

19 ENVIRONMENTAL INTERACTIONS & CUMULATIVE IMPACT

19.1 Introduction

This Chapter of the EIAR identifies the principle interactions between the potential impacts of the environmental factors identified in Chapter 5 to 16 inclusive.

The principal interactions are summarised below, under Table 19.1, and further discussed in Section 19.2 of this Chapter.

The predicted impacts identified in Chapters 5 – 16 have taken into account the principal interactions listed below and associated mitigation measures.

The cumulative impacts arising from the interaction of impacts identified below, is also outlined in this Chapter.

	Population & Human Health	Biodiversity	Land, Soils & Geology	Water	Climate – Air Quality & Climate Change	Climate – Sunlight	Climate – Daylight	Air – Noise & Vibration	Landscape & Visual Impact	Material Assets – Transport	Material Assets – Waste	Archaeological, Architectural and Cultural Heritage
Population & Human Health		x	x	x	✓	x	x	✓	✓	✓	x	x
Biodiversity	x		✓	✓	✓	x	x	✓	x	x	x	x
Land, Soils & Geology	x	✓		✓	x	x	x	x	✓	x	x	x
Water	x	✓	✓		x	x	x	x	✓	x	x	x
Climate – Air Quality & Climate Change	✓	✓	x	x		x	x	x	x	✓	x	x
Climate – Sunlight	x	x	x	x	x		x	x	x	x	x	x
Climate – Daylight	x	x	x	x	x	x		x	x	x	x	x
Air – Noise & Vibration	✓	✓	x	x	x	x	x		x	✓	x	x
Landscape & Visual Impact	✓	x	✓	✓	x	x	x	x		✓	x	✓
Material Assets - Transport	✓	x	x	x	✓	x	x	✓	✓		x	x
Material Assets - Waste	x	x	x	x	x	x	x	x	x	x		x
Archaeological, Architectural and Cultural Heritage	x	x	x	x	x	x	x	x	✓	x	x	

Where there is an interaction = ✓ No Interaction = x

Table 19.1: Matrix of Interactions between Environmental Factors (During Construction and Operational Phases)

19.2 Interactions

19.2.1 Population and Human Health (Chapter 5)

Population and Human Health items interact with other environmental items as outlined in Chapter 5 of this EIAR, these are summarised as follows: -

- Air Quality and Climate – Potential impacts on the receiving air quality and climate could also result in associated population and human health impacts. However the mitigation measures described in Chapter 5: Population and Human Health and Chapter 9: Climate (Air Quality and Climate Change) will ensure that these are suitably mitigated against.
- Air, Noise and Vibration – Potential impacts on the receiving air, noise and vibration could also result in associated population and human health impacts. However the mitigation measures described in Chapter 5: Population and Human Health and Chapter 12: Air, Noise and Vibration will ensure that these are suitably mitigated against.
- Landscape and Visual Impact – Potential impacts on the receiving landscape and visual amenity could also result in associated population and human health impacts. However the mitigation measures described in Chapter 5 – Population and Human Health and Chapter 13: Landscape and Visual Impact will ensure that these are suitably mitigated against.
- Transport – Potential impacts on the receiving transport environment could also result in associated population and human health impacts. However the mitigation measures described in Chapter 5: Population and Human Health and Chapter 14: Material Assets (Transportation) will ensure that these are suitably mitigated against.

19.2.2 Biodiversity (Chapter 6)

Biodiversity items interact with other environmental items as outlined in Chapter 6 of this EIAR, these are summarised as follows: -

- Water – Potential impacts on the receiving hydrology and hydrogeology environment could also result in associated biodiversity impacts. However the mitigation measures described in Chapter 6: Biodiversity and Chapter 8: Water will ensure that these are suitably mitigated against.
- Land, Soils and Geology – Potential impacts on the receiving land, soils and geology environment could also result in associated biodiversity impacts. However the mitigation measures described in Chapter 6: Biodiversity and Chapter 7: Land, Soils and Geology will ensure that these are suitably mitigated against.
- Air Quality and Climate – Potential impacts on the receiving air quality and climate could also result in associated biodiversity impacts. However the mitigation measures described in Chapter 6: Biodiversity and Chapter 9: Climate (Air Quality and Climate Change) will ensure that these are suitably mitigated against.
- Air, Noise and Vibration – Potential impacts on the receiving air in terms of noise and vibration on associated biodiversity impacts were considered, however, it was predicted that no associated impacts would occur.

19.2.3 Land, Soils and Geology (Chapter 7)

Land, Soils and Geology items interact with other environmental items as outlined in Chapter 7 of this EIAR, these are summarised as follows: -

- Water – Potential impacts on the receiving hydrology and hydrogeology environment could also result in associated land, soils and geology impacts. However the mitigation measures described in Chapter 7: Land, Soils and Geology and Chapter 8: Water will ensure that these are suitably mitigated against.
- Landscape – Potential impacts on the receiving Land, Soils and Geology could also result in associated landscape impacts. However the mitigation measures described in Chapter 7: Land, Soils and Geology and Chapter 13: Landscape and Visual Impact Assessment will ensure that these are suitably mitigated against.

19.2.4 Water (Chapter 8)

Water items interact with other environmental items as outlined in Chapter 8 of this EIAR, these are summarised as follows: -

- Land, Soil and Geology – Potential impacts on the receiving hydrology and hydrogeology environment could also result in associated land, soils and geology impacts. However the mitigation measures described in Chapter 7: Land, Soils and Geology and Chapter 8: Water will ensure that these are suitably mitigated against.
- Landscape – Potential impacts on the receiving landscape could also result in associated water impacts. However the mitigation measures described in Chapter 8: Water and Chapter 13: Landscape and Visual Impact Assessment will ensure that these are suitably mitigated against.

19.2.5 Climate (Air Quality and Climate Change) (Chapter 9)

Air Quality and Climate Change items interact with other environmental items as outlined in Chapter 9 of this EIAR, these are summarised as follows: -

- Population and Human Health – Potential impacts on the receiving air quality and climate could also result in associated human health impacts. However the mitigation measures described in Chapter 5: Population and Human Health and Chapter 9: Climate (Air Quality and Climate Change) will ensure that these are suitably mitigated against.
- Transport – Potential impacts of the proposed development on transport could also result in associated impacts on the receiving air quality and climate. However, the mitigation measures described in Chapter 14: Material Assets and Chapter 9: Climate (Air Quality and Climate Change) will ensure that these are suitably mitigated against.

19.2.6 Climate (Sunlight) (Chapter 10)

No potential impacts from other chapters of this EIAR were considered to have the potential to have associated sunlight impacts.

19.2.7 Climate (Daylight) (Chapter 11)

No potential impacts from other chapters of this EIAR were considered to have the potential to have associated daylight impacts.

19.2.8 Air, Noise and Vibration (Chapter 12)

Air, Noise and Vibration items interact with other environmental items as outlined in Chapter 12 of this EIAR, these are summarised as follows: -

- Population and Human Health – Potential impacts on the receiving air, noise and vibration could also result in associated population and human health impacts. However the mitigation measures described in Chapter 5 – Population and Human Health and Chapter 12 – Air, Noise and Vibration will ensure that these are suitably mitigated against.
- Transport – Potential impacts on the receiving transport could also result in associated population and human health impacts. However the mitigation measures described in Chapter 5 – Population and Human Health and Chapter 12 – Air, Noise and Vibration will ensure that these are suitably mitigated against.

19.2.9 Landscape and Visual Impact (Chapter 13)

Landscape and Visual Impact items interact with other environmental items as outlined in Chapter 13 of this EIAR, these are summarised as follows:

- Transport – Traffic in the proposed development will have landscape and visual effects on properties in proximity to the proposed development. These effects were taken into account during design development of the Proposal. Mitigation measures have been proposed, in the form of landscape planting, street trees, width of new streets and roads. The organised planting of street trees along roads and parking spaces, all provide a new environment and sense of place. The new traffic from the existing R136 and Old Nangor road through the development provides the opportunity to propose an organised and varied design that shall provide a positive landscape and visual impact along the proposed roads and streets. This shall reduce the visual impact of Traffic.
- Land, Soils and Geology - The construction of the proposed development will involve excavation of existing soils, primarily soft in nature, with spoil material being placed in material deposition areas within the landtake. The development of the proposal, both horizontal and vertical, take account of landscape and visual impacts on residential properties.
- Water – As a result of the redistribution of traffic, there is a risk to water quality through pollution and spillage accident risk. The construction phase of the project has the potential to impact on groundwater and habitats. Mitigation measures have been put in place to avoid and/or minimise these effects. During the operational stage, sealed drainage systems will be used and stormwater drainage will be suitably treated prior to discharge. The SUDS (Sustainable Urban Drainage System) proposed will be a significant improvement over the traditional drainage regimes and with the distribution of the traffic onto the new roads is likely to result in an improvement during the operation stage for hydrogeology. The SUDS proposed aim to utilise a two-step intervention of surface water, cleaning and temporary storage, prior to release to the system.
- Archaeology Architecture Cultural Heritage – The development of the proposed development both including and following the selection of the preferred design has given due consideration to the existing habitats and development of the area. The development took account of the impact on the archaeological, architectural and cultural heritage impacts. Most particularly on Corkagh Park. During the construction phase, there is the potential to excavate previously unrecorded archaeological and cultural heritage artefacts. As a result, pre-construction surveys are proposed to be carried out to identify and resolve any previously undiscovered sites of archaeological potential prior to the main works commencing. The development of Kilcarbery also took account of Archaeological Heritage and Cultural Heritage and Architectural Heritage impacts, as outlined in the respective Chapter 16.



Figure 19.1: Image inside Corkagh Demesne House and Yard. Image shows Proposed Kilcarbery Housing as red Line.

- Biodiversity – The scheme has been developed to minimise the removal of existing hedgerows and trees in Kilcarbery. Open spaces have been selected to retain the Trees and hedgerows. However some parts of hedgerows and scrub vegetation will be removed in the construction – generally for access roads. This shall have a negative effect on landscape quality visual amenity and biodiversity. Landscape mitigation proposals have been developed to be complementary with the ecological requirements. These include planting of native, naturalised and indigenous species to augment existing hedgerows. The hierarchy of street tree planting shall help in reconnecting ecological networks resulting in a positive effect on biodiversity and a positive long term impact for Kilcarbery.
- Population & Human Health – Negative temporary visual impacts will arise for residents located close to or adjoining the construction boundary. A construction Management plan shall be drawn prior to construction and implemented. Specific mitigation measures include the provision of hoarding around construction compounds during the construction phase for properties particularly impacted by the works. During the Operational phase, landscape & visual impacts will arise from the built physical presence of the roads and streets. Mitigation measures will include general measures such as retention of existing hedgerows and trees, the augmentation of existing hedgerows established throughout the development. Planting a range of trees and species. Landscape and visual mitigation measures have been utilised in the design of the proposed development to reduce impacts on property. The impacts of the new development shall be offset by the further potential to enhance sustainable green links through the site and to surrounding employment and housing areas. The engagement with the natural landscape environment and renewed habitat areas are beneficial to the health and wellbeing of the local population. The facilitating of sustainable alternative transportation is positive for human health and aids in the forming of a sense of place in Kilcarbery.

19.2.10 Material Assets (Transport) (Chapter 14)

Transport items interact with other environmental items as outlined in Chapter 14 of this EIAR, these are summarised as follows: -

- Air Quality and Climate – Potential impacts on the receiving transportation network could also result in associated Air Quality and Climate impacts. However the mitigation measures described in Chapter 14: Material Assets (Transport) and Chapter 9: Climate (Air Quality and Climate Change) will ensure that these are suitably mitigated against.
- Air, Noise and Vibration – Potential impacts on the receiving transportation network could also result in associated Air, Noise and Vibration impacts. However the mitigation measures described in Chapter 14: Material Assets (Transport) and Chapter 12: Air, Noise and Vibration will ensure that these are suitably mitigated against.

19.2.11 Material Assets (Waste) (Chapter 15)

Waste items interact with other environmental items as outlined in Chapter 15 of this EIAR, these are summarised as follows: -

- Land, Soils and Geology – Potential impacts on the receiving land, soils and geology could also result in associated population and human health impacts. However the mitigation measures described in Chapter 7: Land, Soil and Geology and Chapter 15: Material Assets (Waste) will ensure that these are suitably mitigated against.

19.2.12 Cultural Heritage (Archaeology and Architectural Heritage) (Chapter 16)

Based upon the findings of the assessment of this Chapter, there are minor interactions along the southern boundary with Corkagh Demesne, with the Landscape and Visual Impact Chapter. However, the receiving environment has also been adequately considered within the Landscape and Visual Impact Chapter. Please refer to the relevant sections including mitigation measures within Chapter 13: Landscape and Visual Impact.

19.3 Cumulative Impacts

Where cumulative impacts were considered to arise, these have been outlined in the relevant Chapters of this EIAR. The below sections outline the cumulative impacts as raised in each relevant Chapter.

19.3.1 Population and Human Health (Chapter 5)

If additional large scale developments are proposed in the future, in the vicinity of the proposed development, this has the potential to impact of Human Health of the local population. However, it is unlikely that other future developments of similar scale would give rise to a significant impact during the construction and operational stages of those projects.

The cumulative impact of the development on the health of the surrounding area will be neutral, long-term & imperceptible.

19.3.2 Biodiversity (Chapter 6)

Construction Stage

There is potential to produce in combination effects on downstream water quality in the Camac River if there is overlap of construction phases with the proposed development. A number of surrounding applications are located within existing built environments and therefore involve minimal vegetation clearance, which will reduce the risk of sediment and silt contaminated surface water run-off from entering the receiving hydrological environment.

In the absence of mitigation, there may be a risk that contaminated construction-related surface water run-off reaches the Camac River and results in a temporary to long-term adverse significant impact at a local to County scale.

Operational Stage

Considering the proposed development in-combination with other proposed plans and projects in the surrounding area and current South Dublin County Council Development Plan 2016-2022 zoning, cumulative impacts are considered highly unlikely. An objective of the Greater Dublin Strategic Drainage Study is for all development plans, including South Dublin County Council and in this case any other development within the Camac River catchment, to include Sustainable Urban Drainage Systems in new development. This objective is considered likely to reduce pressures on water quality in the receiving hydrological environment.

Under South Dublin County Council Development Plan 2016-2022, Corkagh Park to the south and Grange Castle Golf Course to the west are protected under 'Objective OS – to preserve and provide for open space and recreational amenities' (SDCC, 2016). These green spaces may provide long-term alternative habitat for displaced birds, and other fauna, and will not be subject to future development under current zoning.

For reasons outlined above, no cumulative adverse significant impacts are predicted from the proposed development in combination with other plans or projects.

19.3.3 Water (Chapter 8)

Construction Stage

There are not considered to be any cumulative effects on the water environment during the construction stage.

Operational Stage

In the context of water and hydrology, consideration is given to the longer-term cumulative effects on the water environment post development. The most significant of these is development of the zoned lands upstream of the subject site. The development of these lands has the potential to increase the effects on the water environment outlined above through increased impermeable cover, increased pollutant potential and increased risk of flooding.

A preliminary search was undertaken for the subject site and no permitted development plans apart from those related to the subject site were found. Future risks will need to be considered as development progresses and in the context of the proposed development.

19.3.4 Climate (Air Quality and Climate Change) (Chapter 9)

Construction Stage

Air Quality

The primary sources of air quality impacts during the construction phase of the other phases of the Kilcarbery development will be nuisance dust impacts. The dust minimisation measures outlined for the Phase 1 development should be implemented throughout the construction phase of the full development to avoid any nuisance dust impacts occurring. Once these minimisation measures are in place the impact to air quality is considered short-term and imperceptible.

Climate

Construction machinery and vehicles have the potential to impact climate through the release of GHG emissions. However, the impact to climate is considered imperceptible due to the low volumes of machinery and vehicles required.

Human Health

The mitigation measures that will be put in place during construction of the proposed development will ensure that the impact of the development complies with all EU ambient air quality legislative limit values which are based on the protection of human health. Therefore, the impact of construction of the proposed development is likely to be short-term and imperceptible with respect to human health.

Operational Stage

Local Air Quality

Air dispersion modelling of operational phase traffic impacts was undertaken for the design year of 2035 which assumes the cumulative impact of the full phase of the Kilcarbery development.

NO₂

The impact of the proposed cumulative development on NO₂ in the design year of 2035 has been assessed. The annual average concentration is within the limit value at all worst-case receptors. The maximum 1-hour NO₂ concentration is not predicted to be exceeded. The impact of the proposed development in terms of NO₂ is negligible. Therefore, the overall impact of NO₂ concentrations as a result of the proposed cumulative development is long-term and imperceptible at all of the receptors assessed.

PM₁₀

The impact of the impact of the proposed cumulative development for PM₁₀ in the design year of 2035 has been assessed. Predicted annual average concentrations at the worst-case receptor in the region of the development are at most 35% of the limit value in 2035. It is predicted that the worst case receptors will not experience any exceedances of the 50 µg/m³ 24-hour mean value with or without the proposed development in place.

Relative to baseline levels, some imperceptible increases in PM₁₀ levels at the worst-case receptors are predicted as a result of the proposed development. The greatest impact on PM₁₀ concentrations in the region of the proposed development will be an increase of 0.1% of the annual limit value at Receptor 1. Therefore, the overall impact of PM₁₀ concentrations as a result of the proposed cumulative development is long-term and imperceptible.

PM_{2.5}

Predicted annual average concentrations for PM_{2.5} in the region of the proposed development are 38% of the limit value in 2035 at all worst-case receptors.

Relative to baseline levels, imperceptible increases in PM_{2.5} levels at the worst-case receptors are predicted as a result of the proposed development. None of the receptors assessed will experience an increase in concentrations of over 0.12% of the limit value. The impact of the proposed development with regard to PM_{2.5} is negligible at all of the receptors assessed. Overall, the impact of increased PM_{2.5} concentrations as a result of the proposed cumulative development is long-term and imperceptible.

CO and Benzene

Predicted pollutant concentrations with the proposed cumulative development in place are below the ambient standards at all locations. Levels of CO are 15% of the limit value in 2035 with levels of benzene reaching 19% of the limit value.

Relative to baseline levels, some imperceptible increases in pollutant levels at the worst-case receptors are predicted as a result of the proposed cumulative development. The greatest impact on CO and benzene concentrations will be an increase of 0.16% of the CO limit value and 0.08% of the benzene limit value at Receptor 1. The impact of the proposed cumulative development in terms of CO and benzene is negligible, long-term and imperceptible.

Summary of Local Air Quality Modelling Assessment

Levels of traffic-derived air pollutants from the cumulative impact of the proposed development will not exceed the ambient air quality standards either with or without the proposed cumulative development in place. The impact of the cumulative development in terms of PM₁₀, PM_{2.5}, CO, NO₂ and benzene is negligible, long-term, localised, negative and imperceptible.

Regional Air Quality Impact

The regional impact of the proposed cumulative development on emissions of NO_x and VOCs has been assessed. The results show that the likely impact of the proposed cumulative development are imperceptible and long-term. For the design year 2035, the predicted impact of the changes in AADT is to increase NO_x levels by 0.00079% of the NO_x emissions ceiling and increase VOC levels by 0.000232% of the VOC emissions ceiling to be complied with in 2035.

Therefore, the likely overall magnitude of the changes on air quality in the operational stage is imperceptible, long-term and not significant.

Climate

The impact of the proposed cumulative development on emissions of CO₂ impacting climate were also assessed. The results show that the impact of the proposed development in the design year 2035 will be to increase CO₂ emissions by 0.00056% of Ireland's EU 2035 Target. Thus, the impact of the proposed cumulative development on national greenhouse gas emissions will be insignificant.

Therefore, the likely overall magnitude of the changes on climate in the operational stage is imperceptible, long-term and not significant.

Human Health

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

19.3.5 Climate – Sunlight (Chapter 10)

In the context of sunlight, the longer term cumulative impacts are considered not significant as the sunlight assessment has shown that the vast majority of private amenity space and all communal open spaces provided as part of the development comply with the BRE Guidelines for sunlight both within the proposed development and in relation to adjacent properties.

19.3.6 Climate – Daylight (Chapter 11)

In the context of daylight the longer term cumulative impacts are considered not significant as the daylight assessment has shown the development is in compliance with the BRE requirements for daylight both within the proposed development and in relation to adjacent properties.

Construction Stage

The analysis considers both the daylight impact to future residents, and the impact to existing adjacent properties as a result of the proposed development. It is considered that during the construction phase there will be no impacts experienced in relation to daylight and sunlight due to the proposed development, and the effect to the existing properties in the adjoining developments will be neutral.

Operational Stage

The analysis considers both the daylight impact to future residents, and the impact to existing adjacent properties as a result of the proposed development. It is considered that during the operational phase there will be no impacts experienced in relation to daylight and sunlight due to the proposed development, and the effect to the existing properties in the adjoining developments will be neutral.

19.3.7 Air, Noise and Vibration (Chapter 12)

If additional large scale developments are proposed in the future, in the vicinity of the proposed development, this has the potential to add further additional vehicles to the local road network. However, it is unlikely that other future developments of similar scale would give rise to a significant impact during the construction and operational stages of those projects.

Future projects of a large scale would need to conduct an EIAR to ensure that no significant impacts associated with noise and vibration will occur as a result of those developments.

19.3.8 Landscape and Visual Impact (Chapter 13)

With regard to the cumulative impact of proposed development on landscape and visual amenity, the future development will take place on a brownfield site that were formerly agricultural lands that no longer provide that function. They now comprise undeveloped infill lands within the expanded area of the Clondalkin settlement and will form part of the comprehensive redevelopment and rejuvenation of the existing housing at Kilcarbery. In this regard, the cumulative impact of the overall development is expected to be moderately positive, from a landscape and visual perspective.

It is considered that there will be short to medium term moderate negative impacts associated with the construction phase of the project over all phases of development. Subsequent construction phases are likely to occur sequentially after the completion of the first Phase.

It is considered that there will be a long term positive visual impact as a result of the proposed development, due to the modern residential facilities being provided, the improved visual amenity and outlook from the surrounding area, creation of an integrated streetscape and attractive, useable public realm, and the provision of commercial, retail and community floorspace to serve the needs of the local community.

19.3.9 Material Assets (Transport) (Chapter 14)

Construction Stage

It is predicted that the committed development (Ref. SD178/0002) will be complete by the subject development's adopted 2020 Opening Year. Accordingly, the peak construction stage traffic associated with both the subject development and committed development traffic is not expected to coincide. Similarly, potential future development on zoned 3rd Party lands that have yet to be subject to planning applications will likely be developed in phases thereby reducing the potential cumulative construction impact on the local road network at any one time.

Operational Stage

The analysis detailed above represents an appraisal in terms of potential cumulative impacts for a typical weekday as it is focused upon the key two busiest periods of the day (i.e. AM and PM peak hours). During the other 22 hours of the day, traffic flows are predicted to be significantly lower resulting in the network operating with additional reserve capacity to that forecast for the peak hour periods.

The adjacent committed development (Ref. SD178/0002) has been incorporated into the analysis detailed above and therefore the cumulative impact of both the subject proposals and this committed development have been assessed.

If all the zoned lands in the surrounding area were to be developed, this would have an effect on the local road network traffic levels. However, the scale of potential impact would be fully assessed during the planning procedures for any of these individual third-party developments (which currently do not benefit from planning permission). Nevertheless, the utilisation of TII's growth rates does take some account of the potential additional traffic that such third party site could generate.

19.3.10 Cultural Heritage (Archaeology and Architectural Heritage) (Chapter 16)

No cumulative impacts are predicted upon the archaeological, architectural or cultural heritage resource.