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19 Interactions and Cumulative Effects

19.1 Introduction

In addition to the assessment of impacts on individual topics presented in the previous chapters of this Environmental Impact Assessment (EIAR), the interaction between these factors has also been considered as part of the environmental impact assessment.

This chapter analyses the Interrelationships and cumulative effects and main interactions between different aspects of the environment likely to be significantly affected by the Proposed Project. The first type is the assessment of effects on receptors or receptor groups, such as local residents, which may be affected by different environmental elements generated by the proposed road project simultaneously or concurrently. This is sometimes referred to as the 'interrelationships' or 'in combination effects' between different environmental effects. The assessment includes consideration of particular locations/receptors where several effects for example noise, air and landscape may all occur.

The second type is the assessment of effects of the proposed road project together with other past, present or reasonably foreseeable projects, where there is potential for overlap spatially or temporally, often referred to as cumulative effects.

19.2 Assessment Methodology

19.2.1 Statutory Requirements

The requirements to address interactions of effects and cumulative impacts is set out in Council Directive 85/337/EEC on the assessment of the effects of certain public and private projects on the environment. This Directive has been amended by Council Directive 97/11/EC, Directive 2003/35/EC and Directive 2009/31/EC and is now codified in Directive 2011/92/EU which has now been amended in 2014 by Directive 2014/52/EU.

Article 3 of the EIA Directive outlines the information to be contained in an EIAR as follows;

"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; and

(e) the interaction between the factors referred to in points (a) to (d)."

The aforementioned Directive are transposed into Irish Legislation through the Planning and Development Regulations 2018.

19.2.2 Guidance

This chapter has been prepared in accordance with the following guidelines;

- EPA (2017) Guidelines on the Information to be Contained in Environmental Impact Assessment Reports, Draft, August 2017.
- EPA (2015) Revised *Guidelines on the Information to be contained in Environmental Impact Statements*, Draft, 2015;
- EPA (2015) *Advice Notes on Current Practice in the Preparation of Environmental Impact Statements*, Draft, 2015; and
- EPA (2002) Guidelines on the Information to be contained in Environmental Impact Statements, 2002;
- EPA (2003) *Advice Notes on Current Practise in the Preparation of Environmental Impact Statements*, 2003.
- European Commission Guidelines for the Assessment of Indirect and Cumulative Impacts as well as Impact Interactions.

19.2.3 Assessment Methodology

The potential for significant interactions, cumulative impact and indirect impacts was examined at the screening stage in the preparation of the EIAR. Where the potential for significant interactions or impact was identified, such interactions and impacts were included in the scope and addressed in the baseline and impact assessment chapter for each of the relevant environment media namely Chapters 7 to 18 inclusive.

The matrix and expert opinion approaches, as described and outlined in the aforementioned EU Guidelines were used in the identification of the potential for significant interactions, cumulative impacts, direct and indirect impacts.

19.3 Interaction of Effects

All environmental factors are inter-related to some extent, and the relationships can range from tenuous to highly complex.

The major interactions between the recorded environmental impacts are assessed within the individual chapters of the EIAR. Table 19-1 provides a matrix summarising the interactions between the various parameters outlined in this EIAR from Chapters 7 to 18, inclusive.

Table 19-1: Matrix to Summarise Key Inter-relationships.

Key Environmental Interaction Matrix	Traffic and Transportation	Air Quality and Climatic Factors	Noise and Vibration	Biodiversity	Archaeological, Architectural and Cultural Heritage	Landscape/Townscape and Visual	Land and Soils	Water and Hydrology	Resource and Waste Management	Population and Human Health	Material Assets- Land Use and Property	Material Assets-Utilities
Traffic and Transportation	✓	✓	✓	✓			✓	✓	✓	✓	✓	
Air Quality and Climatic Factors	✓	✓					✓			✓		
Noise and Vibration	✓		✓				✓			✓		
Biodiversity	✓			✓		✓		✓				
Archaeological, Architectural and Cultural Heritage					✓	✓						
Landscape/Townscape and Visual				✓	✓	✓					✓	
Land and Soils	✓	✓	✓				✓	✓	✓			✓
Water and Hydrology	✓			✓			✓	✓		✓		
Resource and Waste Management	✓						✓	✓	✓			
Population and Human Health	✓	✓	✓					✓		✓	✓	
Material Assets- Land Use and Property	✓					✓				✓	✓	
Material Assets-Utilities							✓					✓

The matrix highlights the potential for the topic or issue in the left-hand column to have an effect on the environmental issue mentioned in the top row of the matrix. If there is a “✓” in a box this means that there is potential for an effect during the operational or construction phase of the proposed project. If there is considered to be no significant potential for an effect, or if the interaction is more relevant to a different issue pair, the box will be left blank.

The purpose of the effects matrix is to identify potential significant effects on different environmental issue. Actual effects and their significance are dealt with in the most relevant chapter.

This assessment was based on information contained within this EIAR, the outcome of workshops and consultation with the relevant sub-consultants. The main environmental interactions anticipated as they relate to the Proposed Project are also summarised in the following sections.

Interaction of Traffic and Transportation & Air Quality And Climatic Factors

The interaction between air quality and traffic is considered important. The proposed development will result in a change in traffic levels causing a change in ambient air pollution levels in certain areas along the scheme. The proposed scheme will divert traffic away from some heavily congested areas and thus have a beneficial impact on air quality. However, ambient pollutant concentrations will increase in areas that did not experience high volumes of traffic prior to the scheme resulting in a negative impact. Overall, the impact of the interaction between air quality and traffic is considered long-term, slight negative and not significant. Refer to the relevant chapters for additional information.

Interaction of Traffic and Transportation & Noise and Vibration

The noise emission sources from the proposed road development during the operational phase will be from traffic. The noise impact assessment has been prepared in consultation with the design team and traffic engineers. Noise emissions have the potential to negatively impact on human beings, population and human health. Traffic noise levels have been calculated at noise sensitive buildings along the length of the proposed road development and mitigation has been identified for a number of properties. The mitigation measures required to reduce traffic noise levels are specified based on the predicted noise levels for the Design Year of 2035. Refer to the relevant chapters for additional information.

Interaction of Traffic and Transportation & Biodiversity

The presence of the road infrastructure and traffic flows can have impacts on biodiversity including physical land take of habitat, severance of commuting or feeding routes and direct mortality. Chapter 10 Biodiversity sets out a range of mitigation measures which include preconstruction surveys, mammal crossings at key wildlife corridors, mammal shelves at watercourse crossings, habitat compensation, bat sensitive lighting and bat roosting boxes. Refer to the relevant chapters for additional information.

Interaction of Traffic and Transportation & Land & Soils

The volumes of surplus soils generated by the scheme and the earthworks import requirement will affect construction stage traffic generation. Measures to optimise design and minimise material

generation are detailed in Chapter 5, Chapter 13 & Chapter 15. Measures to mitigate against construction stage traffic impacts are detailed in Chapter 5 and Chapter 7.

Interaction of Traffic and Transportation & Water and Hydrology

Construction and operational stage traffic have the potential to impact on water quality via hydrocarbon spills and leaks and via increased sediment/particle loading on trafficked surfaces. Measures to mitigate against impacts are detailed in Chapter 5 and Chapter 14.

Interaction of Traffic and Transportation & Resource and Waste Management

Construction and operational stage traffic have the potential to be impacted by waste generation and resource management on site. Measures to mitigate against impacts are detailed in Chapter 5, Chapter 14 and Chapter 15.

Interaction of Traffic and Transportation & Population and Human Health

Construction and operational stage traffic and traffic management measures have the potential to affect journey amenity or economic activity as a result of increased congestion or access restrictions. Interactions on human health as a result of traffic generated air and noise pollution are detailed above and within the relevant chapters

The upgraded infrastructure provided as part of the scheme can facilitate growth in population and increased infrastructure for sustainable travel modes can contribute towards modal shift in travel patterns and increased physical activity. The scheme provides increased access to local attractions by virtue of reduced congestion. Employment and economic activity will be generated during the construction stage of the project. Refer to the relevant chapters for additional information.

Interaction of Traffic and Transportation & Material Assets – Land Use and Property

Construction and operational stage traffic and traffic management measures have the potential to affect local journey duration, journey time reliability and journey patterns for all forms of transports (private vehicle, public transport, pedestrian, cyclist etc.). Impacts may be positive or negative. Impact magnitude will be influenced by changes to journey length or duration, transport modes affected and alternatives available

The presence of new roads may physically sever land parcels or access routes. Changes to traffic loads may tend to either increase or decrease severance caused by traffic loading. For example the significant reduction in traffic flows on Glenamuck Road east of the Bus gate and Enniskerry Road through Kiltiernan will reduce the severance caused by the heavy traffic load on these existing routes. The land take of the road and any associated works will also have an economic impact on affected properties.

Refer to the relevant chapters for additional information.

Interaction of Air Quality And Climatic Factors & Land and Soils

Exposed soils during the construction stage have the potential to generate nuisance dust during dry periods. Chapter 13 and Chapter 8 set out mitigation measures for soils handling and for construction

stage dust management. The mitigation measures that will be put in place at the proposed development for the construction phase will ensure that the impact of construction dust emissions are short-term and negative but overall imperceptible.

Interaction of Air Quality And Climatic Factors & Population and Human Health

The mitigation measures that will be put in place at the proposed development for the construction phase will ensure that the impact of construction dust emissions in the form of nuisance dust soiling or human health effects are short-term and negative but overall imperceptible.

Air dispersion modelling of operational traffic emissions was undertaken to assess the impact of the scheme 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 scheme are compliant with all National and EU ambient air quality limit values and, therefore, will not result in a significant impact on human health.

Interaction of Noise and Vibration & Land & Soils

Earthworks activities associated with the scheme have the potential to affect Noise and vibration. Excessive earthworks can generate noise resulting from earth moving plant. Interactions with bedrock can introduce the requirements for pneumatic breaking of rock or blasting, based on site investigation results and the generally shallow depth of earthworks on the scheme there are only anticipated to be local construction interactions with bedrock which can be completed in line with mitigation measures set out in the relevant chapters. Measures to optimise design and minimise material generation are detailed in Chapter 5 and Chapter 13. Measures to mitigate against noise and vibration impacts are detailed in Chapter 9.

Interaction of Noise and Vibration & Population and Human Health

Earthworks activities associated with the scheme have the potential to affect Noise and vibration. Excessive earthworks can generate noise resulting from earth moving plant. Interactions with bedrock can introduce the requirements for pneumatic breaking of rock or blasting, based on site investigation results and the generally shallow depth of earthworks on the scheme there are only anticipated to be local construction interactions with bedrock which can be completed in line with mitigation measures set out in the relevant chapters. Measures to optimise design and minimise material generation are detailed in Chapter 5 and Chapter 13. Measures to mitigate against noise and vibration impacts are detailed in Chapter 9.

Interaction of Biodiversity & Landscape and Visual

Ecological mitigation measures entail planting of native species to mitigate any loss of trees from the scheme extents. Planting of these species can also be incorporated into the mitigation measures for Landscape and Visual by reducing impacts on the surrounding environment during the operational phase. Ecological mitigation measures will create a positive effect on the landscape and reduce visual impacts on sensitive receptors.

Interaction of Biodiversity & Water and Hydrology

Silts, suspended solids, oils and chemicals entering water environment have the potential to adversely affect water quality, with associated effects to fish and aquatic ecology. Unsuitable culvert/channel sizing or installation can affect movement of fish or mammals along the watercourse corridor. Mitigation measures are described in Chapter 14 and include pollution control methods, water quality treatment measures and compliance with best practice procedures. Culverts will be designed to be fish and mammal passable.

Interaction of Archaeological, Architectural and Cultural Heritage & Landscape/Townscape & Visual

These topics have some close relationships in that Architectural and Cultural Heritage elements influence the townscape and views experienced. Mitigation measures outlined in Chapter 11 and Chapter 12 are often therefore applicable to both topics.

Interaction of Landscape/Townscape & Material Assets: Land Use and Property

The landscape character and existing views in the area will change during both the construction and operational phases of the proposed road development. This impact has the potential to interact with people, both in terms of landscape and visual impacts where they live, work and their use and “experience” of surrounding amenities. Mitigation measures outlined in Chapter 12 will therefore also be applicable to Material Assets and Land use.

Interaction of Land and Soils & Water and Hydrology

The landscape character and existing views in the area will change during both the construction and operational phases of the proposed road development. This impact has the potential to interact with people, both in terms of landscape and visual impacts where they live, work and their use and “experience” of surrounding amenities. Mitigation measures outlined in Chapter 12 will therefore also be applicable to Material Assets and Land use.

Interaction of Land and Soils & Resource & Waste Management

The volumes of surplus soils generated by the scheme and the earthworks import requirement will affect waste generation. Measures to optimise design, minimise material generation and manage waste are detailed in Chapter 5, Chapter 13 & Chapter 15.

Interaction of Land and Soils & Material Assets Utilities

Earthworks associated with the scheme have the potential to affect existing underground and aboveground services. Various existing services will be required to be diverted as a result of the scheme. Measures to mitigate against impacts on utilities are described in Chapter 5, Chapter 13 & Chapter 18.

Interaction of Water and Hydrology & Population and Human Health

Contamination of the water environment has the potential to affect human health through impacts on downstream drinking water abstractions. The linkages from the local water environment to drinking water sources has been determined in chapter 14 and no significant downstream potable abstractions have been identified. Measures to mitigate against impacts on the water environment are described in Chapter 5 & Chapter 14.

Interaction of Population and Human Health & Material Assets: Land Use and Property

Primary impacts on population and human health due to material assets and land will entail landtake and impact on the property. Potential impacts on human beings as a result of material assets: land use and property will be mitigated by measures including the provision of new accesses and replacement boundaries to affected properties.

Monetary compensation will be subject to negotiation with all relevant parties from whom land or property is acquired for the proposed road development.

19.4 Cumulative Effects

The EU Guidelines define cumulative effects/impacts as:

“Impacts that result from incremental changes caused by other past, present or reasonably foreseeable actions together with the project. For Example;

- Incremental noise from a number of separate developments;*
- Combined effect of individual impacts, e.g. noise, dust and visual, from one development on a particular receptor; and*
- Several developments with insignificant impacts individually but which together have a cumulative effect.”*

The EPA draft guidelines on the information to be contained in EIAR’s mirrors this approach and defines cumulative impacts/effects as *‘The addition of any minor or significant effects, including effects of other projects, to create larger, more significant effects’.*

Therefore, the assessment of cumulative impacts considers the total impact associated with the Proposed Project when combined with other past, present and reasonably foreseeable future developments.

An examination of the potential for other projects to contribute cumulatively to the impacts from this Proposed Project was undertaken during the preparation of this EIAR. Chapter 6 of the EIAR (Planning and Policy) includes an overview of strategic land use policy objectives for the area and significant development proposals with planning permission or under consideration through the statutory planning process. The traffic assessment in Chapter 7 includes a comprehensive assessment of the GDRS within the strategic road network for the area, and includes the effect of forecasted development in the area. The GDRS has an integrated relationship with landuse under the Kiltiernan/Glenamuck LAP, in that it supports the sustainable development of the LAP area. The GDRS supports the implementation of policies but it is not dependent upon nor does it enable the implementation of other infrastructure projects which would be subject to a separate permission process. In the absence of the GDRS scheme development in the area would be likely to progress on an ad-hoc basis without a coherent approach to sustainable mobility and transport. This cumulative assessment has considered cumulative impacts that are:

1. Likely;
2. Significant; and
3. 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 the following:

- Dún Laoghaire Rathdown County Council (planning and roads section);
- An Bord Pleanála website;

- Dún Laoghaire Rathdown County Development Plan 2016-2022;
- Kiltiernan-Glenamuck Local Area Plan 2013-2018 (extended for 5 years);
- EIAR Portal.

19.4.1 Road developments in the Area:

From the County Development Plan, the following relevant roads were identified as a six-year road development for the County;

- Cherrywood SDZ (necessary roads infrastructure as detailed in Cherrywood SDZ Planning Scheme);
- Cherrywood to Dún Laoghaire Strategic Route (R118, Wyattville Road to Glenageary Roundabout);
- Enniskerry Road (Stepaside to Glenamuck District Distributor Road);
- Glenamuck District Distributor Road;
- Glenamuck Local Distributor Road (including Ballycorus Link);
- Glenamuck Road South;
- Hillcrest Road;
- Kilgobbin Road (Mount Eagle to Ballyogan Road);
- Leopardstown Link Road Phase 1 and Roundabout Reconfiguration;
- M11 Upgrade (M50 to Fassaroe);
- Sandyford / Enniskerry Road (Coolkill to Aiken's Village);
- Shanganagh Road;
- The Park, Carrickmines to Ballyogan Road; and
- Woodbrook/Shanganagh Access Road.

The development process on each road is at different stages. There are a number of long term road developments which are referred to in Table 2.2.6 of the Development Plan. The Glenamuck Road is not dependent on road schemes outside the LAP area, and in turn does not restrict or limit other infrastructure investment outside the LAP area as a result of its implementation or non-implementation.

19.4.2 Other Road Plans located outside of Dún Laoghaire Rathdown

From all other documents available, the following plans and roads are undergoing Planning/Design/Construction within the area:

- N11/M11 Junction 4 to Junction 14 Improvement Scheme.

The scheme is located over 3.5km from the subject site and both schemes will only have a localized construction footprint. The M11/N11 scheme is at feasibility stage and construction stages of both would not be anticipated to overlap.

- Dublin BusConnects

The total estimated cost of this development is €2 billion euro with an estimated completion date of 2027. Dublin BusConnects will deliver a transformational redesign of the bus system in Dublin. It will comprise a network of 'next generation' bus corridors on the busiest routes with segregated cycling facilities, a complete redesign of the bus network, cashless and simpler fare structures, and state-of-the-art ticketing systems, account-based ticketing, new bus branding, integrating bus vehicles of different operators and types, new bus stops and shelters and use of low-emission vehicles. The development of this scheme will improve the overall GDRS scheme and vice versa. This plan is currently in planning stages and is not expected for completion for another 10 years.

19.4.3 Major Accidents and/or Disasters

As required in the Directive 2014/52/EU, this EIAR has looked at the effects on the environment in the event of major accidents and/or disasters relevant to the project, including those caused by climate change. It is considered that the main area of potential for major accidents and/or disasters relevant to the project are:

- Proximity to Seveso Sites;
There are no Seveso (COMAH) sites near the proposed road development with the nearest Seveso site being the Synergen Power Ltd. t/a ESB Dublin Bay Power, Pigeon House Road, Ringsend, Dublin 4, is located approximately 15.0km north of the site. Therefore, there is no likely significant impact as a result.

19.4.4 Noise and Vibration

The cumulative traffic noise impacts associated with committed and proposed future developments have been assessed at each of the receptor locations considered as part of this assessment. During the Do-Nothing scenario, road traffic flows along the existing road network have been modelled and the cumulative traffic noise level calculated. For the modelled Do-Something scenarios, road traffic along the existing road network coupled with traffic along the proposed road development are combined to obtain a cumulative traffic noise level. The assessment takes account of any alignment alterations to the existing roads and junction and the re-distribution of traffic along the existing road network as a result of the proposed road development.

In this regard the cumulative road traffic noise impacts are incorporated into the calculated operational noise levels set out in Chapter 9, Table 9.8.

19.5 References

- European Commission (1999), guidelines for the Assessment of Indirect and Cumulative Impacts as well as Impact Interactions. European Commission, Luxembourg.
- Environmental Protection Agency (2017) Draft, Guidelines on the Information to be Contained in Environmental Impact Assessment Reports. EPA. Wexford.
- Health and Safety Authority (2018) Notified Seveso Establishments. www.hsa.ie. Available from: https://www.hsa.ie/eng/Your_Industry/Chemicals/Legislation_Enforcement/COMAH/List_of_Establishments/.