual Analysis of this EIAR.

Noise & Vibration

The interaction between soils and geology and Noise and Vibration is considered significant during the construction stage. The excavation and movement of soils and rock have the potential to cause noise and vibration impacts and have been assessed in Chapter 12 Noise and Vibration. Mitigation measures have been put in place to limit working hours and noise levels associated with blasting and soil and rock excavation along the proposed road development.

Air Quality and Climate

Soils and Geology is likely to have significant interactions with Air Quality and Climate. The movement of soil during the construction phase has potential to result in the

release of airborne dust particles. Mitigation measures are provided in Chapter 13 Air Quality and Climate to ensure appropriate actions are taken to prevent such impacts.

Archaeology, Architecture and Cultural Heritage

The disturbance of soil during the construction phase of the proposed development has the potential to uncover archaeological finds. A programme of archaeological test excavations will be carried out within the lands made available (LMA) for construction of the proposed road development prior to construction going ahead and a Project Archaeologist will be assigned to the construction phase. Further mitigation measures are detailed in Chapter 14 Archaeology, Architecture and Cultural Heritage.

Material Assets and Land – Agriculture

The movement of soils and rock excavation will result in noise and vibration levels which may affect neighbouring livestock. Therefore, significant interactions may occur between Soils and Geology and Material Assets and Land. Impacts associated with this interaction have been assessed however in chapter 15 Material Assets and Land – Agriculture. Good communication between the contractor and adjacent landowners during the construction phase will allow farm animals to be moved, avoiding undue disturbance.

Material Assets and Land – Non-Agriculture

Impacts caused by blasting or rock cutting techniques has the potential to cause significant interactions between soils and geology and Material Assets and Land – Non-Agriculture. Impacts on residential properties as a result of noise and vibration from soils and geology works have been addressed in Chapter 12 Noise and Vibration. Mitigation measures have been included in both Chapter 16 Material Assets and Land – Non-Agriculture and Chapter 12: Noise and Vibration which include property condition surveys offered for buildings within 150m of blasting works.

17.3.3 Hydrogeology Interactions

Hydrogeology will interact / or interrelate with the following:

Population and Human Health

The potential risk of pollution to groundwater from a spillage event has the potential to contaminate the ground water and subsequently the private water supplies from wells in the locality. Chapter 9 Hydrogeology has assessed the potential impacts on groundwater supplies in terms of yield and chemistry, and mitigation measures are included in chapters 9 Hydrogeology and 10 Hydrology to mitigate impacts on groundwater supplies.

The construction of the proposed road development may result in impacts to the volume of groundwater supplies. Mitigation measures have been put in place to ensure that any groundwater supplies that experience impacts on flow, will be compensated through a replacement well or a connection to the public supply. Therefore, interactions between Hydrogeology and Population and Human Health are not likely.

Biodiversity

A number of groundwater fed ecosystems including fens and turloughs are located in the vicinity of the proposed road development. Impacts on the groundwater in the region could affect the water supply to these sites and there is potential to impact on the biodiversity they support. Impacts to the drainage of the area have been assessed

in Chapter 09 Hydrogeology and mitigation measures have been put in place to ensure the groundwater system of the area is not disturbed to a level that may affect the local biodiversity. Therefore, significant interactions are not likely between Hydrogeology and Biodiversity.

Hydrology

Potential changes to aquifers or unsaturated zones may result in changes to existing baseflow to watercourses and water quality within the location of the proposed development. Mitigation measures have been implemented in Chapter 09 Hydrogeology to ensure that groundwater flows will be maintained, and that water quality will not be impacted during construction or operational phase. No significant interactions are predicted.

Material Assets and Land - Agriculture

Potential significant interactions could arise as a result of impacts to the hydrogeology of the area as private wells and group water schemes could be affected. Any potential impacts on the hydrogeology of the area could impact on water supplies to agricultural premises. Mitigation measures have been implemented in Chapter 09 Hydrogeology to ensure that groundwater flows will be maintained, and that if any impact to flows occur, a replacement supply will be established through a replacement well or connection to a public supply.

Material Assets and Land – Non-Agriculture

The potential risk of pollution to groundwater from routine run-off could have a resultant impact on water quality and therefore material assets. The proposed drainage system incorporates a range of pollution control features to limit the water quality impact to receiving waters. A sealed road drainage system will also be used to prevent pollutants infiltrating to groundwater in areas of High or Extreme Vulnerability. The likelihood of this interaction has been assessed in Chapter 10 Hydrogeology and mitigation measures have been put in place to ensure water supplies are maintained where possible and that replacement supplies are established where impacts occur.

17.3.4 Hydrology Interactions

Hydrology will interact / or interrelate with the following:

Population and Human Health

The proposed road development and the watercourse crossings have been designed to eliminate the likelihood of significant interactions between Hydrology and Population and Human Health. Structures have been designed to avoid impacts such as flooding in the surrounding area while the drainage system has been designed with mitigation measures to ensure water quality is not impacted by the proposed road development during either construction or operational phase.

Biodiversity

During construction, there is potential for water quality to be impacted through earthworks material or contaminated run-off. This impact on water quality could have impacts on fish and other flora or fauna using the watercourses. Chapter 7 Biodiversity and the Environmental Operating Plan set out mitigation measures to avoid the runoff of contaminants into watercourses during the construction stage to avoid impacts on Biodiversity.

During operation, new road drainage outfalls to watercourses within the area could potentially have a negative impact on water quality in the receiving watercourse,

causing disruption to aquatic ecology. However, the proposed road drainage system has been designed to avoid or minimise the water quality impact on watercourses by means of appropriate pollution control features for discharge. Positive effects are also likely to arise for biodiversity along the existing N69 route, due to a reduction in traffic along the road. The removal of traffic off a road that is likely to have poor drainage systems, will reduce the risk of pollution to the number of European sites that are crossed by the existing road. While interactions are likely between hydrology and biodiversity, they are not expected to be significant.

Material Assets and Land - Agriculture

Field drainage systems currently in situ will be disturbed and in places impacted by the construction works. These systems will be restored as part of the completed road works. However, there may be temporary impaired drainage in the time between initial disturbance and final reinstatement of such drainage works. In cases where impeded drainage during construction will cause obvious difficulty to a particular landowner, temporary measures will be looked at on a site-specific basis. This may include allowing waters to drain to less critical areas, so as to minimise the impact. Short term interactions are likely between Hydrology and Material Assets and Land – Agriculture, however these interactions will be mitigated where they arise.

17.3.5 Landscape Interactions

Landscape will interact / or interrelate with the following:

Population and Human Health

Interactions between Landscape and Population and Human Health are likely to be significant. Landscape and Visual impacts will occur as a result of the proposed road development and will alter the views and setting of local residents and for local road users. Impacts during construction will be short term, while operational stage impacts will be mitigated through the landscape planting proposed. Along short sections of the road where landscaping is limited, views from the road will provide positive landscape views of County Limerick to road users, enhancing journey experience. Landscape mitigation measures will help mitigate the impacts for those living in the surrounding area through the provision of landscape planting, in addition, landscape features will be incorporated at the entrances to villages and towns along the route to enhance the experience for road users.

Biodiversity

Biodiversity and landscaping are very much interlinked within the landscape. The biodiversity of the landscape is one of the key factors in determining the visual and landscape character of an area, while changes to the landscape can impact on the suitability and connectivity for species. Many key landscape features such as rivers, lakes, trees, woodlands, etc. are also habitats.

The biodiversity and landscape mitigation measures for the operation stage of the proposed development have been designed by both the Landscape Architect and Ecologist, taking into account constraints from other disciplines, e.g. the cultural heritage exclusion zones, noise barriers and some equine constraints. The landscaping measures which are proposed in Figures 11.1 to 11.24 of Volume 3 incorporate the landscape planting which is required to mitigate visual impacts for adjacent properties, and in addition, the mitigation measures required by the biodiversity chapter, such as connectivity planting to direct species towards underpasses, or planting to prevent foraging by certain species, e.g. planting scrub instead of grass on roadside spaces to make the area unsuitable for Barn Owl. The

landscape mitigation measures include 10 different categories of planting, to match the biodiversity of the current landscape and native species are included where possible. These species mixes have been developed with the project ecologist and have incorporated their recommendations.

Noise and Vibration

Landscape mitigation plans include for additional planting in areas along the proposed road development where space allows. This planting will help mitigate the appearance of noise barriers along the proposed road development, reducing any potential for indirect visual impacts due to noise barriers.

Archaeology, Architecture & Cultural Heritage

Archaeology, Architecture & Cultural Heritage features, including upstanding ringforts, cashels, cemeteries, historic buildings and demesnes can be receptors for landscape and visual impact and can also act as focal elements in the landscape, lending character to views. Interactions between Landscape and Archaeology, Architecture and Cultural Heritage is likely to be significant during operation stage and they have been assessed in Chapters 11 Landscape and Chapter 14 Archaeology, Architecture & Cultural Heritage. Landscape mitigation proposals have taken account of exclusion zones defined in Chapter 14 to protect cultural heritage. New planting proposed along the road corridor will take account of architectural heritage and any new archaeological or cultural heritage findings over the construction period, with the aim of mitigating impacts and preserving setting.

Material Assets and Land – Agriculture

Visual impacts of the proposed road development have potential to significantly interact with agriculture, especially equine facilities. Visual impacts have the potential to disturb horses and animals alike during construction stage predominantly. These interactions have been assessed in Chapter 15 Material Assets and Land – Agriculture. The landscape mitigation measures proposed as part of Chapter 11 Landscape such as screen planting will benefit equine and agricultural farms along the route. Additional mitigation measures have been incorporated such as noise and visual screening for identified sensitive receptors along the route, which will reduce the visual impact on material assets and these are detailed in Chapter 15 Material Assets and Land - Agriculture.

Material Assets and Land – Non-Agriculture

Changes to the Landscape are likely to have significant interactions with Material Assets and Land – Non-Agriculture. Landscape and visual impacts will occur as a result of the proposed road development and will alter the views and setting for sensitive receptors including local residents and local road users. The impact of Landscape on local residents has been assessed in Chapter 11: Landscape and mitigation measures are proposed to help mitigate the impacts for those living in the surrounding area.

17.3.6 Noise and Vibration Interactions

Noise and vibration will interact / or interrelate with the following:

Population and Human Health

Interactions between Noise and Vibration and Population and Human Health are likely as a result of the proposed road development. Noise and vibration levels will have impacts on the Population and Human Health due to increased noise and vibration levels during both construction and operational stages. The impact of noise and

Vibration has been assessed in Chapter 12, with sensitive receptors being identified within the vicinity of the proposed road development. The noise and vibration impact assessment describes in detail the changes to noise climate that noise sensitive receptors will experience. Mitigation measures have been incorporated into the design to reduce such impacts on sensitive receptors. The overall impact of noise and vibration is also assessed in Chapter 6 Population and Human Health including the positive impact which sensitive receptors along the existing N69 and N21 will experience as a result of reduced traffic volumes.

Biodiversity

There is potential for interactions between Noise and Vibration and Biodiversity as a result of the proposed road development. Noise and vibration impacts as a result of the construction of the proposed road development have potential to impact on Biodiversity, causing disturbance to species. Mitigation measures proposed as part of Chapter 07 Biodiversity will, however, ensure that all biodiversity is excluded from the site prior to earthworks commencing to prevent noise disturbance.

Landscape

The installation of noise and vibration mitigation measures in the form of noise barriers may result in landscape and visual impacts. They will form visual barriers and screen views of traffic but can also block attractive views across the countryside. Where feasible, new planting will be used to reduce the visual impact of noise mitigation walls, and these will be planted with climbers to soften their appearance.

Archaeology, Architecture and Cultural Heritage

Interactions between Noise and Vibration and Archaeology, Architecture and Cultural Heritage are considered to be significant. Increased noise and vibration levels have the potential to impact on the setting of archaeological, architectural or cultural heritage sites along the proposed road. Impacts on these sites have been assessed in Chapter 14: Archaeology, Architecture & Cultural Heritage. The route selection avoided Archaeological, Architectural and Cultural Heritage sites in the first instance, where possible.

Material Assets and Land - Agriculture

Noise impacts during both the construction and operational phases may impact on sensitive agricultural receptors including a number of equine enterprises. The interactions between these two topics are likely to be significant. While noise mitigation for sensitive receptors for the operation stage have been outlined in Chapter 12 Noise and Vibration, additional measures for construction stage have been included in Chapter 15 Material Assets and Land – Agriculture, where required, to further mitigate noise impacts on equine enterprises. Indirect impacts such as Noise and Vibration impacts have been accounted for in Chapter 15 which has been supplemented by an assessment carried out on equine facilities.

Noise and Vibration levels from the removal of soils and rock excavation have the potential to affect neighbouring livestock on adjacent agricultural land. Good communication between the contractor and adjacent landowners during the construction phase will allow farm animals to be moved, avoiding undue disturbance.

Material Assets and Land - Non-Agriculture

Vibration impacts caused by blasting or rock cutting techniques could have the potential to impact on residential properties in close proximity to the works. Interactions are considered likely to be to be significant. Mitigation measures have

been included in both Chapter 16: Material Assets and Land - Non-Agriculture and Chapter 12: Noise and Vibration which include the provision of property condition surveys for buildings within 150m of blasting works to check for their stability prior to works.

17.3.7 Air Quality and Climate Interactions

Air Quality and Climate will interact / or interrelate with the following:

Biodiversity

Interactions between Air Quality and Climate and Biodiversity have the potential to be significant. As well as impacts on human health, some air pollutants also have an effect on vegetation. Concentrations of pollutants in air and deposition of particles can damage vegetation directly or affect plant health and productivity. Deposition of pollutants to the ground and vegetation can alter the characteristics of the soil, affecting the pH and nitrogen availability that can then affect plant health, productivity and species composition. Increased greenhouse gas emissions on a global scale can affect the climate, such that the ability of existing species to tolerate local conditions can change.

Accordingly, a sufficiently detailed assessment as presented within Chapter 13: Air Quality & Climate has been undertaken to estimate pollutant concentrations (i.e. Oxides of Nitrogen (NO_x)) at ecologically designated sites that could change as a result of the proposed road development. Mitigation measures proposed for the construction phase of the proposed development will also ensure that airborne dust generation is minimised.

Population and Human Health

There is potential for significant interactions between Air Quality and Climate and Population and Human Health. There has been a detailed consideration of the potential for human health impacts related to airborne emissions from the construction and operational phase of the proposed development. A detailed assessment, as presented within Chapter 13: Air Quality & Climate, has been undertaken to estimate pollutant concentrations (i.e. Nitrogen Dioxide (NO₂) and fine particulates (PM₁₀ & PM_{2.5})) at specific locations that could change as a result of the proposed road development.

Air dispersion modelling of operational traffic emissions was undertaken to assess the impact of the proposed road with reference to EU ambient air quality standards which are based on the protection of human health. As demonstrated by the modelling results, emissions as a result of the proposed road are compliant with all National and EU ambient air quality limit values and are addressed in Chapter 6 Population and Human Health.

Soils and Geology

There is the potential for interactions between Air Quality and Soils and Geology. Excavations and the movement of soil during the construction phase has potential to result in the release of airborne dust particles. Mitigation measures are provided in Chapter 13 Air Quality and Climate to ensure appropriate actions are taken to prevent such impacts. Therefore, interactions are not likely to be significant.

Material Assets and Land - Non-Agriculture

The potential for impacts on property from air quality and climate during both the construction and operational phases are negligible and a dust minimisation plan has

been formulated for the construction phase of the project to avoid any impacts on material assets and land. Interactions are not likely to be significant.

17.3.8 Archaeological, Architecture and Cultural Heritage Interactions

Archaeological, Architecture and Cultural Heritage will interact / or interrelate with the following:

Population and Human Health

Enhanced amenity, setting and access at Archaeological, Architectural and Cultural Heritage sites as a result of reduced volumes of traffic along existing N69 and N21, will improve the experience for visitors to view and visit these sites. The heritage village of Adare will be much more attractive to tourists and locals, once the congestion and indirect impact of the existing traffic is removed.

Soils and Geology

The discovery of archaeological finds along the proposed road development during earthworks is a possibility and has been included for in the assessment. A programme of archaeological test excavations will be carried out within the lands made available (LMA) for construction of the proposed road development prior to construction going ahead. These measures will be factored into the soils and geology programme.

17.3.9 Material Assets and Land (Agriculture) Interactions

Material Assets and Land - Agriculture will interact or interrelate with the following:

Population and Human Health

Primary impacts on population and human health due to material assets and land will entail landtake and other agricultural property impacts. Potential impacts on population will be mitigated by measures including the provision of new accesses and replacement boundaries to affected properties. Other mitigation measures include, where possible, the provision of accesses to severed areas of land and fields, stockproof boundary replacements and underpasses reconnecting farmer's land for operational stage.

17.3.10 Material Assets and Land (Non-Agriculture) Interactions

Material Assets and Land – Non-Agriculture will interact or interrelate with the following:

Population & Human Health

Significant interactions are likely between Material Assets and Land – Non-Agriculture and Population and Human Health. Primary impacts on population and human health due to material assets and land (Non-Agriculture) will entail landtake and other impacts on non-agricultural property. In particular, the acquisition of a number of private dwelling houses will impact on the population. Potential impacts on human beings will be mitigated by measures including the provision of new accesses and replacement boundaries to affected properties.

17.4 Cumulative Effects

Cumulative effects are impacts that result from incremental changes caused by other past, present or reasonably foreseeable developments together with the proposed road development. Cumulative effects were assessed by looking at developments within the last ten years and current developments for which planning has been

received within 10km of the proposed road development location. A consideration of development objectives in the current development plans in the area was also carried out. This cumulative assessment has considered cumulative impacts that are:

- a. Likely;
- b. Significant; and
- c. Relating to an event which has either occurred or is reasonably foreseeable together with the impacts from this development.

A search in relation to plans and projects that may have the potential to result in cumulative impacts was carried out. Data sources included those listed in section 17.2.2. In addition to the projects and plans listed below, a number of small-scale developments, including dwelling houses and extensions, were identified from the wider area surrounding the proposed road development. Plans and projects which were identified from this search are listed and discussed below.

17.4.1 Shannon Foynes Port Expansion

The Shannon Foynes Port Company was granted permission in December 2018 for port expansion works, to include an area of 0.51 ha for quay / jetty development, 33.95 ha undeveloped land at Durnish (to the east for port), related storage and ancillary activities (ABP Ref: 301561-18).

Modifications to the existing jetties and quays are to include:

- i. Connection of the existing West Quay to the existing East Jetty, for the purpose of extending the length of the existing quay to facilitate the mooring of vessels and port related operations;
- ii. Phased expansion of the port estate on 33.95 ha of land immediately adjacent to the east of the existing port estate to provide serviced industrial land, and, to accommodate marine related industry, port centric logistics; and
- iii. Associated infrastructure, to be provided in accordance with a development framework programme prepared for the overall expansion area, which has been lodged with the planning application.

More specifically, the proposal includes the following elements:

1. Site development and infrastructure works to the entire expansion lands on a phased basis including:
 - i. Raising of ground levels with fill material to a typical height of +4.44m OD Malin;
 - ii. Provision of all associated services including storm water infrastructure and modification to the existing OPW drainage attenuation system;
 - iii. Provision of 2.4m high perimeter fencing;
 - iv. Landscaping berms and treatments; and
 - v. All associated site development works; all to be delivered on a phased basis.
2. Implementation and use of 'Phase 1' of port expansion works including:
 - i. Modification and realignment of part of the existing port estate access road, including provision of new roundabout and junction arrangements, associated lighting, and storm water drainage;
 - ii. Provision of new internal port access road (with associated footpath and combined cycle path) including the provision of bridge structures to facilitate access across existing drainage channels;

- iii. Construction of three covered industrial type warehouse units (with typical maximum ridge height of 15.1m above raised ground level) with associated external storage, parking and circulation areas;
- iv. The provision of separate dedicated uncovered open storage area / container storage area and associated circulation and service area (with maximum container stacking height of 8m if / when container storage required);
- v. Provision of foul water treatment system with polishing filter and discharge to ground to serve the Phase 1a expansion area;
- vi. Modifications to existing Foynes Engineering industrial building, which involves the removal of the lean-to structure affixed to the main building and remedial building and site development works;
- vii. Provision of an ESB electrical substation;
- viii. Provision of lighting columns within the 'Phase 1' expansion area;
- ix. Provision of a new security kiosk and access control barrier on the existing port access road;
- x. Provision of noise attenuation measures along parts of the southern and western boundary of 'Phase 1' expansion area;
- xi. Provision of a bus stop on the existing port access road;
- xii. Landscaping; and
- xiii. All associated site development works.

An EIAR and NIS were submitted as part of the application to An Bord Pleanála. A site-specific Flood Risk Assessment was also undertaken which assessed the impact of the development on both coastal and fluvial flooding. It has been concluded that, with mitigation measures put in place, the development will not result in increased fluvial / drainage flood risk, while in the coastal flooding scenario, the development was found to have at worst a neutral impact, and, at best, a positive impact.

Fill material will be imported onto the site to raise the level of the Durnish lands, requiring a depth of between 1.8 and 2.8m infill. The EIAR identified a number of potential quarries which may be used to source this material and states that the quarry facilities from which this material will be sourced will be registered with the Local Authority and will have the necessary planning permission and other consents in place for the winning and haul of such material. The proposed port expansion will require approximately 592,000m³ of infill material and has not assumed any potential effect on soils and geology as a result. The proposed road development will require a further 1,150,000 m³ of material. While both of these developments may use the same quarry sources for material, the haulage of this material has been included in the assessment for indirect impacts and neither environmental impact assessment found an impact with regard to the sourcing of fill material on any environmental criteria.

The Traffic and Transport assessment for the proposed road development took into consideration the proposed Shannon Foynes Port Expansion and included the roundabout proposed at the location of the junction of the L-6188 Port Access Road and the N69, at the western extent of the proposed road development. The proposed road development will assist the expansion of the port through the provision of improved road infrastructure and carrying capacity on the surrounding road network.

On review of the EIAR and NIS for the Shannon Foynes Port Expansion, negative cumulative effects are not likely due to the nature of the impacts and coordination between the two projects during planning stages. The proposed road development

has accounted for the future growth of HGV traffic from the Shannon Foynes Port and will support the Shannon Foynes Port expansion, having positive cumulative effects.

17.4.2 Bord na Móna

Planning reference 15/468 relates to a smokeless and bio-mass based solid fuel manufacturing and packaging facility adjacent to existing coal storage and bagging facility, approximately 750m north of the western tie in of the proposed road development. The works will include demolition of buildings and storage structures, changes to an existing warehouse building and construction of a new administration block and car park, installation of weighbridges, kiosk, drainage system and construction of storage areas, an electricity substation and other site works.

Permission was granted to Bord Na Móna Fuels Limited in February 2016. An appeal was taken to An Bord Pleanála and Bord Na Móna was granted permission in July 2016 by the Bord with revised conditions (ref number PL91.246279). An Environmental Impact Statement (EIS) was submitted by the developer and the environmental impact assessment carried out by An Bord Pleanála. It is not considered that significant cumulative impacts will arise from the proposed road development due to the modification and expansion of the existing operations at this site. While the alterations to the facility will result in an increase in production levels on site, the site is already established as a production facility and the proposed development has been found to have no direct impacts on a number of environmental criteria. Mitigation measures have been incorporated where required in the design to ensure that residual impacts will not be significant. The impacts as a result of this development have been considered in light of the proposed road development and will not result in significant cumulative effects.

17.4.3 Nestle – Wyeth Nutritionals Ireland Ltd

A number of planning applications have been submitted in the past few years for the site at Tomdeely North, Askeaton, 780m north of the Askeaton Link tie in proposed as part of the proposed road development.

Planning Application Reference 17617 was granted permission in August 2017 to demolish the existing temporary building and link corridor to the existing production building, relocation of an external fire escape stairs, construction of a one-storey staff locker room, an enclosed loading area to the existing warehouse building and minor internal alterations. Also in 2017, permission was granted for the demolition of 2 no. existing Oil Tanks and bund wall, and the construction of a two-storey Water Treatment Building and a two-storey Waste Treatment Building in planning application 17584.

Two planning applications were also granted in 2016 for the site, (planning application Reference 16249) comprised permission for construction of two proposed new buildings that will adjoin the existing building, a new entrance lobby and exit lobby onto the existing building and construction of a surface car park to the south of the new pilot plant building to accommodate 9 visitor car parking spaces. Planning Application Reference 16194 granted permission for the construction of a two-storey extension to the existing High-level Warehouse at ground floor level consisting of a two storey Intermediate Hopper Room and a single-storey Plant/Equipment Room at its manufacturing facility.

Previous to this, in 2015, planning application Reference 151057 granted permission for a surface car park for 156 parking spaces and site development works include the demolition of two vacant residential dwellings. While planning application Reference 14895 granted permission for 5 Air Handling Unit Rooms, 1 Plant Room and 1

Transformer Room including link corridors and equipment platforms, all on the roof of the existing single storey production building at its manufacturing facility.

Wyeth Nutritionals are regulated by the Environmental Protection Agency (EPA), Integrated Pollution Control (IPC) Licence No (P0395-03). The 2018 annual report found that all emissions were within their licensed emission limit values. It is not considered that significant cumulative impacts will arise from the proposed road development and the Nestle – Wyeth Nutritionals development due to the distance between the two developments and the nature of the works associated with the above applications.

17.4.4 Great Southern Greenway

An extension to the Great Southern Greenway walking & cycling route was submitted as a Part 8 application (Reference 178002) in 2017. The section from Rathkeale to Ballingarrane along the former Limerick to Kerry line will include development of approximately 3km section to include the provision of a rolled gravel surface path and all associated drainage, fencing, signage and repair works to structures.

As the proposed development crosses the route of this proposed greenway extension, an underpass will be provided to allow the planned development of the greenway, despite the development of the proposed road development. Given the quite limited interactions between the two developments, no cumulative effects are expected as a result of the proposed road development.

17.4.5 Adare Manor Hotel & Golf Resort (15/920) Tizzard Holdings

The refurbishment of Adare Manor Hotel and Golf Resort was granted permission in January 2016 for refurbishment and expansion works. Construction was carried out in 2016 and 2017, of which the key elements of the works included a conference / ballroom wing and bedroom wing attached to the hotel extension at the manor, a refurbished golf clubhouse and carriage house, and reorganised support buildings such as a facilities complex and an energy centre, in addition to reorganised car parks and new entrance gates.

An EIS was completed for this development, in which works were stated to have potential to interfere with bat roosts and feeding areas. It was also stated that an ecologist will monitor any such activity and liaise with National Parks and Wildlife Service (NPWS) as required. The potential impacts on bats have been assessed in detail within this EIAR and the Natura Impact Statement (NIS) prepared for the proposed scheme. Due to the distance of the proposed road development from the Adare Manor Hotel, and the suite of mitigation measures proposed as part of the proposed road development, there is not likely to be any cumulative impact on Lesser horseshoe bats as a result of the two developments.

17.4.6 Irish Cement Limited

Irish Cement Limited was granted a 10-year permission for development to allow for the replacement of fossil fuels through the introduction of lower carbon alternative fuels and to allow for the use of alternative raw materials in their Limerick Cement Works. The works included the construction of: a tyre storage area and associated conveyor; a proposed pumpable fluids storage tank; a proposed fine solids dosing building; an alternative raw materials storage building; 3 silos; and a by-pass filter. The works will also include for the demolition of 4 steel and metal clad covered car park bay structures and ancillary works. The application (ref. 16/345) for the works in Castlemungret, approximately 6.5km north east of the eastern tie in at the Attyflin Junction was

appealed to An Bord Pleanála in April 2017 and was subsequently granted permission by the Bord with conditions, in April 2018.

Due to the distance from the proposed road development and the onus of the factory to comply with their IPC license, no likely significant cumulative effects are expected.

17.4.7 Greenstar Environmental Services Ltd

Greenstar Environmental Services Ltd was granted planning permission in 2014 under planning reference 13300 to increase the amount of waste accepted annually to their company in Ballykeeffe, Dock Road Limerick, to 130,000 tonnes. The application was accompanied by an EIS and a revision will be required to their EPA IPC License on expansion of capacity. The proposed expansion does not require the construction or provision of any new buildings.

The planning application for the proposed increase in capacity relates to the Greenstar holding on Dock Rd, approximately 8.2km north east of the proposed road development. Due to the distance from the proposed development, no significant cumulative impacts are expected as a result of the proposed road development.

17.4.8 CPL Fuels Ireland Ltd (14/603, 15/818 and 18/491)

CPL Fuels Ireland Ltd were granted planning permission in 2015 for works including the alterations and extension to the existing industrial building, erection of new buildings and hardcore area for processing and storage of solid fuel briquettes by CPL and to use the property for the import and export of products through the Port of Foynes. The development will incorporate the construction of two weighbridges, a wastewater treatment system and drainage infrastructure etc. An EIS and NIS were prepared for the application, which found that it would not have impacts on the Lower River Shannon SAC and River Shannon and River Fergus Estuaries SPA alone or in combination with other Shannon-Foynes Port activities. The CPL Fuels site is located 1km north of the Foynes tie in of the proposed road development, within the lands of Shannon Foynes Port.

The permission granted was subject to a number of conditions, to ensure impacts would not occur. Minor amendments were made to this application in 2015 through a further planning application (ref:15818). This was granted by the Local Authority in January 2016. Minor amendments to this approved development were granted permission in July 2018, to include additional covered storage area and reduced packaging area, and the relocation of the permitted biomass building to accommodate such.

The proposed road development will provide improved road infrastructure for companies such as CPL Fuels Ireland for the distribution of their product. Significant negative cumulative impacts are not anticipated as a result of the mitigation measures provided in the EIS and NIS and the conditions attached to the planning permission.

17.4.9 Housing Developments

Nasso Property Holdings Ltd.

Permission was granted in 2014 to extend the duration of planning application Reference 08/1900 for development comprising 28 dwellings of various bed numbers, three blocks comprising apartments and commercial/retail units, a crèche, retirement village of 70 units, and the demolition of 2 agricultural buildings. Permission is granted until 2nd March 2020 and the site is located at Graigue, Adare, approximately 2km

south of the proposed development. Due to the distance from the proposed road development, no cumulative impacts are likely.

17.4.10 Development Plans

Limerick County Development Plan (As Extended) (2010 - 2016)

The Limerick County Development Plan 2010 – 2016 (As Extended) includes transport and development objectives to ensure that the transportation, infrastructure, natural and energy resources shall be developed in a sustainable and efficient manner. Variation No.6 was adopted as part of the Plan in April 2018, which sees policy support for “*Design, reserve land for and commence construction of a bypass of Adare and N21 Route Improvements from Adare to the County boundary*”, as resources become available” and “*Design, reserve land for and commence construction of a new road between the N21 at Rathkeale and the N69 at Foynes as resources become available*”. The environmental impacts of the Variation were assessed within the Strategic Environmental Assessment carried out for the Variation. Mitigation measures were included in the Variation text to ensure that significant impacts would not occur at project level.

The County Development Plan also outlines proposed National Road Improvements, of which the N20 Cork Road is included:

“Design, reserve land and commence construction of the N20 upgrade to Motorway standard, which forms part of the strategic Atlantic Corridor and is included in “Transport 21” from Patrickswell to Charleville in County Limerick.”

Cork to Limerick M20

In 2008 a study was commissioned by Cork County Council to identify a preferred route corridor for an upgraded road between Cork and Limerick. Subsequently proposals for the M20 Cork Limerick Motorway Scheme were lodged with An Bord Pleanála in 2010. The 2010 scheme included a proposed motorway between the existing N20 at Blarney, Cork and the existing N21 west of Attyflin, Limerick. The M20 Cork Limerick Motorway Scheme was withdrawn from An Bord Pleanála in 2011 due to the economic downturn.

An improved road between Cork and Limerick has been identified in the 2018-2027 National Development Plan (NDP) as a major enabler for balanced regional development. Since the identification and appraisal of the preferred route for the M20 Cork Limerick Motorway Scheme in 2010, assessment methods for environmental and economic impacts have been updated and these may affect the suitability of any previously selected corridors. In May 2019, Limerick City and County Council appointed Technical Advisors to progress the planning and design for the N/M20 Cork to Limerick Road Improvement Scheme. The Technical Advisors have been commissioned to deliver the planning and development of the scheme encompassing Concept and Feasibility, Options Selection, Design & Environmental Evaluation and Statutory Processes.

While currently there is limited information available regarding the predicted impacts of the future N/M20 Cork to Limerick Road Improvement Scheme, on review of the original M20 Cork to Limerick EIS documents that were published in 2010, it is expected at this stage that there will be some cumulative impacts as a result of both road developments.

Population and Human Health

While the proposed developments are within different study areas, they are expected to result in similar impacts with regard to population and human health. Similar to the

proposed Foynes to Limerick Road development, the M20 Scheme is expected to result in cumulative positive impacts in terms of improved safety, journey times, journey amenity to road users and improved amenity within towns and villages along the existing roads due to the removal of through traffic. Cumulative impacts to human health are also expected to be beneficial on a community level.

Ecology / Hydrology

The previous M20 fell predominantly within the catchment of the River Blackwater, and the EIS and NIS focused on potential effects on the River Blackwater cSAC. While the M20 road development included a crossing of the River Maigue, it was approximately 7km upstream of the Lower River Shannon cSAC at Adare. The predicted residual impact of the river crossing, and the crossings of associated tributaries of the River Maigue, was found to be imperceptible and temporary during the construction stage on both the River Maigue and the Lower River Shannon cSAC, while for the construction stage it was found to be imperceptible and permanent. In addition, residual impacts on water quality in general, were found to be imperceptible to slight beneficial (in areas where the existing N20 was being upgraded). The proposed Foynes to Limerick Road (including Adare Bypass) has been found to have no residual negative impacts on water quality within the catchments crossed by the proposed development. Similarly, the NIS found that the development will not adversely affect the integrity of any European Site, in view of its Conservation Objectives including the Lower River Shannon SAC. Therefore, the cumulative impact as result of both road developments for Ecology and Hydrology is not significant.

It is likely that the construction of the M20 scheme will result in the severance of commuting routes for wildlife and mammal territories including breeding grounds and foraging habitat. However, extensive mitigation measures have been provided as part of the proposed Foynes to Limerick road development to reduce impacts and to re-establish connectivity within the landscape. Once best practice measures are undertaken in the design of the M20 scheme, it is considered that there will not be significant cumulative impacts for mammal movements.

Hydrogeology

The eastern tie-in of the proposed Foynes to Limerick Road development, where the previous M20 proposed to tie into the M21 at Monearla, is located in a Locally Important Aquifer (Bedrock which is Moderately Productive only in Local Zones). The Foynes to Limerick Road (including Adare Bypass) has been found to have a residual impact of imperceptible on all aquifers it crosses, therefore, it is expected that no cumulative impacts on the hydrogeology would be expected as a result of the future M20 Scheme.

Noise and Vibration

With regard to cumulative noise and vibration impacts, the construction phase of the proposed Foynes to Limerick road development will occur mainly offline, and north of the existing N21, and therefore will be remote from the development of the M20 Scheme. The only potential for cumulative impacts could therefore be due to construction vehicles on the existing road network between Adare and Patrickswell if both road schemes were constructed at the same time, which is very unlikely in the context of the significant time differential of several years between the planning applications for the two schemes.

The operational stage of the proposed development will provide reductions in noise levels along the existing N21, west of, and including Adare town due to the removal of traffic. Impacts along the N21, east of Adare, as far as the existing M20 junction at

Attyflin have been modelled using the high-growth scenario in the Design Year 2039 as per Chapter 5 which also took into account the traffic volumes forecast for the M20. Predicted noise levels have been reduced to the TII design goal, or the same levels as the Do-Minimum value, in line with the TII guidelines, with the use of mitigation measures. Therefore the likely cumulative impacts of both road schemes have been assessed in this EIAR for noise and vibration.

Air Quality and Climate

The construction stage of the proposed development has been found to have an insignificant and imperceptible impact on air quality and climate respectively following mitigation. The operation phase has also found the impact of the proposed road development to be imperceptible for both air quality and climate, for the long and short term. It is therefore likely that the cumulative impacts from both the proposed road development and the M20 Scheme will not be significant.

Archaeology and Cultural Heritage, Material Assets

The proposed road development travels north of the existing N21 and joins the N21 in the townland of Kilgobbin. East of this, the proposed road development is online on the N21 and will require limited upgrades to the existing N21. While it is unclear where the proposed M20 Scheme will terminate, it is expected that there will be no significant cumulative impacts on Material Assets as a result of both developments.

Shannon-Foynes Port Company Masterplan – Vision 2041 (2013)

The Shannon-Foynes Port Company's ambition to provide a new deep-water berth (circa 15m draught) at Foynes and the continued expansion of existing infrastructure at Foynes in order to capitalise on the trend toward larger vessels will all lead to increases in traffic at the port. The Shannon Foynes Annual Report 2016 states continued growth is strongly dependent on good quality road and rail connection. It also states the implementation of the preferred route for the Foynes to Limerick Scheme is critical infrastructure required for the development of the Shannon Foynes Port Company and its hinterland. Provision of improved road access to Shannon - Foynes Port will provide a key support for the growth of the port and associated industries.

The Vision 2041 Masterplan also includes for the reinstatement of the Foynes to Limerick Railway Line. Objectives included in relation to the Rail line include:

- *Protection of the permanent way of the existing line should be ensured at a minimum*
- *A programme of maintenance and inspection should be put in place to ensure that the line does not fall into further disrepair*
- *Clarification should be received from IE regarding a definitive reinstatement timeline, so that the line can have a specific re-opening timeline in place in the event of a trigger event becoming likely*

A Strategic Environmental Assessment (SEA) was carried out for the Vision 2041 Masterplan which concluded that potential impacts included increased road traffic and emissions. However, the proposed road development will provide a less congested route for the Port of Foynes traffic and has taken into account the impact of Heavy Goods Vehicle (HGV) levels and traffic counts projected by Vision 2041 in the traffic analysis for the proposed road development. The proposed road will intersect with the Foynes to Limerick Railway Line at three locations, providing overbridges for the proposed road to travel across the rail line, so as to preserve the railway for further

development. Therefore, with the implementation of mitigation measures, there will be no significant impacts on air quality and climate, and noise and vibration.

17.5 Additional Mitigation Measures

Following the above assessment of potential cumulative impacts as a result of planned or reasonably foreseeable developments within the study area, there are no additional mitigation measures proposed as part of the Foynes to Limerick Road (including Adare Bypass).

17.6 Residual Impacts

Based on the above, it can be objectively concluded that, in view of best scientific knowledge, the proposed development will not result in any likely significant effects on the environment.

17.7 Conclusion

Interactions

The interactions between the individual environmental disciplines have been considered and assessed. It is concluded that once relevant mitigation measures are implemented, no residual likely significant effects will exist as a result of the construction or operation of the proposed road development.

Cumulative Impacts

It is considered that the scale of the works and implementation of effective environmental control measures will avoid all likely significant effects on environmental parameters. There is no potential for significant cumulative impacts arising in combination with any other plans or projects and therefore no potential for significant in-combination effects on environmental parameters.