Chapter 21
Cumulative Impacts & Environmental Interactions

Contents

21. Cumulative Impacts and Environmental Interactions

21.1 Introduction

This chapter reports the assessment of cumulative impacts of the Templeogue-Rathfarnham to City Centre Core Bus Corridor Scheme (hereafter referred to the Proposed Scheme) in combination with other existing and or approved projects and projects which, at the time of assessment, were yet to be approved, but for which a decision on such project is reasonably foreseeable over the likely consenting and construction period anticipated for the Proposed Scheme.

In addition, the chapter addresses the potential for interactions between impacts on different environmental factors of the Proposed Scheme itself on the receiving environment.

21.1.1 Cumulative Impacts

Annex IV of the EIA Directive (2011/92/EU as amended by 2014/52/EU) requires that an EIAR provides a *'description of the likely significant effects of the project on the environment resulting from…the cumulation of effects with other existing and/or approved projects, taking into account any existing environmental problems relating to areas of particular environmental importance likely to be affected or the use of natural resources.'*

The Environmental Protection Agency's (EPA) Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (EPA 2022) (hereafter referred to as the EPA EIAR Guidelines) define cumulative effects as:

> *'The addition of many minor or insignificant effects, including effects of other projects, to create larger, more significant effects.'*

Note that the EPA EIAR Guidelines use the terms impacts and effects interchangeably. A relatively minor effect on a particular receptor caused by the Proposed Scheme could result in a significant effect if it is added to by impacts from other nearby projects. This chapter identifies and provides an assessment of likely significant cumulative effects caused by the Proposed Scheme in combination with other planned projects. This includes consideration of the potential effects of the other BusConnects Core Bus Corridor Schemes as well as other projects (e.g., Metrolink and DART+). Section 21.2 sets out the process for deciding which other planned projects were included in the assessment.

21.1.2 Environmental Interactions

Environmental interactions are the reactions between impacts, whether between the impacts of just one project (i.e., the Proposed Scheme), or between the impacts of multiple projects. For each environmental topic there will be certain interactions or interdependencies with other environmental topics, whereby impacts may interact to create a greater effect or different type of effect. An assessment of these interactions has been undertaken as required by Article 3 of the EIA Directive, which states the following:

> *'The environmental impact assessment shall identify, describe and assess in an appropriate manner, in the light of each individual case, the direct and indirect significant effects of a project on the following factors:*
>
> *(a) Population and human health;*
>
> *(b) Biodiversity, with particular attention to species and habitats protected under Directive 92/43/EEC and Directive 2009/147/EC;*
>
> *(c) Land, soil, water, air and climate;*
>
> *(d) Material assets, cultural heritage and the landscape;*
>
> *(e) **The interaction between the factors referred to in points (a) to (d).**'*

Some of the topic assessments within this EIAR already address environmental interactions. For example, Chapter 10 (Population) provides an assessment of effects on community amenity, which relates to the interaction

of impacts on air quality; visual amenity; traffic and transport; and noise and vibration. Furthermore, Chapter 11 (Human Health) describes and assesses how a combination of impacts on health determinants (air quality; noise and vibration; community amenity; traffic and transport) can interact and influence health outcomes. Section 21.4.3 of this chapter sets out the main environmental interactions identified from the Proposed Scheme, sign-posting chapters which already address environmental interactions and providing a description and assessment of environmental interactions which are not addressed elsewhere in this EIAR.

21.1.3 Guidance

This assessment has been completed with reference to the following guidance documents:

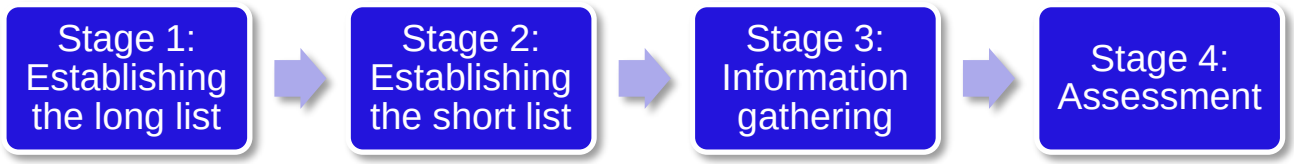
- Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (EPA 2022);
- Guidance on the Preparation of the Environmental Impact Assessment Report (European Commission 2017);
- Guidelines for the Assessment of Indirect and Cumulative Impacts as well as Impact Interactions (European Commission 1999); and
- Environmental Impact Assessment of Projects: Guidance on the preparation of the Environmental Impact Assessment Report (European Union 2017).

21.2 Methodology for Cumulative Impacts Assessment

21.2.1 Introduction

Broadly speaking, the potential cumulative effects of the Proposed Scheme can be classed as traffic related or non-traffic related. The traffic related effects such as potential air emissions or noise resulting from the cumulation of traffic distribution from multiple projects are predicted through the results of traffic scenario modelling. The traffic modelling scenarios for the cumulative assessment are described in Section 21.2.6.

For non-traffic related cumulative effects, it is necessary to consider the scale, nature and likely impacts of other projects which could combine with the Proposed Scheme to cause cumulative effects. It was therefore necessary to identify which other projects should be included for analysis as part of the cumulative effects assessment (CEA). A staged approach to identify such other projects was applied as illustrated below, with each stage described in subsequent chapter sections.



21.2.2 Stage 1: Establishing the Long List of 'Other Projects'

The first stage of the CEA was to identify other projects deemed potentially relevant to be included in the long list. While the EIA Directive only requires the consideration of other existing and/or approved projects, this assessment has gone further in that it is assumed that the BusConnects Dublin - Core Bus Corridors Infrastructure Works (i.e., the 12 BusConnects Core Bus Corridor schemes) will be undertaken over a circa six year period (with construction commencing in 2023 subject to approval being granted). There is also potential for a number of other projects to receive approval and be progressed within that time period which may give rise to cumulative effects in combination with the Proposed Scheme. It was, therefore, considered appropriate to identify projects which, at the time of assessment, were yet to be approved, but for which a decision and potentially approval is reasonably foreseeable over the likely consenting and construction period anticipated for the Proposed Scheme.

21.2.2.1 Sources for the identification of other projects

Potentially relevant other projects include those from various sectors, such as residential and commercial projects, utilities, and other transport projects. The identification of projects for the long list considered the following sources:

- An Bord Pleanála (ABP) website (http://www.pleanala.ie/index.htm) – for details of Strategic Infrastructure Developments (SIDs) and Strategic Housing Developments (SHDs);
- Local authority websites and the development plans for Dublin City, South Dublin, Dún Laoghaire-Rathdown, Fingal and Wicklow – for details of allocations and areas for regeneration;
- National Planning Application Database (https://data.gov.ie/dataset/national-planning-applications) – for downloadable list of planning applications sent from Local Authorities;
- Projects being planned by the National Transport Authority (the NTA website, (https://www.nationaltransport.ie/planning-and-investment/transport-investment/projects/, provides detail) as part of other major transport projects and programmes in accordance with the Transport Strategy for the Greater Dublin Area 2016 – 2035;
- Project Ireland 2040, which combines the National Development Plan and National Planning Framework. (gov.ie - Project Ireland 2040 (www.gov.ie) and its interactive mapper (https://geohive.maps.arcgis.com/apps/MapSeries/index.html?appid=f05a07c5a0324b1a887cd9d5d7103e22);
- Transport Infrastructure Ireland website (https://www.tii.ie/public-transport/projects-and-improvements/) – to identify major transport projects and programmes;
- Discussion between the BusConnects Infrastructure Team/TII/Iarnrod Éireann to gain an understanding of each organisation's relevant projects and programmes;
- The EIA Portal (https://www.housing.gov.ie/planning/environmental-assessment/environmental-impact-assessment-eia/eia-portal) maintained by the Department of Housing, Planning and Local Government – for applications for development consent accompanied by an EIAR; and
- Irish Water's website, which includes a page on its projects (https://www.water.ie/projects/).

All planning application data provided by each local authority is fed into the national Data.Gov.ie database (https://data.gov.ie/dataset/national-planning-applications). This dataset was used to identify planning applications within a search area of the Proposed Scheme. The dataset included planning applications of various scales, most of which were for small-scale applications such as domestic residential modifications. The planning application lists were searched to identify and exclude very minor applications from the long list on the basis that given their minor nature these were not likely to have a cumulative effect noticeable over the effects of the Proposed Scheme in isolation. Examples of planning applications which were excluded from the preliminary long list were applications to construct or demolish conservatories, house extensions, loft conversions, change of uses for single or small numbers of buildings, construction of outbuildings, modifications to driveways and retention applications. Granted and pending applications older than ten years were also excluded from the preliminary long list on the basis that they would likely already have been built (and so would form part of the existing baseline) or are now unlikely to be progressed. Applications which have been refused or annulled were discounted from the preliminary long list on the basis that they are unlikely to progress, unless through successful appeal. The exercise to identify relevant planning applications was undertaken at various points during the EIAR preparation and most recently in January 2023.

In addition to this process and to capture other potentially relevant foreseeable projects, major projects as part of transport and other infrastructure programmes were added to the preliminary long list. As noted earlier, this included the identification of major transport projects from the Transport Strategy for the Greater Dublin Area. It also included other known major projects or programmes of schemes that are currently undergoing some form of formal environmental appraisal, for example, Metrolink and the DART+ Coastal South project.

As noted previously, the other 11 BusConnects Core Bus Corridor schemes were also included for assessment. While each of the other BusConnects Core Bus Corridor schemes will be subject to an application for approval, they have a similar likelihood of going ahead as this Proposed Scheme and therefore, the potential cumulative effects of the other BusConnects Core Bus Corridor schemes are of relevance to the potential cumulative effects of this Proposed Scheme so they were included on the preliminary long list. Types of projects that were identified for consideration on the long list have been classed as follows:

- Local Planning Applications – those projects for which planning permission is applied for through the local planning authorities themselves and were identified from local authority planning application lists;
- SHDs – housing developments of a certain type and scale (e.g., 100 or more houses or student accommodation units) for which applications are lodged directly with An Bord Pleanála;
- Large Scale Residential Developments (LRDs) – housing developments of a certain type and scale (e.g., 100 or more houses or student accommodation units comprising 200 bed spaces or more) for which planning permission is applied for through the local planning authorities;
- SIDs – major infrastructure developments by local authorities and others for which applications are lodged directly with An Bord Pleanála;
- Greater Dublin Area Park & Ride Projects – strategic rail and bus-based Park & Ride projects identified in the Transport Strategy for the Greater Dublin Area 2022 - 2042;
- Irish Water projects – projects under the programmes of work listed on Irish Water's website;
- Other Major Projects – projects which were at a pre-application stage at the time of identification, but which are anticipated to be developed over the time period for the Core Bus Corridor Infrastructure Works. These include projects from various sectors including energy, utilities and transport; and
- Other Core Bus Corridor schemes: the other 11 Core Bus Corridor schemes proposed by the NTA.

The process for applying for SHDs directly to ABP was enacted under The Planning and Development (Housing) and Residential Tenancies Act 2016. In July 2021, the Government announced that the process of applying for SHDs was to be terminated and replaced with LRDs under The Planning and Development (Amendment) (LRD) Act 2021, when the Department of Housing, Local Government and Heritage issued Circular Letter PL13/2021 in December 2021 (Department of Housing, Local Government and Heritage, 2021). The key difference between the two processes being that applications for LRDs are submitted to the local authority in the first instance, as opposed to directly to ABP. In some cases, applications and permissions granted for SHDs remain valid and therefore have been included in the assessment of cumulative effects. Where an LRD has been applied for that either replaces, modifies or amends an existing SHD, only the LRD has been included in the assessment, to avoid double counting.

21.2.2.2 Search areas to guide the Inclusion of Projects for the Long List

In the absence of specific guidance on CEA study areas, consideration was given as to the distance over which impact pathways from other projects could potentially combine with the impact pathways of the Proposed Scheme to have likely significant effects on relevant receptors for each environmental topic. The starting point was taken to be impact pathways relating to biodiversity as this was deemed likely to be the most extensive. The Natura Impact Statement which has been prepared complies with the requirements of the Habitats Directive (Council Directive 92/43/EEC) and contains all of the information, data and analysis to inform the Appropriate Assessment to be conducted by the competent authority in order for the competent authority to establish whether the Proposed Scheme individually or in combination with other plans or projects, will have a significant effect on a European site.

The Guidance for Planning Authorities on Appropriate Assessments (Department of Environment, Heritage and Local Government 2009) recommends a study area of 15km is applied. However, any Appropriate Assessment to be conducted by the competent authority needs to consider all potential pathways to impacts on European nature conservation sites and therefore the application of an arbitrary distance may not be suitable. For example, this may be the case where highly mobile species are concerned, or where there is a credible impact pathway which extends over some distance, such as a watercourse. Consideration was therefore given to the distance and scales of projects that should be included on the long list for consideration that would be considered for the biodiversity cumulative assessment in this EIAR. This has meant that some major projects added to the long list were more than 15km from the Proposed Scheme itself. All major and strategic projects that have been (or would be) lodged with An Bord Pleanála within a 15km search area, or otherwise identified by the Biodiversity assessors as discussed above, were included on the preliminary long list.

Waste management is undertaken on a regional basis and therefore for the Waste & Resources assessment, consideration has been given to projects within the Eastern Midlands Waste Region (EMWR) – see also Section 21.2.3.3.

The Climate assessment has been considered on a national basis and not confined to a specific study area, as the drivers and impacts of climate change operate on a wider scale.

It was considered that a smaller search area could be applied to guide the identification of the majority of planning applications. A buffer of 500m from the Proposed Scheme was applied for this purpose, with flexibility retained so that particularly large-scale planning applications were included on the preliminary long list where they were considered to have potential significant cumulative impacts.

This 500m buffer was deemed appropriate since guidance from the Chartered Institution of Highways and Transportation (CIHT) (CIHT 2018) indicates that the preferred walking distance to a bus stop is 400m. A buffer of 500m is therefore sufficient to capture the population that is most likely to interact with the Proposed Scheme, and which could reasonably be exposed to cumulative effects in combination with other projects. The 500m buffer is greater than the study areas for all the other environmental topics with the exception of Biodiversity and Waste & Resources. For Biodiversity, it was considered that the scale and nature of most projects that seek planning permission through local authorities (rather than through An Bord Pleanála) are unlikely to give rise to impacts that would be noticeable above the baseline trends of Dublin's urban environment on biodiversity interests. However, as noted above, some flexibility was retained to allow some particularly large further afield planning applications lodged with local authorities to be included on the preliminary long list, as per the major and strategic projects identified.

21.2.2.3 Zones of influence

The long listing process next involved establishing the topic Zones of Influence (ZoI). This was done by establishing whether each of the other projects identified would fall within the study areas for the topics considered for the Proposed Scheme in isolation, as assessed in the topic chapters of this EIAR. The ZoI provides a guide as to the likelihood that another project may contribute to potentially significant cumulative effects with the Proposed Scheme. All local planning applications were included on the finalised long list to be considered further during the Stage 2 as described above being a short-listing process stage, while some of the major projects, Strategic Infrastructure Developments and Strategic Housing Developments, some of which were outside of any ZoI, would not be taken through to the shortlisting stage.

Table 21.1 sets out the pre-defined ZoI to guide the long-listing process.

Table 21.1: Pre-defined ZoI for CEA

Topic	ZoI*
Air quality (construction)	350m
Climate	N/A (Informed by traffic modelling scenario and the area of influence the Proposed Scheme has on changing traffic volumes and on long-term trends of climate change)
Noise & vibration (construction)	300m
Population	Community areas
Human Health	500m
Biodiversity	15km (not including watercourses linked to estuarine habitats and highly mobile species)
Water	500m
Land & soils	250m
Archaeology	50m
Architectural heritage	50m
Landscape & visual impacts	50m
Archaeology	50m
Architectural heritage	50m
Landscape & visual impacts	50m
Waste	N/A waste assessment is informed by regional data on waste. Study area of Eastern-Midlands Waste Region (EMWR) is applied to waste assessment.

Topic	ZoI*
Material assets	50m (used as proxy for footprint of Proposed Scheme & affected utilities.)
Traffic and transport	N/A Informed by traffic modelling scenario and the area of influence the Proposed Scheme has on changing traffic volumes
*Note: ZoI = Zones of influence. These were used as a guide only. Where appropriate, other projects which were outside the pre-defined ZoI for the topic were considered on the basis that potentially likely significant effects of a cumulative nature could extend beyond the pre-defined ZoI for the Proposed Scheme in isolation.	

The outcome of Stage 1 was a long list of projects for review (and amendment if required) and consideration at Stage 2 of the assessment being the establishment of the short list of projects. The long list of other projects is provided in Appendix A21.1 Summary of Stages 1 and 2 Shortlisting Outcomes in Volume 4 of the EIAR.

The review step of the Stage 1 long list was more applicable to the Biodiversity and Waste topics. In the case of Biodiversity, any major or strategic project within 15km of the Proposed Scheme was included in the long list to be reviewed at Stage 2. For the major and strategic projects outside of the 15km buffer, considering issues such as connectivity to sensitive habitats via watercourses has helped inform whether further afield projects could contribute to likely significant cumulative impacts with the Proposed Scheme. In relation to the Waste & Resources assessment, consideration was given to the potential for likely significant cumulative impacts within the Eastern-Midlands Waste Region.

21.2.3 Stage 2: Establishing the Shortlist of 'Other Projects'

The aim of Stage 2 was to narrow down the Stage 1 long list to include only those other projects where there was potential for significant cumulative effects arising in combination with the Proposed Scheme. To do this, the following was considered:

- Whether the project has been completed, or the planning applications have been refused (where not identified at stage 1), annulled or expired (if so, they were not shortlisted). If a project was identified as completed, it has been considered as part of the baseline as appropriate;
- Whether there is a likelihood of temporal overlap (including overlap for construction periods) between the Proposed Scheme and the other project; and
- Whether the scale and nature of the other project is likely to significantly contribute to the effects of the Proposed Scheme, taking account of the aspects of the environment for which the ZoI are relevant.

21.2.3.1 Scale and Nature of Other Projects

In considering the scale and nature of the other projects, regard was had for the screening thresholds set out in Schedule 5 of the Planning and Development Regulations 2001 (as amended). For example, the threshold for screening a housing project for EIA is where there are more than 500 dwelling units. The use of EIA screening thresholds was only a guide however, and some projects which are below thresholds yet relatively close in proximity to the Proposed Scheme and still of a scale to be noticeable in the local context were shortlisted. Ultimately, the judgement as to whether a project should be shortlisted depended on whether the scale, location and/or nature could be sufficient to generate impacts which would be noticeable against typical baseline trends in the same ZoI as the Proposed Scheme.

21.2.3.2 Shortlisting

The shortlisting was informed by input from the environmental topic specialists involved in the preparation of this EIAR, which allowed for consideration as to whether a particular type of project could result in impacts to receptors of interest for the Proposed Scheme assessment. In most cases, the ZoI for the topic has informed whether or not another project is likely to have a cumulative effect. However, in some instances the environmental topic specialists have considered that there is potential for a likely significant cumulative effect beyond the ZoI applied for the Proposed Scheme in isolation, and therefore a project could be scoped into Stages 3 and 4 for an individual topic even though it was outside of the pre-defined ZoI identified at Stage 1. The rationale for whether a project should be scoped or not is recorded where relevant in Appendix A21.1 Summary of Stages 1 and 2 Shortlisting Outcomes in Volume 4 of the EIAR, which provides a record of key decisions made when shortlisting projects for

Stages 3 and 4 of the CEA. This includes a note of reasons where a specialist has scoped out a project that falls within the ZoI for their topic. The shortlisted projects are indicated on Figures 21.1 and 21.2 in Volume 3 of the EIAR.

21.2.3.3 Biodiversity, Climate, Waste and Resources

For some topics a slightly different approach has been deemed appropriate. The Biodiversity assessment has primarily considered individual Strategic Infrastructure Developments, Strategic Housing Developments and other Major Projects for shortlisting within the CEA. For other projects, such as those covered by local planning applications, the scale of each project was not deemed sufficient to warrant a specific assessment of cumulative impacts on biodiversity. Instead, the Biodiversity cumulative assessment assesses how the general trend of development across Dublin cumulatively impacts on the biodiversity resource. This is set out as part of the assessment reported in Section 21.4.1.6.

The Climate assessment has considered the cumulative influence of the Proposed Scheme with other developments on a national basis.

The Waste and Resources assessment has focused on key projects that were considered to have potential for likely significant effects on a regional basis, Specifically it has focused on those projects likely to generate a similar waste profile to the Proposed Scheme such as soil and stones and bitumen containing material, which may lead to cumulative effects associated with the off-site treatment of solid waste that will be generated by the Construction and Operational Phase of the Proposed Scheme, and other projects in the Eastern Midlands Waste Region (EMWR) that will have simultaneous requirements for landfill and treatment capacity of any construction and demolition (C&D) waste generated during the construction timeframe. The approach to the CEA for waste is set out in more detail along with the assessment in Section 21.4.1.12.

21.2.4 Stage 3: Information Gathering for the Shortlist of 'Other Projects'

The CEA has relied primarily on the gathering of environmental information from a range of sources published as part of planning application submissions or planning documentation for the shortlisted projects. In addition, where environmental assessments have not yet been undertaken or published, then any published Strategic Environmental Assessments (SEA) have been relied on for additional supporting information where available. Specific information has been obtained from the following sources:

- Planning application documentation and supporting environmental assessments obtained via the National Planning Application Database and the EIA Portal;
- Local authority websites and the development plans for Dublin City, South Dublin, Dún Laoghaire-Rathdown, Fingal and Wicklow Local Authorities for details of SEAs; and
- Developers' websites, for example for Irish Water and other utilities companies.

The information sought focused on:

- Proposed design and location of the project;
- Proposed programme of construction, operation and decommissioning (if relevant); and
- Environmental assessments, if available, that set out baseline data and effects arising from the project.

In many cases there is limited information on the above available with which to inform the CEA; for example, for many of the projects in a pre-application stage.

21.2.5 Stage 4: Assessment

The CEA assessment has been undertaken with the findings recorded in Appendix A21.2 Stage 4 Specialist Assessments in Volume 4 of the EIAR. The assessment has been made for construction effects and operation effects based on the scenarios outlined below.

For Construction Phase cumulative impacts, it has been generally assumed that other projects (including the other 11 Core Bus Corridor schemes), would be under construction concurrently with the Proposed Scheme, to present

a worst-case scenario. In some cases, a worst case was considered to be likely where other projects are constructed sequentially, with the effect of lengthening the time that certain receptors may be exposed to similar impacts. For example, this has been the case with the Landscape (Townscape) and Visual impact assessment. Individual topics have set out any such assumptions in the assessments provided in Appendix A21.2 Stage 4 Specialist Assessments in Volume 4 of the EIAR.

For the assessment of Operational Phase cumulative impacts, an assumption has been made that all 12 Core Bus Corridor schemes and any other shortlisted projects, would be complete and in operation, to present a worst-case scenario.

The level of assessment is commensurate with the level of information available for each shortlisted other project.

21.2.6 Traffic Related Cumulative Impacts: Construction Scenarios for Assessment

While for the purposes of the cumulative impacts assessment, it is assumed that the other 11 Core Bus Corridor schemes will be approved, however, as with any proposed project, there is a risk of delay in grant of approval or indeed a risk of refusal, or delay in starting construction, due to unforeseen circumstances. As noted in the EPA EIAR Guidelines (EPA 2022), where uncertainty arises then an EIAR needs to describe the 'worst case' of the accumulation of effects that could arise from these other projects. For this reason, a 'Combined Worst-Case' scenario, where all 12 Core Bus Corridor schemes and other major schemes would be constructed at the same time, was developed and modelled within the Local Area Model (LAM) to inform the assessment of the potential traffic effects. The scenario includes for background traffic and HGV growth for a common construction year of 2024, to ensure increased travel demand activity during the construction stage period was captured which is expected to incorporate all additional construction traffic relating to new development in the study area.

21.2.6.1 Combined Worst-Case Traffic Scenario

In order to assess the impacts of the 'Combined Worst-Case Traffic Scenario', the construction traffic management plans (CTMPs) associated with the worst-case stage of construction for each of the 12 Core Bus Corridor schemes and other major schemes in combination was modelled on top of a 2024 Do Minimum model year scenario in the local area model (LAM). The year 2024 was selected as representative of the likely receiving traffic network environment during the construction timeframe of the 12 Core Bus Corridor schemes. The 2024 modelled scenario also includes for background traffic growth from reasonably foreseeable projects in line with regional growth projections and local development plans, therefore taking account of the effects of traffic generated by a mix of construction projects and general traffic across the city when the CTMPs are applied. It was envisaged that the results of the Combined Worst-Case construction scenario modelling would allow the identification of the more significant locations of traffic displacement and associated environmental impacts to help inform mitigation proposals.

The results from modelling the traffic effects of the Combined Worst-Case scenario in the LAM revealed that there would be significant traffic displacement across the Dublin area.

These significant increases would occur on both main traffic arteries (Regional, National roads) as well as local and residential roads. The increases on the main traffic arteries were not deemed to generate a significant adverse impact on the road network due to the function of these roads to accommodate high volumes of traffic. However, the large cumulative increase on local roads had the potential to generate a significant adverse impact. The implications of the increases in traffic were assessed in terms of traffic flows and highway network performance. The modelling indicated that there would be a significant increase in total travel time and delay, with associated increases in queuing and decreases in average speed when compared to the 2024 Do Minimum scenario. The most notable issues were the 'Over Capacity Queues' (an indicator of traffic congestion) across the network which would increase by approximately 59% in the morning (AM) peak and by 82% in the evening (PM) peak.

Due to the modelled impacts based on traffic congestion from the Combined Worst-Case scenario and the risk of generating associated significant air quality and noise impacts, a revised construction scenario was developed.

21.2.6.2 Revised Construction Traffic Scenario

Based on the outputs from the assessment of the Combined Worst-Case scenario, it is proposed that the following schemes will not be constructed concurrently with adjacent BusConnects Core Bus Corridor schemes so as to avoid potential traffic and associated environmental impacts:

- Templeogue / Rathfarnham to City Centre Core Bus Corridor Scheme (the Proposed Scheme) will not be constructed concurrently with Kimmage and Bray to City Centre Core Bus Corridor Schemes.
- Bray to City Centre Core Bus Corridor Scheme – will not be constructed concurrently with Belfield-Blackrock to City Centre Core Bus Corridor Scheme and the Proposed Scheme;
- Ballymun / Finglas to City Centre Core Bus Corridor Scheme – will not be constructed concurrently with Swords to City Centre Core Bus Corridor and Blanchardstown to City Centre Core Bus Corridor Schemes; and
- Lucan to City Centre Core Bus Corridor Scheme – will not be constructed concurrently with Liffey Valley to City Centre Core Bus Corridor and Blanchardstown to City Centre Core Bus Corridor Schemes.

For example, no section of the Bray scheme will be constructed at the same time as the Proposed Scheme and the Belfield-Blackrock to City Centre Core Bus Corridor Scheme. Also, no section of the Ballymun / Finglas scheme will be constructed at the same time as Blanchardstown or Swords schemes. The remaining eight schemes can be constructed concurrently or with a combination of other schemes incorporating the limitations outlined above.

Limiting the schemes under construction concurrently will minimise additional congestion and associated significant impacts over and above the standalone schemes. As the Proposed Scheme is expected to generate significant adverse environmental impacts at receptor locations when constructed concurrently with other adjacent Core Bus Corridor schemes, over and above those identified as part of the standalone scheme assessment, the localised assessments such as traffic, air (non-regional) and noise are based on the Proposed Scheme not under construction concurrently with adjacent Core Bus Corridor schemes. For the purposes of the climate and regional air assessments, consideration is given to the construction traffic impacts due to all schemes as these assessments are considered on a regional (non-local) basis and on the basis that 2024 was selected as representative of the likely receiving traffic network environment. In addition, both the Do Minimum and Do Something scenarios include for background traffic and HGV growth for a common construction year of 2024, which accounts for the construction of other projects such as those provided in Appendix A21.1 Summary of Stages 1 and 2 Shortlisting Outcomes in Volume 4 of the EIAR.

The Proposed Construction Traffic Scenario (i.e., the worst-case stage of construction of the Proposed Scheme without adjacent Core Bus Corridor Schemes) has formed the basis of the air quality and noise and vibration Construction Phase cumulative impact assessments in Sections 21.3.1.2 and 21.3.1.4 respectively where the Proposed Scheme is assessed by comparing the 2024 Do Minimum construction scenario to the Do Something cumulative construction scenario. The climate and regional air assessment considers all schemes as the impacts are considered on a regional (not local) basis and again compares the 2024 Do Minimum construction scenario to the Do Something cumulative construction scenario. As above the Do Minimum and Do Something scenarios are expected to account for traffic associated with the development of other schemes.

21.2.7 Operational Scenario for Assessment

For operational cumulative effects including the Proposed Scheme, the assessment has been undertaken based on a scenario where all the other 11 Core Bus Corridor schemes are also operational. This has been done for the following reasons:

- It is the NTA's intention that all Core Bus Corridor schemes would be completed by 2028, therefore the scenario is considered to be reasonable; and
- It is the largest scale option and therefore represents a reasonable worst case for operational effects in terms of redistribution of traffic and traffic related effects.

The Do Minimum scenarios (in both 2028 and 2043) include all other elements of the BusConnects Programme (apart from the Core Bus Corridor Infrastructure Works elements) i.e. the new BusConnects routes and services

(as part of the revised Dublin Area bus network), new bus fleet, the Next Generation Ticketing and integrated fare structure proposals are included in the Do Minimum scenarios.

In 2028, other notable Do Minimum transport schemes include; the roll out of the DART+ Coastal South project, LUAS Green Line capacity enhancement and the Greater Dublin Area Cycle Network Plan implementation (excluding BusConnects Core Bus Corridor elements). As outlined above, the 2043 Do Minimum scenario assumes the full implementation of the GDA Strategy schemes and so assumes that proposed major transport schemes such as MetroLink, LUAS line extensions to Lucan, Finglas, Poolbeg and Bray are all fully operational.

Appendix A6.2 (Transport Modelling Report) in Volume 4 of the EIAR, contains further information on the modelling assumptions contained within the Do Minimum scenario including the full list of transport schemes included.

For non-traffic modelling related CEA, the assessment is on the basis that the other shortlisted projects would all be in an operational state for the assessment. For traffic modelling related CEA, the Operational Phase scenario has been modelled including for background growth from reasonably foreseeable projects in line with regional growth projections and local development plans to capture the wider traffic effects expected from projected development in Dublin.

21.2.8 Summary of Assessment Methodology for CEA

In summary, a four-stage process has been adopted for assessing cumulative effects for all environmental topics. Stage 1 involved developing and reviewing a long list of other existing and / or approved projects as well as reasonably foreseeable projects and planning applications and identifying whether or not they fall within a ZoI for any of the assessment topics. Stage 2 involved the review of the long list of projects and deciding whether the distance, location, scale and nature of the proposed projects have potential to result in significant impacts in cumulation with the Proposed Scheme. At the end of Stage 2 a shortlist was established for further assessment of potential cumulative effects. Stages 3 and 4 involved the gathering of available information on the projects in the shortlist and carrying out the assessment. The results of these assessments are summarised in Section 21.3, with supporting detail contained in Appendix A21.2 Stage 4 Specialist Assessments in Volume 4 of this EIAR.

For the Operational Phase CEA, it was assumed that all 12 Core Bus Corridor schemes are operational, and all shortlisted projects are operational as they form part of general traffic growth. For the Construction Phase CEA, it was generally assumed that all 12 Core Bus Corridor schemes and other projects on the short list would be under construction at the same time as a worst case unless, for a particular environmental topic, it was considered that sequential construction of projects would represent a worst case.

In addition to the process summarised here, for assessment topics which depend on traffic modelling (i.e., Air Quality, Noise and Vibration and Traffic and Transport) traffic modelling scenarios for construction and operation were prepared. For the Construction Phase, a Proposed Worst-Case Scenario was modelled whereby the eight schemes outlined earlier would be under construction concurrently and have their CTMPs implemented at the same time. For Operational Phase cumulative traffic related effects, it was assumed that all 12 Core Bus Corridor schemes are operational in addition to other transport schemes in line with the progressive roll out of the Greater Dublin Area (GDA) Transport Strategy. These schemes were applied, along with the forecasted increased travel demand from general development, within the model to capture projected traffic growth from reasonably foreseeable development across the city in both 2028 and 2043.

21.3 Assessment of Cumulative Impacts and Environmental Interactions

This section provides a topic-by-topic assessment of likely significant cumulative effects of the Proposed Scheme in combination with other projects, before moving on to a description of the main environmental interactions identified for the Proposed Scheme.

In total, 342 other projects, including all eleven other Core Bus Corridor schemes, were shortlisted for further cumulative assessment. Appendix A21.1 of Volume 4 of this EIAR sets out a record of which projects were shortlisted for assessment against the relevant topics for which they were shortlisted. Reference should be made to Figures 21.1 and 21.2 in Volume 3 of the EIAR, for the locations of the shortlisted projects.

21.3.1 Construction Impacts

21.3.1.1 Traffic and Transport

As described in Section 21.6, it is proposed to limit the number of Core Bus Corridor schemes which would be under construction concurrently as part of the proposed realistic worst-case scenario to manage overall construction impacts across the city region. The following schemes will not, therefore, be constructed concurrently with adjacent schemes to limit potential for significant adverse traffic, air quality and noise issues during the construction stage:

- The Proposed Scheme;
- Ballymun / -Finglas to City Centre Core Bus Corridor Scheme;
- Lucan to City Centre Core Bus Corridor Scheme; and
- Bray to City Centre Core Bus Corridor Scheme.

The effect of limiting the concurrent construction of certain Core Bus Corridor schemes is that the traffic redistribution impacts, during the construction stage, of each of the Core Bus Corridor schemes will be limited to the adjacent areas of the direct study area of each scheme. This will ensure limited overlap of traffic dispersion into the direct study areas of other Core Bus Corridor schemes which has the potential to cause cumulative traffic impacts above the levels of the schemes in isolation.

In terms of the Proposed Scheme in isolation, significant impacts due to general traffic redistribution away from the direct study area are not anticipated during the Construction Phase. This is based on the intended nature of the progressive works along the corridor whereby traffic flows are generally to be maintained in both directions – refer to Chapter 6 (Traffic & Transport) and Chapter 5 (Construction) for further information on the Proposed Scheme assessment. There may be a requirement for some localised temporary lane closures for short durations of the day or night, which will involve consultation between the appointed contractor and relevant authorities. Access for general traffic to existing residential and commercial units immediately adjacent to the Proposed Scheme will be accommodated throughout the Construction Phase.

A CTMP has been prepared and is included in the CEMP (Appendix A5.1 in Volume 4 of the EIAR). The appointed contractor will develop the CTMP to ensure that it gives due consideration to provision of local access requirements and designates appropriate diversion routes in the cases where localised temporary closures are required. It will be a condition of the Employer's Requirements that the successful contractor, immediately following appointment, must detail in the CTMP the manner in which it is intended to effectively implement all the applicable mitigation measures identified in this EIAR and any additional measures required pursuant to conditions imposed by An Bord Pleanála, should they grant approval.

The likely timelines of the Proposed Scheme construction works have considered the potential for simultaneous construction of, and cumulative impacts with other infrastructure projects and developments which are proposed along, or in the vicinity of the Proposed Scheme. No other major transport schemes are planned within the study area of the Proposed Scheme during the project timeframe. As specified in Section 5.9 of this EIAR, interface liaison will take place on a case-by-case basis, as will be set out in the Construction Contract, to ensure that there is coordination between any projects, that construction access locations remain unobstructed by the Proposed Scheme works and that any additional construction traffic mitigation measures required to deal with cumulative impacts are managed appropriately.

Based on the aim to coordinate between the Proposed Scheme works and other major infrastructure projects and major projects which are proposed along the route, or in the vicinity of the Proposed Scheme, no likely significant cumulative effects are predicted on Traffic and Transport over and above the effects of the Proposed Scheme in isolation which are reported in Chapter 5 (Construction) and Chapter 6 (Traffic and Transport).

21.3.1.2 Air Quality

21.3.1.2.1 Construction Dust Assessment

An appraisal has been carried out to assess the cumulative risk to sensitive receptors as a result of dust soiling, health impacts and ecology impacts due to the Construction Phase of the Proposed Scheme, and other projects

listed in Appendices A21.1 and A21.2 in Volume 4 of the EIAR, in accordance with the IAQM's Guidance on the Assessment of Dust from Demolition and Construction (IAQM, 2014). The assessment methodology is described in full in Section 7.2.4.4 in Chapter 7 (Air Quality). Fifty-seven other projects were identified within the 350m ZoI (refer to Section 21.2.2.3) of the Proposed Scheme and sensitive receptors identified within this ZoI were identified and shortlisted for the construction dust assessment. The other projects within the ZoI for which there is potential for construction dust effects included 35 DCC planning applications, eight SDCC planning applications, four SHDs, one Irish Water projects, six other Major Projects, the Kimmage to City Centre Core Bus Corridor scheme and the Bray to City Centre Core Bus Corridor scheme.

As outlined in Section 21.2.6.2, limitations on the construction of four Core Bus Corridor schemes concurrently with other adjacent Core Bus Corridor schemes are proposed to minimise the potential environmental impacts. Specifically, the Kimmage to City Centre Core Bus Corridor scheme and the Bray to City Centre Core Bus Corridor scheme will not be constructed concurrently with the Proposed Scheme to avoid potentially significant cumulative effects.

Without mitigation, there is the potential for significant cumulative impacts near these other projects. However, in order to ensure that no dust nuisance impacts occur on human health or ecological receptors, a series of mitigation measures have been identified that will be implemented during construction of the Proposed Scheme. These are set out in Chapter 7 (Air Quality). Mitigation measures to reduce construction dust are standard practice for moderate/major scale developments likely to generate dust. Therefore, it is predicted that no significant cumulative impacts will arise from the concurrent construction of the other Core Bus Corridor schemes and those other projects (see Appendix A21.2 in Volume 4 of the EIAR and the Proposed Scheme).

21.3.1.2.2 Construction Traffic Assessment

Local Air Quality

As outlined in Section 21.2.6.2, limitations on the construction of four Core Bus Corridor schemes concurrently with other adjacent Core Bus Corridor schemes are proposed to minimise the potential environmental impacts. Specifically, the proposed Kimmage to City Centre Core Bus Corridor Scheme and Bray to City Centre Core Bus Corridor Scheme will not be constructed concurrently with the Proposed Scheme to avoid potentially significant cumulative effects.

No new additional significant adverse impacts are identified when comparing the Do Minimum to the Do Something cumulative construction scenario compared with the standalone scenario assessed in Section 7.4.3.2 in Chapter 7 (Air Quality), refer to Appendix A.21.3 for full set of air quality results.

In accordance with the EPA EIAR Guidelines (EPA 2022) the impacts associated with the cumulative Construction Phase traffic emissions arising from the Proposed Scheme in combination with the adjacent Core Bus Corridor schemes are overall Neutral and Short-term.

As outlined in Section 21.3.1.2.1, a number of other local projects could directly interface with the construction of the Proposed Scheme. As outlined in Section 5.9 of this EIAR, liaison with third-party developers will take place on a case-by-case basis, as will be set out in the Construction Contract, to ensure that there is coordination between projects, that construction access locations remain unobstructed by the Proposed Scheme works and that any additional construction traffic mitigation measures required to deal with cumulative impacts are managed appropriately.

Based on the aim to coordinate between the Proposed Scheme works and other major infrastructure projects and major projects which are proposed along the route, or in the vicinity, of the Proposed Scheme, no likely significant cumulative effects are predicted on air quality over and above the effects of the Proposed Scheme in isolation which are reported in Chapter 7 (Air Quality).

21.3.1.2.1 Ecological Assessment

An assessment of the cumulative impact of the Proposed Scheme and the other adjoining Core Bus Corridor Schemes (apart from Kimmage to the City Centre Core Bus Corridor Scheme and Bray to City Centre Core Bus

Corridor Scheme) on ecological receptors has been undertaken using the approach outlined in Section 7.2.4.3 in Chapter 7 (Air Quality)).

The cumulative impact of the Proposed Scheme and the other adjoining Core Bus Corridor Schemes (apart from Kimmage to the City Centre Core Bus Corridor Scheme and Bray to City Centre Core Bus Corridor Scheme) on the nearby ecologically sensitive areas within 200m of roads impacted by the Proposed Scheme, as defined in Section 7.2.4.1 in Chapter 7 (Air Quality)), is outlined in Table 21.2. The annual mean NO_X concentration has been compared to the critical level of 30µg/m^3 at each of the designated habitat sites. All sites exceed the critical level for NO_X in both the Do Minimum and the cumulative operational Do Something scenarios, within 200m of the nearest impacted road, as per the standalone scenario (refer to Table 7.27 in Chapter 7 Air Quality).

Table 21.2: Potential Construction Cumulative Impacts at Key Ecological Receptors (NO_X Annual Mean Concentration In 2024)

Annual Mean NO_x in 2024 At Closest Point Within Ecological Site To Road							
Receptor	**Receptor Location (ITM)**	**Do Minimum (µg/m³)**	**Distance from road beyond which concentration is below critical level (30µg/m³) (m)**	**Do Something (µg/m³)**	**Distance from road beyond which concentration is below critical level (30µg/m³) (m)**	**Impact (DS – DM) (µg/m³)**	**Change as a percentage of critical level (30µg/m³) (%)**
Dodder Valley pNHA (M50)	711343, 727787	88.3	>200m	89.4	>200m	1.1	4%
Dodder Valley pNHA (Tallaght Road)	710796, 727740	104.1	>200m	108.7	>200m	4.6	15%
Grand Canal pNHA (Canal Road)	715821, 732513	113.8	>200m	115.0	>200m	1.2	4%
Grand Canal pNHA (Charlemont Bridge, western side)	715881, 732544	91.9	>200m	91.8	>200m	-0.1	0%
Grand Canal pNHA (Charlemont Bridge, eastern side)	715894, 732549	110.5	>200m	111.0	>200m	0.5	2%
Grand Canal pNHA (Charlemont Mall)	715814, 732531	44.9	>200m	44.7	>200m	-0.3	-1%
Grand Canal pNHA (Cheltenham Place)	715924, 732560	76.4	>200m	76.0	>200m	-0.4	-1%
Grand Canal pNHA (Dartmouth Walk)	716126, 732631	65.4	>200m	64.7	>200m	-0.8	-3%
Grand Canal pNHA (Emmet	714864, 732443	123.5	>200m	111.0	>200m	-12.5	-42%

Annual Mean NO_x in 2024 At Closest Point Within Ecological Site To Road							
Receptor	Receptor Location (ITM)	Do Minimum (µg/m³)	Distance from road beyond which concentration is below critical level (30µg/m³) (m)	Do Something (µg/m³)	Distance from road beyond which concentration is below critical level (30µg/m³) (m)	Impact (DS – DM) (µg/m³)	Change as a percentage of critical level (30µg/m³) (%)
Bridge, western side)							
Grand Canal pNHA (Emmet Bridge, eastern side)	714874, 732441	149.4	>200m	132.2	>200m	-17.2	-57%
Grand Canal pNHA (Grand Parade)	715926, 732552	90.1	>200m	88.7	>200m	-1.4	-5%
Grand Canal pNHA (Grove Road, western end)	714919, 732420	86.5	>200m	82.9	>200m	-3.5	-12%
Grand Canal pNHA (Grove Road, center)	715221, 732446	73.0	>200m	70.9	>200m	-2.1	-7%
Grand Canal pNHA (Grove Road, eastern end)	715565, 732488	77.2	>200m	75.5	>200m	-1.7	-6%
Grand Canal pNHA (La Touche Bridge, western side)	715609, 732499	113.8	>200m	115.0	>200m	1.2	4%
Gand Canal pNHA (La Touche Bridge, eastern side)	715881, 732544	91.9	>200m	91.8	>200m	-0.1	0%
Grand Canal pNHA (Leeson Bridge, western side)	716368, 732736	120.7	>200m	125.5	>200m	4.7	16%
Grand Canal pNHA (Leeson Bridge, eastern side)	716382, 732741	166.0	>200m	174.5	>200m	8.5	28%
Grand Canal pNHA (Mespil Road,western end)	716425, 732748	56.0	>200m	55.8	>200m	-0.2	-1%
Grand Canal pNHA (Parnell Road)	714464, 732489	69.3	>200m	72.7	>200m	3.4	11%

Nitrogen deposition levels have been compared to the lower and higher critical loads for the designated habitat sites in Table 21.3. All sites are below the lower critical load for the designated habitat site in both the Do Minimum and the Do Something cumulative construction scenarios, with the exception of the Dodder Valley pNHA (Tallaght Road) and the Grand Canal pNHA (Canal Rd, Charlemont Bridge, Emmet Bridge, La Touche Bridge and Leeson Bridge) as per the standalone scenario (refer to Table 7.28 in Chapter 7 Air Quality).

Table 21.3: Potential Cumulative Construction Impacts at Key Ecological Receptors (N Deposition In 2024)

Annual Mean N Deposition In 2024 At Closest Point Within Ecological Site To Road									
Receptor	Receptor Location (ITM)	Lower critical load for most sensitive feature (kgN/ha/yr)	Do Minimum (kgN/ha/yr)	Distance from road beyond which deposition is below critical load (m)	Do Something (kgN/ha/yr)	Distance from road beyond which deposition is below critical load (m)	Change relative to lower critical load (%)	Distance from road beyond which the change is <1% (m)	Change in deposition kgN/ha/yr
Dodder Valley pNHA (M50)	711343, 727787	5	4.82	10m	4.87	10m	1%	20m	0.04
Dodder Valley pNHA (Tallaght Road)	710796, 727740	5	5.46	10m	5.64	0m	4%	30m	0.18
Grand Canal pNHA (Canal Road)	715821, 732513	5	5.12	10m	5.03	10m	-2%	0m	-0.09
Grand Canal pNHA (Charlemont Bridge, western side)	715881, 732544	5	4.97	10m	4.97	10m	0%	0m	<0.01
Grand Canal pNHA (Charlemont Bridge, eastern side)	715894, 732549	5	5.71	10m	5.73	10m	0%	0m	0.02
Grand Canal pNHA (Charlemont Mall)	715814, 732531	5	2.84	0m	2.83	0m	0%	0m	-0.01
Grand Canal pNHA (Cheltenham Place)	715924, 732560	5	4.31	0m	4.30	0m	0%	0m	-0.02
Grand Canal pNHA (Dartmouth Walk)	716126, 732631	5	3.82	0m	3.79	0m	-1%	0m	-0.04

Annual Mean N Deposition In 2024 At Closest Point Within Ecological Site To Road									
Receptor	Receptor Location (ITM)	Lower critical load for most sensitive feature (kgN/ha/yr)	Do Minimum (kgN/ha/yr)	Distance from road beyond which deposition is below critical load (m)	Do Something (kgN/ha/yr)	Distance from road beyond which deposition is below critical load (m)	Change relative to lower critical load (%)	Distance from road beyond which the change is <1% (m)	Change in deposition kgN/ha/yr
Grand Canal pNHA (Emmet Bridge, western side)	714864, 732443	5	6.21	10m	5.73	10m	-10%	0m	-0.48
Grand Canal pNHA (Emmet Bridge, eastern side)	714874, 732441	5	7.14	10m	6.53	10m	-12%	0m	-0.61
Grand Canal pNHA (Grand Parade)	715926, 732552	5	4.90	0m	4.84	0m	-1%	0m	-0.06
Grand Canal pNHA (Grove Road, western end)	714919, 732420	5	4.74	0m	4.59	0m	-3%	0m	-0.15
Grand Canal pNHA (Grove Road, center)	715221, 732446	5	4.16	0m	4.07	0m	-2%	0m	-0.09
Grand Canal pNHA (Grove Road, eastern end)	715565, 732488	5	4.35	0m	4.27	0m	-2%	0m	-0.08
Grand Canal pNHA (La Touche Bridge, western side)	715609, 732499	5	5.84	0m	5.88	10m	1%	10m	0.04
Gand Canal pNHA (La Touche Bridge, eastern side)	715881, 732544	5	4.97	10m	4.97	10m	0%	0m	<0.01

Annual Mean N Deposition In 2024 At Closest Point Within Ecological Site To Road									
Receptor	**Receptor Location (ITM)**	**Lower critical load for most sensitive feature (kgN/ha/yr)**	**Do Minimum (kgN/ha/yr)**	**Distance from road beyond which deposition is below critical load (m)**	**Do Something (kgN/ha/yr)**	**Distance from road beyond which deposition is below critical load (m)**	**Change relative to lower critical load (%)**	**Distance from road beyond which the change is <1% (m)**	**Change in deposition kgN/ha/yr**
Grand Canal pNHA (Leeson Bridge, western side)	716368, 732736	5	6.10	10m	6.28	10m	4%	20m	0.18
Grand Canal pNHA (Leeson Bridge, eastern side)	716382, 732741	5	7.71	20m	7.99	20m	6%	0m	0.28
Grand Canal pNHA (Mespil Road, western end)	716425, 732748	5	3.38	0m	3.37	0m	0%	0m	-0.01
Grand Canal pNHA (Parnell Road)	714464, 732489	5	4.00	0m	4.15	0m	3%	>200m	0.15

In accordance with the EPA EIAR Guidelines (EPA 2022), the ecological impacts associated with the cumulative Construction Phase traffic emissions arising from the Proposed Scheme in combination with the other Core Bus Corridor schemes are predicted to be overall Negative, Slight and Short-term, as per the standalone scheme, refer to Chapter 7, Air Quality.

21.3.1.2.2 Regional Air Quality Assessment

The potential changes in regional air emissions due to the cumulative Construction Phase traffic impacts have been assessed using the ENEVAL tool (methodology set out in Section 7.2.4.2 in Chapter 7 (Air Quality)). This assessment considers all 12 schemes on a regional basis to account for the total emissions, although, as outlined in Section 21.2.6.2, all 12 schemes will not be constructed concurrently.

Pollutant emissions (in tonnes) produced in both the Do Minimum and Do Something scenarios for the 2024 cumulative Construction Phase are shown in Table 21.4. The Proposed Scheme cumulatively with the other 11 Core Bus Corridor schemes is predicted to increase emissions of all pollutants modelled. The majority of these increases result from redistribution of vehicles onto other longer routes, while construction of the schemes takes place. To produce these emissions estimates, the traffic model and therefore the ENEVAL tool has applied the peak construction day in 2024 across the whole year. Emissions are therefore worst-case and likely to be lower in reality.

Table 21.4. Cumulative Construction Phase Regional Pollutant Emissions (tonnes) – Construction Year 2024

	Vehicle Class	**NO_X (tonnes)**	**NO_2 (tonnes)**	**PM_{10} (tonnes)**	**$PM_{2.5}$ (tonnes)**	**HC (tonnes)**	**CO (tonnes)**	**Benzene (tonnes)**	**Butadiene (tonnes)**
DM	Car	1,625	489	18.4	17.5	86	1,952	1.5	1.2

	Vehicle Class	NO_X (tonnes)	NO_2 (tonnes)	PM_{10} (tonnes)	$PM_{2.5}$ (tonnes)	HC (tonnes)	CO (tonnes)	Benzene (tonnes)	Butadiene (tonnes)
DS		1,659	499	18.8	17.9	89	2,007	1.5	1.2
Change		34	10.4	0.4	0.4	2.1	55	0.04	0.02
% Change		2.1%	2.1%	2.1%	2.1%	2.5%	2.8%	2.6%	1.6%
DM	Goods	1,437	408	11.3	10.7	43	223	0.4	0.5
DS		1,468	416	11.5	10.9	44	231	0.4	0.5
Change		30.7	7.5	0.2	0.2	0.8	7.9	0.02	0.01
% Change		2.1%	1.8%	1.7%	1.7%	1.8%	3.5%	5.8%	1.6%
DM	Urban Bus	44	4.5	0.7	0.7	2.0	8.9	0	0.05
DS		52	5.2	0.8	0.8	2.2	10.2	0	0.05
Change		7.6	0.8	0.09	0.08	0.24	1.3	0	0.004
% Change		17.2%	17.2%	11.5%	11.5%	12.3%	15.0%	0%	9.6%
DM	Total	3,106	902	30	29	132	2,184	1.8	1.72
DS		3,179	920	31	30	135	2,249	1.9	1.75
Change		73	19	0.7	0.6	3.1	64	0.06	0.03
% Change		2.3%	2.1%	2.2%	2.2%	2.4%	3.0%	3.2%	1.8%

In accordance with the EPA EIAR Guidelines (EPA 2022) the regional impacts associated with the cumulative Construction Phase traffic emissions from the Proposed Scheme, the other 11 Core Bus Corridor schemes are considered overall Negative, Not Significant and Short-term.

21.3.1.2.3 Summary of Predicted Cumulative Construction Phase Impacts

Table 21.5 summarises the predicted impacts associated with the construction of the Proposed Scheme cumulatively with the other Core Bus Corridor Schemes concurrently.

Table 21.5: Summary of Predicted Cumulative Construction Phase Impacts

Assessment Topic	Predicted Impact – Cumulative Construction
Construction dust	Neutral, Short-term
Road traffic impacts on local human receptors	Neutral, Short-term
Road traffic impacts on local ecological receptors	Negative, Slight, Short-term
Regional air quality	Negative, Not significant, Short-term

With the implementation of the dust minimisation measures detailed in the CEMP (Appendix 5.1 in Volume 4 of the EIAR), fugitive emissions of dust will be insignificant and pose no nuisance at nearby receptors. Thus, there will be no residual cumulative Construction Phase dust impacts.

The air dispersion modelling assessment of cumulative 2024 Construction Phase traffic emissions has found that the Proposed Scheme will be neutral overall in the study area, as with the standalone scenario described in Section 7.4.3.2 of Chapter 7 (Air Quality). No specific Construction Phase mitigation measures are required.

Overall, therefore, it is considered that the cumulative residual effects as a result of the Proposed Scheme's construction is Neutral and Short-term, whilst meeting the scheme objectives set out in Chapter 1 (Introduction). No additional significant negative impacts are predicted over and above the standalone assessment for the Proposed Scheme as outlined in Chapter 7 (Air Quality).

21.3.1.3 Climate

21.3.1.3.1 Construction Embodied Carbon Assessment

As outlined in Section 21.2.2.3, the ZoI for the embodied carbon climate assessment is not limited to the study area and is considered on a national basis. The construction of a wide range of projects in Ireland over the construction period of BusConnects will result in the generation of embodied carbon. These projects include local planning applications, major projects and strategic developments with a varying extent of embodied carbon generation.

The IEMA Guidance Note on Assessing Greenhouse Gas (GHG) Emissions and Evaluating their Significance 2nd Edition (IEMA 2022) advises that in order to determine significance, the key test is *"whether it contributes to reducing GHG emissions relative to a comparable baseline consistent with a trajectory towards net zero by 2050"*. The approach used to assess significance is based on the following principles:

- Is the project "business as usual" in terms of climate reduction? – major or moderate negative impact;
- Is the project compatible with net zero by 2050 and complies with "good practice" reduction measures? – minor adverse impact that is not significant.
- Does the project achieve emissions that go substantially beyond the reduction trajectory and has minimal residual emissions? – Negligible effect that is not significant.
- Does the project cause GHG emissions to be avoided or removed from the atmosphere? – beneficial effect that is significant. Only projects that reverse (rather than reduce) the risk of severe climate change can be judged as beneficial.

The EPA Guidelines (EPA 2022) describe the quality of effects in terms of positive, neutral and negative where neutral is defined as effects that are imperceptible, within normal bounds of variation. Taking into account both the IEMA and EPA guidance approach, this chapter has assessed impacts as being either negligible or positively / negatively significant (ranging from minor, moderate to major). Negligible is defined as a change in GHG emissions which is less than ±0.01% of the 2030 Transport Sectoral Emission Ceiling. Minor is determined to be an impact which is between ±0.01% and ±0.5% of the 2030 Transport Sectoral Emission Ceiling. Moderate is an impact which is between ±0.5% and ±1.0% of the 2030 Transport Sectoral Emission Ceiling, whilst major is defined as being an impact which is greater than ±1.0% of the 2030 Transport Sectoral Emission Ceiling. In relation to the Construction Phase, the guiding principles outlined above are applied to determine the level of significance.

However, notwithstanding that carbon emissions are to be considered on a national basis, an appraisal has been carried out to assess the Embodied Carbon associated with the Construction Phase of the Proposed Scheme cumulatively with the other 11 Core Bus Corridor schemes using the 'TII Carbon Assessment Tool' (Version 2) (TII 2020). The methodology to assess Embodied Carbon is described in full in Section 8.2.4.1 in Chapter 8 (Climate). As has been previously outlined in Section 21.2.6.2, four Core Bus Corridor schemes will not be constructed concurrently with adjacent Core Bus Corridor Schemes, however for the purpose of the Embodied Carbon assessment, the timing of the construction of the schemes is not considered a determining factor for the assessment. It is assumed that all 12 Core Bus Corridors will ultimately be constructed and therefore the carbon impacts associated with the schemes would materialize.

Based on the TII Carbon Tool (TII 2020), the breakdown of the activities between the different phases of the Proposed Scheme cumulatively with all other Core Bus Corridors has been assessed. Table 21.6provides the key phases of the cumulative GHG generation which are the embodied carbon of the construction materials and construction activities, which when combined account for 88% of all carbon emissions. Pre-construction together with construction waste is expected to account for 12% of all cumulative emissions.

Table 21.6: Construction GHG Emissions

Activity	Kilotonnes (kt) CO2eq / Total	% Of Total
Pre-Construction	0.8	1%
Embodied Carbon	85.7	76%
Construction Activities	13.8	12%
Construction Waste	11.9	11%
All	112.2	100%

The Proposed Scheme, cumulatively with all other Core Bus Corridor schemes, is estimated to result in total Construction Phase GHG emissions of 112.2kt (kilotonnes) embedded CO_{2eq} for materials (refer to equivalent to an annualised total of 0.05% of Ireland's non-ETS (Emissions Trading Scheme) 2020 target or 0.06% of Ireland's non-ETS 2030 target. Over the predicted operational 60-year lifespan of the Proposed Scheme, the annualised emissions due to the Construction Phase of the Proposed Scheme is projected to reach, at most, 0.005% of Ireland's non-ETS 2030 emissions target. The operational lifespan of 60 years is the default used in the TII Carbon Tool and is the default in LA 114 Climate (UKHA 2021). 60 years is also the timeline for the appraisal of the Core Bus Corridor Infrastructure Works business case.

The IEMA Guidance (IEMA 2022) states that "*Carbon budgets allow for continuing economic activity, including projects in the built environment, in a controlled manner*". Thus, projects which have a carbon footprint are not necessarily significant provided that the projects are compatible with net zero by 2050 and the full range of mitigation measures are employed to minimize the carbon footprint. Given that the construction of the Proposed Schemes itself will lead to operational GHG emission reductions overall then the Construction Phase should be viewed as compatible with net zero emission targets. Thus, the assessment of significance for the Construction Phase of the Proposed Scheme is deemed to have a minor adverse impact given that the six-year Construction Phase emissions are equivalent to an annualised total of 0.06% of Ireland's non-ETS 2020 target and 0.31% of the 2030 Transport Emission Ceiling. The predicted impact to climate due to embodied carbon emissions during the Construction Phase, prior to mitigation, will be Negative, Minor and Short-Term.

As outlined in Section 21.3.1.3.1 and in line with IEMA guidance (IEMA 2022), the combined impact of the Proposed Scheme with other schemes under construction concurrently is considered to result in a cumulative Negative, Short-term and Significant impact. In general, the carbon emissions associated with embodied carbon and energy to construct schemes on a national basis is accounted for cumulatively as part of the ETS.

21.3.1.3.2 Construction Traffic Assessment

As outlined in Section 21.2.6.1, the traffic data used for both the 2024 Do Minimum and Do Something cumulative construction scenarios includes background traffic growth accounting for wider construction activity. Therefore, it is assumed that potential emissions associated with the concurrent construction traffic related to other projects alongside the construction of the Proposed Scheme are included in the carbon emission forecasts in both the Do Minimum and Do Something scenarios.

The climate impact assessment of road traffic emissions from the Construction Phase of the Proposed Scheme cumulatively with all other Core Bus Corridor schemes has been carried out according to methodology outlined in Section 8.2.4.2 in Chapter 8 (Climate).

Specifically, the predicted GHG emissions from the Do Minimum scenario were compared with the GHG emissions from the Do Something cumulative construction scenario. The cumulative construction scenario assumed construction of the Proposed Scheme in addition to all other Core Bus Corridor Schemes concurrently, as a worst-case as the greatest level of traffic redistribution would occur with all Core Bus Corridor schemes under construction at the same time.

A comparison of the construction traffic associated with the Proposed Scheme cumulatively with all other Core Bus Corridors and the Do Minimum GHG emissions in the construction year of 2024 indicates that there is predicted to be an overall temporary increase of 25.3kt in $CO_{2eq,}$. This is equivalent to a 2.4% temporary increase in CO_{2eq} relative to the construction year Do Minimum estimates. To put these figures in context, approximately

10,870kt CO_{2eq} are projected to be emitted in Ireland by the Transport sector in 2024 (EPA 2022b). The majority of these increases will result from redistribution of vehicles onto other longer routes, while construction of the Proposed Scheme takes place. To produce these emissions estimates, the traffic model and therefore the ENEVAL tool have applied the peak construction day in 2024 across the whole year. Emission predictions are therefore a highly conservative worst-case and are likely to be conservatively 50% lower in reality.

Carbon emissions are accounted for on an annual basis by the EPA. The predicted cumulative GHG emissions included in Table 21.7 are totalled across all schemes which are expected to be constructed over a six year period. Therefore, an average annual GHG emission value is also provided on a per annum basis.

Table 21.7: Cumulative Construction Phase Traffic CO_{2e} Emissions Total over a Six Year Period and Per Annum

Scenario	Vehicle Class	CO_{2eq} (Kt CO_{2eq})	CO_{2eq} (Kt CO_{2eq}) per annum
DM	Car	582.0	97.0
DS		596.9	99.5
Change		14.9	2.5
% Change		2.6%	2.6%
DM	Goods	429.4	71.6
DS		435.8	72.6
Change		6.3	1.1
% Change		1.5%	1.5%
DM	Bus	24.0	4.0
DS		28.0	4.7
Change		4.1	0.7
% Change		16.9%	16.9%
DM	Total	1035.4	172.6
DS		1060.7	176.8
Change		25.3	4.2
% Change		2.4%	2.4%

The assessment of significance for the construction traffic during the Construction Phase, prior to mitigation, is deemed to be a minor adverse impact given that the increases in construction traffic emissions are equivalent to an annualised total of 0.011% of Ireland's non-ETS 2020 target and 0.07% of the 2030 Transport Emission Ceiling. The potential impact to climate due to construction traffic carbon emissions during the Construction Phase, prior to mitigation, will be Negative, Minor and Short-Term.

A series of embedded mitigation measures have been incorporated into the design of the Core Bus Corridor schemes with the goal of reducing the embodied carbon and traffic emissions associated with the Construction Phase of all Core Bus Corridor schemes. It is proposed is that where feasible concrete containing Portland cement will be replaced with concrete containing ground granulated blast furnace slag (GGBFS). This measure will lead to a cumulative saving of approximately 11.1kt of CO_{2eq} across all 12 Core Bus Corridor Schemes. In addition, the Core Bus Corridor schemes will minimise wastage of materials due to poor timing or over ordering on site thus helping to minimise the embodied carbon footprint of the Proposed Scheme; and where practicable, opportunities for materials reuse will be considered within the extent of the Core Bus Corridor schemes. In addition, where practicable, materials will be sourced locally to reduce the embodied emissions associated with transport.

After the implementation of mitigation measures, the predicted impact to climate due to the Construction Phase of the Proposed Scheme in combination with the other 11 Core Bus Corridor schemes, after mitigation, is Negative, Minor and Short-term.

21.3.1.3.3 Overall Cumulative Construction Climate Assessment

Table 21.8 summarises the predicted impacts on climate associated with the Proposed Scheme cumulatively with the construction of all other Core Bus Corridor schemes.

Table 21.8: Summary of Predicted Cumulative Construction Phase Climate Impacts

Assessment Topic	Predicted Impact – Cumulative Construction
Embodied Carbon	Negative, Minor and Short-Term
Construction Traffic	Negative, Minor and Short-Term
Combined Construction Phase	Negative, Minor and Short-Term

21.3.1.4 Noise and Vibration

21.3.1.4.1 Construction Noise Assessment

An appraisal was carried out to assess the cumulative impact to noise sensitive locations (NSLs) as a result of construction noise due to the Construction Phase of the Proposed Scheme, the other Core Bus Corridors and the other projects listed in Appendix A21.1 in Volume 4 of the EIAR. Thirty-one projects were identified within the 300m potential Zone of Influence (ZoI) of the Proposed Scheme (Refer to Section 21.2.2.3). These include 24 DCC planning applications, four SDCC planning applications, one SHD, one other Major Project, the Kimmage to City Centre Core Bus Corridor scheme and the Bray to City Centre Core Bus Corridor scheme.

The highest noise impacts associated with the Proposed Scheme are calculated at NSLs along the immediate boundary of the proposed construction works (typically within 50m of a specific working area). Due to the linear nature of works associated with the Proposed Scheme, construction noise impacts will occur over temporary periods at any one location. Construction activities associated with the Proposed Scheme will therefore dominate noise levels at the closest NSLs to the Proposed Scheme when occurring in their proximity. Due to the further distance of the other Core Bus Corridor schemes and the other projects to these NSLs, the cumulative construction noise levels will remain dominated by the Proposed Scheme and the magnitude of impacts described in Section 9.4.4.2 of Chapter 9 (Noise & Vibration) remain valid.

In order to ensure that construction activities associated with the Proposed Scheme are controlled at the closest NSLs, a series of mitigation measures will be implemented throughout the Construction Phase. These measures are set out in Section 9.5.1.1 of Chapter 9 (Noise & Vibration) . With the implementation of the mitigation measures to reduce construction noise levels associated with the Proposed Scheme and due to the separation from the nearest other Core Bus Corridor scheme, there are no significant cumulative impacts predicted to occur from concurrent construction of the Proposed Scheme in combination with the other Core Bus Corridor schemes and other projects identified.

21.3.1.4.2 Construction Traffic Assessment

Potential noise impacts associated with Construction Phase traffic during the construction of the Proposed Scheme has been assessed in Section 9.4.3.4 of Chapter 9 (Noise & Vibration). The assessment methodologies and significance criteria used for the assessment is set out in Section 9.2.4.1 and Section 9.2.4.2 of Chapter 9 (Noise & Vibration).

The assessment of potential cumulative construction traffic noise impacts has been undertaken using the following approach:

- Traffic noise levels have been calculated along the modelled roads within a 1km study area of the Proposed Scheme;
- Noise levels have been calculated for the Do Minimum scenario for the assessed construction year, 2024;
- Noise levels have been calculated for the Cumulative Do Something scenario for the assessed construction year, 2024;

- The change in traffic noise levels between the Do Minimum and Cumulative Do Something scenarios for the year 2024 has been calculated and the associated magnitude of change and noise level ranges using the same methodology as the stand-alone scheme, as set out in Section 9.2.4 of Chapter 9 (Noise & Vibration); and
- It is assumed that other schemes that may be under construction concurrently are captured in the 2024 Do Minimum and Do Something traffic volumes which accounts for traffic and HGV growth.

For the majority of the 1km study area relative to the standalone Proposed Scheme and assessed for the cumulative 2024 construction scenario, traffic noise impacts are determined to be Neutral, Imperceptible and Temporary to Negative, Moderate and Temporary due to the negligible to low volume of additional traffic along the road network during the cumulative Construction Phase scenario.

There is one additional road where a moderate impact is identified due to traffic redistribution onto the surrounding road network due to temporary traffic management measures during the cumulative construction scenario. This road is presented in Table 21.9. The relevant impact during the standalone scheme along these roads is also presented.

Table 21.9: Summary of Additional Predicted Construction Traffic Noise Impacts Due to Standalone Proposed Scheme and Cumulative Construction (other Bus Connects Core Bus Corridors under Construction)

Road	Predicted Impact – Standalone Proposed Scheme	Predicted Impact – Cumulative Construction
Ravensdale Park	Negative, Imperceptible, Temporary	Negative, Moderate, Temporary

21.3.1.5 Population

The Population assessment has considered potential cumulative effects on land-take, amenity and accessibility during construction. Sixteen projects were shortlisted as having potential interfaces with population receptors affected by the Proposed Scheme as assessed in Chapter 10 (Population). These are:

- SDCC planning application reference SD178/0003: Dodder Greenway Route Scheme;
- DCC planning application reference 2878/15: demolition of existing dwelling at No. 85 Templeogue Road, Dublin 6W and the construction of a total of 30 no. residential units;
- DCC planning application reference 4628/18: development of part 7, part 8 and part 9 storey office development with retail/cafe/restaurant units at site bound by Charlemont Street, Harcourt Road and Richmond Street which contains four Protected Structures;
- DCC planning application reference 3024/18: comprehensive redevelopment of site (previously permitted under DCC Ref. Ref. 2527/15 and DCC Reg. Ref. 3987/15 at Harcourt Square, Harcourt Street and Charlotte Way;
- DCC planning application reference 3389/15: demolition of No. 46 Lower Rathmines Road and a derelict mews building on Fortesque Lane, refurbishment of existing Nos. 40, 42 and 44 Lower Rathmines Road (protected structures) and the construction of two new buildings creating a student residential complex;
- DCC planning application reference 2769/21: Build-To-Rent residential development at No. 348 Harold's Cross Road, Dublin 6, D6W VW99;
- DCC planning reference 2851/21: new educational campus of 2 No. new school buildings located at the former Harold's Cross Greyhound Stadium, Harold's Cross, Dublin 6;
- DCC planning reference 3546/21: demolition under Grant of permission DCC Reg. Ref. 4059/18. and the demolition of an additional 2 no. existing structures and construction of a new mixed-use development;
- DCC planning reference 4936/22: construction of a new 9 no. storey office block;
- DCC planning reference 4832/22: demolition of existing pitched blazed roof over shopping mall and construction of a new 111 bedroom hotel around a central lightwell;
- DCC planning reference 4937/22: reconfiguration and extension of the exiting office block utilising existing structural elements to provide modernised office accommodation;

- SDCC planning reference SD228/0008: construction of a combination of single way and two-way cycle tracks on and adjacent to the vehicle carriageway;
- SDCC planning reference SD18A/0053: construction of 2 three-storey buildings accommodating: 32 apartments;
- DCC planning reference 2028/21: construction of a 4-storey hotel with a setback at third floor accommodating 78 no. hotel bedrooms;
- Major Project (id MP15) - DART+ Tunnel Element (Kildare Line to Northern Line); and
- Major Project (id MP16) - Potential Metro South alignment: SW option.

Constructing the Proposed Scheme and the shortlisted projects at the same time has the potential to bring about impacts on amenity in the immediate vicinity of works during a temporary period. A cumulative impact could potentially occur during construction with no mitigation.

In regard to DCC planning application reference 2851/21, construction is due to take 18-24 months. However as there is uncertainty around the construction dates, the assessment of cumulative effects has assumed a worst case of construction overlap which would lead to a potential cumulative impact on land take in conjunction with the Proposed Scheme.

As outlined in Section 5.9 in Chapter 5 (Construction) in Volume 2 of this EIAR, liaison with third-party developers will take place on a case-by-case basis, as will be set out in the Construction Contract, to ensure that there is coordination between projects, that construction access locations remain unobstructed by the Proposed Scheme works and that any additional construction traffic mitigation measures required to deal with cumulative impacts are managed appropriately. On that basis it is not envisaged that the Proposed Scheme in combination with other projects will give rise to significant cumulative impacts.

21.3.1.6 Human Health

The Human Health assessment identified 34 other projects with potential for likely significant cumulative effects with the Proposed Scheme and took into the assessment stages 3 and 4 (see Appendix A21.1). These included 16 DCC planning applications, two SDCC planning application, one SHD, three other Major Projects (DART+ Tunnel Element, Potential Metro South alignment and the Greater Dublin Area Cycle Network Plan) and the remaining 11 Core Bus Corridor Schemes.

For 12 of the shortlisted DCC planning applications, the Human Health assessment identified potential for in-combination impacts of noise, dust, loss of visual amenity and general disruption from construction traffic and plant affecting nearby residents and business employees in conjunction with the Proposed Scheme. The Human Health assessment also identified potential for cumulative disruption to pedestrian activity and traffic, although this is expected to be localised. The Health impact is likely to be transient annoyance. These impacts were assessed as Negative, Moderate and Temporary however are considered to be Not Significant on population health.

Mitigation would comprise the standard measures used in typical construction practice to limit impacts on local amenity. It is not considered that any further mitigation is required for cumulative impacts over and above those measures that would be used by each project in isolation.

For the remaining shortlisted projects, the Human Health assessment either identified no cumulative impacts during construction or identified cumulative impacts that were assessed as Negative, Slight and Temporary.

21.3.1.7 Biodiversity

This cumulative impact assessment examines whether the Proposed Scheme, along with any other projects could cumulatively result in a likely significant effect on biodiversity. Projects either in place, or proposed, are considered in assessing the potential for cumulative impacts to increase the significance of the impacts predicted for the Proposed Scheme on biodiversity. These projects are outlined in Table A21.2.5 in Appendix A21.2 Stage 4 Specialist Assessments in Volume 4 of the EIAR.

The potential for cumulative impacts on biodiversity to arise are limited to those residual impacts associated with the Proposed Scheme and those effects the Proposed Scheme will have on the receiving environment that are measurable in some way, but themselves will not result in a likely significant residual effect on biodiversity.

The residual biodiversity impacts associated with the Proposed Scheme itself, as reported in Section 12.6, Chapter 12 (Biodiversity) in this EIAR, are all significant at the local geographic scale (i.e. habitats of Local Importance (Higher Value) or equivalent) and are summarised as follows and in Table 21.10 under the following categories:

- Habitat loss;
- Mortality risk for birds;
- Habitat loss for breeding birds; and
- Disturbance / displacement of fauna (breeding birds);

Table 21.10: Summary of Construction Phase Significant Residual Impacts

Ecological Receptor	Ecological Valuation	Predicted Impact (Pre-Mitigation and Monitoring)	Potential Significance	Significant Residual Impact (Post Mitigation)
Habitats (outside of designated areas for nature conservation)				
(Mixed) broadleaved woodland (WD1)	Local Importance (Higher Value)	Habitat Loss	Likely significant effect at the local geographic scale	Likely significant effect at the local geographic scale
Hedgerows (WL1)	Local Importance (Higher Value)	Habitat Loss	Likely significant effect at the local geographic scale	Likely significant effect at the local geographic scale
Tree lines (WL2)	Local Importance (Higher Value)	Habitat Loss	Likely significant effect at the local geographic scale	Likely significant effect at the local geographic scale
Immature woodland (WS2)	Local Importance (Higher Value)	Habitat Loss	Likely significant effect at the local geographic scale	Likely significant effect at the local geographic scale
Fauna Species				
All other breeding bird species (non-SCI)	Local Importance (Higher Value)	Habitat Loss; Mortality risk; Disturbance / Displacement; Habitat Degradation (hydrology)	Likely significant effect at the local geographic scale	No significant residual effect (Mortality risk; Habitat Degradation (hydrology)) Likely significant residual effect at the local geographic scale (Habitat Loss; Disturbance / Displacement)

21.3.1.7.1 Impacts from Habitat Loss

Potential cumulative impacts on habitat loss will relate to the following five key environmental receptor (KER) habitats where the Proposed Scheme will result in a residual effect significant at the local geographic level; (Mixed) Broadleaved woodland (WD1); Hedgerows (WL1); Treelines (WL2) and Immature woodland (WS2).

The majority of these habitats are located adjacent to the existing roadway and are highly disturbed and typically fragmented in nature. Given the location of the Proposed Scheme and the on-going urban development trends across Dublin, there is likely to be continued habitat loss and fragmentation. Lands surrounding the Proposed Scheme are largely zoned for residential, commercial or industrial purposes. In relation to areas of locally

important habitats that will be lost, given the nature and availability of these habitat types in the wider environment, any cumulative losses of these habitat types from the Proposed Scheme in combination with other development are not likely to increase the impact significance above the residual local geographic scale.

Various protective policies and objectives in place within the land use plans will also moderate any future losses of habitats of a biodiversity value. There are overarching plan level environmental protection policies from the following plans; Dublin City Development Plan 2022 – 2028 and South Dublin County Development Plan 2022 – 2028.

The Proposed Scheme is compliant with all of the plan level biodiversity protection policies and objectives described within the Dublin City Development Plan 2022 – 2028 and South Dublin County Development Plan 2022 - 2028 listed below. Furthermore, the Proposed Scheme will not prevent the achievement of any of these plan level biodiversity protection policies and objectives across the identified potential impact pathways.

Dublin City Development Plan 2022 - 2028

GI13: To ensure the protection, conservation and enhancement of all areas of ecological importance for protected species, and especially those listed in the EU Birds and Habitats Directives, including those identified as supporting the favourable conservation condition of any European sites, in accordance with development standards set out in this plan.

GI14: To maintain and strengthen the integrity of the city's ecological corridors and stepping stones which enable species to move through the city, by increasing their connectivity [to be shown in the proposed Green Infrastructure Strategy] under Article 10 of the EU Habitats Directive. Development proposals should not compromise their ecological functions and should realise opportunities to contribute to enhancing the nature conservation value of them by landscaping that provides complementary habitats. An Ecological Impact Assessment will be required for any proposed development likely to have a significant impact on habitats and species of interest on or adjacent an ecological corridor.

GI16: That new developments (as appropriate) will be required to support local biodiversity and incorporate biodiversity improvements through urban greening and the use of nature-based infrastructural solutions that are of particular relevance and benefit in an urban context. Opportunities should be taken as part of new development to provide a net gain in biodiversity and provide links to the wider Green Infrastructure network. All suitable new buildings will be required to incorporate swift nesting blocks into the building fabric.

GI17: To increase the percentage of restored and naturalised areas on public land in the city. That new development on private and public lands should provide opportunities for restoration of degraded habitats and soils where feasible and provide for their long-term maintenance to limit degradation.

GI41: To protect existing trees as part of new development, particularly those that are of visual, biodiversity or amenity quality and significance. There will be a presumption in favour of retaining and safeguarding trees that make a valuable contribution to the environment.

GI43: To protect and enhance the City's hedgerow network, in particular, hedgerows that form townland, parish and barony boundaries. It is Council policy to increase hedgerow coverage and promote the planting of hedgerows in new developments using native species.

GIO42: To protect trees, hedgerows or groups of trees which function as wildlife corridors or 'stepping stones' in accordance with Article 10 of the EU Habitats Directive.

South Dublin County Council Development Plan 2022 - 2028

GI1 Objective 1: To establish a coherent, integrated and evolving GI Network across South Dublin County with parks, open spaces, hedgerows, trees including public street trees and native mini woodlands (Miyawaki-Style), grasslands, protected areas and rivers and streams and other green and blue assets forming strategic links and to integrate and incorporate the objectives of the GI Strategy throughout all relevant land use plans and development in the County.

GI2 Objective 1: To reduce fragmentation and enhance South Dublin County's GI network by strengthening ecological links between urban areas, Natura 2000 sites, proposed Natural Heritage Areas, parks and open spaces and the wider regional network by connecting all new developments into the wider GI Network.

GI2 Objective 2: To protect and enhance the biodiversity and ecological value of the existing GI network by protecting where feasible (and mitigating where removal is unavoidable) existing ecological features including tree stands, woodlands, hedgerows and watercourses in all new developments as an essential part of the design and construction process, such proactive approach to include provision to inspect development sites post construction to ensure hedgerow coverage has been protected as per the plan.

GI2 Objective 3: To retrospectively repair habitat fragmentation and provide for regeneration of flora and fauna where weaknesses are identified in the network through the implementation of new GI interventions.

GI2 Objective 4: To integrate GI, and include areas to be managed for biodiversity, as an essential component of all new developments in accordance with the requirements set out in Chapter 12: Implementation and Monitoring and the policies and objectives of this chapter.

GI2 Objective 5: To protect and enhance the County's hedgerow network, in particular hedgerows that form townland, parish and barony boundaries recognising their historic and cultural importance in addition to their ecological importance and increase hedgerow coverage using locally native species including a commitment for no net loss of hedgerows on any development site and to take a proactive approach to protection and enforcement.

GI2 Objective 7: To enhance the biodiversity value of publicly owned hard infrastructure areas by incorporating the planting of new trees, grasses and other species, thereby integrating this infrastructure into the overall GI network.

NCBH11 Objective 1: To review Tree Preservation Orders within the County and maintain the conservation value of trees and groups of trees that are the subject of any Tree Preservation Order.

NCBH11 Objective 3: To protect and retain existing trees, hedgerows, and woodlands which are of amenity and / or biodiversity and / or carbon sequestration value and / or contribute to landscape character and ensure that proper provision is made for their protection and management taking into account Living with Trees: South Dublin County Council's Tree Management Policy (2015-2020) or any superseding document and to ensure that where retention is not possible that a high value biodiversity provision is secured as part of the phasing of any development to protect the amenity of the area.

NCBH11 Objective 4: To protect the hedgerows of the County, acknowledging their role as wildlife habitats, biodiversity corridors, links within the County's green infrastructure network, their visual amenity and landscape character value and their significance as demarcations of historic field patterns and townland boundaries. (Refer also to Chapter 4: Green Infrastructure).

GI5 Objective 6: To provide more tree cover across the county, in particular to areas that are lacking trees, with an emphasis on planting native Irish trees as appropriate.

Where habitat losses can be compensated for this would also reduce the impact significance and the potential for any cumulative impacts with any future developments. However, the Proposed Scheme is likely to result in cumulative impacts with regard to loss of hedgerow, treeline, woodland and parkland habitat at the local geographic scale; no higher than the already predicted residual effects significant at the local geographic scale for the Proposed Scheme alone.

21.3.1.7.2 Impacts on Birds

Section 12.6 of Chapter 12 (Biodiversity) in this EIAR reports there are predicted residual impacts on the local bird population with regard disturbance and the loss of foraging / nesting habitat as a result of the Proposed Scheme.

Disturbance to local bird populations as well as loss of foraging and nesting habitat may result from other projects within the vicinity of the Proposed Scheme. Habitats / features which could be used by birds which are also proposed for removal / development in the immediate vicinity include hedgerows, tree lines and woodlands. Pressures on local bird species are likely to continue given the location of the Proposed Scheme in the wider environment. Given the on-going urban development across Dublin there is likely to be continued habitat loss and fragmentation of suitable foraging and nesting habitat as well as disturbance associated with on-going development.

However, disturbance or displacement impacts during construction will be temporary or short-term and are not likely to have long-term population level effects, even cumulatively with any future projects that might be proposed.

Additionally, potential cumulative impacts will be controlled by the assessment of individual planning applications which must consider the effects on protected species such as birds as part of their appraisal by the competent authority, having regard to the protective environmental policies outlined in the Fingal Development Plan 2017-2023, the Dublin City Development Plan 2022-2028, the Dún Laoghaire-Rathdown County Development Plan 2022-2028, the Wicklow County Development Plan 2022 - 2028 and the South Dublin County Development Plan 2022 - 2028.

The Proposed Scheme is likely to result in cumulative impacts on birds but no higher than the already predicted residual effects significant at the local geographic scale for the Proposed Scheme alone.

21.3.1.7.3 Other Biodiversity Impacts

The other impacts associated with the Proposed Scheme that are measurable in some way, but themselves will not result in a likely significant effects on biodiversity are:

- Impacts on the existing hydrological and hydrogeological regimes;
- Impacts on air quality;
- Disturbance to species not already listed in Table 21.10; and
- Temporary habitat loss affecting species not already listed in Table 21.10.

Specific assessments have been undertaken by air quality, hydrogeology, and hydrology specialists to identify the potential for cumulative effects to occur, however an overarching assessment is included below.

Any proposed projects must comply with statutory licensing and planning requirements and be in accordance with the objectives and policies of the relevant land use plans (Development Plans, Local Area Plans etc.). These land use plans contain objectives and policies to ensure the protection of biodiversity.

Proposed projects will be subject to planning consent, including preparation of an EIAR and AA Screening Report / Natura Impact Statement, if required. Following this, projects will be bound by environmental commitments confirmed within the planning consent.

21.3.1.7.4 Impacts on the existing hydrological and hydrogeological regimes

The Proposed Scheme will not have any significant residual effects on the existing hydrological or hydrogeological regime in those surface and ground water catchments crossed by the Proposed Scheme or in the downstream receiving surface and marine water environment as set out in Chapter 13 (Water) and Chapter 14 (Land, Soil, Geology and Hydrogeology) of the EIAR and in Appendix 13.1 in Volume 4 of the EIAR (the Water Framework Directive Assessment). Specific design and mitigation measures have been included to address any potential effects such that there will be no significant residual effects.

The Proposed Scheme lies within Hydrometric Area (HA) 09 (Liffey and Dublin Bay) and is within the Liffey River catchment. The objectives for this catchment are outlined in The River Basin Management Plan for Ireland (2018-2021), which aims to protect all waters within the district and, where necessary, improve waters and achieve sustainable water use. The purpose of the River Basin Management Plan is to reduce pollution levels, to restore good water quality status and to prevent deterioration in water quality in the river basins and groundwater bodies. There are many land-use plans and projects that lie within the catchment that have the potential to affect surface

water and groundwater bodies. However, all of the overarching land use plans have environmental policies to protect the existing surface water and ground water catchments. Therefore, there are no other plans or projects that are likely to result in a significant effect on biodiversity, cumulatively with the proposed road development, as a consequence of surface water or groundwater impacts.

21.3.1.7.5 Impacts on air quality

The Proposed Scheme will not have any significant residual effects on the existing air environment as is set out in detail in Chapter 7 (Air Quality) of the EIAR. Specific design and mitigation measures have been included to address any potential effects such that there will be no significant residual cumulative effects on air quality. Therefore, the Proposed Scheme is not anticipated to act in combination with any other projects to result in significant residual air quality effects.

21.3.1.7.6 Impacts on fauna species (excluding those discussed in Table 21.8) as a result of disturbance or displacement

The Proposed Scheme will not result in a likely significant residual effect on any fauna species (excluding those listed in Table 21.10) as a result of disturbance or displacement effects during the Construction Phase. Disturbance or displacement impacts during the Construction Phase are temporary and are not likely to have long-term population level effects, even cumulatively with any future development projects that might be proposed.

21.3.1.7.7 Impacts on fauna species (excluding those discussed in Table 21.8) as a result of temporary habitat loss

The Proposed Scheme will not result in a likely significant residual effect on any fauna species (excluding those listed in Table 21.10) as a result of temporary habitat loss effects during the Construction Phase. Disturbance or displacement impacts during the Construction Phase are temporary and are not likely to have long-term population level effects, even cumulatively with any future development projects that might be proposed.

21.3.1.7.8 Impacts on European Sites

The potential for other plans or projects to act cumulatively with the Proposed Scheme to adversely affect the integrity of any European sites is considered in Section 8 of the NIS which is provided as a standalone document in the planning application package with this EIAR (termed “in combination effects” in the context of the NIS assessment). The conclusion of that assessment is summarised here.

The Proposed Scheme will not affect the integrity of any European sites. It will not result in the loss or fragmentation of any Qualifying Interest (QI) habitats, or habitats supporting populations of QI / Special Conservation Interest (SCI) species, in (or associated with) any European sites, nor will it degrade any such habitats or affect QI/SCI species as a result of hydrological or hydrogeological impacts (quality or quantity), air quality impacts or introducing/spreading non-native invasive plant species.

The in-combination assessment has concluded that there is no potential for adverse effects on the integrity of any European sites, to arise as a consequence of the Proposed Scheme in combination with any other plans or projects, as in consideration of the mitigation measures detailed in Section 7 of the NIS, no adverse effects on European site integrity will arise from the implementation of the Proposed Scheme. Furthermore for the same reasons, there will be no adverse effects on the integrity of any European sites as a consequence of the Proposed Scheme acting in-combination with any, some or indeed all taken together, of these plans or projects.

The implementation of, and adherence to, the policies and objectives within the following plans; Fingal County Development Plan 2017 – 2023, Dublin City Development Plan 2022 – 2028, South Dublin County l Development Plan 2022 – 2028, Wicklow County Development Plan 2022 – 2028 and Dún Laoghaire-Rathdown County Development Plan 2022 – 2028, will ensure the protection of European sites across all identified potential impact pathways and will include the requirement for any future project to undergo Screening for Appropriate Assessment and/or Appropriate Assessment as relevant.

Therefore, as the Proposed Scheme will not adversely affect the integrity of European sites within the Zol of the Proposed Scheme, and given the protection afforded to European sites under the overarching land use plans, it

has been concluded that there will be no adverse effects on the integrity of any European sites, either alone or to arise as a consequence of the Proposed Scheme acting in combination with any other plans or projects.

21.3.1.8 Water

The Water assessment identified 17 other projects for further assessment of potential for cumulative effects in conjunction with the Proposed Scheme during construction. These were:

- SDCC planning reference SD178/0003: Dodder Greenway Route Scheme;
- DCC planning reference 2409/19: 3 no. storey 7 no. bay hipped roof terrace block to comprise of 4 no. three-bedroom townhouses, 3 no. two-bedroom apartments and 5 no. one-bedroom apartments;
- DCC planning reference 2878/15: demolition of existing dwelling at No. 85 Templeogue Road, Dublin 6W and the construction of a total of 30 no. residential units;
- DCC planning reference 2479/20: 24 build to rent residential units located at car park level 3 to car park level 4 level on the Jervis Street and Abbey Street Upper frontages of the building;
- DCC planning reference 4735/18: construction of an infill residential development of 34 no. apartments in two blocks;
- SDCC planning reference SD21A/0101: Residential development comprising a total of 28 apartments, in a building up to 4-storeys on Nutgrove Avenue;
- SDCC planning reference SD22A/0039: construction of 22 4 bed, 3-4 storey units;
- DCC planning reference 3971/22: construction of a four-storey building providing a 120 no. bed space nursing home and all associated ancillary development at former Highfield Plant Nursery;
- DCC planning reference 4027/22: construction of an office development comprising two buildings of office space over five, six and eight floors in Block A and office space over five floors in Block B;
- DCC planning reference 4816/22: construction of an 8 storey office building and café/restaurant;
- SDCC planning reference SD228/0008: construction of a combination of single way and two-way cycle tracks on and adjacent to the vehicle carriageway;
- Irish Water Project - Clarendon Street. Clarendon Street Sewer Upgrades;
- Major Project (id MP15) - DART+ Tunnel Element (Kildare Line to Northern Line);
- Major Project (id MP16) - Potential Metro South alignment: SW option;
- Major Project (id MP17) - LUAS Cross City incorporating LUAS Green Line Capacity Enhancement - Phase 1;
- Major Project (id MP19) - Potential Metro South alignment: Charlemont to Sandyford; and
- Major Project (id MP32) - MetroLink.

The further assessment predicted that given the mitigation measures set out in the Surface Water Management Plan (SWMP) for the Proposed Scheme and the assumption that other projects would implement good practice measures during construction, the cumulative impacts during construction would not be significant.

21.3.1.9 Land, Soils, Geology and Hydrogeology

The residual impacts on Land, Soils, Geology and Hydrogeology due to the Proposed Scheme are expected to be of negligible magnitude and imperceptible significance as a result of the construction of the Proposed Scheme. It is also considered following on from a review of other proposed projects within the study area that the construction of the Proposed Scheme in combination with other proposed projects will not result in significant cumulative impacts.

From a Land, Soils, Geology and Hydrogeology perspective most of the proposed projects will result in the loss of a small quantity of soil and geology. However, the cumulative loss is still considered small on a local scale. As such, there are no likely significant direct, indirect cumulative impacts in combination with other proposed projects on land, soils, geology and hydrogeology.

21.3.1.10 Archaeological and Cultural Heritage

The Archaeological and Cultural Heritage assessment has identified that no residual impacts would occur as a result of the construction of the Proposed Scheme. It is considered therefore that the construction of the Proposed Scheme in combination with other proposed projects will not result in significant cumulative impacts.

21.3.1.11 Architectural Heritage

The Architectural Heritage assessment identified five projects with potential for cumulative effects in combination with the Proposed Scheme during construction. These were:

- SDCC planning reference SD178/0003: Dodder Greenway Route Scheme;
- Major Project (id MP15) - DART+ Tunnel Element (Kildare Line to Northern Line);
- Major Project (id MP16) - Potential Metro South alignment: SW option;
- Major project (id MP34) - Greater Dublin Area Cycle Network Plan; and
- Kimmage to City Centre Core Bus Corridor scheme.

The architectural heritage assessment identified potential for Negative, Moderate and Temporary cumulative effects for the remaining shortlisted projects in conjunction with the Proposed Scheme. These effects resulting from negative impact on protected structures and architectural heritage features including direct impacts, vibration impacts and visual impacts. However, with the implementation of mitigation already included within Appendix 16.3 of Volume 4 of this EIAR for the Proposed Scheme, these cumulative effects are not anticipated to be significant.

The architectural heritage assessment identified potential for a Negative, Significant and Temporary cumulative effect for the Kimmage to City Centre Core Bus Corridor scheme in conjunction with the Proposed Scheme as a result of temporary negative visual impact on regionally important protected structures of medium sensitivity. However, with the implementation of mitigation already included within Appendix 16.3 of Volume 4 of this EIAR for the Proposed Scheme, these cumulative effects are not anticipated to be significant.

21.3.1.12 Landscape (Townscape) and Visual

The Landscape (Townscape) and Visual assessment shortlisted 30 other projects for further assessment. These included three SDCC planning applications, 15 DCC planning applications, one other Major Project (Greater Dublin Area Cycle Network Plan) and the remaining 11 Core Bus Corridor schemes.

No cumulative effects in conjunction with the Proposed Scheme during construction are anticipated for the following Core Bus Corridor schemes:

- Clongriffin to City Centre Core Bus Corridor Scheme;
- Swords to City Centre Core Bus Corridor Scheme;
- Ballymun-Finglas to City Centre Core Bus Corridor Scheme;
- Blanchardstown to City Centre Core Bus Corridor Scheme;
- Liffey Valley to City Centre Core Bus Corridor Scheme;
- Lucan to City Centre Core Bus Corridor Scheme;
- Templeogue-Rathfarnham to City Centre Core Bus Corridor Scheme;
- Bray to City Centre Core Bus Corridor Scheme;
- Blackrock/Belfield to City Centre Core Bus Corridor Scheme; and
- Ringsend to City Centre Core Bus Corridor Scheme.

For the remaining shortlisted projects (including the Kimmage to City Centre Core Bus Corridor scheme). the assessment (Table A21.2.8 in Appendix A21.2) found there will be potential for moderate, temporary in-combination indirect townscape and visual effects to occur in relation to each of the above developments, should the construction periods either overlap or follow on within a short timeframe with the Proposed Scheme. Effects would be not significant if this is not the case. The potential impacts would be localised and contained, due to enclosing effect of the surrounding built form.

The proposed Kimmage to City Centre Core Bus Corridor Scheme will not be constructed concurrently with the Proposed Scheme. However, if the schemes are constructed in quick succession there would be potential for temporary indirect townscape cumulative effects.

21.3.1.13 Waste and Resources

The waste management baseline for the Eastern Midlands Waste Region (EMWR), established for the assessment using publicly available data from the Regional Waste Management Offices and the EPA, has been used as the baseline for the cumulative assessment. Tables 18.3, 18.4 and 18.5 in Section 18.3 of Chapter 18 of this EIAR, set out permitted and licensed capacity and Article 27 notifications for 2020. This data has been used to establish a baseline for 2020. The available C&D waste and by-product capacity in EMWR for 2020 is approximately 11.7 million tonnes based on the following assumptions, see Table 21.11:

- Using the available capacity for permitted facilities for construction and demolition wastes;
- Including only licensed facilities accepting soil and stones; and
- Including all Article 27 notifications for 2020 in the EMWR.

Table 21.11: C&D waste management baseline for EMWR, 2020 (permitted, licensed and Article 27 notifications)

C&D Waste Management Baseline for 2020	Authorised Annual Waste and By Product (Tonnes)
Permitted capacity (Regional Waste Management Office (Offaly County Council 2022)	5,336,915
Licenced annual intake (soil and stone facilities) (EPA 2022c)	3,893,800
Article 27 (by-product) notifications (EPA 2020)	2,504,482
Total	**11,735,197**

Therefore, the authorised C&D waste and by product tonnage in EMWR in 2020, and so the construction and operation waste baseline, is an estimated 11.7 million tonnes per annum.

The Regional Waste Authorities state in the publication '*Construction and Demolition Waste Management Plans 2015-2021: Update Report 2020*' (which sets out the national capacity of primarily soil and stone treatment facilities):

> *"the licensed capacity is most prominent in the EMWR which has a healthy supply of active capacity and substantial new capacity due to come on stream. The Region contains 80% of the active national capacity … New licensed facilities are also due to come on stream. Future capacities (new applications and un-commenced operations) exceed 2.1m tonnes nationally, with 73% of this capacity planned for the EMR... The urban centres of Dublin and Cork which are a focal point for development and construction are (or will be) well served by licensed capacity."*
>
> *"Nationally there were 325 registered and permitted facilities at the end of 2018, with an estimated 5.2m tonnes of lifetime capacity remaining by the end of the year. It is noted that the reported remaining capacity and intake data at permitted and registered facilities is an under-estimation due to incomplete rates of reporting."*

The Update Report sets out that there were four inert landfill facilities active nationally in 2018, all located in the EMWR. Two of these facilities are located in Fingal and Kildare and the Update Report notes that they have significant remaining capacity:

- IMS, Co. Dublin;
- Walshestown, Co. Kildare;
- Kyletalesha, Co. Laois; and
- Tara Mines, Co. Meath.

Due to the nature of waste management in Ireland cumulative effects for waste have been considered on a regional basis. A short-list of proposed projects planned within the region, was also developed, including having regard to those projects set out in Project 2040 (Department of Public Expenditure and Reform 2018; Investment Projects and Programmes Office 2019). These projects were reviewed and screened based on the following criteria:

- Construction phases likely to overlap with the Proposed Scheme - where unknown, overlap is considered as a worst case; and
- Similar project waste profile is expected to be generated i.e., tunnelling excavation material, soil and stones and bitumen containing material.

A list of regional projects that have been taken into account in the cumulative effect's assessment is provided in Table 21.12.

Table 21.12: Regional Projects Included in Cumulative Assessment

Project Name	Project Type	Anticipated Construction completion (year) where known	Waste type likely to be generated
Metrolink	19km rail line running from Swords to Charlemont, majority of the line will be run underground via a single bore tunnel.	2028	▪ Soil and stones ▪ General C&D waste
Dart Underground	7.5km twin bore tunnel for electrified heavy rail in Dublin city centre, linking the Northern line to the Heuston Main line.	TBC	▪ Soil and stones ▪ General C&D waste
Dublin Port Masterplan 2040	Works include construction of new quays and jetties, remediation of contamination on the bed of the basin, capital dredging to deepen the basin, infilling of the Basin at some berth locations and construction of a new river berth with a double tiered Ro-Ro ram and deepening of fairway and approach to Dublin port.	TBC	▪ Soil and stones ▪ General C&D waste
N2 Slane Bypass	3.4km long bypass that runs from the east of Slane to the existing N2 at a location 500m north of McGruder's crossroads.	2026	▪ Soil and stones ▪ Bitumen containing material ▪ General C&D waste
Ardee bypass	6km single carriageway, commencing in the townland of Mandistown to Glebe townland north of Ardee.	2024	▪ Soil and stones ▪ Bitumen containing material ▪ General C&D waste
M11 Capacity Enhancement (Phase 1 & Phase 2) including Glen of the Downs tunnel	The N11/M11 is 22 km in length between Junction 4 to Junction 14. The primary objectives of the scheme are to improve the efficiency of road based public transport and journey time, and to provide continuity of road type between Junction 6 and Junction 15. 2km tunnel under the west side of the Glen of the Downs.	TBC	▪ Soil and stones ▪ Bitumen containing material ▪ General C&D waste
Blanchardstown Regional Drainage Scheme	The project involves the upgrade of the sewer network currently serving Blanchardstown, Mulhuddart and Castleknock as well as a number of towns in Meath.	2022	▪ Soil and stones

Project Name	Project Type	Anticipated Construction completion (year) where known	Waste type likely to be generated
North Dublin sewage plant (pipeline)	Construction of an underground pipeline beginning at Blanchardstown which will collect and transfer sewage, via a new pumping station at Abbotstown to the plant at Clonshaugh. The treated water will be discharged through a 6km marine outfall pipeline.	2026	▪ Soil and stones
Water Supply Project – Eastern and Midlands Region	Abstraction and treatment of water at Parteen Basin in Co. Tipperary, together with a 170km underground treated water pipeline from Parteen Basin to Dublin.	2030	▪ Soil and stones
Greater Dublin Drainage Project	The orbital sewer route will intercept an existing sewer at Blanchardstown and will divert it from this point to the proposed wastewater treatment plant at Clonshaugh (13.7km in length; 5.2km of a 1.4m diameter rising main and 8.5km of a 1.8m diameter gravity sewer).	2029	▪ Soil and stones
Automated people mover (APM) Dublin Airport	Approximately twin bore tunnel across the apron in Dublin Airport for an APM.	TBC	▪ Soil and stones
Eastern Bypass project	Cut and cover tunnel - Dublin Tunnel to Sandymount Strand.	TBC	▪ Soil and stones
O'Devaney Gardens Regeneration Programme	Development consists of 1,047 residential units across 10 blocks up to 14 storeys tall.	2025	▪ Soil and stones ▪ Bitumen containing material ▪ General C&D waste
Belcamp Hall Residential Development	Residential development consisting 2,718 residential units (2,233 no. apartments, 485 no. houses), 2 no. creches and all associated site works.	TBC	▪ Soil and stones ▪ Bitumen containing material ▪ General C&D waste
Luas Cross City extension	Delivering an additional 30km of Luas Lines running to Lucan, Bray, Poolbeg and Finglas.	2042 (NTA, 2022)	▪ Soil and stones ▪ Bitumen containing material ▪ General C&D waste
Southern Port Access Route	Deliver a new public road which links from the national road network at the Dublin Tunnel to serve the south port lands and adjoining areas.	2042 (NTA, 2022)	▪ Soil and stones ▪ Bitumen containing material ▪ General C&D waste

In addition to the projects listed above, the assessment has taken account of the other 11 Core Bus Corridor schemes. All the Core Bus Corridor schemes are anticipated to be constructed in the period 2023 to 2028.

The projects identified comprise a mixture of major infrastructure transport projects, commercial and residential projects. Each project would generate solid waste from construction and from operation for management within the regional areas. Waste will generally be generated over the period of construction for each project. Additionally, waste generation will vary over time as the nature of the projects are multi-year and are undertaken with a phase approach i.e., demolition, excavation and construction.

21.3.1.13.1 Cumulative Construction Effects

Construction of projects within the region will produce C&D waste, a proportion of which will be sent for recycling, further treatment or disposal to landfill. In line with the waste hierarchy and relevant policy including the Waste Framework Directive, also applicable to the Proposed Scheme, it is anticipated that all these projects will seek to minimise disposal to landfill and manage waste in accordance with the waste hierarchy.

The Proposed Scheme, together with all the other Core Bus Corridor schemes and the projects listed in Table 21.12 will add to the need for off-site capacity for recovery, recycling, treatment and disposal of waste to landfill. Many of the listed projects are in very early stages so documentation hasn't been published or associated planning documents submitted which would include waste generation estimates however is anticipated that the proposed projects will give rise to rise to similar types of wastes to the Proposed Scheme and that the quantities will vary depending on the type of project.

Opportunities are likely to continue to arise during the Construction Phase of other projects to provide C&D waste and surplus excavated material for use in other local construction projects thereby increasing diversion of such materials from landfill.

As set out above, the EMWR has the most capacity of all the regions. The Regional Waste Management Offices Report states, the Dublin region is (or will be) well served by licensed capacity to support construction and development. Additionally, it was acknowledged the volumes of waste being generated would support the provision of further licensed capacity:

> *"The available intake data indicates that current volumes would support the development of long-term licensed capacity in these areas to support planned infrastructure and housing developments."*

The Construction Phase impact of the Proposed Scheme has been assessed as not significant short-term and adverse. Considering therefore, the likely potential for waste generation from other projects, the opportunities to divert waste from off-site treatment and the amount of inert, non-hazardous and hazardous waste treatment capacity likely to be available in the region in the coming years over the time period for the delivery of the Proposed Scheme, it is considered that there will be no likely significant cumulative effects as a result of the construction of the Proposed Scheme in combination with the construction of the other Core Bus Corridor schemes and the projects listed in Table 21.12.

21.3.1.14 Material Assets

Material quantities for the Proposed Scheme are considered insignificant and therefore no likely significant cumulative effects on material quantities are predicted as a result of the Proposed Scheme in combination with other proposed development in Dublin.

The Material Assets assessment did not identify any potential for likely significant cumulative effects on services and utilities during the Construction Phase. Either no utility diversions are proposed for the Proposed Scheme in the location of the projects within the ZoI, or a potential for overlap in utilities was identified, but these would be managed in accordance with utility provider requirements and would not result in significant cumulative effects. On this basis, no projects were shortlisted for further assessment.

21.3.2 Operational Impacts

21.3.2.1 Traffic and Transport

A detailed assessment of cumulative impacts on Traffic and Transport is set out in Appendix A6.1 in Volume 4 of the EIAR (Traffic Impact Assessment Report). Reference should be made to that appendix for details on cumulative transport demand, and the cumulative impacts on People Movement. A summary of the findings is set

In general, total trip demand (combining all transport modes) will increase into the future in line with projected population and employment growth. A greater share of meeting this increasing demand will be by sustainable modes (public transport, walking, cycling) as the GDA Strategy is progressively implemented.

The analysis indicates that with the 12 Core Bus Corridor schemes in place, there will be a Significant Positive impact on sustainable mode share. Cumulatively, the 12 Core Bus Corridor schemes, while supporting less congested bus based public transport and cycling movement, will also act as a constraint to increasing private car traffic within the study area, with the assessment indicating a reduction in car trips below 2020 (pre-COVID19) levels.

In the 2028 Opening Year scenario, it is estimated that for people travelling within a 500m catchment area of the Core Bus Corridor schemes (including City Centre) there will be a 12% increase in public transport trips, 2% decrease in general traffic trips (i.e., motorists) and a 14% increase in cycling trips in the AM Peak Hour. Across the whole day (7am-7pm), there will be a corresponding 12% increase in public transport, 3% decrease in general traffic and a 12% increase in cycling trips each day. In the 2043 Design Year scenario, it is estimated that for people travelling within the 500m catchment area (including City Centre) there will be a 6% increase in public transport trips, 6% decrease in general traffic trips (i.e. motorists) and a 10% increase in cycling trips in the morning peak hour and a 7% increase in public transport, 7% decrease in general traffic and a 11% increase in cycling trips each day (7am-7pm) compared to the Do Minimum scenario.

General traffic levels reduce more in 2043 when compared to 2028 due to the increased level of additional non-bus public transport infrastructure and services (MetroLink, LUAS extensions and DART+ from the Greater Dublin Area Strategy) in tandem with the road capacity reduction measures as part of the Proposed Scheme leading to increased usage on all public transport modes.

The modelling outputs for the 2028 Cumulative Opening Year scenario demonstrate that there is a high growth in bus patronage along all the Core Bus Corridor schemes in the AM Peak Hour. The bigger increases occur in the inbound direction on the Blanchardstown to City Centre, the Proposed Scheme and the Bray to City Centre schemes where the loadings reach more than 2,000 additional passengers per hour compared to the Do Minimum scenario.

In the 2028 Opening Year AM Peak Hour scenario with the Proposed Scheme and the other 11 Core Bus Corridor schemes in place, there will be an estimated 10% more passenger boardings across all public transport services and 17% more boardings on bus services. In the 2028 Opening Year Operational Cumulative PM Peak Hour scenario with the Proposed Schemes in place, there will be an estimated 11% increase in total passengers boarding public transport services and 18% more passengers boarding buses services.

In the 2043 Design Year AM and PM Peak Hour scenarios, increase in total passengers boarding all public transport services will be 7% and 8% respectively, and the increase in passengers boarding bus services will increase by 11% and 14% respectively.

Overall, the Proposed Scheme and the other 11 Core Bus Corridor schemes are expected to facilitate a long term, profound positive cumulative effect on People Movement by sustainable modes. The Core Bus Corridor schemes are seen to enable significant improvements in People Movement by sustainable modes along the direct Core Bus Corridor alignments, particularly by bus and cycling, with reductions in car mode share due to the enhanced sustainable mode provision. The Proposed Scheme and the other 11 Core Bus Corridor schemes provide for enhanced integration and efficiencies for all public transport modes by facilitating substantial increases in public transport average network wide travel speeds.

Consideration of Traffic Related Cumulative Effects in the Design Process

Throughout the development of the Preliminary Design for the Proposed Scheme there have been various design stages undertaken based on a common understanding of the maturity of the design at a given point in time. Part of this process was to ensure the environmental and transport impacts were mitigated to the greatest extent possible during the design development iteration and to take account of information on potential impacts from the various Environmental Impact Assessment (EIA) and Transport Impact Assessment (TIA) disciplines. This iterative approach resulted in mitigation being embedded into the design process by the continual consideration of potential environmental impacts. A key consideration was the potential for cumulative effects that the Proposed Scheme could have in combination with the other 11 Core Bus Corridor schemes under development.

A multi-tiered modelling framework (described further in Chapter 6) was developed to support this iterative design process, whereby the emerging design for each of the Proposed Schemes has been tested using the transport

models as part this iteration both in isolation and with all Core Bus Corridor schemes in place. Each of the CBC projects worked closely together to align proposals at direct interface points (e.g. overlapping junctions) as well in the indirect / offline areas where displaced traffic would arise. This included the provision of complimentary traffic management arrangements and/or turn bans to ensure that any displaced traffic was kept to a minimum and/or was maintained on higher capacity roads, whilst continuing to meet scheme objectives along the Proposed Scheme.

For the Proposed Scheme, the iterative process concluded when the design team were satisfied that the Proposed Scheme both in isolation and in combination with the other 11 Core Bus Corridor Schemes, met its required objectives (maximising the people movement capacity of the Proposed Scheme) and that the environmental impacts and level of residual impacts were reduced to a minimum.

Traffic Related Cumulative Effects

To examine the potential cumulative traffic effects that the Proposed Scheme may have in combination with any of the other Core Bus Corridor schemes, an area of influence for each scheme was determined to understand the scale of traffic displacement and its interactions with other schemes. The 'area of influence' is the area in which traffic flows are likely to change as a result of the Proposed Scheme measures as indicated by the transport modelling. The outcome of this assessment revealed that the Proposed Scheme has indirect interface with the proposed Kimmage to City Centre Core Bus Corridor Scheme, with modelling indicating some level of traffic displacement between the study areas of each scheme.

In terms of direct interfaces, the Proposed Scheme intersects the Kimmage to City Centre Core Bus Corridor at which the Proposed Scheme interacts at the signalised junction of Harold's Cross Road / Rathgar Avenue / Kenilworth Square / Kenilworth Park and the junction of Harold's Cross Road and Parkview Avenue. The BusConnects Infrastructure Team has coordinated the design tie-ins at these locations to ensure a holistic design has been achieved, so that each scheme can be implemented, and integrated, independent of the planning consent process. Further details on the tie-ins between both schemes can be found in Chapter 4 (Proposed Scheme Description) of this EIAR.

When both schemes are operational (as well as all other proposed Core Bus Corridor schemes), this has the effect of constraining the opportunity for traffic to displace onto adjoining / adjacent roads when compared to the effect when only one of the Core Bus Corridor schemes is operational. In addition to this, with all the Core Bus Corridor schemes operational, there is predicted to be a higher modal shift from private car trips to sustainable modes of travel compared to the singular scheme scenario. This is due to the combined effect of all Core Bus Corridor schemes being operational and the journey time savings and reliability for bus travel and the interchange opportunities that this provides to travel around Dublin in combination with the BusConnects network re-design proposals. In addition, the Core Bus Corridor schemes will facilitate a step change in the level of segregated cycling provision in comparison with existing conditions along the entire length of the corridors resulting in more people cycling.

The result of the above is that the cumulative effect of all Core Bus Corridors in operation and in tandem with the roll out of the wider GDA Transport Strategy measures, future growth in overall travel demand is catered for by sustainable modes. No significant negative effects over and above those considered in the standalone assessments for the Operational Phase were predicted in the cumulative impact assessment and therefore no additional mitigation measures are considered necessary.

21.3.2.2 Air Quality

21.3.2.2.1 Local Air Quality

The traffic data used in the cumulative assessment for the Do Minimum and Do Something scenarios for future years also considers development, traffic growth and transport schemes proposed for the Dublin area which may have an effect on traffic volumes.

The air quality impact assessment of cumulative road traffic emissions from the Operational Phase of the Proposed Scheme in combination with the other 11 Core Bus Corridor Schemes has been carried out according to methodology outlined in Section 7.2.4.1 in Chapter 7 (Air Quality).

Five new additional Significant Moderate Adverse localised impacts on the R105 Burgh Quay, R114 Aungier Street and R148 Aston Quay/Wellington Quay are identified in the cumulative scenario compared with the standalone scenario assessed in Section 7.4.4.3 in Chapter 7 (Air Quality), refer to Appendix A21.3 of Volumes 4 of this EIAR. However these are expected to reduce to Slight Adverse or Negligible by 2043, due to reductions in emissions between 2028 and 2043 from advancements in engine technology and the addition of a higher percentage of electric vehicles to the fleet.

In accordance with the EPA EIAR Guidelines (EPA 2022), the impacts associated with the cumulative Operational Phase traffic emissions arising from the Proposed Scheme in combination with the other 11 Core Bus Corridor schemes are overall Neutral and Long-term.

To put the impacts of the Proposed Scheme into context, a comparison of the impacts associated with the Proposed Scheme in isolation and the total impacts predicted across all Core Bus Corridors in the cumulative Operational Phase is shown in Table 21.13, impacts are based on significance criteria outlined in Table 7.10 in Chapter 7 (Air Quality).

Table 21.13: Comparison of Predicted Cumulative Impacts During Operational Phase

NO_2 Impacts (number of modelled receptors)							
Operational Phase	**Negligible**	**Slight Adverse**	**Moderate Adverse**	**Substantial Adverse**	**Slight Beneficial**	**Moderate Beneficial**	**Substantial Beneficial**
Individual Templeogue / Rathfarnham	494	16	6	-	54	24	6
Cumulative All Core Bus Corridors	4,769	203	68	18	532	207	177

It is clear from the above table that the Proposed Scheme generates little change or positive change in air quality in the context of the cumulative situation with all Core Bus Corridors in operation.

21.3.2.2.2 Ecological Assessment

An assessment of the cumulative impact of the Proposed Scheme and the other 11 Core Bus Corridor Schemes on ecological receptors has been undertaken using the approach outlined in Section 7.2.4.3 in Chapter 7 (Air Quality).

The cumulative impact of the Proposed Scheme and the other 11 Core Bus Corridor Schemes on the nearby ecologically sensitive areas within 200m of roads impacted by the Proposed Scheme, as defined in Section 7.2.4.1 in Chapter 7 (Air Quality)), is outlined in Table 21.14. The annual mean NO_X concentration has been compared to the critical level of 30µg/m^3 at each of the designated habitat sites. All sites exceed the critical level for NO_X in both the Do Minimum and the cumulative operational Do Something scenarios, within 200m of the nearest impacted road, as per the standalone scheme (refer to Table 7.33 in Chapter 7 Air Quality).

Table 21.14: Significance of Operational Cumulative Impacts at Key Ecological Receptors (NO_X Annual Mean Concentration In 2028)

Annual Mean NO_x in 2028 At Closest Point Within Ecological Site To Road							
Receptor	**Receptor Location (ITM)**	**Do Minimum (µg/m³)**	**Distance from road beyond which concentration is below critical level (30µg/m³) (m)**	**Do Something (µg/m³)**	**Distance from road beyond which concentration is below critical level (30µg/m³) (m)**	**Impact (DS – DM) (µg/m³)**	**Change as a percentage of critical level (30µg/m³) (%)**
Dodder Valley pNHA (M50)	711343, 727787	91.7	>200m	95.8	>200m	4.2	14%
Dodder Valley pNHA	710796, 727740	108.3	>200m	99.0	>200m	-9.3	-31%

Annual Mean NO_x in 2028 At Closest Point Within Ecological Site To Road							
Receptor	**Receptor Location (ITM)**	**Do Minimum (µg/m³)**	**Distance from road beyond which concentration is below critical level (30µg/m³) (m)**	**Do Something (µg/m³)**	**Distance from road beyond which concentration is below critical level (30µg/m³) (m)**	**Impact (DS – DM) (µg/m³)**	**Change as a percentage of critical level (30µg/m³) (%)**
(Tallaght Road)							
Grand Canal pNHA (Canal Road)	715821, 732513	102.9	>200m	70.7	>200m	-32.2	-107%
Grand Canal pNHA (Charlemont Bridge, western side)	715881, 732544	97.0	>200m	109.9	>200m	12.9	43%
Grand Canal pNHA (Charlemont Bridge, eastern side)	715894, 732549	116.2	>200m	148.5	>200m	32.3	108%
Grand Canal pNHA (Charlemont Mall)	715814, 732531	46.8	>200m	43.3	>200m	-3.6	-12%
Grand Canal pNHA (Cheltenham Place)	715924, 732560	79.1	>200m	59.6	>200m	-19.5	-65%
Grand Canal pNHA (Dartmouth Walk)	716126, 732631	69.0	>200m	57.2	>200m	-11.8	-39%
Grand Canal pNHA (Emmet Bridge, western side)	714864, 732443	128.1	>200m	99.2	>200m	-28.9	-96%
Grand Canal pNHA (Emmet Bridge, eastern side)	714874, 732441	154.7	>200m	116.0	>200m	-38.7	-129%
Grand Canal pNHA (Grand Parade)	715926, 732552	95.8	>200m	84.1	>200m	-11.7	-39%
Grand Canal pNHA (Grove Road, western end)	714919, 732420	92.5	>200m	71.3	>200m	-21.2	-71%

Annual Mean NO_x in 2028 At Closest Point Within Ecological Site To Road							
Receptor	**Receptor Location (ITM)**	**Do Minimum (µg/m³)**	**Distance from road beyond which concentration is below critical level (30µg/m³) (m)**	**Do Something (µg/m³)**	**Distance from road beyond which concentration is below critical level (30µg/m³) (m)**	**Impact (DS – DM) (µg/m³)**	**Change as a percentage of critical level (30µg/m³) (%)**
Grand Canal pNHA (Grove Road, center)	715221, 732446	79.0	>200m	66.2	>200m	-12.8	-43%
Grand Canal pNHA (Grove Road, eastern end)	715565, 732488	80.7	>200m	70.5	>200m	-10.2	-34%
Grand Canal pNHA (La Touche Bridge, western side)	715609, 732499	107.1	>200m	80.8	>200m	-26.3	-88%
Gand Canal pNHA (La Touche Bridge, eastern side)	715881, 732544	97.0	>200m	109.9	>200m	12.9	43%
Grand Canal pNHA (Leeson Bridge, western side)	716368, 732736	117.7	>200m	93.3	>200m	-24.3	-81%
Grand Canal pNHA (Leeson Bridge, eastern side)	716382, 732741	157.9	>200m	122.9	>200m	-35.0	-117%
Grand Canal pNHA (Mespil Road, western end)	716425, 732748	56.9	>200m	51.3	>200m	-5.7	-19%
Grand Canal pNHA (Parnell Road)	714464, 732489	74.7	>200m	73.6	>200m	-1.0	-3%

Nitrogen deposition levels have been compared to the lower critical loads for the designated habitat sites in Table 21.15. All sites are below the lower critical load for the designated habitat site in both the Do Minimum and the Do Something cumulative operational scenarios, with the exception of Dodder Valley pNHA (Tallaght Road) and the Grand Canal pNHA (Canal Road, Charlemont Bridge, Emmet Bridge, Grand Parade, La Touche Bridge and Leeson Bridge) as per the standalone scenario (refer to Table 7.33 in Chapter 7 Air Quality). However, nitrogen deposition levels reduce at most of these sites due to the Proposed Scheme.

Table 21.15: Significance of Cumulative Operational Impacts at Key Ecological Receptors (N Deposition In 2028)

Annual Mean N Deposition In 2028 At Closest Point Within Ecological Site To Road									
Receptor	Receptor Location (ITM)	Lower critical load for most sensitive feature (kgN/ha/yr)	Do Minimum (kgN/ha/yr)	Distance from road beyond which deposition is below critical load (m)	Do Something (kgN/ha/yr)	Distance from road beyond which deposition is below critical load (m)	Change relative to lower critical load (%)	Distance from road beyond which the change is <1% (m)	Change in deposition kgN/ha/yr
Dodder Valley pNHA (M50)	711343, 727787	5	4.99	10m	5.16	10m	3%	40m	0.17
Dodder Valley pNHA (Tallaght Road)	710796, 727740	5	5.66	10m	5.29	0m	-7%	0m	-0.37
Grand Canal pNHA (Canal Road)	715821, 732513	5	5.44	10m	4.08	0m	-27%	0m	-1.37
Grand Canal pNHA (Charlemont Bridge, western side)	715881, 732544	5	5.20	10m	5.72	10m	10%	10m	0.52
Grand Canal pNHA (Charlemont Bridge, eastern side)	715894, 732549	5	5.97	10m	7.16	20m	24%	30m	1.19
Grand Canal pNHA (Charlemont Mall)	715814, 732531	5	2.94	0m	2.76	0m	-4%	0m	-0.18
Grand Canal pNHA (Cheltenham Place)	715924, 732560	5	4.45	0m	3.56	0m	-18%	0m	-0.89
Grand Canal pNHA (Dartmouth Walk)	716126, 732631	5	4.00	0m	3.45	0m	-11%	0m	-0.55
Grand Canal pNHA (Emmet Bridge, western side)	714864, 732443	5	6.42	10m	5.30	10m	-22%	0m	-1.12
Grand Canal pNHA (Emmet Bridge, eastern side)	714874, 732441	5	7.38	20m	5.96	10m	-28%	0m	-1.42

Annual Mean N Deposition In 2028 At Closest Point Within Ecological Site To Road									
Receptor	Receptor Location (ITM)	Lower critical load for most sensitive feature (kgN/ha/yr)	Do Minimum (kgN/ha/yr)	Distance from road beyond which deposition is below critical load (m)	Do Something (kgN/ha/yr)	Distance from road beyond which deposition is below critical load (m)	Change relative to lower critical load (%)	Distance from road beyond which the change is <1% (m)	Change in deposition kgN/ha/yr
Grand Canal pNHA (Grand Parade)	715926, 732552	5	5.16	10m	4.66	0m	-10%	0m	-0.49
Grand Canal pNHA (Grove Road, western end)	714919, 732420	5	5.02	10m	4.10	0m	-18%	0m	-0.92
Grand Canal pNHA (Grove Road, center)	715221, 732446	5	4.45	3m	3.87	0m	-12%	0m	-0.58
Grand Canal pNHA (Grove Road, eastern end)	715565, 732488	5	4.52	4m	4.07	0m	-9%	0m	-0.45
Grand Canal pNHA (La Touche Bridge, western side)	715609, 732499	5	5.61	10m	4.52	10m	-22%	0m	-1.09
Gand Canal pNHA (La Touche Bridge, eastern side)	715881, 732544	5	5.20	10m	5.72	10m	10%	10m	0.52
Grand Canal pNHA (Leeson Bridge, western side)	716368, 732736	5	6.02	10m	5.05	10m	-19%	0m	-0.97
Grand Canal pNHA (Leeson Bridge, eastern side)	716382, 732741	5	7.50	20m	6.22	10m	-25%	0m	-1.27
Grand Canal pNHA (Mespil Road,western end)	716425, 732748	5	3.43	0m	3.16	0m	-5%	0m	-0.27
Grand Canal pNHA (Parnell Road)	714464, 732489	5	4.25	0m	4.21	0m	-1%	0m	-0.04

In accordance with the EPA EIAR Guidelines (EPA 2022), the ecological impacts associated with the cumulative Operational Phase traffic emissions arising from the Proposed Scheme in combination with the other 11 Core Bus Corridor schemes are overall Positive, Slight and Long-term.

21.3.2.2.3 Regional Air Quality Assessment

The potential changes in regional air emissions when comparing the Do Minimum to the cumulative Do Something in the Operational Phase have been assessed using the ENEVAL tool (methodology set out in in Section 7.2.4.2 in Chapter 7 (Air Quality)).

Pollutant emissions (in tonnes) produced in both the Do Minimum and Do Something cumulative scenarios during the opening year (2028) of the Operational Phase are shown in Table 21.16.

Table 21.16: Cumulative Operational Phase Regional Pollutant Emissions (tonnes) – Opening Year 2028

	Vehicle Class	NO_X (tonnes)	NO_2 (tonnes)	PM_{10} (tonnes)	$PM_{2.5}$ (tonnes)	HC (tonnes)	CO (tonnes)	Benzene (tonnes)	Butadiene (tonnes)
DM	Car	862	249	6.2	5.9	53	1036	0.6	0.8
DS		845	245	6.1	5.8	52	1041	0.6	0.8
Change		-17	-5	-0.1	-0.1	-1	5	-0.01	-0.02
% Change		-2%	-2%	-2%	-2%	-2%	0%	-2%	-3%
DM	Goods	1080	301	2.6	2.5	32	178	0.3	0.4
DS		1103	306	2.6	2.5	32	185	0.4	0.4
Change		23	5	0.03	0.03	0.2	7	0.03	0.001
% Change		2%	2%	1%	1%	1%	4%	8%	0.2%
DM	Bus	14	1.4	0.1	0.1	0.6	4.6	0	0.005
DS		13	1.3	0.1	0.1	0.5	3.9	0	0.004
Change		-1	-0.1	-0.02	-0.02	-0.1	-0.7	0	-0.001
% Change		-8%	-8%	-15%	-15%	-16%	-14%	0%	-16%
DM	Total	1957	552	9	8	86	1219	0.9	1.2
DS		1961	552	9	8	85	1229	0.9	1.2
Change		5	-0.004	-0.1	-0.1	-0.9	11	0.02	-0.02
% Change		0.2%	-0.001%	-1%	-1%	-1%	1%	2%	-2%

The Proposed Scheme will be overall beneficial with regards to cars and buses, with reductions in emissions of the majority of pollutants modelled. The majority of these reductions result from a predicted modal shift, with decreased car usage (Section 6.4.5.2.2, Chapter 6 (Traffic & Transport)) and a cleaner and more efficiently routed bus fleet. The NTA has committed to replacing its diesel-powered vehicles with plug-in hybrid and fuel cell electric buses by 2028 and zero emission vehicles by 2043, so the reductions in emissions due to the Scheme are due to more efficiently operated routes. Emissions from goods vehicles increase for all pollutants, reflecting the technical challenges in converting particularly the HGV fleet to electric vehicles.

Pollutant emissions (in tonnes) produced in both the Do Minimum and cumulative Do Something scenarios during the design year of the Operational Phase are shown in Table 21.17.

Table 21.17: Cumulative Operational Phase Regional Pollutant Emissions (tonnes) – Design Year 2043

	Vehicle Class	NO_X (tonnes)	NO_2 (tonnes)	PM_{10} (tonnes)	$PM_{2.5}$ (tonnes)	HC (tonnes)	CO (tonnes)	Benzene (tonnes)	Butadiene (tonnes)
DM	Car	322	93	2.8	2.7	24	393	0.2	0.4
DS		300	86	2.6	2.5	23	378	0.2	0.3
Change		-23	-6	-0.2	-0.2	-1.8	-14.5	-0.02	-0.04
% Change		-7%	-7%	-7%	-7%	-7%	-4%	-7%	-10%
DM	Goods	686	165	2.6	2.5	23	137	0.2	0.3
DS		694	166	2.6	2.4	23	138	0.2	0.2
Change		8	0.4	-0.04	-0.04	-0.5	0.7	0.01	-0.01
% Change		1%	0.2%	-1%	-1%	-2%	0.5%	5%	-4%
DM	Bus	0	0	0.1	0.1	0	0	0	0
DS		0	0	0.1	0.1	0	0	0	0
Change		0	0	-0.02	-0.02	0	0	0	0
% Change		0%	0%	-18%	-18%	0%	0%	0%	0%
DM	Total	1009	258	6	5	47	530	0.4	0.63
DS		994	252	5	5	45	516	0.4	0.58
Change		-15	-6	-0.3	-0.3	-2	-14	-0.01	-0.05
% Change		-1%	-2%	-5%	-5%	-5%	-3%	-2%	-8%

In accordance with the EPA EIAR Guidelines (EPA 2022) and considering that the predicted change in concentrations, the regional impacts associated with the cumulative Operational Phase traffic emissions arising from the Proposed Scheme in combination with the other 11 Core Bus Corridor schemes are considered overall Neutral and Long-term as per the standalone scenario (refer to Chapter 7 Air Quality). Emissions from goods vehicles increase for all pollutants, reflecting the technical challenges in converting particularly the HGV fleet to electric vehicles.

21.3.2.2.4 Summary of Predicted Cumulative Operational Phase Impacts

In 2028, the majority of all modelled receptors are predicted to experience negligible impacts as a result of the cumulative Operational Phase of the Proposed Scheme in combination with the other 11 Core Bus Corridor schemes. As outlined earlier, the traffic data used in the cumulative assessment for the cumulative Do Minimum and Do Something for future years represents other potential projects.

Overall therefore, it is considered that the residual effects during the cumulative Operational Phase of the Proposed Scheme and the other 11 Core Bus Corridor schemes are Neutral, and Short-term whilst meeting the scheme objectives set out in Chapter 1 (Introduction). Six additional Significant localised Negative impacts are predicted over and above the standalone assessment for the Proposed Scheme, which are predicted to reduce to not significant by 2043, refer to Table 21.18.

Table 21.18: Summary of Predicted Cumulative Operational Phase Air Quality Impacts

Assessment Topic	Predicted Impact – Cumulative Operational
Road traffic impacts on local human receptors	Neutral, Long-term
Road traffic impacts on local ecological receptors	Positive, Slight, Long-term
Regional air quality	Neutral, Long-term

21.3.2.3 Climate

The Climate Action and Low Carbon Development Act, 2021, as amended, commits to a reduction in GHG emissions such that the total amount of annual GHG emissions in the year ending on 31 December 2030 is 51% less than the annual GHG emissions reported for the year ending on 31 December 2018. Policy changes will include the acceleration of the electrification of the transport system, including electric bikes, electric vehicles and electric public transport, alongside a ban on new registrations of petrol and diesel cars from 2030. In addition, there is a policy to ensure an unprecedented modal shift in all areas by a reorientation of investment to walking, cycling and public transport.

In 2028, the Do Minimum and Do Something scenarios assumes a number of transport schemes to be in the traffic model including the roll out of the DART+ Coastal South project, LUAS Green Line capacity enhancement and the Greater Dublin Area Cycle Network Plan implementation (excluding BusConnects Core Bus Corridor elements) as well as general traffic growth. The 2043 Do Minimum and Do Something scenarios assume the full implementation of the GDA Strategy schemes and so assumes that proposed major transport schemes such as MetroLink, LUAS line extensions to Lucan, Finglas, Poolbeg and Bray are all fully operational as well as general traffic growth.

The climate impact assessment of road traffic emissions from the Operational Phase of the Proposed Scheme cumulatively with the other 11 Core Bus Corridors schemes has been carried out according to methodology outlined in Section 8.2.4.2 in Chapter 8 (Climate). The core assessment scenario outlined below has considered a reasonable worst-case operational scenario for assessment purposes. In addition to the core scenario, an alternative scenario has been analysed in order to demonstrate the potential for further carbon reduction should the alternative scenario, in terms of higher bus frequencies materialise. The assessment has been carried out according to best practice and guidelines relating to climate and GHG emissions.

The IEMA Guidance Note on Assessing GHG Emissions and Evaluating their Significance 2nd Edition (IEMA 2022) advises that in order to determine significance, the key test is *"whether it contributes to reducing GHG emissions relative to a comparable baseline consistent with a trajectory towards net zero by 2050"*. The approach used to assess significance is based on the following principles:

- Is the project "business as usual" in terms of climate reduction? – major or moderate negative impact;
- Is the project compatible with net zero by 2050 and complies with "good practice" reduction measures? – minor adverse impact that is not significant.
- Does the project achieve emissions that go substantially beyond the reduction trajectory and has minimal residual emissions? – Negligible effect that is not significant.
- Does the project cause GHG emissions to be avoided or removed from the atmosphere? – beneficial effect that is significant. Only projects that reverse (rather than reduce) the risk of severe climate change can be judged as beneficial.

The EPA EIAR Guidelines (EPA 2022) describe the quality of effects in terms of positive, neutral and negative where neutral is defined as effects that are imperceptible, within normal bounds of variation. Taking into account both the IEMA and EPA guidance approach, this chapter has assessed impacts as being either negligible or positively / negatively significant (ranging from minor, moderate to major) with negligible defined as a change in GHG emissions which is less than ±0.01% of the 2030 Transport Sectoral Emission Ceiling. Minor is determined to be an impact which is between ±0.01% and ±0.5% of the 2030 Transport Sectoral Emission Ceiling, moderate as being an impact which is between ±0.5% and ±1.0% of the 2030 Transport Sectoral Emission Ceiling whilst major is defined as being an impact which is greater than ±1.0% of the 2030 Transport Sectoral Emission Ceiling. In relation to the Construction Phase, the guiding principles outlined above are applied to determine the level of significance.

The direct and indirect impacts have been considered with reference to the following study area extents:

- **Direct Study Area** – The Proposed Scheme cumulatively with the other 11 Core Bus Corridors (i.e. the transport network along the Proposed Scheme); and
- **Indirect Study Area** – This is the area of influence that the Proposed Scheme has cumulatively with the other 11 Core Bus Corridors in terms of changing traffic volumes above a defined threshold with reference to TII's Traffic and Transport Assessment Guidelines (May 2014).

21.3.2.3.1 Direct Cumulative Operational Phase Carbon Emissions

BusConnects will provide an attractive alternative to private car travel, encouraging more travel by more sustainable modes. Supported by the Proposed Scheme and other projects planned under the GDA Transport Strategy, a greater share of travel demand will be by sustainable modes (public transport, walking and cycling). The Proposed Scheme in combination with the other 11 Core Bus Corridors will result in reductions in capacity for general traffic along its route with a rebalancing of this capacity towards sustainable modes. The potential changes in GHG emissions due to the direct Operational Phase traffic impacts of the Proposed Scheme cumulatively with the other 11 Core Bus Corridors have been assessed using the Environmental Appraisal Module, which is based on the ENEVAL software (refer to Chapter 8, Climate for further information).

A comparison between Do Minimum and cumulative Do Something GHG emissions for Total Car and Bus in the Opening Year of 2028 predicts a decrease of 29.5kt in CO_{2eq} cumulatively along the routes of the Core Bus Corridors, refer to Table 21.19. This is equivalent to a 27% decrease in CO_{2eq} relative to the Opening Year Do Minimum estimates.

Table 21.19: Direct Cumulative Operational Phase CO_{2eq} emissions – Opening Year 2028

Scenario	Vehicle Class	CO_{2eq} (Kt CO_{2eq})
DM	Car	104
DS		77
Change		-27
% Change		-26%
DM	Goods	67
DS		55
Change		-12
% Change		-17%
DM	Bus	5.2
DS		2.5
Change		-2.7
% Change		-51%
DM	Total	176.2
DS		134.9
Change		-41.3
% Change		-23%
DM	Total (Car & Bus)	109
DS		79.5
Change		-29.5
% Change		-27%

A comparison between the direct Do Minimum and Do Something operational cumulative GHG emissions in the Design Year of 2043 predicts a decrease of 0.7kt in $CO_{2eq,}$ refer to Table 21.20. This is equivalent to a 1.9% decrease in CO_{2eq} relative to the Design Year Do Minimum estimates. This lower reduction compared to the 2028 projections is due to decreases in carbon emissions from all vehicles in the 2043 scenario.

Table 21.20: Direct Cumulative Operational Phase CO_{2eq} emissions – Design Year 2043

	Vehicle Class	CO_{2eq} (Kt CO_{2eq})
DM	Car	35.2
DS		34.5

	Vehicle Class	CO_{2eq} (Kt CO_{2eq})
Change		-0.7
% Change		-1.9%
DM	Goods	52.7
DS		56.5
Change		3.8
% Change		7.2%
DM	Bus	0.0
DS		0.0
Change		0.0
% Change		0.0%
DM	Total	91.1
DS		92.9
Change		1.8
% Change		2.0%
DM	Total (Car & Bus)	35.2
DS		34.5
Change		-0.7
% Change		-1.9%

21.3.2.3.2 Indirect Cumulative Operational Phase Carbon Emissions

The Core Bus Corridor Infrastructure Works aims to provide an attractive alternative to the private car and promote a modal shift to public transport, walking and cycling. It is, however, recognised that there will be an overall reduction in operational capacity for general traffic along the direct study area given the proposed changes to the road layout and the rebalancing of priority to walking, cycling and bus. This reduction in operational capacity for general traffic along the Proposed Scheme and the other 11 Core Bus Corridors will likely create some level of trip redistribution onto the surrounding road network, in the absence of wider regional wide demand management measures (outside the scope of the Core Bus Corridor Infrastructure Works).

The potential changes in GHG emissions due to the indirect Operational Phase traffic impacts of the Proposed Scheme cumulatively with the other 11 Core Bus Corridors have been assessed using the Environmental Appraisal Module, which is based on the ENEVAL software.

A comparison between the indirect cumulative Do Something and Do Minimum CO_{2eq} emissions in the Opening Year of 2028 predicts an overall increase of 22.8kt in CO_{2eq} due to the indirect impact of the Proposed Scheme in parallel with the other 11 Core Bus Corridors, refer to Table 21.21. This is equivalent to a 4.8% increase in CO_{2eq} relative to the Opening Year Do Minimum estimates.

Table 21.21: Indirect Cumulative Operational Phase CO_{2eq} emissions – Opening Year 2028

Scenario	Vehicle Class	CO_{2eq} (Kt CO_{2eq})
DM	Car	459.4
DS		482.4
Change		23.0
% Change		5.0%
DM	Goods	425.5
DS		443.1

Scenario	Vehicle Class	CO_{2eq} (Kt CO_{2eq})
Change		17.6
% Change		4.1%
DM	Bus	15.4
DS		15.2
Change		-0.2
% Change		-1.4%
DM	Total	900.3
DS		940.6
Change		40.3
% Change		4.5%
DM	Total (Car & Bus)	474.8
DS		497.5
Change		22.8
% Change		4.8%

A comparison between the cumulative indirect Do Something and Do Minimum GHG emissions in the Design Year of 2043 predicts an overall decrease of 14.5 kt in CO_{2eq} refer to Table 21.22. This is equivalent to a 6.6% decrease in CO_{2eq} relative to the Design Year Do Minimum estimates.

Table 21.22: Indirect Cumulative Operational Phase CO_{2eq} emissions – Design Year 2043

	Vehicle Class	CO_{2eq} (Kt CO_{2eq})
DM	Car	219.6
DS		205.1
Change		-14.5
% Change		-6.6%
DM	Goods	465.1
DS		456.4
Change		-8.7
% Change		-1.9%
DM	Bus	0.0
DS		0.0
Change		0.0
% Change		0.0%
DM	Total	681.4
DS		659.6
Change		-21.8
% Change		-3.2%
DM	Total (Car & Bus)	219.6
DS		205.1
Change		-14.5
% Change		-6.6%

21.3.2.3.3 Overall Cumulative Operational Phase Carbon Emissions

The potential changes in GHG emissions due to the combined direct and indirect Operational Phase traffic impacts of the Proposed Scheme cumulatively with the other 11 Core Bus Corridors have been assessed.

A comparison between the cumulative operational DoSomething and Do Minimum GHG emissions in the Opening Year of 2028 in parallel with the other 11 Core Bus Corridors predicts a decrease of 6.9kt in $CO_{2eq,}$ refer to Table 21.23. This is equivalent to a 1.2% decrease in CO_{2eq} relative to the Opening Year Do Minimum estimates. To put these figures in context, approximately 10,280Kt CO_2 equivalent were emitted in Ireland by the Transport sector in 2020 (EPA 2022b) and approximately 8,990Kt CO_2 equivalent emissions are projected in 2028.

The Core Bus Corridor schemes will also support the delivery of government strategies outlined in the 2023 Climate Action Plan (CAP) and the 2021 Climate Act by enabling sustainable mobility and delivering a sustainable transport system. Its aim is to provide enhanced walking, cycling and bus infrastructure on key access corridors in the Dublin region. This will subsequently enable and deliver integrated sustainable transport movement along these corridors. BusConnects provides connectivity and integration with other public transport services leading to more people availing of public transport. The CAP outlines measures to deliver decarbonisation targets for transport. The delivery of the Proposed Scheme, the BusConnects programme and other major sustainable-mobility projects listed in the CAP are critical to the achievement of climate reduction targets.

Table 21.23: Combined Direct and Indirect Cumulative Operational Phase CO_{2eq} emissions – Opening Year 2028

Scenario	Vehicle Class	CO_{2eq} (Kt CO_{2eq})
DM	Car	563.3
DS		559.3
Change		-4.0
% Change		-0.7%
DM	Goods	492.5
DS		498.4
Change		5.9
% Change		1.2%
DM	Bus	20.6
DS		17.7
Change		-2.9
% Change		-14.0%
DM	Total	1076.5
DS		1075.5
Change		-1.0
% Change		-0.1%
DM	Total (Car & Bus)	583.9
DS		577.0
Change		-6.9
% Change		-1.2%
% Change Relative To Transport Emission Ceiling		-0.12%

A comparison between the cumulative operational Do Something and Do Minimum GHG emissions in the Design Year of 2043 cumulatively with the other 11 Core Bus Corridors predicts a decrease of 15.2 kt in CO_{2eq}, refer to Table 21.24, This is equivalent to a 6.0% decrease in CO_{2eq} relative to the Design Year Do Minimum estimates.

Both the Do Minimum and Do Something benefit from predicted increases in electric car usage and further electrification of the bus fleet. Light and heavy goods vehicles are estimated to contribute the majority of CO_2 emissions in 2043, reflecting the technical challenges in converting particularly the heavy goods fleet to electric vehicles.

Table 21.24: Combined Direct and Indirect Cumulative Operational Phase CO_{2eq} emissions – Design Year 2043

Scenario	Vehicle Class	CO_{2eq} (Kt CO_{2eq})
DM	Car	254.7
DS		239.6
Change		-15.2
% Change		-6.0%
DM	Goods	517.8
DS		513.0
Change		-4.9
% Change		-0.9%
DM	Bus	0.0
DS		0.0
Change		0.0
% Change		0.0%
DM	Total	772.6
DS		752.5
Change		-20.0
% Change		-2.6%
DM	Total (Car & Bus)	254.7
DS		239.6
Change		-15.2
% Change		-6.0%

Applying the significance criteria outlined in Section 21.3.1.3.1 for the 2028 scenario, the potential impact to climate during the Operational Phase of the Proposed Scheme, prior to mitigation, will be Positive, Minor and Permanent, as it falls between the range of ±0.01% and ±0.5% of the Transport Emissions Ceiling. As the Transport Emissions Ceiling only extends to 2030, a comparison with a 2043 ceiling cannot be made, however, a similar level of impact is expected in 2043.

For context, the reduction in GHG emissions in the core assessment for 2028, is equivalent to the removal of approximately 13,400 car trips per weekday from the road network. This results in a reduction in total vehicle kilometres, a reduction in fuel usage, and increases to sustainable transport trips and modal share. in accordance with the 2023 Climate Action Plan (CAP) (DCCAE 2023).

Overall, due to the Operational Phase of the Proposed Scheme cumulatively with the 11 other Core Bus Corridor Schemes will lead to a decrease in GHG emissions.

In terms of policy measures, CO_2 emissions for the average new car fleet will reduce from 130g/km (grams per kilometre) over the period 2015 to 2019 to 95g/km in 2021 (European Commission 2020). In addition, from 2025 the average emissions from new car fleet are required to reduce by 15% relative to 2021 levels and, by 2030, the average emissions from new car fleet are required to reduce by 37.5% relative to 2021 levels as outlined in Regulation (EU) 2019/631 of the European Parliament and of the Council of 17 April 2019 setting CO_2 emission performance standards for new passenger cars and for new light commercial vehicles, and repealing Regulations (EC) No 443/2009 and (EU) No 510/2011.

In relation to decarbonising the transport sector, the CAP has set a target that all new cars and vans sold in Ireland will be zero carbon emissions or zero emission capable by 2030. Targets are also included for public transport buses and trains. The realisation of these targets will ensure that GHGs from transport will decrease significantly in line with the projections outlined in the CAP.

The other source of GHG emissions during the Operational Phase is maintenance. Maintenance GHG emissions of the Proposed Scheme cumulatively with other 11 Core Bus Corridors is predicted to be 5,038 tonnes of CO_{2eq} over the 60 year operational span. It is expected that GHG emissions from the 12 Core Bus Corridor schemes and other GDA Strategy schemes will primarily arise from the use of bitumen containing material use to maintain road pavement quality. The impact on GHG emissions due to the embodied carbon associated with the maintenance phase of the Operational Phase of the Proposed Scheme will be Negligible and Permanent.

Table 21.25 summarises the predicted impacts associated with the Proposed Scheme cumulatively with the operation of all 12 Core Bus Corridor Schemes. The predicted impact to climate due to cumulative operation of all 12 Core Bus Corridor Schemes is predicted to be Positive, Minor and Permanent.

Table 21.25: Summary of Predicted Operational Phase Impacts Due to Proposed Cumulative Operational Scheme

Assessment Topic	Predicted Impact – Cumulative Construction
Maintenance	Negligible and Permanent
Operational Traffic	Positive, Minor and Permanent.

The CBC Infrastructure Works will also support the delivery of government strategies outlined in the CAP (DCCAE 2023) and the 2021 Climate Act by enabling sustainable mobility and delivering a sustainable transport system. Its aim is to provide enhanced walking, cycling and bus infrastructure on key access corridors in the Dublin Region. This will subsequently enable and deliver integrated sustainable transport movement along these corridors. The CBC Infrastructure Works will provide connectivity and integration with other public transport services leading to more people availing of public transport, helping to further reduce GHG emissions.

21.3.2.3.4 Climate Sensitivity Analysis and Other Considerations

Introduction

As outlined previously, the Core Bus Corridor Infrastructure Works aims to provide an attractive alternative to the private car and promote a modal shift to public transport, walking and cycling. It is, however, recognised that there will be an overall reduction in operational capacity for general traffic along the direct study area of the Core Bus Corridor schemes given the proposed changes to the road layout and the rebalancing of priority to walking, cycling and bus. This reduction in operational capacity for general traffic along the Core Bus Corridor schemes will likely create some level of trip redistribution onto the surrounding road network, in the absence of wider regional wide demand management measures (outside the scope of the CBC Infrastructure Works).

The Do Minimum and Do Something scenarios are based on the assumption that travel behaviour will remain broadly consistent over time and that car demand, used for this assessment, represents a likely worst-case scenario. It is possible that societal trends in the medium to long term may reduce car demand further due to the ongoing changes to travel behaviours and further shifts towards sustainable travel, flexibility in working arrangements brought on following COVID-19 restrictions, and delayed car ownership trends that are emerging. Due to the uncertainties around how travel behaviours may change in the future, it was considered prudent to assess a worst-case scenario based on current trends for the core scenario.

Increased Bus Frequency Resilience Scenario

To fully understand the benefits that the Proposed Scheme in combination with the other 11 Core Bus Corridor schemes could provide in relation to carbon reduction, further sensitivity analysis has been undertaken to demonstrate the potential the Core Bus Corridor schemes have in supporting further reductions in carbon above those levels presented in the worst-case assessment scenarios above. An increased bus frequency resilience scenario was undertaken. Further to this sensitivity test, consideration has also been given to the potential

enabling effects that the CBC Infrastructure Works will have in supporting a significant increase in cycle mode share and to support traffic demand management measures.

As described in Chapter 6, for the purposes of this EIAR and the transport modelling undertaken in support of the EIAR, no increase in bus service frequency beyond that planned under the current BusConnects Network redesign proposals was assessed. The bus frequencies used in the modelling are based on the proposed service rollout as part of the BusConnects Network Redesign and are the same in both the Do Minimum and Do Something scenarios. This rollout is currently underway. The rationale for undertaking this approach was that the planning consent being sought and which this EIAR supports is solely for the infrastructural improvements associated with providing bus priority along the Proposed Scheme.

This analysis, however, is highly conservative as the bus priority infrastructure improvements and indeed the level of protection it will provide to bus journey time consistency and reliability will provide a significant level of resilience for bus services that will use the Core Bus Corridor Schemes from implementation into the future. This resilience will allow the service pattern and frequency of bus services to be increased into the future to accommodate additional demand without having a significant negative impact on bus journey time reliability or the operation of cycle and pedestrian facilities. In order to assess this resilience and the potential impacts of this resilience on carbon emissions, an additional analysis has been undertaken, which is detailed in Chapter 6 (Traffic & Transport).

This assessment shows that the Proposed Scheme can accommodate higher levels of bus frequency whilst maintaining journey time reductions and reliability. A key benefit of the provision of a resilient BusConnects Service network, one which can provide reliable and consistent journey times, is that it has potential to cater for further significant transfer from private car travel to more sustainable and environmentally friendly travel via public transport.

Following on from the analysis in Chapter 6 (Traffic & Transport), an additional climate scenario assessment was undertaken to estimate the potential carbon emission savings that could be achieved if the additional residual capacity, facilitated by the Core Bus Corridor Schemes, was satisfied by a shift from car to bus. To undertake this assessment a carbon calculator was developed to account for the potential per person carbon emissions savings for each car removed from the network and absorbed by the additional residual capacity provided by increased bus frequency. The calculator includes the following assumptions:

- Bus design capacity of 90 people;
- Additional bus frequency of 10 buses per hour per BusConnects Spine route;
- Average emissions per car – 120 / 55 g CO_2/km (Source: ENEVAL software (2028 / 2043));
- Average emissions per bus (average across fleet) – 422 / 0 g CO_2/km (Source: ENEVAL software (2028 / 2043));
- Annualisation factor – 251 (i.e., weekdays only (excluding bank holidays));
- Average trip length of 9.9km (Source: NTA Regional Modelling System).

To account for the uncertainty associated with future carbon policies (e.g., beyond the current planned increase in the carbon tax to €100 per tonne by 2030) that will be imposed by the Government aimed at reducing carbon emissions, the assessment examined the impact of a notional 100%, 75% and 50% transfer from car-based travel to public transport with the uplifted bus service frequency along the Proposed Scheme corridor in place. Table 21.26 and Table 21.27 below outlines the results of the sensitivity analysis.

Table 21.26: Combined Direct and Indirect Operational Phase CO_2 Emissions with Additional Service Frequency – Opening Year (2028)

Additional Service Frequency Scenario	Vehicle Class	Core Scenario CO_2 (kt CO_2)	100% Uptake of residual capacity from Car	75% Uptake of residual capacity from Car	50% Uptake of residual capacity from Car
			CO_2 (kt CO_2)	CO_2 (kt CO_2)	CO_2 (kt CO_2)
DM	Car	562.9	562.9	562.9	562.9
DS		558.9	531.4	536	540.7

Additional Service Frequency Scenario	Vehicle Class	Core Scenario CO_2 (kt CO_2)	100% Uptake of residual capacity from Car	75% Uptake of residual capacity from Car	50% Uptake of residual capacity from Car
			CO_2 (kt CO_2)	CO_2 (kt CO_2)	CO_2 (kt CO_2)
Change		-4.0	- 31.5	- 26.9	- 22.2
% Change		-0.7%	-5.6%	-4.8%	-3.9%

Table 21.27: Combined Direct and Indirect Operational Phase CO_2 Emissions with Additional Service Frequency – Design Year (2043)

Additional Service Frequency Scenario	Vehicle Class	Core Scenario CO_2 (kt CO_2)	100% Uptake of residual capacity from Car	75% Uptake of residual capacity from Car	50% Uptake of residual capacity from Car
			CO_2 (kt CO_2)	CO_2 (kt CO_2)	CO_2 (kt CO_2)
DM	Car	254.52	254.52	254.52	254.52
DS		239.36	226.07	228.28	230.50
Change		- 15.16	- 28.45	- 6.24	- 24.02
% Change		-6.0%	-11.2%	-10.3%	-9.4%

The analysis shows that should a portion of the drivers currently modelled as redistributed general traffic make the decision to make their journeys by public transport, the impact of this shift in transport mode would result in a further significant reduction in GHG emissions compared to the core scenario. The core scenario assumes no additional frequency beyond that planned under the current BusConnects Network redesign proposals. Even if an uptake of only 50% of the residual capacity was achieved by a transfer from car, a 3.9% and 9.4% reduction in CO_2 emissions across the study area could potentially be achieved in 2028 and 2043 respectively.

For context, the 31.5kt and 28.5kt reduction in CO_2 emissions in 2028 and 2043 respectively, achieved by a 100% uptake of residual capacity, is equivalent to the removal of approximately 105,500 and 209,100 car trips per weekday from the road network in 2028 and 2043. With a 50% uptake of residual capacity, the equivalent reduction in weekday car trips would be 74,400 in 2028 and 176,650 and 2043. This has the effect of a reduction in total vehicle kilometres, a reduction in fuel usage, and increases to sustainable transport trips and modal share in accordance with the 2023 Climate Action Plan (CAP) (DCCAE 2023).

Future Growth in Cycling

The Core Bus Corridor schemes will facilitate a step change in the level of segregated cycling provision in comparison with existing conditions along the entire length of the corridors. The representation of improvements to cycling infrastructure in the transport models follows a standard approach and are appropriate for the strategic nature of the model. It is applied by way of an increase in cycling speed on the network where the improvements have been made, as well as new connectivity by way of new links as part of the CBC Infrastructure Works. Modelling cycling infrastructure improvements using speeds is a standard approach that means an increase in cycling mode share can be obtained through a reduction in the modelled cost of a journey by bicycle relative to other modes. This has been applied as part of the modelling to represent improvements with a cycling mode share of approximately 5-7% achieved. The transport modelling undertaken, is therefore conservative in terms of the predicted cycling mode share. This has the effect that predicted traffic levels are on the higher and conservative side in relation to a potential future receiving environment. This is appropriate for EIAR purposes as a reasonable worst-case has been assessed in terms of traffic levels on the road network.

It must be noted, however, that the Core Bus Corridor schemes have been designed to cater for much higher levels of cycling uptake due to the significant segregation and safety improvements to cycling infrastructure. This will provide the opportunity for a significant increase in the movement of people travelling sustainably along the corridor and will therefore cater for higher levels of future population and employment growth and support higher

cycling mode share levels, which would otherwise not be achieved in the absence of the schemes. The background environment changes with regards to cycling segregation and safety improvements will encourage more people to cycle in greater numbers. The Core Bus Corridor schemes provide the capacity to facilitate a greater uptake in cycling than what has been predicted in the core assessment and facilitates the opportunity for further reductions in CO_{2eq} emissions, beyond those reported in the above assessment.

Demand Management

The GDA Transport Strategy, of which the Proposed Scheme is a key element of, aims to provide for the efficient, effective and sustainable movement of people and goods and to accommodate future travel growth in a managed and balanced way. Increased public transport provision, coupled with enhanced cycling and walking facilities in the urban areas, will enable a transition to more sustainable travel modes for many people in addition to providing the means to cater for much of the increased travel demand. However, without complementary demand management measures the full benefits of the Strategy will not be achieved.

The Core Bus Corridor schemes will be an enabler to allow for further reductions in car mode share with corresponding transfer to public transport, walking and cycling modes. Sustainable modes capacity is significantly enhanced by the Core Bus Corridor schemes which in turn will support demand management measures which could be applied to meet climate emission targets. This growth in sustainable mode share cannot be accommodated in the absence of the Proposed Scheme and the other Core Bus Corridor schemes. A greater increase in sustainable mode share can be accommodated by the Core Bus Corridor schemes which will in turn lead to further reductions in CO_{2eq} emissions, beyond those reported in the above assessment.

21.3.2.3.5 Climate Impact Summary

The Proposed Scheme in combination with the other Core Bus Corridor schemes achieves the project objectives in supporting the delivery of an efficient, low carbon and climate resilient public transport service, which supports the achievement of Ireland's emission reduction targets. The Proposed Scheme has the potential to reduce GHG emissions equivalent to the removal of approximately 105,500 and 209,100 car trips per weekday from the road network in 2028 and 2043 respectively. This has the effect of a reduction in total vehicle kilometres, a reduction in fuel usage, and increases to sustainable transport trips and modal share in accordance with the 2023 Climate Action Plan (CAP) (DCCAE 2023). It is concluded that, cumulatively, the Core Bus Corridor Infrastructure Works will make a significant contribution to carbon reduction.

21.3.2.4 Noise and Vibration

Since the Operational Phase assessment for Noise and Vibration takes account of the traffic model outputs (which incorporates future traffic growth from projected development including GDA Strategy development), the cumulative operational impacts, as assessed in Chapter 9 (Noise & Vibration), represent a cumulative scenario with the consideration of future development.

The impact assessment of cumulative road traffic noise levels associated with the Operational Phase of the Proposed Scheme in combination with the other 11 Core Bus Corridor Schemes has been carried out according to methodology outlined in Section 9.4.4.1 and in Chapter 9 (Noise & Vibration). The modelled results were compared to those predicted for the standalone Proposed Scheme, to determine if any additional impacts are expected.

The traffic data used in the both the standalone Proposed Scheme and cumulative assessment for future years also considers projects and transport schemes proposed for the Dublin area which may have an effect on traffic volumes.

The potential changes in traffic noise due to the cumulative Operational Phase traffic impacts have been assessed in this section and compared with those assessed for the standalone Proposed Scheme. The assessment has concluded that during the year of opening, 2028, higher initial short to moderate term impacts will be experienced along additional roads with all 12 Core Bus Corridor Schemes in place when the compared to the standalone Proposed Scheme. During the design year, 2043, traffic volumes are, for the majority, lower than the year of opening along the surrounding road network which result in lower calculated impacts along the same identified roads.

The identified roads with predicted noise impacts of moderate or greater compared to the standalone Proposed Scheme are summarised in Table 21.28 for the opening year 2028 and the design year 2043.

Table 21.28: Summary of Predicted Operational Traffic Noise Impacts Due to Standalone Proposed Scheme and Cumulative Operational- Opening and Design Years

Road	Predicted Impact – Standalone Proposed Scheme	Predicted Impact – Cumulative Operational - 2028	Predicted Impact – Cumulative Operational - 2043
Palmerstown Road	Indirect, Negative, Slight – Moderate, Short-Medium Term	Indirect, Negative, Moderate, Short-Medium Term	Indirect, Negative, Slight – Moderate, Long Term
Castlewood Park	Indirect, Negative, Slight – Moderate, Short-Medium Term	Indirect, Negative, Moderate, Short-Medium Term	Indirect, Negative, Slight – Moderate, Long Term
Blackpits	Imperceptible / Positive	Indirect, Negative, Moderate, Short-Medium Term	Indirect, Negative, Slight – Moderate, Long Term
Malpas Street	Imperceptible / Positive	Indirect, Negative, Moderate, Short-Medium Term	Indirect, Negative, Slight, Long Term
Digges street upper	Indirect, Negative, Slight – Moderate, Short-Medium Term	Indirect, Negative, Moderate, Short-Medium Term	Indirect, Negative, Slight, Long Term
Mercer Street upper	Indirect, Negative, Slight, Short-Medium Term	Indirect, Negative, Moderate, Short-Medium Term	Indirect, Negative, Slight, Long Term
Ashdale Road	Indirect, Negative, Slight, Short-Medium Term	Indirect, Negative, Moderate, Short-Medium Term	Indirect, Negative, Not Significant, Long Term
Fergus Road	Indirect, Negative, Slight, Short-Medium Term	Indirect, Negative, Moderate, Short-Medium Term	Indirect, Negative, Moderate, Long Term
Gray Street	Indirect, Negative, Imperceptible, Short-Medium Term	Indirect, Negative, Moderate, Short-Medium Term	Indirect, Negative, Slight, Long Term
Grosvenor Place	Indirect, Negative, Slight, Short-Medium Term	Indirect, Negative, Moderate, Short-Medium Term	Indirect, Negative, Not Significant, Long Term
Sallymount Avenue	Indirect, Negative, Imperceptible, Short-Medium Term	Indirect, Negative, Moderate, Short-Medium Term	Indirect, Negative, Not Significant, Long Term

During the year of opening, there are twelve additional roads which are determined to have an indirect, negative, moderate, short to medium term noise impact in accordance with the methodology outlined in Section 9.4.5.1 in Chapter 9 (Noise & Vibration). The impacts are calculated at roads outside of the Proposed Scheme due to traffic redistribution.

During the future design year, 2043, the predicted cumulative noise impacts are lower that the opening year along the same roads due to the lower magnitude of impact assigned to changes in road traffic noise over time and lower traffic volumes across the network predicted into the future. The combined effect results in a similar magnitude of impact when compared to the standalone Proposed Scheme.

Section 9.4.4.1.1.6 of Chapter 9 (Noise & Vibration) notes that traffic noise levels along the surrounding road network, will be lower than those assumed for the impact assessment due to lower noise emissions from the future fleet of electric vehicles along urban and suburban roads with lower speeds, particularly those along residential streets and roads. In reality, the impacts determined and presented for both years will be further reduced when the lower noise emissions associated with electric fleet along low speed roads are factored in.

21.3.2.5 Population

The Population assessment considered potential cumulative effects on land-take, amenity and accessibility during operation. Sixteen projects were shortlisted as having potential interfaces with population receptors affected by the Proposed Scheme as assessed in Chapter 10 (Population). These are:

- SDCC planning application reference SD178/0003: Dodder Greenway Route Scheme;

- DCC planning application reference 2878/15: demolition of existing dwelling at No. 85 Templeogue Road, Dublin 6W and the construction of a total of 30 no. residential units;
- DCC planning application reference 4628/18: development of part 7, part 8 and part 9 storey office development with retail/cafe/restaurant units at site bound by Charlemont Street, Harcourt Road and Richmond Street which contains four Protected Structures;
- DCC planning application reference 3024/18: comprehensive redevelopment of site (previously permitted under DCC Ref. Ref. 2527/15 and DCC Reg. Ref. 3987/15 at Harcourt Square, Harcourt Street and Charlotte Way;
- DCC planning application reference 3389/15: demolition of No. 46 Lower Rathmines Road and a derelict mews building on Fortesque Lane, refurbishment of existing Nos. 40, 42 and 44 Lower Rathmines Road (protected structures) and the construction of two new buildings creating a student residential complex;
- DCC planning application reference 2769/21: Build-To-Rent residential development at No. 348 Harold's Cross Road, Dublin 6, D6W VW99;
- DCC planning reference 2851/21: new educational campus of 2 No. new school buildings located at the former Harold's Cross Greyhound Stadium, Harold's Cross, Dublin 6;
- DCC planning reference 3546/21: demolition under Grant of permission DCC Reg. Ref. 4059/18. and the demolition of an additional 2 no. existing structures and construction of a new mixed-use development;
- DCC planning reference 4936/22: construction of a new 9 no. storey office block;
- DCC planning reference 4832/22: demolition of existing pitched blazed roof over shopping mall and construction of a new 111 bedroom hotel around a central lightwell;
- DCC planning reference 4937/22: reconfiguration and extension of the exiting office block utilising existing structural elements to provide modernised office accommodation;
- SDCC planning reference SD228/0008: construction of a combination of single way and two-way cycle tracks on and adjacent to the vehicle carriageway;
- SDCC planning reference SD18A/0053: construction of 2 three-storey buildings accommodating: 32 apartments;
- DCC planning reference 2028/21: construction of a 4-storey hotel with a setback at third floor accommodating 78 no. hotel bedrooms;
- Major Project (id MP15) - DART+ Tunnel Element (Kildare Line to Northern Line); and
- Major Project (id MP16) - Potential Metro South alignment: SW option.
- Major Project (id MP15) - DART+ Tunnel Element (Kildare Line to Northern Line);
- Major Project (id MP16) - Potential Metro South alignment: SW option.

Of the above listed projects, 3 projects were considered to have greater potential for cumulative population impacts (SD178/0003; 4626/18; 3024/18) Projects identified which could have the potential to give rise

As outlined in Section 5.9 of this EIAR, liaison with third-party developers will take place on a case-by-case basis, as will be set out in the Construction Contract, to ensure that there is coordination between projects, that construction access locations remain unobstructed by the Proposed Scheme works and that any additional construction traffic mitigation measures required to deal with cumulative impacts are managed appropriately. On that basis it is not envisaged that Proposed Scheme in combination with other projects identified above, will give rise to significant cumulative impacts.

21.3.2.6 Human Health

The Human Health assessment identified 34 other projects with potential for likely significant cumulative effects with the Proposed Scheme and took into the assessment stages 3 and 4 (see Appendix A21.1). These included 16 DCC planning applications, three SDCC planning application, one SHD, three other Major Projects (DART+ Tunnel Element, Potential Metro South alignment and the Greater Dublin Area Cycle Network Plan) and the remaining 11 Core Bus Corridor Schemes.

For two of the SDCC planning applications and the DART+ Tunnel Element and the Greater Dublin Area Cycle Network Plan, the Human Health assessment identified that the projects would be complementary to the Proposed

Scheme and could have a cumulative beneficial effects by connecting different communities and destinations which would improve general accessibility to areas of leisure and employment. These cumulative impacts would result in positive effects in mental health, assessed to be Positive and Significant in the Long-term on health. A similar cumulative effect was identified for the Potential Metro South Alignment, assessed to be Positive and Moderate in the Long-term on health.

The Human Health assessment judged that there were likely significant cumulative effects from the Core Bus Corridor Schemes, despite their location outside the ZoI for the Proposed Scheme when considered in isolation. This is because cumulatively the Core Bus Corridor schemes would have the effect of linking all the schemes' Human Health study areas, thereby affecting a much greater population. Assuming all 12 Core Bus Corridor schemes would become operational, it is considered likely that this would encourage greater uptake of sustainable transport options among the population surrounding the Proposed Scheme by offering a choice of efficient public transport journeys and active travel opportunities. This would be beneficial to health by improving wellbeing from greater journey reliability, access to services (including health services) for those without a car and supporting greater physical activity as a part of an active travel journey or overall journey via public transport. The implementation of the above projects will facilitate a step change in modal shift, reducing reliance on car travel. In the medium to long term this should help environmental improvement such as reduced air pollutants, improved urban realm and better use of social space. Due to the substantial size of overall population with the opportunity to benefit from the proposals, the effect is assessed as Positive, Very Significant and Long-term for health.

No cumulative effects during operation in conjunction with the Proposed Scheme were identified for the remaining shortlisted projects.

21.3.2.7 Biodiversity

Most residual biodiversity impacts of the Proposed Scheme relate to the Construction Phase, there is limited potential for likely significant cumulative effects on biodiversity during the Operation Phase.

The only impacts associated with the Proposed Scheme that are measurable in some way, but themselves will not result in a likely significant effect on biodiversity are:

- Impacts on the existing hydrological and hydrogeological regimes; and
- Disturbance or displacement to species (birds, badger and otter).

Specific assessments have been undertaken by hydrogeology and hydrology specialists to identify the potential for cumulative effects to occur, however an overarching assessment is included below.

21.3.2.7.1 Impacts on the existing hydrological and hydrogeological regimes

The Proposed Scheme will not have any significant residual effects on the existing hydrological or hydrogeological regime in those surface and ground water catchments crossed by the Proposed Scheme or in the downstream receiving surface and marine water environment as set out in Chapter 13 (Water) and Chapter 14 (Land, Soils, Geology & Hydrogeology) of the EIAR and in Appendix A13.1 in Volume 4 of the EIAR (the Water Framework Directive Assessment). Specific design and mitigation measures have been included to address any potential effects such that there will be no significant residual effects.

The Proposed Scheme lies within Hydrometric Area (HA) 09 (Liffey and Dublin Bay) and is within the River Liffey catchment. The objectives for this catchment are outlined in the The River Basin Management Plan for Ireland (2018-2021), which aims to protect all waters within the district and, where necessary, improve waters and achieve sustainable water use. The purpose of the River Basin Management Plan is to reduce pollution levels, to restore good water quality status and to prevent deterioration in water quality in the river basins and groundwater bodies. There are many land use plans and projects that lie within the catchment that have the potential to affect surface water and groundwater bodies. However, all of the overarching land use plans have environmental policies to protect the existing surface water and groundwater network. Therefore, there are no other plans or projects that are likely to result in a significant effect on biodiversity, cumulatively with the proposed road development, as a consequence of surface water or groundwater impacts.

21.3.2.7.2 Impacts on fauna species (birds, badger and otter) as a result of disturbance or displacement

The Proposed Scheme will not result in a likely significant residual effect on any fauna species as a result of disturbance or displacement effects during the Operation Phase. The identified ZoI from the Proposed Scheme is limited to the immediate vicinity and will not result in a likely significant residual effect on any fauna species as a result of disturbance or displacement effects. Considering the land use zonings in the areas through which the Proposed Scheme passes (residential, commercial or industrial zoning), and the minimal effect of operational disturbance from road traffic in an already highly urbanized locality, future development is not likely to result in a significant effect on biodiversity, cumulatively with the Proposed Scheme, as a consequence of disturbance or displacement impacts.

21.3.2.8 Water

The Water assessment identified 17 other projects for further assessment of potential for cumulative effects in conjunction with the Proposed Scheme during operation. These were:

- SDCC planning reference SD178/0003: Dodder Greenway Route Scheme;
- DCC planning reference 2409/19: 3 no. storey 7 no. bay hipped roof terrace block to comprise of 4 no. three-bedroom townhouses, 3 no. two-bedroom apartments and 5 no. one-bedroom apartments;
- DCC planning reference 2878/15: demolition of existing dwelling at No. 85 Templeogue Road, Dublin 6W and the construction of a total of 30 no. residential units;
- DCC planning reference 2479/20: 24 build to rent residential units located at car park level 3 to car park level 4 level on the Jervis Street and Abbey Street Upper frontages of the building;
- DCC planning reference 4735/18: construction of an infill residential development of 34 no. apartments in two blocks;
- SDCC planning reference SD21A/0101: Residential development comprising a total of 28 apartments, in a building up to 4-storeys on Nutgrove Avenue;
- SDCC planning reference SD22A/0039: construction of 22 4 bed, 3-4 storey units;
- DCC planning reference 3971/22: construction of a four-storey building providing a 120 no. bed space nursing home and all associated ancillary development at former Highfield Plant Nursery;
- DCC planning reference 4027/22: construction of an office development comprising two buildings of office space over five, six and eight floors in Block A and office space over five floors in Block B;
- DCC planning reference 4816/22: construction of an 8 storey office building and café/restaurant;
- SDCC planning reference SD228/0008: construction of a combination of single way and two-way cycle tracks on and adjacent to the vehicle carriageway
- Irish Water Project - Clarendon Street. Clarendon Street Sewer Upgrades;
- Major Project (id MP15) - DART+ Tunnel Element (Kildare Line to Northern Line);
- Major Project (id MP16) - Potential Metro South alignment: SW option;
- Major Project (id MP17) - LUAS Cross City incorporating LUAS Green Line Capacity Enhancement - Phase 1;
- Major Project (id MP19) - Potential Metro South alignment: Charlemont to Sandyford; and
- Major Project (id MP32) - MetroLink.

The further assessment predicted that given the mitigation measures set out in the Surface Water Management Plan (SWMP) for the Proposed Scheme and the use of SUDs, the cumulative impacts during operation would not be significant.

21.3.2.9 Land, Soils, Geology and Hydrogeology

The residual impacts on Land, Soils, Geology and Hydrogeology due to the Proposed Scheme are expected to be of negligible magnitude and imperceptible significance as a result of the Operational Phase of the Proposed Scheme. There are no likely significant direct or indirect cumulative impacts of the Proposed Scheme in combination with the other projects on land, soils, geology and hydrogeology during the Operational Phase.

21.3.2.10 Archaeological and Cultural Heritage

The Archaeological and Cultural Heritage assessment has identified that no residual impacts would occur as a result of the operation of the Proposed Scheme. It is considered therefore that the operation of the Proposed Scheme in combination with other proposed projects will not result in significant cumulative impacts.

21.3.2.11 Architectural Heritage

The Architectural Heritage assessment did identify potential for cumulative effects with any projects in conjunction with the Proposed Scheme during operation due to the mitigation measures already put forward through the Proposed Scheme and the limited predicted impacts on architectural features.

21.3.2.12 Landscape (Townscape) and Visual

The Landscape (Townscape) and Visual assessment shortlisted 30 other projects for further assessment. These included three SDCC planning applications, 15 DCC planning applications, one other Major Project (Greater Dublin Area Cycle Network Plan) and the remaining 11 Core Bus Corridor schemes.

The Landscape (Townscape) and Visual assessment identified that the majority of the shortlisted projects (including the Kimmage to City Centre Core Bus Corridor scheme) in combination with the Proposed Scheme have the potential to contribute to a minor cumulative change in the urban realm, but one which is in keeping with the urban context of ongoing development, and therefore no significant cumulative effects are expected.

Potential Moderate, Negative effects on trees as a result of the Greater Dublin Area Cycle Network Plan in conjunction with the Proposed Scheme would reduce over time with the establishment of proposed landscape mitigation put forward through the Proposed Scheme.

In regard to the remaining ten Core Bus Corridor schemes, the Landscape (Townscape) and Visual assessment identified that potential for temporary in-combination indirect effects are limited by distance. Therefore, no cumulative operational effects are anticipated.

The Kimmage to City Centre Core Bus Corridor in conjunction with the Proposed Scheme also has potential to provide long-term enhance to streetscape where the two projects intersect. There is potential for Positive, Significant, Medium to Long-term cumulative effects on townscape.

In regard to SDCC planning application reference SD178/0003 (Dodder Greenway Route Scheme), there is potential for a Positive cumulative effect in conjunction with the Proposed Scheme resulting from improved access and provision of planting. However, the cumulative effect would not be significant.

21.3.2.13 Waste and Resources

The predominant source of Operational Phase waste from the Proposed Scheme may arise as a result of carriageway maintenance which will be undertaken at regular intervals, or as necessary. This will primarily consist of bitumen containing material due to maintenance of carriageway pavement. The predicted impact of Operational, Construction and demolition waste will be Negative (on the basis that more material will be generated and more overall maintenance will be required compared to the Do Nothing scenario), Not Significant and Long-term. It is therefore considered that the Operational Phase waste arising from the Proposed Scheme considered on combination with the types of waste arising from other projects will not give rise to likely significant cumulative effects.

21.3.2.14 Material Assets

The main impacts on major infrastructure and utilities will be associated with the Construction Phase of the Proposed Scheme. The only Operational Phase residual impacts from the Proposed Scheme on Material Assets were Imperceptible impacts on electricity and telecommunications. As these impacts are insignificant it is unlikely that they will act with potential utility demand increases from other projects to cause significant cumulative effects on Material Assets relating to the Operational Phase, particularly given that the main cumulative projects are other road projects which would have similar utility requirements.

21.4 Environmental Interactions

Table 21.29 sets out a matrix to indicate where interactions between different effects on different environmental factors have been addressed. This is in line with the approach set out in the EPA EIAR Guidelines (EPA 2022). These interactions are described briefly in Table 21.29.

Table 21.29: Environmental Interactions Matrix

Typical Inter-Relationship Matrix – Environmental Elements	Population		Human Health		Biodiversity		Land and Soils		Water		Air Quality		Climate		Noise and Vibration		Waste		Landscape/Townscape		Cultural Heritage		Architectural Heritage		Material Assets		Traffic and Transport		Major Accidents and / or Disasters	
	Con.	Op.	Con.	Op.	Con.	Op.	Con.	Op.	Con.	Op.	Con.	Op.	Con.	Op.	Con.	Op.	Con.	Op.	Con.	Op.	Con.	Op.	Con.	Op.	Con.	Op.	Con.	Op.	Con.	Op.
Population																														
Human Health	✓	✓																												
Biodiversity																														
Land and Soils			✓		✓																									
Water			✓		✓	✓	✓																							
Air Quality	✓	✓	✓	✓	✓	✓																								
Climate				✓						✓	✓	✓																		
Noise and Vibration	✓	✓	✓	✓	✓	✓																								
Waste							✓																							
Landscape/ Townscape	✓	✓		✓	✓	✓	✓		✓																					
Cultural Heritage																			✓	✓										
Architectural Heritage																					✓	✓								
Material Assets			✓				✓																✓	✓						
Traffic and Transport	✓	✓	✓	✓	✓	✓		✓		✓	✓	✓	✓	✓	✓	✓									✓	✓				
Major Accidents and / or Disasters	✓	✓	✓	✓	✓		✓		✓	✓		✓		✓					✓						✓		✓			

Notes: This matrix should be read down, starting with each topic identified across the top. ✓ = significant interaction between. Blank cells indicate no or weak interaction. Con. = Construction Phase. Op. = Operational Phase.

21.4.1.1 Interactions between Population and Human Health

The topics of 'Population' and 'Human Health' are inextricably linked. Chapter 10 (Population) of this EIAR has focused on how the Proposed Scheme could have impacts on communities and the local economy (commercial businesses). As outlined in the methodology in Chapter 11 (Human Health), the social conditions, community networks and economic conditions within which people live are considered wider determinants of health and have an important influence on human health.

Construction Phase

The Population assessment has identified areas of community and commercial land-take, some of which would be permanent. The impacts would be felt at a local, individual level rather than widespread community level. It is considered that the impacts would be strongly linked with impacts on amenity and general disruption from construction activities. Similarly, both the Population and Human Health assessments identify that accessibility may be temporarily disrupted for pedestrians and cyclists during construction, with requirements for short diversions. However access to businesses and properties will be maintained at all times. Health outcomes associated with these construction impacts are likely to be psychosocial, such as stress and anxiety. Where footpaths or off-road cycle tracks are affected by construction, a safe route will be provided past the work area, and where practicable, provisions for matching existing facilities for pedestrians and cyclists will be made. This will limit the likelihood of adverse psychosocial responses.

Operational Phase

The Population and Human Health assessments identify positive impacts on accessibility. While the Population assessment looks at this this in relation to community and commercial receptors, the Human Health assessment considers the health outcomes which may be associated with this improved accessibility. This could include improved and more equitable access to health, education and other services. This is also a social impact, improving the wider determinant of health in relation to transport and opportunities to access services. Health outcomes may also be associated with improved physical fitness arising from increased active travel linked to the proposed improvements to walking and cycling infrastructure and improved social interactions.

21.4.1.2 Interactions between Population and Air Quality, Noise and Vibration and Landscape (Townscape) and Visual

Chapter 10 (Population) assesses impacts on amenity, which involves an assessment of the interactions between Landscape (Townscape) & Visual, Air Quality, Noise and Vibration. It therefore inherently addresses environmental interactions during both the Construction and Operational Phases. Reference should be made to Chapter 10 for the assessments on commercial and community amenity. Visual impacts and landscape impacts on properties have been assessed in Chapter 17 (Landscape (Townscape) & Visual). The Construction Phase will have impacts on a number of local amenities and open spaces used by the community. Access will be maintained to the open spaces and reinstated at the end of the Construction Phase, with replacement / set back boundary fences, footpaths, and replacement and new tree planting.

21.4.1.3 Interactions between Human Health; Land, Soils, Geology and Hydrogeology; Water; and Air Quality; and Noise and Vibration

The quality of the environment, including exposure to pollution and environmental hazards, is an important consideration in health protection. The Human Health assessment reported in Chapter 11 has considered the interaction of these environmental factors on human health.

Chapter 13 (Water) assesses a variety of potential impacts on water including impacts on water quality and impacts on flood risk, both of which have an interaction with human health.

Chapter 14 (Land, Soils, Geology & Hydrogeology) assesses the potential for the excavation of contaminated ground, which can pose an environmental health hazard.

Construction Phase

Chapter 13 (Water) has assessed the potential impacts for temporary increases in flood risk from possible disruption of local drainage systems due to construction works, as well as temporary increases in hardstanding and / or soil compaction which could temporarily increase surface water run-off rates to waterbodies. The assessment has also considered the potential to impact on water quality due to contamination with anthropogenic substances such oil, chemicals or concrete washings. These issues can pose a risk to human health. However, the Water assessment found impacts on water during construction to be imperceptible and so there is no likely significant interaction between Water and Human Health from this Proposed Scheme during construction.

During construction, there is a risk of excavating potentially contaminated ground. Chapter 14 (Land, Soils, Geology & Hydrogeology) has identified potential sources of contamination from a review of current and historic land uses. The processes in place for the investigation of potential ground contamination and management and disposal of contaminated substances ensure health protection. These measures are outlined in Section 14.5 of Chapter 14 (Land, Soils, Geology & Hydrogeology). There are very limited areas of excavation, so the risk of disturbing contaminated materials is slight. Therefore, there is no likely significant interaction between Land, Soils, Geology, and Hydrogeology, and Human Health from this Proposed Scheme during construction.

Chapter 11 (Human Health) has assessed the interaction between Air Quality and Noise and Vibration and Human Health. Reference should be made to Chapter 11 (Human Health) for an assessment of potential health outcomes linked with these issues during the Construction Phase.

Operational Phase

Chapter 13 (Water) has assessed potential impacts on water quality such as from dispersal of traffic onto other roads meaning ‘routine’ road contaminates, such as hydrocarbons and metals may drain to a different catchment or have less stringent pollution control infrastructure. No potential impact on flood risk was assessed on the basis that the drainage design ensures no net increase in run-off rates. In terms of potential impacts on surface water quality the Water assessment identified that the impacts were imperceptible. Therefore there is no likely significant interaction between Water and Human Health from this Proposed Scheme during the Operational Phase.

Chapter 14 (Land, Soils, Geology & Hydrogeology) assesses no significant residual impacts from the Proposed Scheme. On this basis there is no likely significant interaction between Land, Soils, Geology, and Hydrogeology, and Human Health from this Proposed Scheme during the Operational Phase.

Chapter 11 (Human Health) has assessed the interaction between Air Quality and Noise and Vibration and Human Health. Reference should be made to that Chapter 11 (Human Health) for an assessment of potential health outcomes linked with these issues during the Operational Phase.

21.4.1.4 Interactions between Human Health and Landscape (Townscape) and Visual

The assessment of Human Health has an indirect interaction between Landscape (Townscape) and Visual via the assessment of amenity in Chapter 10 (Population).

Operational Phase

The quality of the built environment can influence how people feel about a place and is therefore connected with mental wellbeing. Improvements to the urban realm have been identified as a possible pathway to supporting more social interaction, which is beneficial to health outcomes.

21.4.1.5 Interactions between Human Health and Material Assets

Material assets are resources of both natural and human origin that have intrinsic value. Chapter 19 (Material Assets) provides an assessment of impacts on major infrastructure and utilities and imported materials. The chapter notes that other types of material assets are assessed in other chapters of the EIAR, for example, roads and traffic are assessed in Chapter 6 (Traffic & Transport).

Construction Phase

During construction the Material Assets assessment identified Negative Moderate Temporary impacts of disruption to water supplies, electricity, gas and telecommunications, due diversions which may be required for the Proposed Works. There is an interaction with Human Health as these disruptions could affect the essential services needed to support healthy lives (i.e. fresh water, sanitation, energy and communication). In the case of the Proposed Scheme it is not considered that any of these disruptions would be of a duration to affect health at a population level. The most likely health effects are transient psychosocial impacts such as annoyance and frustration, which are unlikely to result in any change of overall health status.

Operational Phase

No significant Operational Phase impacts on material assets were identified and therefore there is no likely interaction between material assets and Human Health during the Operational Phase.

21.4.1.6 Interactions between Population, Human Health, Air Quality, Noise and Vibration and, Traffic and Transport

There is significant interaction between these topics. The Traffic and Transport assessment has informed the assessments of Population' Human Health, Air Quality and Noise and Vibration. The Population assessment has considered effects on accessibility which directly interacts with Traffic and Transport. The Population assessment has also assessed effects on amenity which relate to traffic emissions of air pollution and noise, which indirectly interact with Traffic and Transport. The Human Health assessment has considered the evidence of associations with health outcomes from exposure to air pollution, traffic noise as well as changes to wider determinants of health such as traffic and transport, and access. It is considered that the key interactions for both Construction and Operational Phases, are inherently captured across Chapter 6 (Traffic & Transport), Chapter 7 (Air Quality), Chapter 9 (Noise & Vibration), Chapter 10 (Population) and Chapter 11 (Human Health).

21.4.1.7 Interactions between Biodiversity, Traffic and Transport, Land, Soils, Geology and Hydrogeology; Water; and Air Quality; Noise and Vibration and, Landscape (Townscape) and Visual

The Biodiversity assessment has considered the interactions between species, habitats and various other environmental issues. Specifically, there is an interaction between Traffic and Transport and mortality risk for species. There is an interaction between Water, Air Quality and Biodiversity as declines in surface water pollution and air pollution can contribute to habitat degradation. Non-native invasive plant species can be spread through soils, and also contribute to habitat degradation, meaning there is an interaction with Biodiversity. Some trees and areas of other planting will be removed during the Construction Phase as set out in in Chapter 17 (Landscape (Townscape) & Visual). However, the Proposed Scheme also includes for replacement and new trees and other planting, with associated opportunities for enhancement of local biodiversity. While it will take time for new trees to establish and mature, no significant medium or long-term impact arises from the interrelationship between biodiversity and landscape and visual factors. Chapter 12 (Biodiversity) describes and assesses how different impacts of the Proposed Scheme on traffic, water, soils, air quality, noise and landscape may interact with biodiversity interests. Reference should be made to Chapter 12 (Biodiversity) to understand those interactions.

21.4.1.8 Interactions between Land, Soils, Geology and Hydrogeology and Water

There is an interaction between Chapter 14 (Land, Soils, Geology & Hydrogeology) and Chapter 13 (Water). Chapter 14 (Land, Soils, Geology & Hydrogeology) assesses potential impacts on water supply and the pollution of groundwater and watercourses from potential land contamination. There is therefore a potential interaction between land contamination and surface water. Surface water is interlinked with hydrogeology, so while impacts on these issues are assessed in separate chapters, there is an interrelationship. It is considered that these interactions are captured within Chapter 14 (Land, Soils, Geology & Hydrogeology) and Chapter 13 (Water) since they are intrinsic to the assessments.

21.4.1.9 Interactions between Land, Soils, Geology and Hydrogeology; Waste and Material Assets

The main interaction between these topics will be during the Construction Phase.

Construction Phase

Chapter 19 (Material Assets) assesses the impact of imported materials, whereas Chapter 18 (Waste & Resources) assesses the use of site-won materials which can be re-used within the Proposed Scheme. There is an interaction between these issues as the amount of material to be imported will depend on the amount of material which can be recovered and re-used on-site. Chapter 14 (Land, Soils, Geology & Hydrogeology) provides an assessment of impacts on soils, including potentially contaminated land. There is an interaction between this issue and waste because the likelihood of excavated materials being suitable for use on site will depend on whether or not it is contaminated, and the type of contamination. This would be established through detailed ground investigations as set out in Chapter 14 (Land, Soils, Geology & Hydrogeology). One of the main reasons for undertaking any excavation of soils as part of the Proposed Scheme is to allow for utility diversions. The need to utility diversions is assessed in Chapter 19 (Material Assets), whereas the likelihood of encountering contaminated materials from this activity is assessed in Chapter 14 (Land, Soils, Geology & Hydrogeology).

21.4.1.10 Interactions between Land, Soils, Geology and Hydrogeology; and Traffic and Transport

Chapter 14 (Land, Soils, Geology & Hydrogeology) identifies traffic and transport as a potential source of pollution during the Operational Phase of the Proposed Scheme. Specifically, it identifies the potential for occasional accidental leakage of oil, petrol or diesel (all can come from motor vehicles), allowing contamination of the surrounding environment. While there is an interaction, this same interaction exists in the Do Nothing scenario and so the significance of the impact is imperceptible.

21.4.1.11 Interactions between Water and, Traffic and Transport

Chapter 13 (Water) identifies the potential impact from the interaction between traffic and transport and the water environment. It refers to traffic modelling described in Chapter 6 (Traffic & Transport) to inform the likelihood of a significant impact on pollutants and sediment from road surface run-off. The chapter identifies that all changes in traffic flows would occur within the same drainage catchments and so there would be no significant impacts from this interaction.

21.4.1.12 Interactions between Climate, Air Quality, Material Assets, Waste and, Traffic and Transport

Chapter 8 (Climate) provides an assessment of the effects of the Proposed Scheme on GHG emissions.

Construction Phase

There is an interaction between Climate and Material Assets as the amount of material to be imported, and waste generated during construction of the Proposed Scheme, influences the embodied carbon footprint of the Proposed Scheme, which is assessed in Chapter 8 (Climate). The redistribution of traffic associated with the traffic management during construction, will also generate GHG emissions, which have informed the assessment in Chapter 8 (Climate).

Operational Phase

Operational Phase traffic is intrinsic to the assessment of climate impacts reported in Chapter 8 (Climate). This interaction is therefore captured within that chapter.

21.4.1.13 Interactions between Climate and Water

The impact of climate change is considered in the flood risk assessment (Appendix A13.2 in Volume 4 of this EIAR), which is summarised in Chapter 13 (Water) and Chapter 8 (Climate). The interaction between climate change and flood risk is therefore captured in these assessments.

21.4.1.14 Interactions between Landscape (Townscape) and Visual

As an environmental factor landscape and visual considerations have natural relationships with all other environmental factors. Some are clearly direct relationships, e.g., population and visual impacts; biodiversity and landscape; land, soils and water and landscape; or the setting around features of cultural heritage etc. Others

may be indirect, e.g. human health, air quality and landscape, material assets and landscape and visual aspects. Wherever possible these potential interactions have been incorporated into the landscape and visual impact assessment presented in this chapter.

The principal potential interrelations for Landscape and Visual Impact with other environmental factors are outlined in the following paragraphs. The main interactions have been identified for Construction phase impacts. Other interrelations do not have potential for significant impacts with landscape and visual aspects.

Construction Phase

The Construction Phase will have impacts on a number of local amenities and open spaces, which have an interaction with population and human health. Access will be maintained to the open spaces and reinstated at the end of the Construction Phase, with replacement / set back boundary fences, footpaths, and replacement and new tree planting. The visual and landscape impacts on properties are assessed in Chapter 17 (Landscape (Townscape) & Visual).

The Proposed Scheme is located within a developed sub-urban / urban area. Nevertheless, the Construction Stage of the Proposed Scheme has potential to interact with local drainage and crosses the River Dodder and Grand Canal. However, no significant works are proposed for these rivers corridors and the proposed drainage is integrated with the existing network. Additional drainage improvement measures, such as Sustainable Drainage Systems (SuDS) are also included with the Proposed Scheme. No significant impact arises from the interrelationship between water and landscape and visual factors.

The Proposed Scheme is located within a developed sub-urban / urban area. Nevertheless, the Construction Stage of the Proposed Scheme will impact on small areas of land / soil along the road corridor, mainly roadside verges, edges of open spaces, small landscape areas and garden areas. The Proposed Scheme will result in an overall minor reduction of soil area, mainly as a result of localised road widening, however, disturbed areas will be reinstated, and landscaped. No significant Medium or Long-term impact arises from the interrelationship between land and soils and landscape and visual factors.

21.4.1.15 Interactions Between Landscape (Townscape) & Visual, Architectural Heritage, Archaeology and Cultural Heritage

Architectural heritage has an influence on the quality of townscape and therefore there is an interaction between these topics. Also, archaeological heritage may also be of architectural interest. Cultural heritage includes tangible heritage such as archaeology, architectural heritage, settlements, buildings and structures, designed landscapes, in addition to placenames and intangible heritage such as folklore, traditions and traditional practices. These issues are therefore interrelated.

Visual impacts and landscape impacts on features / properties of cultural heritage value have been assessed in this landscape and visual chapter. The Construction Phase will have impacts on a number of local features of heritage value, e.g., Protected Structures, Conservation Areas, historic mileposts etc. and the impacts on these features are set out in in Chapter 17 (Landscape (Townscape) & Visual).

The main impacts on archaeology, cultural heritage and architectural heritage would take place during the Construction Phase. Relevant interactions are captured in Chapter 15 (Archaeological & Cultural Heritage) and Chapter 16 (Architectural Heritage).

21.4.1.16 Interactions between Material Assets and Traffic and Transport

Chapter 19 (Material Assets) notes that roads and traffic can also be classed as material assets. However, the issues of roads and traffic are assessed in Chapter 6 (Traffic & Transport). The interaction of the traffic and transport infrastructure included as part of the Proposed Scheme with material assets is captured in Chapter 19 (Material Assets) and includes issues such as utility diversions during construction and use of energy during the Operational Phase.

21.4.1.17 Risk of Major Accidents and / or Disasters

Chapter 20 (Risk of Major Accidents and / or Disasters) inherently considers several potential interactions. For example, it assesses the risk of impacts on or from utilities (interacting with Chapter 19 (Material Assets)) such as a gas mains strike. It assesses the risk of tree instability, which has an interaction between Chapter 17 (Landscape (Townscape) & Visual) and it assesses the risk of spreading invasive species which is interrelated with Chapter 12 (Biodiversity) and Chapter 14 (Land, Soils, Geology & Hydrogeology). Also related to Chapter 14 (Land, Soils, Geology & Hydrogeology) is the risk of encountering contaminated ground or materials. Chapter 20 (Risk of Major Accidents and / or Disasters) assesses the risk of extreme weather events, which are linked to Chapter 8 (Climate) and flood risk (Chapter 13 (Water) and Appendix A13.2 in Volume 4 of this EIAR). The risk of a major road traffic event due to construction traffic is also assessed in Chapter 20 (Risk of Major Accidents and/or Disasters) which is an issue interrelated with Chapter 6 (Traffic and Transport) as well as Chapter 11 (Human Health). Since all identified risks have the potential to harm human health, the assessment in Chapter 20 (Risk of Major Accidents and / or Disasters) is strongly interrelated to human health.

21.5 Mitigation

21.5.1 Construction Phase

As set out in Section 21.2.6 of this chapter, there is a likelihood of significant negative traffic related impacts should all 12 Core Bus Corridor schemes be constructed at the same time. The mitigation for this will be to programme the Construction Phases of the Core Bus Corridor schemes (assuming they are consented) so that the four schemes identified in Section 21.2.6.2 of this chapter will not be constructed concurrently with adjoining schemes. In this regard, scheme construction programming will be controlled and implemented by the NTA.

Limiting the schemes under construction concurrently, will minimise additional congestion and associated air quality and noise impacts over and above the standalone schemes.

Appropriate construction planning of the Proposed Scheme and other nearby projects was identified as mitigation for the Human Health assessment which identified potential cumulative impacts of general construction disruption on neighbouring communities.

Other major infrastructure projects could directly interface with the construction of the Proposed Scheme. Interface liaison will take place on a case-by-case basis through the NTA, as will be set out in the Construction Contract, to ensure that there is coordination between projects, that construction access locations remain unobstructed by the Proposed Scheme works and that any additional construction traffic mitigation measures required to deal with cumulative impacts are managed appropriately.

21.5.2 Operational Phase

No significant negative effects over and above those considered in the standalone assessments for the Operational Phase were predicted in the cumulative impact assessment. No additional mitigation measures are considered necessary.

21.6 Summary of Residual Cumulative Impacts and Environmental Interactions

This chapter has identified and assessed the likely significant cumulative effects caused by the Proposed Scheme in combination with other existing and planned projects. This section provides a summary of the main effects predicted.

21.6.1 Construction Phase

The results of the modelling showed that with the CTMPs for all schemes in place at the same time, there would be significant traffic displacement across the Dublin area. The large cumulative increase of traffic on local roads had the potential to generate a significant adverse impacts of traffic congestion along with the risk of generating

air quality and noise impacts. A revised construction scenario was developed which is based on four schemes which cannot be constructed concurrently with adjoining schemes. This scenario was developed to minimise potential significant impacts on traffic, air quality and noise.

The Biodiversity assessment identified potential for significant residual cumulative effects with regard disturbance and displacement of non-SCI breeding birds during construction and habitat loss for some projects in conjunction with the Proposed Scheme. However, these cumulative effects will be at the local geographic scale and short-term due to the construction duration.

The Landscape (Townscape) and Visual assessment identified the potential for temporary indirect cumulative townscape and visual effects to occur for some projects if the construction periods coincide or are successive with the Proposed Scheme. Effects would be not significant if this is not the case. These effects are most likely to occur at locations where concurrent construction of both schemes have the potential to overlap, however, it is also likely that the extent of any such impacts will be localised and contained.

No other significant construction related cumulative effects were identified from the Proposed Scheme in combination with other projects (including the other Core Bus Corridor Schemes) over and above those identified in the standalone assessments.

21.6.2 Operational Phase

For Operational Phase effects, the assessments assume all 12 proposed Bus Corridor Schemes would be operational, along with other identified projects and GDA Strategy projects included in the Do Minimum and Do Something scenarios. For traffic and transport, the assessment predicted that the Proposed Scheme and the other 11 Core Bus Corridor schemes are expected to facilitate a long term, profound positive cumulative effect on People Movement by sustainable modes. The Core Bus Corridor schemes are seen to enable significant improvements in People Movement by sustainable modes along the direct Core Bus Corridor routes, particularly by bus and cycling, with reductions in car mode share due to the enhanced sustainable mode provision. The Proposed Scheme and the other 11 Core Bus Corridor schemes provide for enhanced integration and efficiencies for all public transport modes by facilitating substantial increases in public transport average network wide travel speeds.

The Core Bus Corridor Infrastructure Works will also support the delivery of government strategies outlined in the CAP (DCCAE 2022) and the 2021 Climate Act by enabling sustainable mobility and delivering a sustainable transport system. The Core Bus Corridor Infrastructure Works will provide connectivity and integration with other public transport services leading to more people availing of public transport, helping to further reduce GHG emissions.

Based on the analysis outlined in the assessment, it is concluded that the Core Bus Corridor Infrastructure Works achieves the project objectives in supporting the delivery of an efficient, low carbon and climate resilient public transport service, which supports the achievement of Ireland's emission reduction targets. The Core Bus Corridor Infrastructure Works has the potential to reduce GHG emissions equivalent to the removal of approximately 105,500 and 209,100 car trips per weekday from the road network in 2028 and 2043 respectively. This has the effect of a reduction in total vehicle kilometres, a reduction in fuel usage, and increases to sustainable transport trips and modal share in accordance with the 2023 Climate Action Plan (CAP) (DCCAE 2023). It is concluded that, cumulatively, the Core Bus Corridor Infrastructure Works will make a significant contribution to carbon reduction.

The Human Health assessment identified that the proposals for two SDCC planning applications, the DART+ Tunnel Element and the Greater Dublin Area Cycle Network Plan, would be complementary to the Proposed Scheme and could have a cumulative, beneficial effects by connecting different communities and destinations which would improve general accessibility to areas of leisure and employment. These cumulative impacts would result in positive effects in mental health, assessed to be Positive and Significant in the Long-term on health. A similar cumulative effect was identified for the Potential Metro South Alignment, assessed to be Positive and Moderate in the Long-term on health.

The only other significant operational cumulative impacts identified over and above the standalone scheme relate to human health. It was assessed that the proposals for the other 11 Core Bus Corridor schemes would also be complementary to the Proposed Scheme and could have a cumulative beneficial effect by encouraging active travel and increased use of public transport through offering a choice of routes. Due to the substantial size of overall population with the opportunity to benefit from the proposals, the effect is assessed as Positive, Very Significant and Long-term for health.

The Landscape (Townscape) and Visual assessment identified that the Kimmage to City Centre Core Bus Corridor in conjunction with the Proposed Scheme during operation has potential to provide long-term enhance to streetscape where the two projects intersect. There is potential for Positive, Significant, Medium to Long-term cumulative effects on townscape.

21.6.3 Environmental Interactions

Significant environmental interactions occur between the topics of population, human health, air quality, noise and vibration and traffic and transport. The assessments made for each of those topics consider those interactions both directly and indirectly. As an environmental factor, landscape and visual considerations have natural relationships with all other environmental factors. Some are direct relationships, e.g., population and visual impacts; biodiversity and landscape; land, soils and water and landscape; or the setting around features of cultural heritage etc. Others may be indirect, e.g. human health, air quality and landscape, material assets and landscape and visual aspects. Wherever possible these potential interactions have been incorporated into the relevant assessments.

In brief, the Proposed Scheme will address sustainable mode transport infrastructure deficits while contributing to an overall integrated sustainable transport system as proposed in the GDA Strategy. It will increase the effectiveness and attractiveness of bus services operating along the corridor and will result in more people availing of public transport due to the faster journey times and reliability improvements which the Proposed Scheme provides. This in turn will support the potential to increase the bus network capacity of services operating along the corridor and thereby further increasing the attractiveness of public transport. In addition to this, the significant segregation and safety improvements to walking and cycling infrastructure that is a key feature of the Proposed Scheme will further maximise the movement of people travelling sustainably along the corridor and will therefore cater for higher levels of future population and employment growth.

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