

21 SUMMARY OF CUMULATIVE IMPACTS & INTERACTIONS

21.1 Introduction

This Chapter of the EIAR identifies the principle interactions between the potential impacts of the environmental factors identified in Chapter 5 to 18 inclusive.

The principal interactions are summarised below, under Table 21.1, and further discussed in Section 21.2 of this Chapter.

The predicted impacts identified in Chapters 5 – 18 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 - Transportation	Material Assets - Waste	Material Assets – Built Services	Cultural Heritage - Archaeology	Cultural Heritage – Architectural Heritage
Population & Human Health		x	x	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	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	x	x	x
Climate - Sunlight	x	x	x	x	x		x	x	x	x	x	x	x	x
Climate - Daylight	x	x	x	x	x	x		x	x	x	x	x	x	x
Air – Noise & Vibration	✓	x	x	x	x	x	x		x	✓	x	x	x	x
Landscape & Visual impact	✓	x	x	x	x	x	x	x		x	x	x	✓	x
Material Assets - Transportation	x	x	x	x	✓	x	x	✓	x		x	x	x	x
Material Assets - Waste	x	x	✓	x	x	x	x	x	x	✓		x	x	x
Material Assets – Built Services	x	x	✓	x	x	x	x	x	x	✓	x		x	x
Cultural Heritage - Archaeology	x	x	✓	x	x	x	x	x	✓	x	x	x		x
Cultural Heritage – Architectural Heritage	x	x	✓	x	x	x	x	x	✓	✓	x	x	✓	

Table 21.1: Matrix of Interactions between Environmental Factors (During Construction and Operational Phases)

Where there is an interaction = ✓ No Interaction = x

21.2 Interactions

21.2.1 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.

21.2.2 Biodiversity (Chapter 6)

At Woodbrook (i.e. both the proposed Woodbrook Residential Area and the Woodbrook Golf Development Area) the main interactions of importance to biodiversity relate to landscape and water (including hydrology and hydrogeology), with air/climate, noise/vibration, and archaeology interactions also relevant. The mitigation measures have been designed to minimise the potential impact that the construction and operational phases of the development may have on the receiving environment, including on water, soil and air quality. The concept of control and attenuation at source of all emissions to air and water has been incorporated into the design and the proposed construction and operational phases of the development, with an Outline Construction & Environmental Management Plan having been compiled for the proposed development.

The landscape design for the proposed development and the surface water management proposals have been drawn together in an iterative manner, taking into account the requirements to minimise the impacts on biodiversity, both locally and within the wider landscape. This is particularly true in the case of the proposed surface water attenuation tank near the badger sett, which was relocated and redesigned by the engineers (Atkins) in order to ensure that the sett could be retained as long as possible. This will allow a comprehensive long-term mitigation plan to be developed for this badger group.

Similarly, the landscape scheme proposes significant ecologically sensitive planting and utilises sustainable drainage, swales and low mounding to provide for potentially diverse habitats.

21.2.3 Land, Soils and Geology (Chapter 7)

Soils and geology interact with other environmental attributes as follows: -

- **Water** – Potential soil contamination could negatively impact surface water and groundwater quality. The impact on hydrology and hydrogeology is addressed in Chapter 8: Water. Mitigation measures outlined in Chapter 8: Water for the construction and operational phase of the proposed development are equally applicable to the protection of soils and bedrock.

- **Biodiversity** – Potential impacts on the underlying soils and geology could also impact on biodiversity conditions present. However, the mitigation measures described above and those relevant in Chapter 6: Biodiversity will ensure that this will not occur.

21.2.4 Water (Chapter 8)

Surface water and groundwater interact with other environmental attributes as follows: -

- **Human Health** – Potential surface water / groundwater contamination could negatively impact human health. However, there are no reported public groundwater or drinking water supplies within 2km of the proposed development. Potential human health risks associated with impacts to groundwater and/or surface water arising from the proposed development during both the construction and operational phases have been evaluated. Taking account of the proposed mitigation measures, any human health risks will be imperceptible. Accordingly, no potential human health impacts associated with surface water / groundwater pathways will occur.
- **Land, Soils and Geology** – Potential surface water / groundwater contamination could negatively impact soils and bedrock. However, the mitigation measures described above and those relevant in Chapter 7 - Land, Soils and Geology will ensure that this will not occur.
- **Biodiversity** – Potential impacts on surface water and groundwater quality in the proposed development could also impact on the ecological conditions present. However, the mitigation measures described above and those relevant in Chapter 6 - Biodiversity will ensure that this will not occur.

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

Air quality does not have a significant number of interactions with other topics. The most significant interactions are between human beings and air quality. An adverse impact due to air quality in either the construction or operational phase has the potential to cause health and dust nuisance issues. The mitigation measures that will be put in place at the proposed development will ensure that the impact of the proposed development complies with all ambient air quality legislative limits and therefore the predicted impact is long term and neutral with respect to human beings.

Interactions between air quality and traffic can be significant. With increased traffic movements and reduced engine efficiency, i.e. due to congestion, the emissions of vehicles increase. The impacts of the proposed development on air quality are assessed by reviewing the change in annual average daily traffic on roads close to the site. In this assessment, the impact of the interactions between traffic and air quality are considered to be not significant.

With the appropriate mitigation measures to prevent fugitive dust emissions, it is predicted that there will be no significant interactions between air quality and soil and geology. No other significant interactions with air quality have been identified.

21.2.6 Climate (Sunlight) (Chapter 10)

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

21.2.7 Climate (Daylight) (Chapter 11)

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

21.2.8 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.
- **Transportation** – 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.

21.2.9 Landscape and Visual Impact (Chapter 13)

Landscape and Visual Impact items interact with Human Health, particularly at construction phase. Potential impacts on landscape and visual amenity could result in associated Human Health impacts. However the mitigation measures described in Chapter 13: Landscape and Visual Impact and Chapter 5: Population and Human Health will ensure that these are suitably mitigated against.

The scheme has been developed to minimise the removal of existing hedgerows and trees. Open spaces have been selected to retain the trees and hedgerows where practically possible. However, some parts of hedgerows and trees will be removed in the construction. This will 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.

21.2.10 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.

21.2.11 Material Assets (Waste) (Chapter 15)

Adherence to the mitigation measures outlined in Section 15.6 will ensure that there are no significant impacts on resource or waste management from the proposed development. The management of waste during the construction phase in accordance with the C&D WMP and during the operational phase in accordance with the OWMP will meet the requirements of regional and national waste legislation and promote the management of waste in line with the priorities of the waste hierarchy.

Land and Soils

During the construction phase excavated soil, stone, gravel and clay (c. 69,434 m³) will be generated from the excavations required to facilitate site levelling, construction of the basement, construction of new foundations, the installation of underground services and attenuation tank. It is anticipated that all the excavated material for the golf holes will be reused in the profiling of the golf holes. It is estimated that c. 38,000m³ of material will need to be excavated from the residential area of the development, however it is envisaged that c. 29,300m³ of excavated material will be reused onsite. Where material has to be taken off site (c. 8,700m³) it will be taken for reuse or recovery, where practical, with disposal as last resort. Adherence to the mitigation measures in Chapter 15 and the requirements of the C&D WMP, will ensure the effect is **long-term, imperceptible** and **neutral**.

Material Assets Transport

Local traffic and transportation will be impacted by the additional vehicle movements generated by removal of waste from the site during the construction and operational phases of the development. The increase in vehicle movements as a result of waste generated during the construction phase will be temporary in duration. There will be an increase in vehicle movements in the area as a result of waste collections during the operational phase but these movement will be imperceptible in the context of the overall traffic and transportation increase and has been addressed in Chapter 14 Material Assets Transportation. Provided the mitigation measures detailed in Chapter 15 and the requirements of the OWMP (included as Appendix 15.2) are adhered to, the effects will be short to **long-term, imperceptible** and **neutral**.

21.2.12 Material Assets (Built Services) (Chapter 16)

Material Assets (Built Services) attributes interact with other environmental attributes as outlined in Chapter 16 of this EIAR and summarised as follows: -

- **Land, Soils & Geology** – Waste management strategies during the construction phase of the proposed development have been informed by the receiving land, soils and geology environment. Refer to Chapter 7: Land, Soils and Geology, and relevant sections including mitigation measures described in Chapter 16: Material Assets (Built Services).
- **Roads & Traffic** – Traffic is one of the environmental attributes typically assessed under Material Assets. For the purposes of this EIAR a full Traffic Impact Assessment has been undertaken and is presented in Chapter 14: Transportation, along with all relevant mitigation measures.

21.2.13 Cultural Heritage (Archaeology) (Chapter 17)

Archaeology has minor interactions 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.

21.2.14 Cultural Heritage (Architectural Heritage) (Chapter 18)

The predominant interactions relate to archaeology, landscape, biodiversity, Roads, Traffic & transportation and land. With reference to archaeology, a number of protected structures were also noted as being recorded monuments including Shanganagh Castle and the Site of Shanganagh Martello Tower. The impact of the proposed development is predominantly an indirect or visual impact and it is likely to be imperceptible or not significant.

In terms of historic landscapes, there will be a slight effect on the Shanganagh demesne as a result of the proposed linkage. It is generally positive as it will link many of the retained landscape features. The retention of existing boundary features and trees within the scheme retains a reference to the existing landscape and will enhance the character of the neighbourhood. It will protect vistas along the road and from adjoining protected structures and designed landscapes. The retention of trees and planting also protects and facilitates biodiversity in the area.

The proposed road linkages from the R119 to the subject site will result in the removal of part of an old demesne boundary wall. The impact negative impact of this has been minimised through the retention of much of this wall, with removal of masonry being confined to the 2 proposed pedestrian entrances and 1 vehicular entrance and where railings have been proposed.

The potential negative impact of the proposal is likely to be increased if the proposed BusConnects involves land take along the R119 as it could potentially result in the removal of most of the wall. The retention of trees at and the boundary wall in phase 1 of the proposed development will however reduce adverse impacts on the character of the R119. Were a land take associated with BusConnects to take place it is recommended that the existing boundary wall be realigned rather than removed.

21.3 Cumulative Impacts

Where cumulative impacts were considered to arise, these have been outlined in the relevant Chapters of this EIAR.

21.3.1 Population and Health (Chapter 5)

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

21.3.2 Biodiversity (Chapter 6)

In general, the on-going urbanisation of South County Dublin will lead to habitat loss and loss of open green space and will increase the risk of siltation and pollution of watercourses from wastewater and surface water. The development at Woodbrook (Phase 1) will provide a significant number of new residential units in an area of existing fields. Cumulative impacts may be considered to be significant at a local scale.

There will be loss of habitat, in particular mature tree lines and hedgerows, and a resultant loss of breeding bird habitat and foraging habitat for badgers. A significant portion of the site is to be retained as open space with ecologically sensitive planting, SuDS features and green roofs also featuring.

On completion of construction works, in particular post-implementation of the new landscape planting, these impacts are not considered to be significant.

21.3.3 Land, Soils and Geology (Chapter 7)

All relevant developments in the immediate environs of the proposed development, which have been approved but are not yet built or operational, have been reviewed as part of this assessment and key developments are summarised below;

- D14A/0872 – Church of St. James at Crinken. Planning permission granted on 08/06/2015 for a single storey extension to the ministry centre immediately to the east of the site; and,
- D17A/0065 – Woodbrook Campus Ltd. Planning permission granted on 19/12/2017 for a 56no. inpatient specialist hospital 20-30m south east of the site.

Based on the nature of the proposed developments identified above, no significant cumulative impacts on land, soils and geology environment are anticipated during the construction or operation phases. The remainder of committed developments in the vicinity generally comprise the redevelopment or extension of existing properties.

21.3.4 Water (Chapter 8)

A search of Dun Laoghaire-Rathdown Planning records was undertaken. Approximately 80no. committed developments (i.e. developments which have been granted planning permission but have not yet been constructed) in the immediate vicinity of the proposed development were reviewed. The majority of these projects consist of small scale extension works or retention works and therefore are not anticipated to result in cumulative impacts with the proposed development.

The following two projects have been further evaluated;

- D14A/0872 – Church of St. James at Crinken. Planning permission granted on 08/06/2015 for a single storey extension to the ministry centre immediately to the east of the site; and,
- D17A/0065 - Woodbrook Campus Ltd. Planning permission granted on 19/12/2017 for a 56no. inpatient specialist hospital 20-30m south east of the site.

Based on the nature of the proposed developments identified above, no significant cumulative impacts on the water environment (i.e. surface water or groundwater) are anticipated during the construction or operational phases, nor is a potential cumulative flood risk identified.

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

Construction Stage

Air Quality

As with the Phase 1 development, the primary sources of air quality impacts during the construction phase of the other phases of the Woodbrook 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 years of 2025 and 2035 which assumes the cumulative impact of the full phase of the Woodbrook development as well as the proposed school and train station park and ride facility and Shanganagh Castle development. The traffic data used in the modelling assessment is detailed in Table 9.5.

NO₂

The results of the assessment of the impact of the proposed cumulative development on NO₂ in the design years of 2025 and 2035 are shown Table 9.6 for the Highways Agency IAN 170/12 and Table 9.7 using the UK Department for Environment, Food and Rural Affairs technique respectively. The annual average concentration is within the limit value at all worst-case receptors using both techniques. Levels of NO₂ are 56% of the annual limit value in 2025, while concentrations are 53% of the annual limit value in 2035 using the more conservative IAN technique. The hourly limit value for NO₂ is 200 µg/m³ and is expressed as a 99.8th percentile (i.e. it must not be exceeded more than 18 times per year). The maximum 1-hour NO₂ concentration is not predicted to be exceeded using either technique (Table 9.8).

The impact of the proposed cumulative development on annual mean NO₂ levels can be assessed relative to “Do Nothing (DN)” levels in 2025 and 2035. Relative to baseline levels, some small increases in pollutant levels are predicted as a result of the proposed cumulative development. With regard to impacts at individual receptors, the greatest impact on NO₂ concentrations will be an increase of 2.2% of the annual limit value at Receptor 3 (R3). Thus, using the assessment criteria outlined in Appendix 9.2 Tables 1 – 3, 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.

PM_{2.5}

The results of the modelled impact of the proposed cumulative development for PM_{2.5} are shown in Table 9.10. Predicted annual average concentrations in the region of the proposed development are 45.5% of the limit value in 2025 and 45.6% 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 0.5% of the limit value. Therefore, using the assessment criteria outlined in Appendix 9.2, Tables 1 – 2, 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

The results of the modelled impact of CO and benzene are shown in Table 9.11 and Table 9.12 respectively. Predicted pollutant concentrations with the proposed cumulative development in place are below the ambient standards at all locations. Levels of CO are 28.2% of the limit value in 2025 with levels of benzene reaching 22.3% of the limit value. Similarly, low levels are predicted for 2035 with levels of CO 28.4% of the limit value and levels of benzene reaching 22.4% of the limit.

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 0.6% of the CO limit value and 0.3% of the benzene limit value at Receptor 3. Thus, using the assessment criteria for NO₂ and PM₁₀ outlined in Appendix 9.2 and applying these criteria to CO and benzene, 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. Using the assessment criteria outlined in Appendix 9.2, Table 1 – 3, 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 using the procedures of Transport Infrastructure Ireland⁽²³⁾ and the UK Department for Environment, Food and Rural Affairs⁽¹⁷⁾. The results (see Table 9.13) show that the likely impact of the proposed cumulative development on Ireland's obligations under the Targets set out by Directive EU 2016/2284 "On the reduction of national emissions of certain atmospheric pollutants and amending Directive 2003/35/EC" are imperceptible and long-term. For the design year of 2025, the predicted impact of the changes in AADT is to increase NO_x levels by 0.0015% of the NO_x emissions ceiling and increase VOC levels by 0.00026% of the VOC emissions ceiling to be complied with in 2030.

Similarly, low impacts are predicted for the design year of 2035 with changes in AADT predicted to increase NO_x levels by 0.0007% of the NO_x emissions ceiling and increase VOC levels by 0.00048% of the VOC emissions ceiling to be complied with in 2030.

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 using the Design Manual for Roads and Bridges screening model (see Table 9.13). The results show that the impact of the proposed cumulative development in the design year 2025 will be to increase CO₂ emissions by 0.00072% of Ireland's EU 2020 Target. Emissions of CO₂ are predicted to increase by 0.0013% in 2035. Thus, the impact of the proposed cumulative development on national greenhouse gas emissions will be insignificant in terms of Ireland's obligations under the EU 2020 Target⁽²⁹⁾.

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.

Do-Nothing Impact

The Do-Nothing impact for the cumulative development is the same as that for the Phase 1 development as outlined in Section 9.6.1.3 of Chapter 9.

21.3.6 Climate (Sunlight) (Chapter 10)**Construction Stage**

As no ameliorative, remedial or reductive measures are now proposed, the residual cumulative impact of both phases of development on the Woodbrook lands on sunlight access is predicted to be as described under Section 10.5.2.1 of Chapter 10: Climate (Sunlight).

Operational Stage

As no ameliorative, remedial or reductive measures are now proposed, the residual cumulative impact of both phases of development on the Woodbrook lands on sunlight access is predicted to be as described under Section 10.5.2.2 of Chapter 10: Climate (Sunlight).

Worst Case Impact

Under a worst case scenario, the cumulative impact of both phases of development on the Woodbrook lands on sunlight access to lands outside the application site is predicted to range from “imperceptible” to “slight”.

21.3.7 Climate (Daylight) (Chapter 11)**Construction Stage**

As no ameliorative, remedial or reductive measures are now proposed, the residual cumulative impact of both phases of development on the Woodbrook lands on daylight access is predicted to be as described under Section 11.5.2.1 of Chapter 11: Climate (Daylight).

Operational Stage

As no ameliorative, remedial or reductive measures are now proposed, the residual cumulative impact of both phases of development on the Woodbrook lands on daylight access is predicted to be as described under Section 11.5.2.2 of Chapter 11: Climate (Daylight).

Worst Case Impact

Under a worst case scenario, the cumulative impact of both phases of development on the Woodbrook lands on daylight access to lands outside the application site is predicted to range from “imperceptible” to “not significant”.

21.3.8 Air, Noise and Vibration (Chapter 12)**Construction Stage**

The construction stages of the Woodbrook masterplan will occur on a phased basis. It is expected that Phase 1 will be largely completed before Phase 2 works commence on site. The indicative noise calculations presented in Table 12.9 are considered valid for works occurring during Stage 2 works at the nearest noise sensitive locations external to the site.

Operational Stage

The overall cumulative impacts associated with the proposed development will be similar to those associated with Phase 1. The key potential sources are discussed in the following headings: -

Additional Vehicle Movements on Public Roads

Forecast traffic growth provided by Atkins have been provided for the design year of 2035 to account of the full potential cumulative impacts associated with all of the Woodbrook development lands, the DART station car park in addition to the proposed future Shanganagh Castle development to the north (assumed to consist of 630 units). The traffic links assessed are illustrated in Figure 12.2. Table 12.12 summarises the calculated increase in noise level along the assessed road links.

Road Link	2035 Do Minimum		2035 Base Plus Cumulative Developments		Calculated Change in Noise Levels
A	12,317	1.1	14,070	0.9	+0.4
B	15,916	0.9	17,434	0.9	+0.5
C	13,789	1.2	14,438	1.2	+0.2
D	14,807	4.6	16,312	4.5	+0.4
E	92,462	4.7	93,259	6.1	+0.7

Table 12.12: Cumulative Operational Traffic Noise Levels along Surrounding Road Network.

The assessment has indicated that due to existing traffic volumes along the local road network, the addition of development related traffic results in a negligible increase in noise level when added to the existing road network. The calculated change in traffic noise is less than 1dB(A) along all link roads in the vicinity of the development site.

Reference to Table 12.8 confirms that a change in noise level of less than 1dB(A) is negligible and not significant.

In summary, the predicted increase in noise levels associated with the addition of development related traffic and other cumulative developments is neutral, negligible and long term.

Mechanical and Electrical Services

Following the development of the childcare facility within Phase 1, the remainder of the neighbourhood centre and plaza will be developed as part of the overall Masterplan. This will include a mixed use building with an element of ground floor retail and commercial space, with residential on the upper floors, and a low rise pavilion building with café at ground floor and residential above. There will be an element of mechanical and electrical plant required to service the retail and commercial units within the neighbourhood centre.

The specific requirements for mechanical and electrical plant items for the neighbourhood areas has not yet been progressed at this stage of the design. The closest off-site noise sensitive locations to operational on-site sources are residential properties along the Old Dublin Road at a minimum distance of 50m. Depending on the operational phasing, there will be a requirement for operational items of plant to operate over day and night-time periods.

The site layout and selection of plant will be designed so that the operation of cumulative elements across the development will not give rise to negative impacts on noise sensitive locations within the development itself (i.e. residential properties within the Neighbourhood Centre). Operational plant noise levels at the residential dwellings within the development itself will be controlled to ensure the internal noise levels included within Table 12.9 will be achieved.

Cumulative noise levels associated with services plant at the existing noise sensitive locations outside the development boundary will be controlled to ensure compliance with BS 4142 (2014) such that adverse impacts are avoided. The results of baseline surveys of the prevailing background sound level will be used to set appropriate operational limit values.

There are no significant vibration sources associated with the full Woodbrook operational phase.

Inward Impact of External Sources to Development Buildings

As part of the proposed Phase 2 of the Woodbrook Masterplan, there is potential for apartment buildings to be developed along the north eastern boundary of the site within the *Dart Gateway* zone of the development lands. Given the proximity of these buildings to the operational rail line, control of noise the rail line will be required to ensure acceptable internal noise levels are achieved within the residential units.

As part of the detailed design of these buildings, the specific sound insulation requirements of the building facades (glazing, walls, vents etc) will be determined taking account of the rail noise levels, orientation of noise sensitive facades towards the rail line, the surface areas of the façade, internal room dimensions etc. Internal noise levels will be designed to achieve internal noise levels not exceeding those included in BS 8233:2014 *Guidance on Sound Insulation and Noise Reduction for Buildings*.

The results of the baseline survey have determined the noise climate along the eastern site boundary bordering the rail line has highest noise levels recorded during the baseline study (UTT1). The measured noise levels indicate that an enhanced glazing system over and above a standard thermal double glazed system will be required along the eastern facades in addition to acoustic vents, where relevant.

21.3.9 Landscape and Visual Impact (Chapter 13)

The Proposed Development represents a Phase 1 residential development of the 'Woodbrook Development Parcel' as set out in the WSLAP. The remainder of the development parcel would be subject to a separate Phase 2 application. In addition, the WSLAP provides details for a second residential development area: the 'Shanganagh Castle Parcel', which lies to the north of Shanganagh Park.

The WSLAP also envisages the provision of a new DART Station on the lands of the 'Woodbrook Development Parcel'.

It is expected that Phase 2 of the 'Woodbrook Development Parcel' and the development of the 'Shanganagh Castle Parcel', would be broadly consistent with the organising structures and urban framework established in the WSLAP.

In this regard the application includes an indicative Masterplan for how development on the overall 'Woodbrook Development Parcel' may be brought forward. This includes for further residential development, supported by local services centre and the provision of the DART Station.

The local authority has also brought forward a masterplan for enhancements in Shanganagh Park and for development of a Crematorium and extended graveyard at Shanganagh Cemetery.

The potential cumulative landscape and visual effects of overall development in the area are considered to result in significant, negative short-term to medium term impacts.

21.3.10 Material Assets (Transport) (Chapter 14)

Cumulative Impact – Shanganagh

A cumulative impact assessment has been undertaken of the proposed development access junction, incorporating the potential Bus Connect upgrades, in the Opening Year +15 Scenario.

Plans currently being progressed by DLRCC associated with the future Shanganagh Castle development are not fully developed at the time of writing this Chapter. However, the potential level of development has been confirmed by DLRCC as being in the order of approximately 630 no. residential units.

The scenario being considered consists of the cumulative traffic impact of Shanganagh Castle in combination with the full development of Woodbrook assessed during the 2035 Opening +15 Year during the AM and PM peak hours.

The traffic generation volumes estimated for the future Shanganagh Castle development was determined based on multi-modal trip generation rates, mode shares, vehicle trip rates, trip distribution and assignments as previously detailed in Section 14.4.1.2. The resultant traffic generation is as follows: -

Type	Period	No. Units	No. Beds	Arrivals	Departures	Two way
Houses / Duplexes	AM	148 Dwelling	342	9	33	42
	PM			28	14	42
Apartments	AM	482 Dwellings	820	14	66	81
	PM			48	19	67
Total Shanganagh Castle			AM	23	99	122
			PM	76	33	109
Total Woodbrook Development			AM	290	361	651
			PM	279	205	484
Total LAP Cumulative Development			AM	313	460	773
			PM	355	238	593

Table 14.29: 4 LAP Cumulative Development Traffic Generation

As per the Opening +15 year Scenario, Junction 3 was modelled with the VISSIM software programme during the Cumulative Opening +15 year scenario. The results of the modelling exercise are presented below.

Junction 3

Movement	Average Queue (pcu)	Mean Max Queue (pcu)	Average Delay: General Traffic (ss)	Average Delay Bus (s)	Average Queue (pcu)	Mean Max Queue (pcu)	Average Delay: General Traffic (ss)	Average Delay Bus (s)
	AM				PM			
Arm A – Dublin Road Southbound								
Straight/Left	5.62	15.11	30.00	12.18	11.63	25.83	32.36	13.71
Right	0.00	0.00	0.00	N/A	0.06	0.42	51.28	N/A
Arm B – Dublin Road Northbound								
Straight/Left	2.33	9.10	16.32	16.39	1.40	6.22	13.26	11.90
Right	1.31	3.33	55.71	N/A	1.22	3.29	49.73	N/A
Arm C – Woodbrook Downs								
All Movements	0.10	0.32	57.40	N/A	0.07	0.25	59.39	N/A
Arm D – Proposed Development								
Straight/Left	1.97	4.94	55.69	N/A	0.81	2.26	50.48	N/A
Right	1.61	3.89	57.40	N/A	0.40	1.17	52.16	N/A
Overall Junction								
All Movements	1.47	5.24	31.46	14.29	2.06	5.63	29.65	12.80

Table 14.30: Cumulative Assessment - Junction 3

As can be seen from the above results, delay has again been minimised on both the straight through general traffic lanes and the bus lanes as associated with the northbound and southbound arms of the Dublin Road. Bus delay is minimised with bus priority ensuring average bus delays are of the order of only 13 seconds which is acceptable

The right turn lanes on the Dublin Road into the proposed development access arm and the Woodbrook Downes arms do endure some delay not of an order that would warrant vehicles to wait through more than one cycle. In addition, queuing associated with these right turns is contained in the length of the right turn lanes and would have no impact on the adjoining straight through lanes.

The proposed development access arm will also endure some delay but not be of an order that would warrant vehicles to wait through more than one cycle. The arm operates within capacity within short queue lengths

In overall terms it is considered that the proposed development access junction during the Cumulative Opening +15 year scenario operates to a satisfactory level.

The above reported impact represents a long term slight negative effect.

21.3.11 Material Assets (Waste) (Chapter 15)

In a worst-case scenario, multiple developments in the area could be developed concurrently or overlap in the construction phase. Due to the high number of waste contractors in the Dublin region there would be sufficient contractors available to handle waste generated from a large number of these sites simultaneously, if required. Similar waste materials would be generated by all the developments.

There are similar existing residential developments close by, along with the neighbouring religious and sporting sites and these developments will generate similar waste types during their operational phases. Authorised waste contractors will be required to collect waste materials segregated, at a minimum, into recyclables, organic waste and non-recyclables. An increased density of development in the area is likely improve the efficiencies of waste collections in the area.

Other developments in the area will be required to manage waste in compliance with national and local legislation, policies and plans which will minimise/mitigate any potential cumulative impacts associated with waste generation and waste management. As such the effect will be a **long-term, imperceptible and neutral**.

21.3.12 Material Assets (Built Services) (Chapter 16)

All relevant developments in the immediate environs of the proposed development, which have been approved but are not yet built or operational, have been reviewed as part of this assessment and key developments are summarised below;

- D14A/0872 – Church of St. James at Crinken. Planning permission granted on 08/06/2015 for a single storey extension to the ministry centre immediately to the east of the site; and,
- D17A/0065 - Woodbrook Campus Ltd. Planning permission granted on 19/12/2017 for a 56no. inpatient specialist hospital 20 – 30 south east of the site.

There are no predicted cumulative impacts arising from the construction or operational phase.

21.3.13 Cultural Heritage (Archaeology) (Chapter 17)

No cumulative impacts are predicted upon the archaeological resource.

21.3.14 Cultural Heritage (Architectural Heritage) (Chapter 18)

The R119 is to be widened under BusConnects which seeks to improve public transport routes and connectivity in Dublin and to reduce reliance on the private car as part of national objectives to reduce carbon emissions in the National Planning Framework. The proposed widening will result in the removal of much of the existing boundary treatment between the subject site and the R119, including the trees. Bus Connects is currently under review, post public consultation and it is likely that its impact on historic boundary treatments will be reduced.

If BusConnects involved land take along the R119, it will have a significant adverse impact on the character of the road. The proposed development will be more visible from the road and the adjoining protected structures and the impact on vistas and setting will be greater. It will also result in the loss of the old boundary wall which was part of Cork Lodge.

Phase 1 of the proposed Woodbrook development has sought to retain as much of the existing boundary as possible in addition to trees on the boundary and set back from it. Were a land take associated with BusConnects to take place, the retention of trees within the Woodbrook lands would mitigate some of the adverse visual impacts and would help retain the character of the R119.

The current application consists of Phase one of the Woodbrook Masterplan. Combined, the Woodbrook Masterplan (i.e. Phase 1 & phase 2) will deliver approximately 1,488no. residential units, a Childcare Facility, Local Centre, Primary School and public open space. Drawing. No. 1618-OMP-00-00-DR-A-11010, prepared by OMP Architects illustrates the Cumulative Development at Woodbrook (i.e. Phase 1 and Phase 2) – Refer to Appendix 3.1

Phase 1 of the proposed Neighborhood Centre will be located 66m from Crinken Church. Phase 2 will be located 60m from the rear wall of the Church at the nearest point. This is still a considerable set back and has been specifically designed to minimize any potential negative visual impact on the setting and views of St James' Church Crinken. The proposed blocks have been spaced to capitalize on views to and from the church and further reduce visual impact. In terms of height the proposed Local Centre will be, below the height of the church and subservient to it, further minimizing the potential for a negative visual impact. The proposed Childcare Facility buildings will be 3 – 5 stories in height but set well back from the Church. The proposed phase 2 residential development to the east will be located further to the east, over 126m from the rear of Crinken Church.

The design and location of the proposed primary school which is intended to be completed in phase 2 of the masterplan, has not been finalized, but it is anticipated that it will be 2 story. The site directly adjoins the rear of St James' Church and the rear elevation of St James' Church is 14.6 m from the site boundary (at closest point to the east). Though lower in height than the Church, the proximity of the site means that the proposed school has the potential to have an adverse visual impact on the setting and views of the Church. This would be in addition to a permitted development for a single storey extension to the ministry centre in the grounds of St. James Church Crinken (planning Ref: D14A/0872). It is therefore essential that the design, scale and location of the proposed school in Phase 2 is cognisant of the Church's protected status, its setting and the views to and from St James' Church.

It is also anticipated that the proposed redevelopment of Shanganagh Castle by the Land Development Agency will deliver approximately 600no. residential units. No detail is available to Aeval on the proposed development at Shanganagh Castle lands, other than the number of dwellings DL RCC have asked to be accounted for. The Shanganagh Castle lands are located to the north of Shanganagh Park and are therefore at a remove from Woodbrook. It is not anticipated that the development of the Shanganagh Castle lands will have a direct impact on the lands at Woodbrook. The retention of trees and planting on the north boundary of the Woodbrook lands and around Shanganagh cemetery means that it is unlikely that there will be a visual impact.

The lands at Shanganagh Castle are a designed demesne landscape in their own right however (NIAH: DU-50-O-256212). The NIAH noted that the main features of the demesne are substantially present although there has been some loss of integrity. The area of former kitchen garden and woodland to the north of the principal building has been covered by residential development. Further residential development of these lands has the potential to further undermine the integrity of the demesne landscape.