Appendix A6.1
Transport Impact Assessment Report

Contents

Executive Summary

Introduction

The purpose of this document is to provide a comprehensive Transport Impact Assessment (TIA) of the proposed Lucan to City Centre Scheme (hereafter referred to as the Proposed Scheme). The TIA also informs Chapter 6 (Traffic and Transport) of the EIAR for the Proposed Scheme which will assess the impacts and significance of those impacts in relation to the receiving environment of the Proposed Scheme.

The aim of the Proposed Scheme is to provide enhanced walking, cycling and bus infrastructure on this key access corridor in the Dublin region, which will enable and deliver efficient, safe, and integrated sustainable transport movement along the corridor. The objectives of the CBC Infrastructure Works, applicable to the Traffic and Transport assessment of the Proposed Scheme are to:

- Enhance the capacity and potential of the public transport system by improving bus speeds, reliability and punctuality through the provision of bus lanes and other measures to provide priority to bus movement over general traffic movements;
- Enhance the potential for cycling by providing safe infrastructure for cycling, segregated from general traffic wherever practicable;
- Support the delivery of an efficient, low carbon and climate resilient public transport service, which supports the achievement of Ireland's emission reduction targets;
- Enable compact growth, regeneration opportunities and more effective use of land in Dublin, for present and future generations, through the provision of safe and efficient sustainable transport networks;
- Improve accessibility to jobs, education and other social and economic opportunities through the provision of improved sustainable connectivity and integration with other public transport services; and
- Ensure that the public realm is carefully considered in the design and development of the transport infrastructure and seek to enhance key urban focal points where appropriate and feasible.

The planning and design of the Proposed Scheme has been guided by these aims and objectives, with the need for the Proposed Scheme described in detail in Chapter 2 (Need for the Proposed Scheme) of the EIAR.

In line with the above objectives, this TIA is focused on the concept of the "movement of people" rather than the "movement of vehicles". The emphasis of the design philosophy is on maximising the capacity of the Proposed Scheme to move more people by sustainable modes whilst providing for the necessary movement of general traffic along it.

This TIA includes the comprehensive assessment impacts and benefits of the Proposed Scheme covering all transport modes for both Construction and Operational Phases.

Scheme Description

The Proposed Scheme measures approximately 9.6 km from end to end. It will commence at Junction 3 of the N4 Lucan Road / Lucan Bypass and be directed east towards the City Centre. From the R136 Ballyowen Road junction with the R835 Lucan Road the Proposed Scheme will run east down the R835 Lucan Road to the roundabout serving the Lucan Retail Park and the N4 Lucan Road eastbound on-slip. The Proposed Scheme will continue via the N4 (passing the Liffey Valley Shopping Centre at Junction 2) as far as the M50 Junction 7 and then via the R148 along Palmerstown Bypass, Chapelizod Bypass, Con Colbert Road, St John's Road West to Frank Sherwin Bridge, where it will join the prevailing traffic management regime on the South Quays.

The Proposed Scheme includes an upgrade of the existing bus priority and pedestrian and cycle facilities. The scheme includes a substantial increase in the level of bus priority provided along the corridor, including the provision of additional lengths of bus lane resulting in improved journey time reliability. Throughout the Proposed Scheme bus stops will be enhanced to improve the overall journey experience for bus passengers and cycle

facilities will be substantially improved with segregated cycle tracks provided along the links and protected junctions with enhanced signalling for cyclists provided at junctions.

For the purpose of describing the Proposed Scheme it has been split into the following three sections:

- Section 1 - N4 Junction 3 to M50 Junction 7 – N4 Lucan Road – N4 Lucan Road;
- Section 2 - M50 Junction 7 to R148 Con Colbert Road – Palmerstown bypass and Chapelizod bypass; and
- Section 3 – R148 Con Colbert Road to City Centre (Frank Sherwin Bridge) – Con Colbert Road and St John's Road West.

Assessment Methodology

The assessment of the Proposed Scheme in relation to the baseline transport environment requires a qualitative assessment of changes to the transport environment, as well as quantitative analysis undertaken using a suite of multi-modal transport modelling tools which have been developed for the Proposed Scheme Infrastructure Works.

The qualitative assessments are as follows:

- **Pedestrian Infrastructure:** The changes to the quality of the pedestrian infrastructure as a result of the Proposed Scheme;
- **Cycling Infrastructure:** The changes to the quality of the cycling infrastructure as a result of the Proposed Scheme;
- **Bus Infrastructure:** The changes to the quality of the bus infrastructure because of the Proposed Scheme; and
- **Parking / Loading:** The changes to the availability of parking and loading because of the Proposed Scheme.

The quantitative assessments are as follows:

- **People Movement:** An assessment has been carried out to determine the potential impact that the Proposed Scheme will have on projected volume of people moving along the corridor by sustainable modes during the Operational Phase only;
- **Bus Performance Indicators:** The changes to the projected operational efficiency for buses as a result of the Proposed Scheme;
- **General Traffic:** The direct and indirect impacts on general traffic using the Proposed Scheme and surrounding road network; and
- **Network-Wide Performance Indicators:** The strategic changes to queuing, total travel times, total travel distance and average network speed.

The changes between the Do Minimum and Do Something scenarios have been presented in either a positive, negative or negligible / neutral magnitude of impacts as a result of the Proposed Scheme, dependent on the assessment topic. A high, medium, low or negligible rating has been applied to each impact assessment to determine the Magnitude of Impact.

Where appropriate, the changes in conditions between the Do Minimum and Do Something scenarios are outlined using a Level of Service (LoS) approach. This concept allows a straightforward comparison of two differing scenarios using a series of metrics specifically developed for this purpose.

Baseline Environment

Section 1 of the Proposed Scheme is approximately 2.8km in length and begins at Junction 3 of the N4 Lucan Road at the R835 Lucan Road / R136 Ballyowen Road junction and ends at the crossing with the M50 at Junction 7. It passes Ballydowd to its south, Hermitage Golf Club to its north, and Liffey Valley Shopping Centre to the south before Junction 7 with the M50.

Section 2 of the Proposed Scheme runs between Junction 7 of the M50 and the R833 Con Colbert Road, in the vicinity of Kilmainham. This section is approximately 4.8km in length and runs along R148 Palmerstown Bypass and Chapelizod Bypass, traversing the M50 and passing through Palmerstown, which lies to the north and south. The route then bypasses Chapelizod to the north, as well as Ballyfermot, and Inchicore to the south, before ending at the R833 Con Colbert Road junction to Kilmainham / Inchicore.

Section 3 of the Proposed Scheme is approximately 2.0km in length and comprises the final segment of the R148 Con Colbert Road, and St John's Road West passing through Kilmainham and Islandbridge, ending adjacent Heuston Station at Frank Sherwin Bridge, where it will join the prevailing traffic management regime on the South Quays.

Potential Impacts

Construction Phase

During the construction phase, the Proposed Scheme will have low negative to medium short-term impacts to pedestrian cycling and bus access, and parking and loading. General traffic redistribution is not anticipated to be a significant issue during the construction phase, however there will be a requirement for some localised temporary road closures for short durations of the day. The impact of construction traffic is anticipated to result in a negative, slight and short-term impact due to the low numbers of vehicles anticipated which are and below the thresholds set out in the Transport Assessments Guidelines.

Operational Phase

This TIA demonstrates that the Proposed Scheme results in the following impacts:

- **Pedestrian Infrastructure:** The Proposed Scheme consists of measures to enhance the existing pedestrian infrastructure along the direct study area. All proposed facilities have been designed in accordance with the Preliminary Design Guidance Booklet for BusConnects Core Bus Corridors (PDGB) which has been developed with cognisance to the relevant accessibility guidance. A LoS junction assessment was undertaken using a set of five criteria to determine the impact that the Proposed Scheme has for pedestrians. The results of the impacted junctions demonstrate that in the Do Minimum scenario, 73% of the junctions assessed has LoS ratings of C or D, with the exception of two B, three E and one F ratings. In the Do Something scenario, i.e. following the development of the Proposed Scheme, 82% of the assessed junctions had the highest A / B LoS ratings. The impacts of the improvements to the quality of the pedestrian infrastructure will be **Medium Positive** in all sections of the Proposed Scheme.

- **Cycling Infrastructure:** The Proposed Scheme also consists of measures to enhance the potential for cycling by providing safe infrastructure for cycling, segregated from general traffic (and pedestrians) wherever practicable along the direct study area. A LoS assessment was undertaken using an adapted version of the NTA's National Cycle Manual QoS Evaluation criteria. The results of the assessment demonstrate that the LoS in the Do Minimum scenario consists predominantly of C ratings, with the exception of one B rating. In the Do Something scenario, eight of the nine LoS ratings are the highest A+, A and B ratings, with the remainder being C rating. The impact of the improvements will be **Medium Positive** in sections 1 and 2 and **Low Positive** in Section 3 of the Proposed Scheme.

- **Bus Infrastructure:** The implementation of the Proposed Scheme will result in improvements in the quality of bus infrastructure provision in the direct study area. A qualitative impact assessment has been undertaken based on the provision of bus priority, pedestrian accessibility and changes to the bus stop facilities. The results of the assessment demonstrate that the impacts of the improvements to the quality of the bus infrastructure will be **Medium Positive** in Section 1 and 2, and **High Positive** in Section 3 of the Proposed Scheme.

- **Parking and Loading:** A qualitative impact assessment has been undertaken of the Proposed Scheme impacts on the existing parking and loading. The results of the assessment demonstrate that the changes to the parking and loading provision will result in an overall loss of 265 spaces (-108 spaces in Section 1, -124 spaces in Section 2 and -33 spaces in Section 3). Given the nature of the loss in parking (i.e. predominately low use informal parking on sections of road where properties and businesses have off

road parking) and the availability of alternative spaces in the indirect study area, the impacts are expected to be **Medium Negative** in Section 1 and **Low Negative** in Section 2 and Section 3.

- **People Movement:** Given the proposed amendments to the pedestrian, cycling, bus and parking / loading infrastructure outlined above, the Proposed Scheme will have greater capacity to facilitate movement of people travelling through the corridor. A quantitative impact assessment has been undertaken using outputs from the NTA's modelling suite, comparing the Do Minimum and Do Something peak hour scenarios for each forecast year (2028, 2043). The results of the assessment demonstrate that there will be an increase in 13% and 9% of people travelling through the Proposed Scheme during the 2028 AM and PM Peak Hours respectively. During the 2043 scenario there will be an increase in 18% and 9% of people travelling through the Proposed Scheme during the AM and PM Peak Hours. The analysis also shows that there will be an increase in 4.6% and 5.3% of passengers boarding buses during the 2028 AM and PM Peak Hours respectively. During the 2043 scenario there will be an increase of 6.3% and 4.8% of passengers boarding buses during the AM and PM Peak Hours respectively. Overall, it is anticipated that the effects of the increases to the total number of people travelling through the Proposed Scheme will be **High Positive**.

- **Bus Network Performance Indicators:** A micro-simulation modelling assessment has been developed and network performance indicators of the bus operations along the 'end to end' corridor. The results of the assessment demonstrate that the total bus journey times on all modelled bus services will improve by up to 19% during the AM and PM Peak hours of the 2028 Opening Year and 2043 Design Year. Based on the AM and PM peak hours alone, this equates to c7.2 hours of savings in 2028 and c7.5 hours in 2043, when compared to the Do Minimum combined across all buses. On an annual basis this equates to approximately 5,400 hours of bus vehicle savings in 2028 and 5,600 hours in 2043, when considering weekday peak periods only. Journey time variation and reliability are shown to improve in all Do Something scenarios compared to the Do Minimum. Overall it is anticipated that the effects of the improvements to the network performance indicators for bus users along the Proposed Scheme will be **Medium Positive**.

- **General Traffic Network Performance Indicators:** There will be an overall reduction in operational capacity for general traffic along the direct study area, given the proposed infrastructural changes to the existing road layout outlined above. This reduction in operational capacity for general traffic will create some level of traffic redistribution from the Proposed Scheme onto the surrounding road network.

  The LAM Opening Year 2028 model results were used to identify the impact in traffic flows between the Do Minimum and Do Something scenarios. A reduction in general traffic flows along a road link has been described as a positive impact to the environment, and vice versa.

  The results of the assessment demonstrate that the surrounding road network has the capacity to accommodate the redistributed general traffic as a result of the Proposed Scheme. The majority of assessed junctions that required further traffic analysis have VoC ratios that are broadly similar before and after the Proposed Scheme.

  Overall, it has been determined that the impact of the reduction in general traffic flows along the Proposed Scheme will be **Low Positive** whilst the impact of the redistributed general traffic along the surrounding road network will be **Negligible.**

- **Network Wide Performance Indicators:** Given the impacts to the traffic conditions outlined above, there will be a knock-on effect to the operational efficiency of the road network beyond the direct and indirect study areas. A quantitative impact assessment has been undertaken using outputs from the NTA's ERM and LAM to determine the conditions to queuing, travel times, travel distances and network speeds during the Do Minimum and Do Something scenarios. The results of the assessment demonstrate that the impacts to the network performance indicators range between -1.5% and +1%. A **Low Positive** impact is anticipated in the 2028 Peak Hour scenarios and a **Negligible** impact is predicted in the 2043 Peak Hour scenarios.

- **Cumulative Assessment**: In general, total trip demand (combining all transport modes) will increase into the future in line with population and employment growth. A greater share of the demand will be by sustainable modes (Public transport, Walking, Cycling) as facilitated by the GDA Strategy implementation.

The analysis indicates that with the 12 BusConnects Proposed Schemes in place, there will be a high positive impact on sustainable mode share. The schemes will prevent any increase in private car traffic within the study area and will instead result in a reduction in car trips below 2020 levels.

In the 2028 Opening Year scenario, it is estimated that for people travelling within the 500m catchment area (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 and a 12% increase in public transport, 3% decrease in general traffic and a 12% increase in cycling trips each day (7am-7pm). 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 11% increase in public transport trips, 4% decrease in general traffic trips (i.e. motorists) and a 15% increase in cycling trips in the morning peak hour and a 9% increase in public transport, 5% decrease in general traffic and a 13% increase in cycling trips each day (7am-7pm).

General traffic levels reduce more in 2043 than 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 GDA 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 Proposed Schemes in the AM Peak Hour. The bigger increases occur in the inbound direction on the Blanchardstown to City Centre, the Rathfarnham to City Centre 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 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 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 9% respectively, and the increase in passengers boarding bus services will increase by 23% and 22% respectively.

Overall the Proposed Schemes are expected to deliver a **High Positive** cumulative impact on People Movement by sustainable modes.

Summary and Conclusions

The Proposed Scheme, between Lucan and the City Centre, comprises the development of improved sustainable modes infrastructure and priority along the entire route. This TIA provides a robust assessment of the Proposed Scheme through qualitative assessment and quantitative analysis using a suite of multi-modal transport modelling tools.

During the Operational Phase, the Proposed Scheme will deliver positive impacts to the quality in terms of People Movement, pedestrian, cycling and bus infrastructure during the Operational Phase. These improvements will help to provide a more attractive alternative to the private car and promote a modal shift to walking, cycling and public transport, allowing for greater capacity along the corridor to facilitate the sustainable movement of people as population and employment levels grow in the future.

The Proposed Scheme will address sustainable mode transport infrastructure deficits while contributing to an overall integrated sustainable transport system as proposed in the GDA Transport 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, more reliable journey times which the Proposed Scheme provides. This in turn will support the future increase to the capacity of the bus network and 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. All of these changes combined will therefore cater for higher levels of future sustainable population and employment growth.

In the absence of the Proposed Scheme, bus services will be operating in a more congested environment, leading to higher journey times and lower reliability for bus journeys. This limits their attractiveness to users which will lead to reduced levels of public transport use, making the bus system less resilient to higher levels of growth and leading to increased levels of car use and congestion. The absence of walking and cycling measures that the Proposed Scheme provides will also significantly limit the potential to grow those modes into the future.

On the whole, the Proposed Scheme will make a significant contribution to the overall aims of BusConnects, the GDA Transport Strategy and allow the city to grow sustainably into the future, which would not be possible in the absence of the Proposed Scheme.

1. Introduction

This TIA presents a comprehensive review of the traffic and transport impacts associated with the Proposed Scheme, which has informed the production of the EIAR Traffic & Transport chapter. The TIA should be read in conjunction with the EIAR chapter and is included as Appendix A6.1 (Transport Impact Assessment Report) to the EIAR.

The Proposed Scheme commences at R136 Ballyowen Road, and travels north to meet R835 Lucan Road. From here it proceeds east on N4 Lucan Road, and passes through the M50 Interchange to meet R148 Palmerstown Bypass Chapelizod Bypass, continuing through its junctions with Kennelsfort Road Upper and Lower, The Oval and Lucan Old Road, to the junction with R833 Con Colbert Road.

From here, the route continues east past Memorial Road and the R101 South Circular Road, where R148 Con Colbert Road becomes R148 St John's Road West. The route passes through the St John's Road / Military Road junction, continues past Heuston Station and ends at R148 Victoria Quay, just to the south of the River Liffey.

Table 1.1 summarises the changes which will be made to the existing transport environment along the corridor as a result of the Proposed Scheme.

Table 1.1: Summary of Changes as a result of the Proposed Scheme

Total Length of Proposed Scheme	**9.6km**	
Bus Priority	**Existing (km)**	**Proposed Scheme (km)**
Bus Lanes		
Eastbound	7.45	9.17
Westbound	6.4	8.6
Bus Measures		
Proportion of Route with Bus Priority Measures	72%	93%
Cycle Facilities – Segregated		
Eastbound	0.73	6.45
Westbound	0.73	6.31
Cyclist Facilities – Non-segregated		
Eastbound	0.85	0.28
Westbound	1.5	0.4
Total Cyclist Facilities (both directions)	3.81	13.44
Proportion Segregated (including Quiet Street Treatment)	38%	95%
Pedestrian Facilities		
Number of Side Entry Treatments (raised tables)	1	19
Number of Signalised Crossings	20	28

The Proposed Scheme is supported by a series of drawings which are contained in Volume 3 of this EIAR. The following drawings (listed in Table 1.2) should be read in conjunction with this TIA.

Table 1.2: List of Drawings

Drawing Series Number	**Description**
BCIDA-ACM-GEO_GA-0006_XX_00-DR-CR-9001	General Arrangement
BCIDA-ACM-GEO_CS-0006_XX_00-DR-CR-9001	Typical Cross Sections
BCIDA-ACM-TSM_GA-0006_XX_00-DR-CR-9001	Traffic Signs and Road Markings
BCIDA-ACM-TSM_SJ-0006_XX_00-DR-TR-9001	Junction System Design

1.1.1 Aim and Objectives of the Proposed Scheme

The aim of the Proposed Scheme is to provide enhanced walking, cycling and bus infrastructure on this key access corridor in the Dublin region, which will enable and deliver efficient, safe, and integrated sustainable

transport movement along the corridor. The objectives of the CBC Infrastructure Works, applicable to the Traffic and Transport assessment of the Proposed Scheme are to:

- Enhance the capacity and potential of the public transport system by improving bus speeds, reliability and punctuality through the provision of bus lanes and other measures to provide priority to bus movement over general traffic movements; and
- Enhance the potential for cycling by providing safe infrastructure for cycling, segregated from general traffic wherever practicable;
- Support the delivery of an efficient, low carbon and climate resilient public transport service, which supports the achievement of Ireland's emission reduction targets;
- Enable compact growth, regeneration opportunities and more effective use of land in Dublin, for present and future generations, through the provision of safe and efficient sustainable transport networks;
- Improve accessibility to jobs, education and other social and economic opportunities through the provision of improved sustainable connectivity and integration with other public transport services; and
- Ensure that the public realm is carefully considered in the design and development of the transport infrastructure and seek to enhance key urban focal points where appropriate and feasible.

The planning and design of the Proposed Scheme has been guided by these aims and objectives.

1.1.1.1 People Movement

The aims and objectives outlined above are underpinned by the central concept and design philosophy of '***People Movement'.*** People Movement is the concept of the optimisation of roadway space and / or the prioritisation of the movement of people over the movement of vehicles along the route and through the junctions along the Proposed Scheme. The aim being the reduction of journey times for higher person carrying capacity modes (bus, walking and cycling), which in turn provides significant efficiencies and benefits to users of the transport network and the environment.

A typical double-deck bus takes up the same road space as three standard cars but typically carries 50-100 times the number of passengers per vehicle. On average, a typical double-deck bus carries approximately 60-70 passengers making the bus typically 20 times more efficient in providing people movement capacity within the equivalent spatial area of three cars. These efficiency gains can provide a significant reduction in road network congestion where the equivalent car capacity would require 50 or more vehicles based on average occupancy levels. Consequently, by prioritising the movement of bus over cars, significantly more people can be transported along the limited road space available. Similarly, cyclists and pedestrians require significantly less roadway space than general traffic users to move safely and efficiently along the route. Making space for improved pedestrian infrastructure and segregated cycle tracks can significantly benefit these sustainable modes and encourage greater use of these modes.

With regards to this traffic and transport chapter, People Movement is the key design philosophy and the Proposed Scheme impacts (both positive and negative) have been assessed on that basis.

1.1.1.2 Preliminary Design Guidelines

To support the 'People Movement' led approach to the design of the Proposed Scheme, the Preliminary Design Guidance Booklet for BusConnects Core Bus Corridors (PDGB) (NTA 2021) (refer to Appendix A4.1 in Volume 4 of this EIAR) was developed. This guidance document was prepared to ensure that a consistent design approach was taken across the various BusConnects Schemes and that the objectives of the project are achieved. A 'People Movement' led design involves the prioritisation of people movement, focusing on maximising the throughput of sustainable modes (i.e. Walking, Cycling and Bus modes) in advance of the consideration and management of general vehicular traffic (private car) at junctions.

In support of this approach, a project specific People Movement at Signal Calculator (PMSC) was developed. The PMSC was applied at the initial design development stage, to provide an initial estimate of green time allocation for all movements at a typical junction, on the basis that sustainable mode movements should be accommodated

foremost to maximise people movement with the remaining green time allocated to general traffic movements. The calculations were underpinned by:

- The number of buses required to be accommodated along the Proposed Scheme, as per the BusConnects Network Re-design proposals;
- The provision of a high Level of Service for cyclists at each junction along the Proposed Scheme; and
- The pedestrian crossing width and crossing timing requirements based on the provision of a high Level of Service for pedestrians at each junction along the Proposed Scheme.

The outputs of the calculator provided an initial estimate of the green times and vehicle capacity movements based on inputs and assumptions for each junction along the Proposed Scheme. The calculator provided an estimate of the People Movement for the junction in question (by mode) and was used to adjust proposals with a view to maximising the total person throughput at each junction along the Proposed Scheme during the iterative design process, described further below in Section 6.2.3. Details on the development of junction designs along the Proposed Scheme are included in TIA Appendix 2 (Junction Design Report).

The People Movement Calculation and the identification of available general traffic capacity from this initial exercise was enhanced further by the Proposed Scheme Transport Models described in Section 4.3 below.

1.1.2 Iterative Design Process and Mitigation by Design

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, and the reason for developing a multi-tiered modelling framework (described in Section 4.2.1), was to ensure the environmental and transport impacts were mitigated to the greatest extent possible during design development and to enable information on potential impacts to be provided from the various Environmental Impact Assessment (EIA) and Transport Impact Assessment (TIA) disciplines back into the design process for consideration and inclusion in the proposals This resulted in mitigation being embedded into the design process by the consideration of potential environmental impacts throughout the Preliminary Design development. A multi-tiered modelling framework (described in Section 4.2.1) was developed to support this iterative design process.

Diagram 1.1 below illustrates this process whereby the emerging design for the Proposed Scheme has been tested using the transport models as part the iteration. The transport models provided an understanding of the benefits and impacts of the proposals (mode share changes, traffic redistribution, bus performance etc.) with traffic flow information also informing other environmental disciplines (such as Air Quality, Noise and Vibration, Climate etc.) which in turn allowed feedback of potential impacts into the design process to allow for changes and in turn mitigation to be embedded in the designs. The design process included physical changes (e.g., cycle lane widening) and adjustments to traffic signals including changes to staging, phasing and green times to limit traffic displacement to the greatest extent possible as well as traffic management arrangements and/or turn bans where appropriate. This ensured that any traffic displacement was kept to a minimum and was maintained on higher capacity roads, whilst continuing to meet scheme objectives along the Proposed Scheme.

The iterative process concluded when the design team were satisfied that the Proposed Scheme 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 whilst ensuring the scheme objectives remained satisfied.

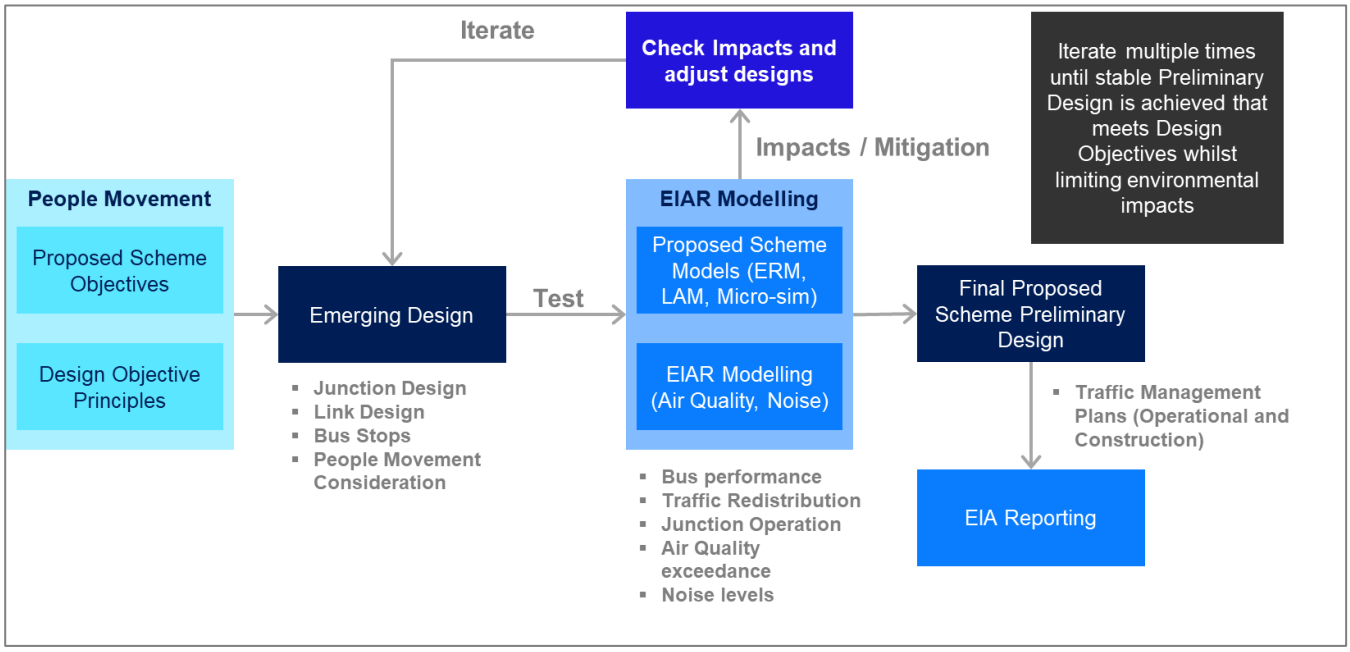

Diagram 1.1 Proposed Scheme Impact Assessment and Design Interaction

The impacts presented in this chapter are based on the final Preliminary Design for the Proposed Scheme which includes the embedded mitigation developed as part of the iterative design process described above.

1.2 Purpose and Structure of This Report

This TIA will include the comprehensive assessment impacts and benefits of the Proposed Scheme covering all transport modes for both Construction and Operational Phases. The TIA also informs the Traffic and Transport chapter of the EIAR for the Proposed Scheme which will assess the impacts and significance of those impacts in relation to the receiving environment of the Proposed Scheme.

The traffic and transport impacts assessment will be undertaken in accordance with latest guidance, which includes the 'Guidelines on the Information to be contained in Environmental Impact Assessment Reports' (EPA 2017), the 'Traffic and Transport Assessment Guidelines' (TII 2014), the National Cycle Manual (NTA 2011) and the UK Design Manual for Roads & Bridges (DMRB) Environmental assessment and monitoring (formerly HA 205/08, HD 48/08, IAN 125/15, and IAN 133/10), LA104 Revision 1 (Highways England, 2020).

The assessment of traffic and transport benefits and impacts will take account of receptors relevant to the Proposed Scheme including:

- Pedestrians / mobility impaired;
- Cyclists;
- Buses;
- General traffic; and
- On-street parking, off-street parking, loading, taxis.

In addition, the following modes of transport will be considered as part of the modelling:

- Public Transport;
- Traffic including private car, taxis and goods vehicles;
- Walking; and
- Cycling.

The traffic and transport assessments have been carried out in relation to the following scenarios:

- **Existing Baseline Conditions (2020) (Pre-COVID-19)** – The existing baseline scenario has been developed based on conditions existing in February 2020. It has been used for the non-modelling-based metrics which rely on qualitative or provision-based assessments. Lockdowns and travel restriction during the Covid-19 pandemic led to lower, unrepresentative traffic flows. Pre-Covid-19 surveys have been used in the assessment, which are considered to be robust.
- **Future 'Do Minimum' ('likely receiving environment') Scenario** – For the quantitative assessments (that use modelling outputs), the baseline model has been developed to represent the agreed future design years, without the Proposed Scheme in place. The 'Do Minimum' model includes any known permanent improvements or changes to the road or public transport network that have taken place, been approved or are planned for implementation. These models are important to form the reference case by which to compare the proposal ('Do Something') models; and
- **Future 'Do Something' Scenario** – This scenario includes the Proposed Scheme infrastructure design models, implementing all elements of the design for the Proposed Scheme i.e. the 'Do Something' conditions with the addition of the Proposed Scheme.

The remaining structure of the report is set out as follows:

- **Section 2 - Study Area:** This chapter sets out both the direct and indirect study areas of the TIA;
- **Section 3 – Policy Context**: This chapter sets details the policy context that the Proposed Scheme has been developed within;
- **Section 4 – Assessment Methodology:** This chapter sets out the proposed method of assessment from quantitative and qualitative perspectives;
- **Section 5 – Baseline Environment**: This chapter sets out the baseline conditions against which the Proposed Scheme has been assessed;
- **Section 6 – Potential Impacts** This chapter provides the assessment of the Proposed Scheme in both operational and construction scenarios, against the baseline conditions. It focusses on walking, cycling, bus, general traffic and parking and loading using the methods set out in Chapter 4. It considers both operational and construction scenarios;
- **Section 7 – Cumulative Assessment:** This chapter provides an assessment of the cumulative impact of the Proposed Scheme in conjunction with the other eleven Proposed Schemes within the BusConnects Dublin – Core Bus Corridor Infrastructure Works;
- **Section 8 – Summary and Conclusions**: This chapter provides a summary of the TIA and the conclusions which can be drawn from it; and
- **Section 9** - **References**: contains the traffic and transport sources referred to within this chapter.

2. Study Area

The direct and indirect impacts have been considered with reference to the following study area extents (as shown in Diagram 2.1.

- **Direct Study Area** – The Proposed Scheme (i.e. the transport network within the red line boundary); and
- **Indirect Study Area** – This is the area of influence that the Proposed Scheme has on changing traffic volumes above a defined threshold with reference to TII's Traffic and Transport Assessment Guidelines (May 2014) (see Section 6.3.3.1.7 for further details on the threshold applied in relation to traffic volume changes used in the definition of the indirect study area).

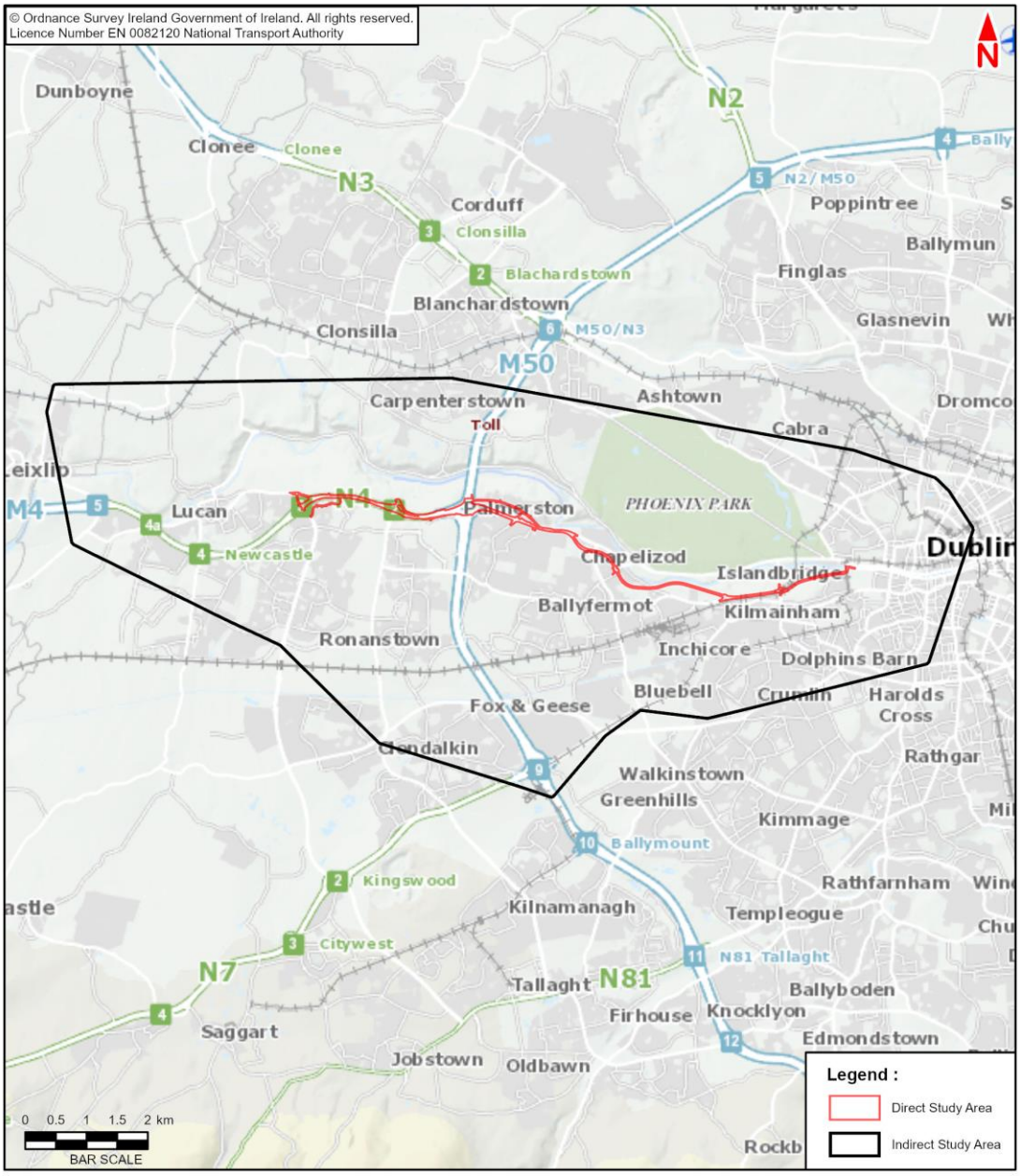

Diagram 2.1 Direct and Indirect Study Areas

3. Policy Context

This chapter outlines the national, regional and local transport and planning policies applicable to the Proposed Scheme. Alignment of the Proposed Scheme with current planning policy at all levels is an important determining factor in planning decisions. Through this summary of policy, the following sections demonstrate that the Proposed Scheme has this alignment and thus is compliant with transport and planning policies.

3.1 National Guidelines

3.1.1 Traffic and Transport Assessment Guidelines

To determine the traffic and transport impact that the Proposed Scheme has in terms of an increase in general traffic flows on the direct and indirect study areas, a robust assessment has been undertaken, with reference to Transport Infrastructure Ireland's (TII) most recent Traffic and Transport Assessment Guidelines (TII 2014).

This document is considered best practice guidance for the assessment of transport impacts related to changes in traffic flows due to proposed developments and is an appropriate means of assessing the impact of general traffic trip redistribution on the surrounding road network.

According to Section 1.3 of the Traffic and Transport Assessment Guidelines (TII 2014):

> *'a Traffic and Transport Assessment is a comprehensive review of all the potential transport impacts of a proposed development or re-development, with an agreed plan to mitigate any adverse consequences'.*

The guidelines aim to provide a framework to promote an integrated approach to development, ensuring that proposals promote more efficient use of investment in transportation infrastructure which reduces travel demand and promotes road safety and sustainable travel.

The TIA, which supports this EIAR chapter, follows the Traffic and Transport Assessment Guidelines and offers an impartial description of the likely impacts of the Proposed Scheme, outlining both its positive and negative aspects.

3.1.2 Design Manual for Urban Roads and Streets

The Design Manual for Urban Roads and Streets (DMURS) (DTTAS 2019) promotes an integrated street design approach within urban areas (i.e. cities, towns, and villages) focused on:

- Influence by the type of place in which the street is located; and
- Balancing the needs of all users.

A further aim of this Manual is to put well designed streets at the heart of sustainable communities to promote access by walking, cycling and public transport.

The principles, approaches and standards set out in this Manual apply to the design of all urban roads and streets (with a speed limit of 60 km/h or less), except: (a) Motorways (b) In exceptional circumstances, certain urban roads and streets with the written consent of Sanctioning Authorities.

The Manual is underpinned by a holistic design-led approach, predicated on a collaborative and consultative design process. There is specific recognition of the importance to create secure and connected places that work for all, characterized by creating new and existing streets as attractive places with high priority afforded to pedestrians and cyclists while balancing the need for appropriate vehicular access and movement.

To achieve a more place-based/integrated approach to road and street design, the following four core principles are promoted within the manual:

- Connected Networks - To support the creation of integrated street networks which promote higher levels of permeability and legibility for all users, and with emphasis on more sustainable forms of transport;
- Multi-Functional Streets - The promotion of multi-functional, place-based streets that balance the needs of all users within a self-regulating environment;
- Pedestrian Focus - The quality of the street is measured by the quality of the environment for the user hierarchy pedestrians considered first; and
- Multi-disciplinary Approach - Greater communication and co-operation between design professionals through the promotion of a plan-led, multidisciplinary approach to design.

3.1.3 Traffic Signs Manual

The Traffic Signs Manual (Department of Transport, 2019) promotes safety, health and welfare for road workers and users. The manual details the traffic signs which may be used on roads in Ireland, including sign layout, sign symbols, the circumstances in which they are required, and the associated rules for positioning them.

Of direct relevance to the assessment of traffic and transport impacts, Chapter 7 - Road Markings outlines the function of road markings, the legalities of road markings and the application of road markings on roads in Ireland. Chapter 8 - Temporary Traffic Measures and Signs for Roadworks outlines the application of temporary traffic management (TTM) at work sites on public roads; this chapter offers instructions and guidance to road users in relation to the use of TTM and outlines the signs to be used at roadworks.

3.1.4 Traffic Management Guidelines

The Traffic Management Guidelines (Department of Transport, 2019) provides guidance on a number of issues including, but not limited to, traffic planning, traffic calming and management, incorporation of speed restraint measures and the provision of suitably designed facilities for public transport users and vulnerable road users.

A core component of the Guidelines is rooted in decision making and balancing priorities, including those that are in conflict with one another. The Guidelines identifies common objectives to be addressed when managing the transport network:

- Environmental improvement;
- Congestion relief;
- Capacity improvement;
- Safety;
- Accessibility;
- Economic vitality; and
- Politics.

The Proposed Scheme has been designed and assessed with reference to the set of guidance documents listed throughout this section.

3.2 National Policy

Project Ireland 2040 was launched by the Government in February 2018 and includes two elements:

- the National Planning Framework - Ireland 2040 Our Plan (NPF) (2018); and
- the National Development Plan (2018- 2027).

Project Ireland 2040 provides the framework for future development and investment in Ireland and is the overall Plan from which other, more detailed plans will take their lead, including city and county development plans and regional strategies. The National Planning Framework (NPF) (Department of Housing, Local Government and Heritage, 2020) is a tool to assist the achievement of more effective regional development.

The NPF now represents the overarching national planning policy document, of direct relevance to the planning functions of regional and planning authorities, including An Bord Pleanála. The NPF is the successor to The National Spatial Strategy (NSS), published in November 2002 and has a statutory basis.

The NPF states that the key future growth enablers for Dublin include:

> *'...The development of an improved bus-based system, with better orbital connectivity and integration with other transport networks...'*

> *'...Delivery of the metropolitan cycle network set out in the Greater Dublin Area Cycle Network Plan inclusive of key commuter routes and urban greenways on the canal, river and coastal corridors.'*

It is a policy of the NPF (Objective 74) to secure the alignment of the NPF and the National Development Plan (NDP) through delivery of the National Strategic Outcomes. The BusConnects scheme is identified in National Strategic Outcome 4, 'Sustainable Mobility', which includes the delivery of:

> *'…key public transport objectives of the Transport Strategy for the Greater Dublin Area (2016-2035) by investing in projects such as New Metro Link, DART Expansion Programme, BusConnects in Dublin'.*

It also allows for the development of:

> *'a comprehensive network of safe cycling routes in metropolitan areas to address travel needs.'*

By enhancing travel by both public transport and active modes the Proposed Scheme accords with the National Planning Framework.

3.2.1 National Development Plan (NDP) (2018- 2027)

The National Development Plan (NDP) (2018- 2027) (Department of Public Expenditure and Reform, 2018) sets out the investment priorities that will underpin the implementation of the NPF, through a total investment of approximately €116 billion to ensure ongoing employment maintenance and creation, with appropriate regional development. This investment is also to provide clarity to the construction sector, allowing the industry to provide the capacity and capability required to deliver the Government's long-term investment plans.

The NDP illustrates the commitment to reforming how public investment is planned and delivered. This is being achieved through a shift to integrated regional investment plans, stronger co-ordination of sectoral strategies and more rigorous selection and appraisal of projects to secure value-for-money.

The NDP states that investment in public transport infrastructure will be accelerated to support the development of an integrated and sustainable national public transport system consistent with the NPF's National Strategic Outcomes of 'Sustainable Mobility' as well as 'Compact Growth'. It outlines that the programmes and underlying projects proposed for delivery during the period up to 2027 which includes the BusConnects scheme, as follows:

> *'Delivery of the full BusConnects programme for all of Ireland's cities (inclusive of ticketing systems, bus corridors, additional capacity, new bus stops and bus shelters etc.'*

> *'Delivery of comprehensive cycling and walking network for Ireland's cities.'*

The NDP promotes the BusConnects proposals, of which the Proposed Scheme forms part, and requires improvements cycles networks such as those included in the scheme. Therefore, the Proposed Scheme is aligned with the NDP.

3.2.2 National Investment Framework for Transport in Ireland (NIFTI) (2021)

The National Investment Framework for Transport in Ireland (NIFTI) (Department of Transport, 2021) was recently published by the Department of Transport for public consultation in March 2021. The purpose of the NIFTI is to support the delivery of the Project Ireland 2040 NPF and NDP by providing a strategic framework for future transport investment that is aligned with their spatial objectives and the National Strategic Outcomes (NSOs). The NIFTI has been developed to ensure decision making in land transport investment enables the NPF, supports the Climate Action Plan, and promotes positive social, environmental, and economic outcomes throughout Ireland. NIFTI establishes four investment priorities and objectives, of which new projects must align with at least one:

- Decarbonisation;
- Protection and Renewal;
- Mobility of People and Goods in Urban Areas; and
- Enhanced Regional and Rural Connectivity.

The development of BusConnects is aligned with Project Ireland 2040, and by extension the NIFTI. The principle of the overall BusConnects programme aligns with at least three of the NIFTI investment priorities; protecting and renewing Dublin's public transport network, enabling better mobility for people across the Dublin City-region, and supporting the decarbonisation of Dublin's transport network.

3.2.3 Smarter Travel: A Sustainable Transport Future (2009 – 2020)

Smarter Travel: A Sustainable Transport Future (2009 – 2020) (Department of Transport, 2019) presents an overall policy framework for sustainable transport in Ireland. The policy sets out a vision, goals and targets to be

achieved, and outlines 49 actions that form the basis for achieving a more sustainable transport future. The relevant parts of this policy to the Proposed Scheme are set out in Chapter 4 and 5, as follows:

> Chapter 4: Actions to Encourage Smarter Travel - 'Action 4 - The delivery of public transport, cycling and promotion of more sustainable travel patterns generally in many existing urban centres can only be achieved through retrofitting. We will require local authorities to prepare plans to retrofit areas towards creating sustainable neighbourhoods so that walking and cycling can be the best options for local trips, for example to reach local facilities such as shops and schools.'
>
> Chapter 5: Actions to Deliver Alternative Ways of Travelling - 'Action 12 - Implement more radical bus priority and traffic management measures to improve the punctuality and reliability of bus services and to support more efficient use of bus fleets. This may involve making some urban streets car-free, creating tram-like priorities in others and making greater use of roads/hard shoulders by buses.'

The Proposed Scheme will support these actions in providing improvements to pedestrian and cycle amenities along the proposed route, whilst also providing greater reliability for road-based public transport.

3.2.1 National Cycle Policy Framework (2009)

In support of the Smarter Travel Policy, the National Cycle Policy Framework (NCPF) (DTTS, 2009) was adopted by Government in 2009 and includes the following statements and commitments, as stated in the Executive Summary:

> *'The mission is to promote a strong cycling culture in Ireland. The vision is that all cities, towns, villages and rural areas will be bicycle friendly. Cycling will be a normal way to get about, especially for short trips. Cycling contributes to improved quality of life and quality of the public realm, a stronger economy and business environment, and an enhanced environment. A culture of cycling will have developed in Ireland to the extent that 10% of all trips will be by bike by 2020.'*

Objective 2 of the NCPF is to *'ensure that the urban road infrastructure (with the exception of motorways) is designed / retrofitted so as to be cyclist-friendly and that traffic management measures are also cyclist friendly.'* This involves junction treatment and traffic management, including combined bus and cycle priority measures.

The Proposed Scheme supports the objectives of the NCPF through the provision bus and cycle priority measures.

3.2.2 Statement of Strategy (2016 – 2019)

The Statement of Strategy (Department of Transport, Tourism and Sport (DTTAS), 2019) is the DTTAS's primary strategic plan and sets out the key priorities for the period 2016 – 2019. It details the Government's high-level goals and objectives, providing the framework for more detailed planning and individual performance management. The strategy mission is:

> *'to shape the safe and sustainable development of transport, tourism, and sport, to support economic growth and social progress.'*

DTTAS's high level goal for land transport is:

> *'to best serve the needs of society and the economy through safe, sustainable and competitive transport networks and services.'*

This will be sought with an emphasis on:

- Safety;
- Enhancing services;
- Facilitating and promoting more sustainable forms of transport, including walking and cycling;
- Achieving value-for-money; and
- Promoting sound governance.

The Proposed Scheme will contribute to improved road safety through improvement works at key junctions and upgrades to the pedestrian and cyclist infrastructure along the proposed route. The Proposed Scheme will enhance bus, walking and cycling services which will, in turn, facilitate and promote travel by these modes.

3.2.3 Road Safety Strategy

The Road Safety Strategy (2013-2020) (Road Safety Authority (RSA), 2019) sets out targets to be achieved in terms of road safety in Ireland, with the primary target defined as follows:

> *'A reduction of road collision fatalities on Irish roads to 25 per million population or less by 2020 is required to close the gap between Ireland and the safest countries. This means reducing deaths from 162 in 2012 to 124 or fewer by 2020. A provisional target for the reduction of serious injuries by 30% from 472 (2011) to 330 or fewer by 2020 or 61 per million population has also been set.'*

The Strategy goes on to state that:

> *'…the attractiveness of walking depends strongly on the safety of the infrastructure provided. Collisions involving pedestrians account for 1 in 5 fatalities annually.'*
>
> *'…collisions involving cyclists account for 1 in 25 road deaths annually, and many collisions involving cyclists lead to serious head injuries.'*

The document sets out strategies for engineering and infrastructure that can effectively reduce collisions. The Proposed Scheme incorporates measures that will contribute to improving road safety in the form of upgrades to key junctions, and new / upgraded pedestrian and cycle infrastructure along the corridor.

3.2.4 Building on Recovery: Infrastructure and Capital Investment (2016-2021)

The Capital Plan (Department of Public Expenditure and Reform, 2015) presented the findings of a Government-wide review of infrastructure and capital investment policy and outlined the Government's commitment to ensuring that the country's stock of infrastructure is capable of facilitating economic growth. The plan identifies the need to improve public transport facilities noting:

> *'It is therefore essential that road, rail and public transport networks are developed and maintained to the standard required to ensure the safe and efficient movement of people and freight. In addition, getting people out of cars and onto public transport has a key role to play in reducing Ireland's carbon emissions, by providing a viable, less polluting alternative to car and road transport for many journeys.'*

The transport capital allocation in the plan is largely framed by the recommendations and priorities set out in the 2015 DTTS Strategic Investment Framework for Land Transport, which centre on:

- Maintaining and renewing the strategically important elements of the existing land transport system;
- Addressing urban congestion; and
- Maximise the contribution of land transport networks to our national development.

The Capital Plan key objective is to provide €3.6 billion of Public Transport Investment including further upgrading of Quality Bus Corridors. The Proposed Scheme is consistent with these recommendations, priorities and objectives as set out in the DTTS investment framework, and the Capital Plan.

3.2.5 The Sustainable Development Goals National Implementation Plan (2018 – 2020)

In September 2015, 'Transforming Our World, the 2030 Agenda for Sustainable Development (the 2030 Agenda)' was adopted by all 193 Members States of the United Nations (UN).

The 2030 Agenda aims to deliver a more sustainable, prosperous, and peaceful future for the entire world, and sets out a framework for how to achieve this by 2030. This framework is made up of 17 Sustainable Development

Goals (SDGs) which cover the social, economic and environmental requirements for a sustainable future which are shown in Diagram 3.1.

Diagram 3.1 The 17 Sustainable Development Goals

The Sustainable Development Goals National Implementation Plan (Department of the Environment, Climate and Communications, 2018) is in direct response to the 2030 Agenda for Sustainable Development and provides a whole-of-government approach to implement the 17 Sustainable Development Goals (SDGs) above.

The Plan also sets out 19 specific actions to implement over the duration of this first SDG National Implementation Plan. The BusConnects scheme aligns with Goals 9 and 11 as they include the following targets:

> *'Goal 9: Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation: Target 9.1: Develop quality, reliable, sustainable and resilient infrastructure, including regional and transborder infrastructure, to support economic development and human wellbeing, with a focus on affordable and equitable access for all.'*

> *'Goal 11: Make cities and human settlements inclusive, safe, resilient and sustainable: By 2030, provide access to safe, affordable, accessible and sustainable transport systems for all, improving road safety, notably by expanding public transport, with special attention to the needs of those in vulnerable situations, women, children, persons with disabilities and older persons.'*

The above goals align with the aim of the Proposed Scheme and the BusConnects proposals overall.

3.2.6 Climate Action Plan

The Climate Action Plan (Department of the Taoiseach, 2019) sets out the strategy of the Irish Government for tackling the climate change crisis and seeks to achieve a zero-carbon energy systems objective for Irish society and in the process, create a resilient, vibrant and sustainable country.

A central pillar of this plan is the role that transport can play in reducing our carbon footprint and improving air quality in our towns and cities. The plan acknowledges that the delivery of improved public transport will lead to a modal shift away from unsustainable transport choices and go a large way to the decarbonization challenge that lies ahead.

BusConnects, and improvements to the bus fleet, are identified in the Climate Action Plan as being a central component of this objective, as noted in the following actions which are extracted from the plan:

> *'Implement major sustainable-mobility projects such as DART Expansion, Metro Link, and the BusConnects Programme. BusConnects targets a 50% increase in bus passenger numbers over the lifetime of the project in our major cities.*
>
> *Expand sustainable-travel measures, including a comprehensive cycling and walking network for metropolitan areas of Ireland's cities, with a particular emphasis on safety of cyclists. We shall also expand greenways and develop over 200km of new cycling network under BusConnects.*
>
> *Establish a new fare structure in BusConnects which will encourage flexible use of an integrated public transport network. We committed to transition to Low-Emission Vehicles, including electric buses, for the urban public bus fleet, with no diesel-only purchases from 1 July 2019, and will set a roadmap for all public PSO urban bus fleets to become LEVs by 2035.'*

By enhancing public and active travel networks the Proposed Scheme will encourage the use of these modes and reduce reliance on private car. Therefore, the Proposed Scheme is aligned with the Climate Action Plan.

3.3 Regional Policy

3.3.1 Transport Strategy for the Greater Dublin Area (2016 – 2035)

The Transport Strategy for the Greater Dublin Area (2016 – 2035) (National Transport Agency (NTA), 2016) provides a framework for the planning and delivery of transport infrastructure and services in the Greater Dublin Area (GDA) over the next two decades.

The Strategy outlines that the GDA is heavily reliant on the bus network and the existing infrastructure is of varying standards and levels of continuity. It therefore identifies the Core Bus Network for the GDA which represents the most important bus routes in the region; generally characterized by a high frequency of bus services, high passenger volumes and with significant trip attractors located along the route.

The GDA Transport Strategy states:

> *'In order to ensure an efficient, reliable and effective bus system, it is intended, as part of the Strategy, to develop the Core Bus network to achieve, as far as practicable, continuous priority for bus movement on the portions of the Core Bus Network within the Metropolitan Area.'*

The NTA has recently published an Issues Paper to commence the review of the Strategy. The purpose of the review is to assess the implementation of the current plan thus far and look to produce an updated Strategy setting out the framework for investment in transport infrastructure and services up to 2042. BusConnects is identified as a major project by the Issues Paper, stating that the BusConnects Core Bus Corridors element is due to go to planning in 2021.

To complement this Strategy, the NTA devised an Integrated Implementation Plan 2019-2024. It sets out an infrastructure investment programme, integrated service plan and actions to be undertaken by the NTA over the Plan period. A core element of this Plan relates to the delivery of the BusConnects programme.

3.3.2 Greater Dublin Area Cycle Network Plan

The Greater Dublin Area Cycle Network Plan (National Transport Authority (NTA), 2013) was adopted by the NTA in early 2014 following a period of consultation with the public and various stakeholders. This plan forms the strategy for the implementation of a high quality, integrated cycle network for the Greater Dublin Area. This involves the expansion of the urban cycle network from 500km to 2,480km comprising a mixture of cycle tracks and lanes, cycle ways and infrastructure-free cycle routes in low traffic environments. Within the urban network, this will consist of a series of routes categorised as follows:

- **Primary:** Main cycle arteries that cross the urban area and carry most cycle traffic – target quality of service (QoS) of two abreast + overtaking width = 2.5m;
- **Secondary:** Link between principle cycle routes and local zones – target QoS of single file + overtaking width = 1.75m; and

- **Feeder:** Cycle routes within local zones and/or connection from zones to the network levels above.

During the analysis carried out to identify the preferred CBCs for the BusConnects scheme, the provision of these cycle routes was considered at all stages. Therefore, any upgrading of infrastructure to provide bus priority also provides cycling infrastructure where practical, to the appropriate level and quality of service (as defined by the NTA National Cycle Manual) required for primary and secondary cycle routes.

By enhancing cycling facilities, the Proposed Scheme accords with the Greater Dublin Area Cycle Network Plan.

3.3.3 Regional Spatial and Economic Strategy for the Eastern and Midlands Region (2019-2031)

A Regional Spatial and Economic Strategy (RSES) is a strategic plan and investment framework to shape future growth and to better manage regional planning and economic development throughout the region.

The RSES (Eastern and Midland Regional Assembly, 2019) builds on the foundations of Government policy in Project Ireland 2040, which combines spatial planning with capital investment, and has been prepared from an extensive bottom up consultation process. It is an integrated cohesive policy document that provides a Spatial Strategy to manage future growth in the region. It identifies regional assets, opportunities and pressures and provides appropriate policy responses in the form of Regional Policy Objectives.

The region includes three subregions or Strategic Planning Areas (SPAs), namely the Midland, Eastern and Dublin SPAs, as shown in Diagram 3.2.

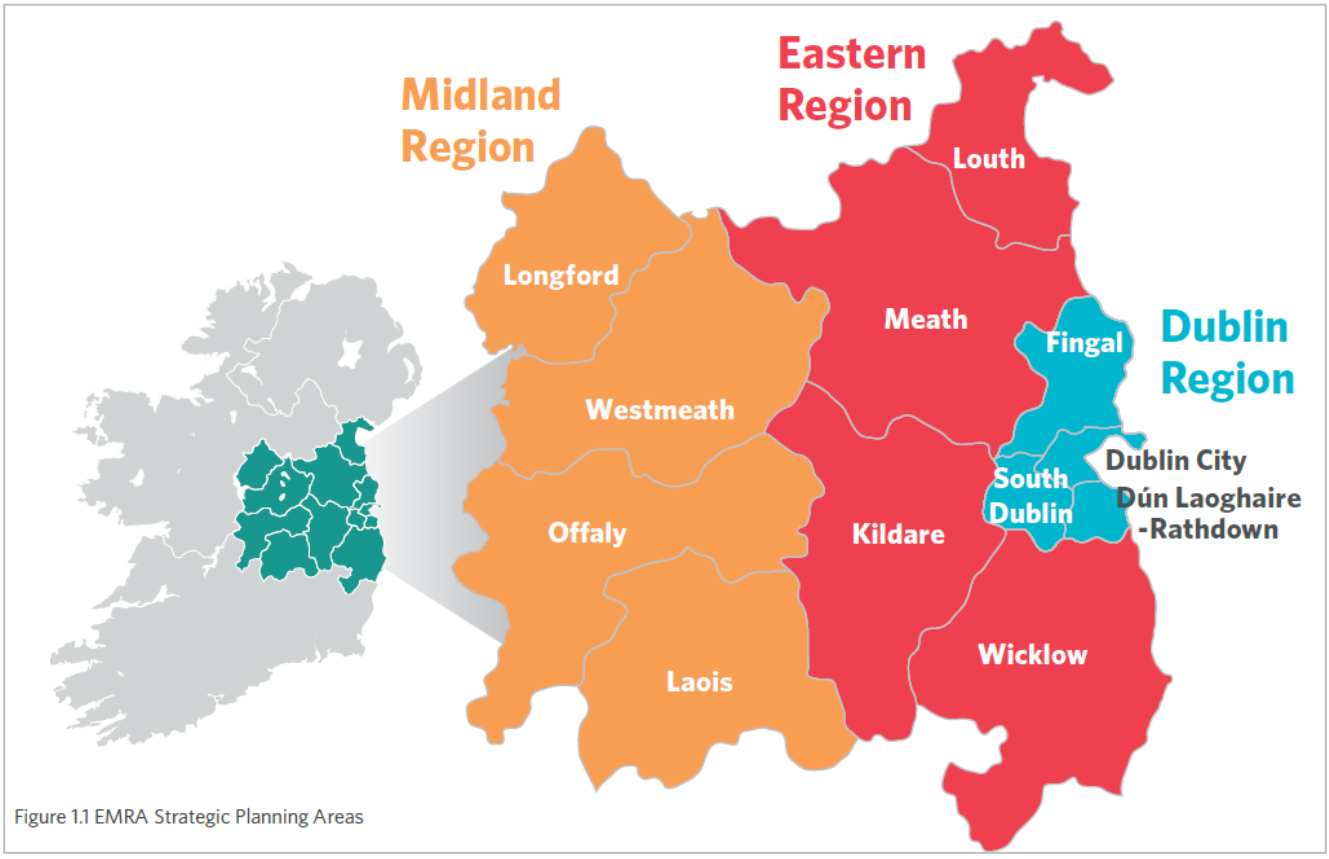

Diagram 3.2 RSES Planning Areas

Dublin City and suburbs is considered in the context of the Dublin Metropolitan Area Strategic Plan (MASP) and is dealt with in greater detail in Chapter 5 of the RSES. The principles underpinning the development of the MASP include the effective integration of transport planning with spatial planning policies, from regional down to local level and the alignment of associated transport and infrastructure investment priorities. The national policy in metropolitan areas is to increase sustainability through greater alignment of land use and transport.

The RSES highlights the BusConnects scheme as a key transport infrastructure investment in the metropolitan area as set out in national policy. The MASP Sustainable Transport Regional Policy Objectives (RPO) are:

> *'RPO5.2: Support the delivery of key sustainable transport projects including Metrolink, DART and LUAS expansion programmes, BusConnects and the Greater Dublin Metropolitan Cycle Network and ensure that future development maximizes the efficiency and protects the strategic capacity of the metropolitan area transport network, existing and planned.'*

> *'RPO 8.9: The RSES supports delivery of the bus projects…subject to the outcome of appropriate environmental assessment and the planning process.'*

Table 3.1: Extract from RSES RPO8.9 – Bus Projects for the Region

Extract from RSES RPO8.9 (Table 8.3: Bus Projects for the Region)
Core Bus Corridors comprising 16 radial routes and 3 orbital routes in Dublin
Regional Bus Corridors connecting the major regional settlements to Dublin
Dublin Metropolitan Bus Network Review
Network reviews for the largest settlements across EMRA, with a view to providing local bus services
Review of bus services between settlements
Review of local bus services throughout EMRA, including services to small towns and villages and the rural transport programme
New interchange and bus hub facilities
New fare structures
Enhances passenger information
Improvements to bus waiting facilities
Integrated time tabling of bus and rail into a coherent national and regional network

The RSES highlights the wider BusConnects proposals as a project, given that the Proposed Scheme fall within this it can be considered to be aligned with it.

3.3.4 Dublin City Council Development Plan (2016 – 2022)

The Dublin City Development Plan (CDP) (Dublin City Council (DCC), 2016) sets out policies and objectives to guide how and where development will take place in the city over the lifetime of the Plan. It provides an integrated, coherent spatial framework within the context of national policies to ensure the city is developed in an inclusive way which improves the quality of life for its citizens, whilst also being a more attractive place to visit and work. The entirety of the Proposed Scheme falls within the remit of the DCDP.

The vision for the city is:

> *'…within the next 25 to 30 years, Dublin will have an established international reputation as one of Europe's most sustainable, dynamic and resourceful city regions.'*

DCDP supports and encourages the uptake of sustainable travel modes to achieve a modal shift through various policies and objectives outlined in the Plan. Mobility and Transport Policy 2 (MT2) states that Dublin City Council (DCC) will:

> *'…promote modal shift from private car use towards increased use of more sustainable forms of transport such as cycling, walking and public transport, and to co-operate with the NTA, Transport*

Infrastructure Ireland (TII) and other transport agencies in progressing an integrated set of transport objectives.'

Policy MT4 makes specific reference to the promotion and facilitation of improvements to the bus network in order to achieve strategic transport objectives.

Policy MT7 is to implement walking and cycling improvements at thoroughfares and junctions and develop new and safe routes. Policy MT11 is to promote improved permeability for both cyclists and pedestrians in existing urban areas.

The Proposed Scheme incorporates upgrades to pedestrian and cycle infrastructure and at key junctions, thus can be considered in alignment with the DCDP.

3.3.5 Dublin City Centre Transport Study

The National Transport Authority (NTA) and Dublin City Council (DCC) published a set of proposals to enhance overall movement in Dublin City Centre and to improve the attractiveness of the City Centre for shoppers, tourists, workers, and residents.

The Transport Study (DCC and NTA, 2016) has been developed as an input into the Dublin City Development Plan (DCCDP) 2016-2022, and sets down a framework for how Dublin City's transport network can be redefined to cater for this increased demand, by better utilising the existing infrastructure available, and by moving towards a more sustainable and efficient use of the public realm within the City Centre.

The key objectives of the Transport Strategy are to:

1) Protect the investment that has been, and continues to be made in public transport across the city;
2) Guarantee the future development potential of the City Centre, and improve confidence in the ability of the City Centre to be the key focus of future investment;
3) Increase the capacity, reliability and use of public transport into and within the City Centre;
4) Improve the quality of service for cycling and walking, with particular emphasis on the 'core' City Centre;
5) Ensure that the city develops in a way which will provide a better living and working environment for residents and visitors alike; and
6) Provide an agreed framework for continued transport investment within the City Centre.

The Proposed Scheme directly contributes towards achieving Objectives 3 and 4 of the Transport Strategy.

3.4 Local Policy

3.4.1 South Dublin County Development Plan (2022 – 2028)

The South Dublin County Development Plan (SDCDP) (South Dublin County Council, 2022) sets out the land use framework to guide future development with a focus placed on the places of residence, the places of work, and how people interact and move between these places while protecting the environment. The aim is to progress to a more sustainable development pattern for South Dublin in the immediate and long-term future up to 2040 and beyond.

SDCDP covers the administrative area of South Dublin County, which is 223 sq. kilometres in extent, as shown in Diagram 3.3. The County extends from the River Liffey to the Dublin Mountains and borders the administrative areas of Dublin City, Fingal, Dun Laoghaire Rathdown, Wicklow and Kildare.

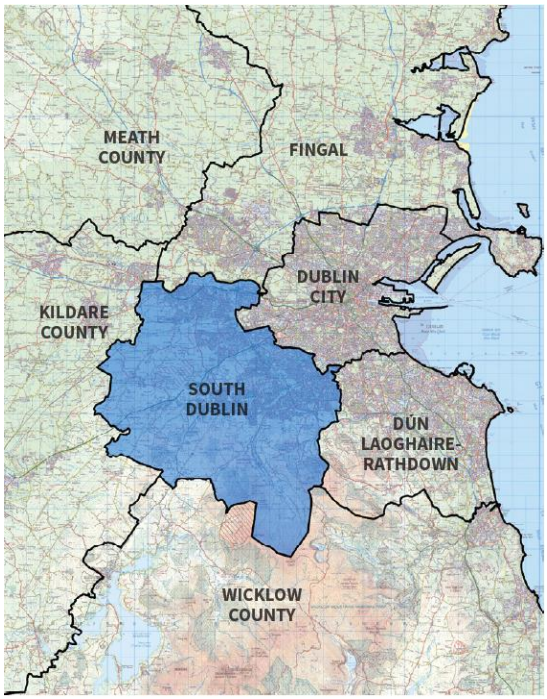

Diagram 3.3 South Dublin Regional Context

The Plan sets out in Chapter 7 (Sustainable Movement) that the key transport vision is to *'Increase the number of people walking, cycling and using public transport and reduce the need for car journeys, resulting in a more active and healthy community, a more attractive public realm, safer streets, less congestion, reduced carbon emissions, better air quality, and a positive climate impact'.*

The overarching Transport and Movement policy (SM1) is to promote ease of movement within, and access to South Dublin by *' integrating sustainable land-use planning with a high-quality sustainable transport and movement network for people and goods.'* The policy includes a transition to more sustainable travel modes including walking (15% target mode share), cycling (10% target mode share) and public transport (25% target mode share).

In line with the overarching policy, '*SM1 Objective 3'* states the requirement: *'To support the delivery of key sustainable transport projects including DART and Luas expansion programmes, BusConnects and the Greater Dublin Metropolitan Cycle Network in accordance with RPO 5.2 of the RSES/MASP.' (Emphasis Added).*

Policy SM2 Walking and Cycling, notes the need to *'re-balance movement priorities towards more sustainable modes of transportation by prioritising the development of walking and cycling facilities and encouraging a shift to active travel for people of all ages and abilities.'*

Policy SM3 Public Transport, notes the need to *' promote a significant shift from car-based travel to public transport in line with County targets and facilitate the sustainable development of the County by supporting and guiding national agencies in delivering major improvements to the public transport network.'*

The BusConnects scheme is featured within this document, as a key programme to improve public transport, ensure safe cycling facilities and address climate change: '*Transition to public transport will be aided by improvements in the pipeline including the roll-out of BusConnects which will include proposals for six new dedicated bus routes through the County. BusConnects will provide a redesigned more efficient bus network with high frequency spines, new orbital routes and increased bus services.'*

The Proposed Scheme satisfies this aspiration and thus can be considered to align with the SDCDP 2022-2028.

4. Assessment Methodology

This chapter of the TIA details the methodologies used to assess the impacts of the Proposed Scheme on the baseline environment.

The assessment of the Proposed Scheme in relation to the baseline transport environment comprises a qualitative assessment of changes to the transport environment, as well as quantitative analysis undertaken using a suite of multi-modal transport modelling tools which have been developed for the Proposed Scheme.

The assessment of traffic and transport benefits and impacts of the Proposed Scheme requires an approach which can provide information on, for example, the mode share changes along the route, people movement by different modes of transport travelling along the corridor as well as traffic re-routing impacts on the surrounding road network. The approach requires an assessment of bus, pedestrian and cycle operations and bus reliability with a focus on the movement of people along the route.

The traffic and transport impact assessments have been undertaken in accordance with the 'Guidelines on the Information to be contained in Environmental Impact Assessment Reports' (EPA 2017), the 'Traffic and Transport Assessment Guidelines' (TII 2014), the National Cycle Manual (NTA 2011) and the UK Design Manual for Roads & Bridges (DMRB) Environmental assessment and monitoring (formerly HA 205/08, HD 48/08, IAN 125/15, and IAN 133/10), LA104 Revision 1 (Highways England, 2020). A range of transport modelling tools which sit within the framework of the NTA's Eastern Regional Model (ERM) have been used.

Where possible a Level of Service (LoS) has been derived for each mode of travel. The benefits of this approach are outlined subsequently.

4.1 Data Collection and Collation

The TIA has two distinct parts, qualitative methods which consider the physical changes to transport networks and quantitative methods which are based upon traffic modelling. The following sections describe the data collection and collation for each method of assessment.

4.1.1 Qualitative Assessment Data Collection

This section discusses the data collection undertaken to inform the qualitative assessment metrics set out in Section 6.3.

4.1.1.1 Site Surveys

A walkover of the route of the Proposed Scheme was undertaken and photographs used to record locations of particular importance. This ensures an up to date record of the existing environment was used to complete the qualitative assessment. The surveys focused on the following aspects which are relevant to the assessment:

- Provision for the movement of pedestrians, cyclists and vehicles;
- Location of, and facilities at, bus stops; and
- Current parking and loading facilities.

These surveys were supplemented by specially commissioned aerial orthophotography along the full length of the Proposed Scheme.

4.1.1.2 Mapping Data

Three sources of mapping data have been used to inform the analysis, Ordnance Survey Mapping (OSM), NavStreets and OpenStreet Map.

OSM is created by Ordnance Survey Ireland which provides detailed mapping for a variety of uses. For the Traffic and Transport Chapter OSM has been used to establish accurate road naming and the location of physical highway features.

NavStreets is a street-level GIS dataset which covers the Republic of Ireland, including the Greater Dublin Area. Two sets of data from this dataset have been used to inform the EIAR:

- Road Network: Functional Class of each road link in the road network, which is a hierarchical classification of roads based on reality, used to determine a logical and efficient route for a traveller. The Functional Class information has been used to help inform the metrics for identifying the sensitivities of roads in the indirect study area.
- Points of Interest: NavStreets contains information on a wide range of "points of Interest". This has been referred to when identifying sensitive community receptors, such as schools, healthcare facilities, places of worship, retail clusters, etc., when determining how sensitive a particular location is to changes in terms of traffic and transport facilities.

OSM and NavStreets have been supplemented by OpenStreet Map which is an open source database of geographic data (i.e. Points of Interest, Land Use and Places of Worship). This has been used to further identify community facilities and open spaces in proximity to the Proposed Scheme.

4.1.2 Quantitative Assessment Data Collection

The following chapter provides an overview of the data collection exercise undertaken to facilitate the calibration and validation of the Local Area Model (LAM), Proposed Scheme micro-simulation and junction models. Existing data sources were reviewed to identify available traffic counts and locate gaps in observed information across the model area. This review was used to define a specification for additional counts which were commissioned for the area. The combination of new commissioned counts, and existing available information, provided a comprehensive dataset for calibration and validation.

4.1.2.1 Existing Data Review (Gap Analysis)

A review of existing traffic survey data available for the model area was undertaken from the following sources:

- NTA Traffic Count Database: A mixture of Automatic Traffic Counts (ATC) and Junction Turning Counts (JTC) from previous studies covering a range of years; and
- TII Automatic Traffic Counters (ATCs): Permanent TII ATCs located on national strategic roads across the network with data publicly available online.

The NTA, Dublin City Council and the other local authorities undertake periodic counts within their administrative areas in connection with their own local schemes. These surveys are conducted throughout the year and a limited set of data was available within the area of the Proposed Scheme.

Information on bus passenger volumes was already available and included in the modelling process as part of the ERM base model calibration and validation, which includes the annual canal and M50 cordon counts as well as ticketing data.

4.1.2.2 Commissioned Traffic Survey Data

Due to the scale of the Proposed Scheme, a full set of consistent up to date traffic counts for a neutral period e.g. November / February when schools, colleges were in session was completed for the Proposed Scheme. Traffic surveys were undertaken in February 2020 (Pre COVID- 19) with the surveyed counts used as inputs to the model calibration and validation process of the strategic model and microsimulation model. The two types of counts used in the study are Junction Traffic Counts (JTCs) and Automatic Traffic Counts (ATCs).

The various components of traffic have different characteristics in terms of operating costs, growth and occupancy. The surveys used the most common vehicle categories, as defined in the COBA (Cost Benefit Analysis) Manual:

- Cars: Including taxis, estate cars, 'people carriers' and other passenger vehicles (for example, minibuses and camper vans) with a gross vehicle weight of less than 3.5 tonnes, normally ones which can accommodate not more than 15 seats. Three-wheeled cars, motor invalid carriages, Land Rovers, Range Rovers and Jeeps and smaller ambulances are included. Cars towing caravans or trailers are counted as one vehicle unless included as a separate class;

- Light Goods Vehicles (LGV): Includes all goods vehicles up to 3.5 tonnes gross vehicle weight (goods vehicles over 3.5 tonnes have sideguards fitted between axles), including those towing a trailer or caravan. This includes all car delivery vans and those of the next larger carrying capacity such as transit vans. Included here are small pickup vans, three-wheeled goods vehicles, milk floats and pedestrian controlled motor vehicles. Most of this group is delivery vans of one type or another;
- Other Goods Vehicles (OGV 1): Includes all rigid vehicles over 3.5 tonnes gross vehicle weight with two or three axles. Also includes larger ambulances, tractors (without trailers), road rollers for tarmac pressing, box vans and similar large vans. A two or three axle motor tractive unit without a trailer is also included;
- Other Goods Vehicles (OGV 2): This category includes all rigid vehicles with four or more axles and all articulated vehicles. Also included in this class are OGV1 goods vehicles towing a caravan or trailer; and
- Buses and Coaches (PSV): Includes all public service vehicles and work buses with a gross vehicle weight of 3.5 tonnes or more, usually vehicles with more than 16 seats.

An overview of the commissioned data is provided Table 4.1.

Table 4.1: Survey Overview

Survey Type	Company	Number	Date
JTC	IDASO LTD	29	Tue 11/2/2020
ATC	IDASO LTD	7	Wed 5/2/2020 to Tue 11/2/2019

The JTCs are 24-hour counts broken down into 15-minute segments over a full day. All main junctions along the Proposed Scheme have been included and provide information on the volume, and types of vehicles, making turning movements at each location. This data is utilised within the models to ensure that the flow of vehicles through the main junctions on the network is being represented accurately.

The ATCs were taken for an entire week. In some cases, the ATC counts were repeated for a second week to account for data-collection issues. The vehicle categories surveyed are motorcycles, cars, LGVs, OGV 1, OGV 2 and PSVs.

The ATCs were taken for an entire week. The vehicle categories surveyed are motorcycles, cars, LGVs, OGV 1, OGV 2 and PSVs. The ATC data provides information on:

- The daily and weekly profile of traffic along the Proposed Scheme; and
- Busiest time periods and locations of highest traffic demand on the network.

Summary information related to the JTCs and ATCs collected for the Proposed Scheme is shown in Section 5.2.

4.1.2.3 Road and Bus Journey Time Data

4.1.2.3.1 Bus Journey Time Data

Bus Journey time data for the Proposed Scheme was provided by the NTA from the Automatic Vehicle Location (AVL) dataset used to monitor bus performance. The data provides information on bus travel time and dwell times at existing bus stops and has been used to inform the development of the transport models used to assess the impacts of the Proposed Scheme.

4.1.2.3.2 TomTom Road Journey Time Data

Road Journey time data for the Proposed Scheme models has been sourced from TomTom, who calculate journey times using vehicle position data from GPS-enabled devices and provide this on a commercial basis to a number of different users. The NTA purchased a license to access the anonymised Custom Area Analysis dataset through the TomTom TrafficStats portal. The NTA has an agreement with TomTom to provide travel time information covering six areas of Ireland and for certain categories of road.

Data is provided based on the area specified by the agreement; however, the date and time range of the data can be specified by the user. For the development of the strategic model and micro-simulation models the following query on the data was applied:

- 2019 weekdays (Monday to Thursday) from mid-January until end of November, excluding all bank holidays and days close to those dates.

The data is provided in the form of a GIS shapefile and accompanying travel time database file. The shapefile contains topographical details for each road segment, which is linked to the travel time database via a unique link ID. The database file then contains average and median travel time, average and median speed, the standard deviation for speed, the number of observations and percentile speeds ranging from 5th to 95th for each link.

4.1.2.3.3 TomTom Data Processing

In order to compare the journey times of specific links and routes between the TomTom data and the road assignment models, the two datasets were linked. After importing both the road assignment model and TomTom networks into the GIS environment, ensuring both datasets are in the same coordinate system, the selected routes were then linked using a spatial join functionality.

Before applying the data to the models, it was checked to ensure that it was fit for purpose. The review included checks of the number of observations that form the TomTom average and median times and checks of travel times against Google Maps travel times.

The TomTom Custom Area Analysis dataset was processed to provide observed journey times against which the strategic and micro-simulation models could be validated along the Proposed Scheme.

4.1.2.3.4 TomTom Data Application

The processed journey time data was used to validate the LAM and the micro-simulation models at an end-to-end travel time level, with intermediate segment travel times used to inform the calibration of both models. Further information about the journey time validation process can be found in Appendix A6.2 (Transport Modelling Report).

4.2 Appraisal Method for the Assessment of Impacts

4.2.1 Overview

This section provides an overview of the methodologies that have been used to assess the potential traffic and transport impacts of the Proposed Scheme during both the construction and Operational Phases. The assessments have been carried out as follows:

- Outlining the Assessment Topics; and
- Determining the Predicted Magnitude of Impacts.

Further detail on the assessment methodologies is provided in Section 6.

4.2.2 Outlining the Assessment Topics

The traffic and transportation impacts have been broken down into the following assessment topics for both the construction and Operational Phases:

- The qualitative assessments are as follows:
  - **Pedestrian Infrastructure**: The changes to the quality of the pedestrian infrastructure as a result of the Proposed Scheme;
  - **Cycling Infrastructure:** The changes to the quality of the cycling infrastructure as a result of the Proposed Scheme;
  - **Bus Infrastructure:** The changes to the quality of the bus infrastructure as a result of the Proposed Scheme; and

- **Parking / Loading:** The changes to the availability of parking and loading as a result of the Proposed Scheme.

- The quantitative assessments are as follows:
  - **People Movement:** An assessment has been carried out to determine the potential impact that the Proposed Scheme will have on projected volume of people moving along the Proposed Scheme during the Operational Phase only;
  - **Bus Performance Indicators:** The changes to the projected operational efficiency for buses as a result of the Proposed Scheme;
  - **General Traffic:** The direct and indirect impacts that will occur for the general traffic conditions on the Proposed Scheme and surrounding road network; and
  - **Network-Wide** Performance Indicators: The strategic changes to the transit queues, overcapacity queues, total travel times, total travel distance and average network speed.

4.2.3 Determining the Predicted Magnitude of Impacts

The methodology used for determining the predicted magnitude of impacts has considered the traffic and transport conditions of the environment before and after the Proposed Scheme is in place.

The impact assessments have been carried out in relation to the following scenarios:

- **Do Minimum** – The 'Do Minimum' scenario (Opening Year 2028, Design Year 2043) represents the likely traffic and transport conditions of the direct and indirect study areas including for any transportation schemes which have taken place, been approved or are planned for implementation, **without** the Proposed Scheme in place. This scenario forms the reference case by which to compare the Proposed Scheme ('Do Something') for the quantitative assessments.
- **Do Something** – The 'Do Something' scenario represents the likely traffic and transport conditions of the direct and indirect study areas including for any transportation schemes which have taken place, been approved or are planned for implementation, **with** the Proposed Scheme in place (i.e. the Do Minimum scenario with the addition of the Proposed Scheme). The Do Something scenario has been broken into two phases:
  - **Construction Phase (Construction Year 2024) –** This phase represents the single worst-case period which will occur during the construction of the Proposed Scheme.
  - **Operational Phase (Opening Year 2028, Design Year 2043) –** This phase represents when the Proposed Scheme is fully operational.

The changes between the Do Minimum and Do Something scenarios have been presented in either a positive, negative or neutral magnitude of impacts as a result of the Proposed Scheme, depending on the assessment topic. A high, medium, low or negligible rating has been applied to each impact assessment to determine the Magnitude of Impact. Refer to Section 6 for further information on the methodology in applying these ratings for each assessment.

4.2.3.1 Level of Service Impact Assessment

To outline the changes in conditions between the Do Minimum and Do Something scenarios a Level of Service (LoS) approach has been developed for the impact assessments, where appropriate. This concept allows a straightforward comparison of two differing scenarios using a series of metrics specifically developed for this purpose.

The concept of LoS was originally developed in the United States' Transportation Research Board's (TRB) Highway Capacity Manual (TRB 2000). Under this concept, potential values for a performance measure are divided into six ranges, with each range assigned a letter grade ranging from "A" (highest quality) to "F" (lowest quality). LoS concepts are applied universally throughout the world, and have their basis in Highway Capacity Manual and, particularly for bus network assessments, in the Transit Capacity and Quality of Service Manual (TRB 2003).

LoS concepts are not target based or rigid in their application and bespoke versions are developed to suit the particular receiving environment of the scheme under consideration or the particular user problems that the scheme and/or project is seeking to address. A mix of quantitative and qualitative indicators can be used and

summarised as a LoS. The process enables integrated planning and decision making across all modes rather than any specific mode which can create a bias in the assessment process (e.g. focusing on Car Volume over Capacity (V/C)). It is intended that the LoS framework for the Proposed Scheme will provide an easily understandable summary of the impact of each assessment topic, where applied.

4.3 Transport Modelling Methodology

A multi-tiered transport modelling approach has been developed. The NTA's East Regional Model (ERM) was the primary modelling tool and provided the overarching information on forecast travel demand for each mode of transport. The ERM was supported by other modelling tools which provide more granular level traffic information and allow for detailed and refined modelling at a local network and junction level. For this purpose, a cordoned (sub-set model) corridor-wide, road (motorised vehicle only) based Local Area Model (LAM) in combination with a multi-modal corridor micro-simulation model and local junction models have been used which work in tandem with the ERM.

Through the multi-tiered transport modelling approach, the following modes of transport have been considered:

- Public Transport including inter-urban rail, suburban rail, DART, light rail (Luas), bus, and MetroLink;
- Traffic including private car, taxis and goods vehicles;
- Walking; and
- Cycling.

Further detail on the modelling can be found in TIA Appendix 1 (Transport Modelling Report) of the EIAR which details the model development, data inputs, calibration and validation and forecast model development for the suite of models used to support the assessment.

4.3.1 Proposed Scheme Transport Models

This section summarises the various transport modelling tools that have been developed and used to inform the preparation of the TIA and Chapter 6 (Traffic and Transport) of the EIAR and has supported design decisions. The purpose of each tool has been detailed and it's use for each element of the Proposed Scheme is defined.

The different modelling tools that have been developed as part of the assessment do not work in isolation but instead work as a combined modelling system driven by the ERM as the primary source for multi-model demand and trip growth. Demand information is then passed from the ERM to the cordoned local area model, microsimulation models and junction models for the Proposed Scheme which have been refined and calibrated to represent local conditions to a greater level of detail then that contained within the ERM.

Importantly, no one tool can provide the full set of modelling data required to inform both the EIAR and TIA requirements and to support design iterations and decisions e.g. the ERM via the LAM has provided road traffic flow information (for example Annual Average Daily Traffic (AADT) and link speed data which has been used to inform Air Quality and Noise models).

The micro-simulation model is the most appropriate tool to provide the end-to-end bus journey times for the Proposed Scheme based on the detailed interaction of vehicle movements along the corridor. In addition, the LAM has been used directly for supporting design development decisions and to assist with an understanding of the implications of banned turns and potential trip redistribution away from the Proposed Scheme during both the Construction and Operational Phases.

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4.3.1.1 Transport Modelling Hierarchy

There are four tiers of transport modelling which are used to assess the Proposed Scheme, and these are detailed below and shown graphically in Diagram 4.1.

- **Tier 1 (Strategic Level):** The NTA's East Regional Model (ERM) is the primary tool which has been used to undertake the strategic modelling of the Proposed Scheme and has provided the strategic multi-modal demand outputs for the proposed forecast years;
- **Tier 2 (Local Level):** A Local Area Model (LAM) has been developed to provide a more detailed understanding of traffic movement at a local level. The LAM is a subset model created from the ERM and contains a more refined road network model used to provide consistent road-based outputs to inform the TIA, EIA and junction design models. This includes information such as road network speed data and traffic redistribution impacts for the Operational Phase. The LAM also provides traffic flow information for the micro-simulation model and junction design models and has been used to support junction design and traffic management plan testing;
- **Tier 3 (Corridor Level):** A micro-simulation model of the full 'end to end' corridor has been developed for the Proposed Scheme. The primary role of the micro-simulation model has been to support the ongoing development of junction redesigns and traffic signal control strategies proposed by the projects four Engineering Designers and to provide bus journey time information for TIA reporting purposes; and
- **Tier 4 (Junction Level):** Local junction models have been developed, for each junction along the Proposed Scheme to support local junction design development. These models are informed by the outputs from the above modelling tiers, as well as the junction designs which are, as discussed above, based on people movement prioritisation.

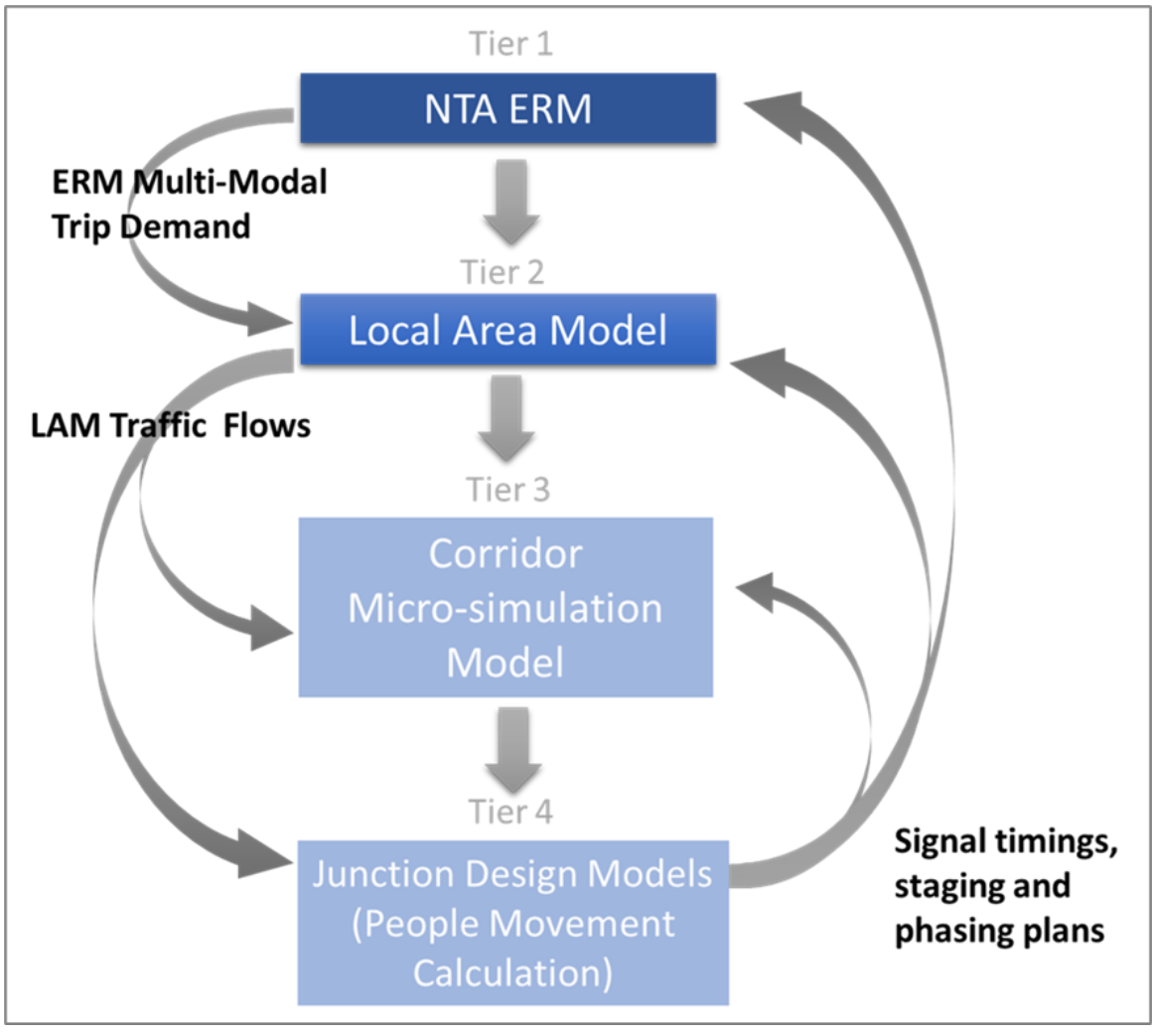

Diagram 4.1 Proposed Scheme Modelling Hierarchy

Further detail on the transport model development process, the traffic data inputs used, the calibration, validation and forecast model development for the suite of transport models can be found in the Transport Modelling Report, in TIA Appendix 1 (Transport Modelling Report) and TIA Appendix 2 (Junction Design Report).

The purpose of each of the modelling tools is summarised in Table 4.2.

Table 4.2: Modelling tool and purpose

Tool	Purpose	Inputs
NTA ERM	Forecast Multi-Modal demand impacts Proposed Scheme including both area wide and corridor level Mode share Policy assessment (e.g. demand management) Donor Network for LAM Flows to inform PDR	NTA Forecast Planning Data (2020,2028,2043) Future year Proposed Scheme information (Traffic signal plans and timings
Local Area Model (LAM)	General Traffic Redistribution impacts Link Flows (AADTs) Link Speeds Junction turning flows Construction Strategy and Traffic Management measure testing Donor network for Proposed Scheme Micro-sim model	Traffic surveys Journey time data ERM forecast matrices Proposed Scheme designs Proposed Scheme Traffic signal plans and timings
Micro-simulation Model	Operational features Design validation Person delay measurement Bus journey times Queue formation Scheme visualisation	LAM demand matrices Proposed Scheme designs Proposed Scheme Traffic signal plans and timings
Junction Design Models / People Movement Calculation	Junction design tool Proposed Scheme signal plan and timing development People Movement Calculation	Junction Turning flows from LAM

The following sections describe in further detail each of the modelling tools used to inform this TIA and their role within the assessment of the Proposed Scheme.

4.3.1.2 NTA Regional Modelling System (RMS) and East Regional Model (ERM)

The East Regional Model is part of the NTA's Regional Modelling System (RMS) for Ireland that allows for the appraisal of a wide range of potential future transport and land use alternatives. The RMS comprises the National Demand Forecasting Model (NDFM); five large-scale, detailed, multi-modal regional transport models; and a suite of Appraisal Modules. The five regional models comprising the RMS are focussed on the travel to-work areas for Dublin (represented by the aforementioned East Regional Model (ERM)), for Cork (represented by the South West Regional Model (SWRM)), for Limerick (represented by the Mid-West Regional Model (MWRM)), for Galway (represented by the West Regional Model (WRM)) and for Waterford (represented by the South East Regional Model (SERM)).

The key attributes of the five regional models include; full geographic coverage of each region, detailed representations of all major surface transport modes including active modes, road and public transport networks and services, and of travel demand for five time periods (AM, 2 Inter-Peaks, PM and Off-Peak). The RMS encompasses behavioural models calibrated to 2017 National Household Travel Survey data that predict changes in trip destination and mode choice in response to changing traffic conditions, transport provision and/or policies which influence the cost of travel.

4.3.1.2.1 Purpose of the RMS

The NTA uses the RMS to help inform decisions required during strategy development and to assess schemes and policy interventions that are undertaken as part of its remit. The RMS has been developed to provide the NTA with the means to undertake comparative appraisals of a wide range of potential future transport and land use options, and to provide evidence to assist in the decision-making process. Examples of how the RMS can assist the NTA include testing new public transport schemes by representing the scheme in the assignment

networks, testing demand management measures by, for example, changing the cost of parking or number of parking spaces within the regional model or testing the impacts of new land use by changing the planning data assumptions within the NDFM.

The RMS includes the 2016 Census/POWSCAR and 2017 National Household Travel Survey (NHTS) data sets and the NTA has included a range of improvements to the main model components where identified and implemented. These improvements include improving and making changes to such elements as the NDFM, development of the Long-Distance Model, updated zoning, networks, and parking modules; best-practice discrete choice modelling using the NHTS and POWSCAR datasets to estimate the parameters of the behavioural models, improved model runtimes, and general model functionality improvements.

4.3.1.2.2 RMS Components

The NTA RMS comprises of the following three main components, namely:

- The National Demand Forecasting Model (NDFM);
- 5 Regional Models (including the ERM); and
- A suite of Appraisal Modules.

The NDFM takes input attributes such as land-use data, population etc., and estimates the total quantity of daily travel demand produced by, and attracted to, each of the 18,641 Census Small Areas in Ireland.

The ERM is a strategic multi-modal transport model representing travel by all the primary surface modes – including, walking and cycling (active modes), and travel by car, bus, rail, tram, light goods and heavy goods vehicles, and broadly covers the Leinster province of Ireland including the counties of Dublin, Wicklow, Kildare, Meath, Louth, Wexford, Carlow, Laois, Offaly, Westmeath, and Longford, plus Cavan and Monaghan.

The ERM is comprised of the following key elements:

- **Trip End Integration:** The Trip End Integration module converts the 24-hour trip ends output by the NDFM into the appropriate zone system and time period disaggregation for use in the Full Demand Model (FDM);
- **The Full Demand Model (FDM):** The FDM processes travel demand, carries out mode and destination choice, and outputs origin-destination travel matrices to the assignment models. The FDM and assignment models run iteratively until an equilibrium between travel demand and the cost of travel is achieved; and
- **Assignment Models:** The Road, Public Transport, and Active Modes assignment models receive the trip matrices produced by the FDM and assign them in their respective transport networks to determine route choice and the generalised cost for each origin and destination pair.

Destination and mode choice parameters within the ERM have been calibrated using two main sources: Census 2016 Place of Work, School or College - Census of Anonymised Records (2016 POWSCAR), and the Irish National Household Travel Survey (2017 NHTS).

4.3.1.2.3 The use of the ERM for the Proposed Scheme

The NTA's ERM is the most sophisticated modelling tool available for assessing complex multi modal movements within an urban context. This provides a consistent framework for transport assessments. The ERM is the ideal tool to use as a basis for the assessment of the Proposed Scheme and to estimate its multi-modal impact. In addition, it provides the platform to forecast future trip demand and distribution.

The NTA ERM is, therefore, the primary high-level modelling tool for the strategic transport assessment of the Proposed Scheme and provides the sole source of multi-modal forecast trip / person demand for each of the scenarios assessed. The ERM provides the strategic impacts and benefits of the Proposed Scheme and the outputs from the ERM provide key inputs to the Transport Impact Assessments (TIA) and EIAR.

4.3.1.3 Local Area Model (LAM)

To support the detailed assessment of the Proposed Scheme a more disaggregated urban area traffic model has been developed, as a cordoned model from the ERM, that incorporates the most up to date traffic survey data. The LAM provides an appropriate level of detail required to inform the various disciplines and levels of decision making within the Proposed Scheme Infrastructure Works e.g., capturing the impact of redistribution of traffic on streets and roads not included within the strategic detail of the ERM. As such, a Local Area Model (LAM) has been developed to support the assessment of the Proposed Scheme.

The LAM is compatible with the ERM road network, being a direct extraction from the ERM road model, but with the addition of extra road network and zoning detail. The LAM is calibrated and validated with the most recent 2019/2020 traffic survey data and journey time information, which ensures that the model reflects 'on-the-ground' conditions for the Proposed Scheme in February 2020 (e.g. prior to COVID-19 restrictions).

The LAM which is a more refined version of the road network model component of the ERM has been used throughout the Proposed Scheme development to provide all road-based outputs to inform the TIA, EIA and junction design models. i.e. AADTs, road network speed data, traffic re-distribution impacts during construction and operation of the Proposed Scheme. The LAM also provides traffic flow information for the corridor micro-simulation models and junction design models.

4.3.1.3.1 Count Data for Calibration and Validation

A full set of consistent up to date traffic counts for a neutral period was completed for the Proposed Scheme. Traffic surveys were undertaken in February 2020 (Pre COVID- 19) with the surveyed counts used as inputs to the model calibration and validation process.

Private cars and taxis were aggregated as a single vehicle type for input to the LAM model. The OGV1 and OGV2 categories were also aggregated as HGVs. PSVs are modelled as fixed routes with a specific frequency in the model and as such were not included in the model inputs. PCL counts are not included in the model inputs. Separate input files were prepared for the following time periods.

- AM: 0800-0900;
- Lunch Time (LT): 1200-1300;
- School Run (SR): 1500-1600;
- PM: 1700-1800; and
- Off Peak (OP): 2000-2100.

The JTCs were merged into a 'flat format' database which permits the extraction of counts grouped by modelled hour (AM, LT, SR or PM) and modelled vehicle category (Car, LGV or HGV). Turn count records were given a unique movement identifier (AB, AC, AD etc.). These identifiers were then associated with their respective nodes in the LAM. In some cases, there is a unique one-to-one relationship between the turn counts and the SATURN network as shown in Diagram 4.2.

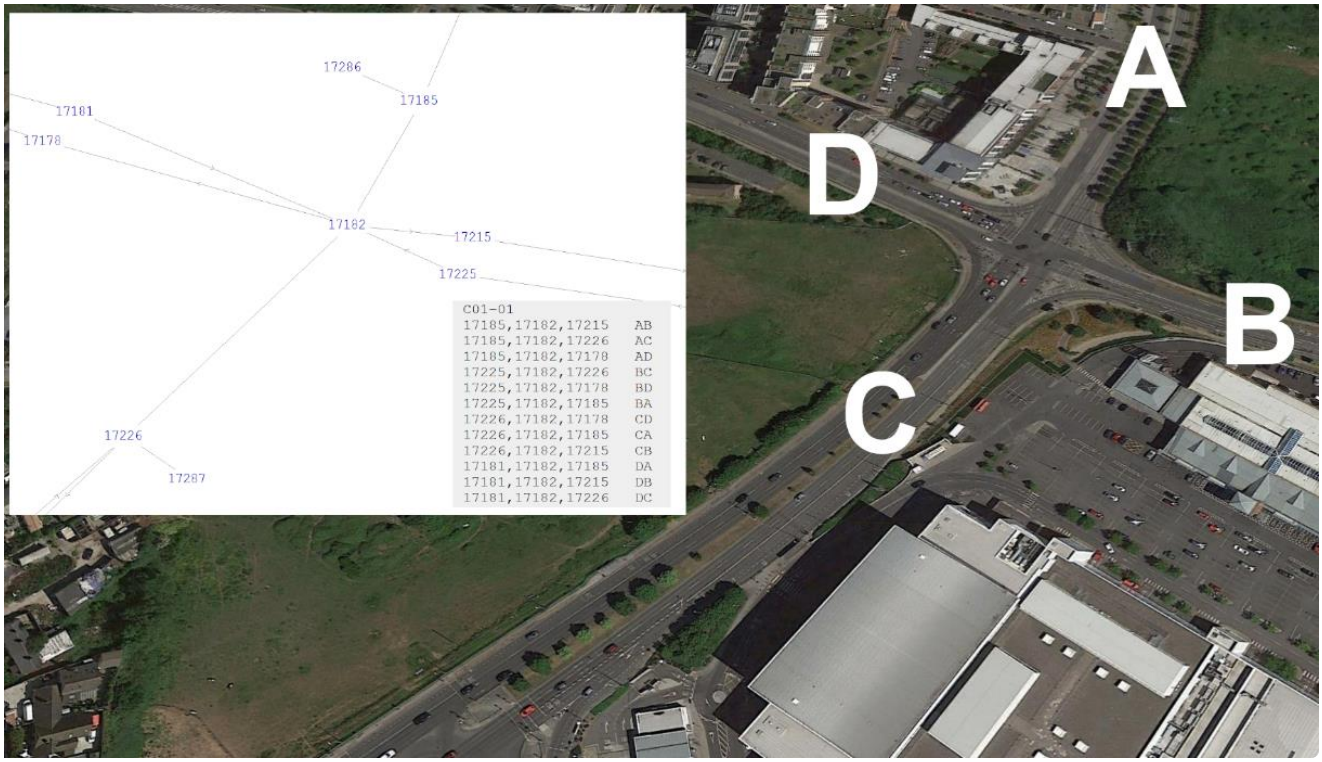

Diagram 4.2 Bus Connects LAM Node Matching (Junction C01-01)

The flows for complex junctions were obtained by combining certain turning movement flows, as shown in Diagram 4.3

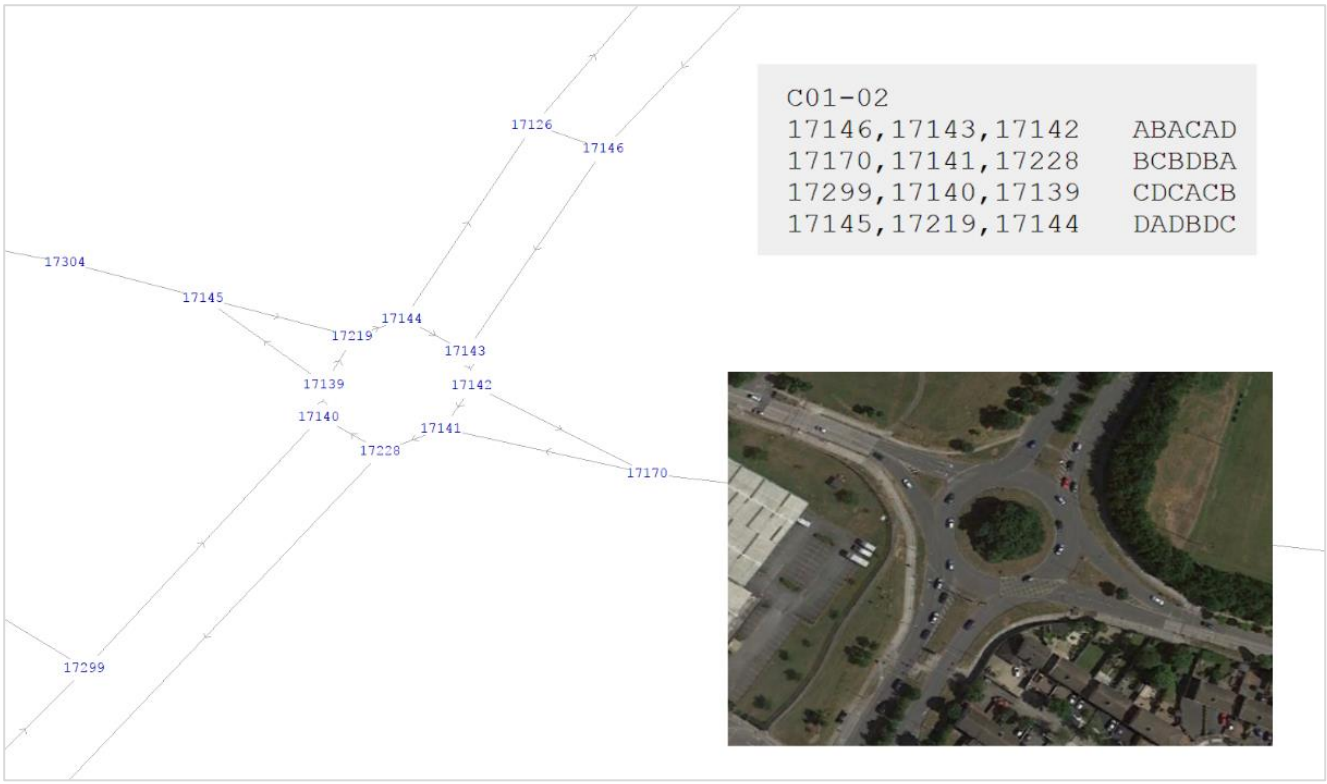

Diagram 4.3 Bus Connects LAM Node Matching (Junction C01-02)

4.3.1.4 Proposed Scheme Micro-Simulation Model

A micro-simulation model has been developed for the full continuous 'end-to-end' route of the Proposed Scheme. The 'end-to-end' corridor micro-simulation model has been developed to assist in the operational validation of the scheme designs and to provide visualisation of scheme operability along with its impacts and benefits.

The term 'end-to-end' refers to the point of model 'entry' (start of Proposed Scheme) to the point of model 'exit' (end of Proposed Scheme) rather than the actual bus service terminus points which, in most cases, lie outside of the modelled area. The modelling of the Proposed Scheme displays the differences in travel time for buses along the full length of the Proposed Scheme, including delay at individual locations. The Proposed Scheme Micro-simulation model network is shown in Diagram 4.4.

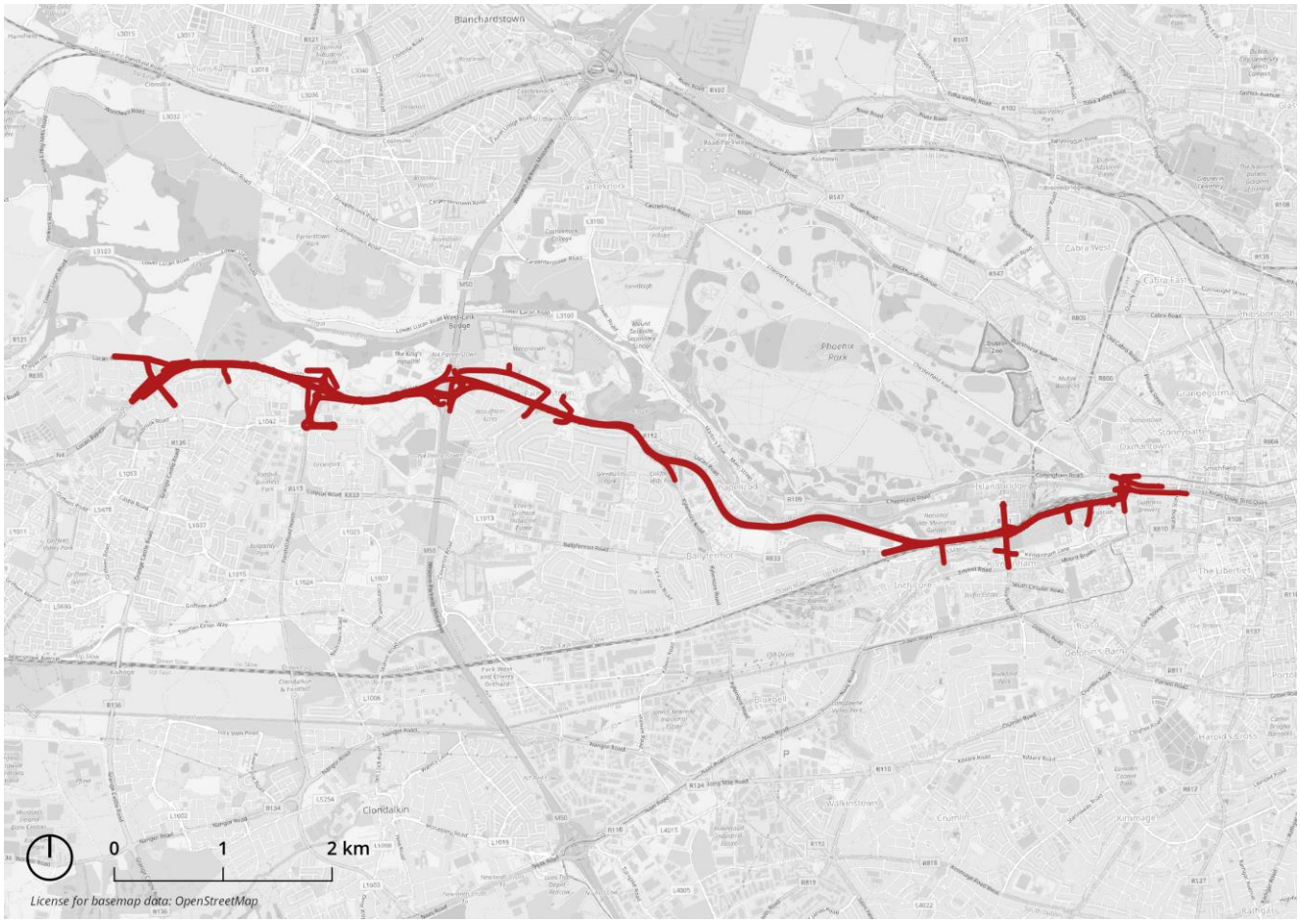

Diagram 4.4 Proposed Scheme Microsimulation Model Network

4.3.1.4.1 Role of the Corridor Micro-Simulation Models

The Proposed Scheme micro-simulation model has provided key information on end-to-end bus and car journey times along the Proposed Scheme. The Proposed Scheme micro-simulation model is supplied traffic flow information from the LAM and uses consistent information from the junction design models, in terms of signal plans, green times, staging, phasing and offsets. 3D Visualisations of sections of the Proposed Scheme have been developed based on the 2D models to help visualise and demonstrate the benefits and impacts of the scheme to stakeholders.

Overall, the Proposed Scheme micro-simulation model has provided key transport metric inputs to the TIA in terms of operational features, vehicle interaction, person level delay and bus journey time and reliability performance.

4.3.1.5 Junction Design Models

The fourth tier of modelling in the modelling hierarchy to support the assessment of the Proposed Scheme is the individual junction design models that have been developed for junctions along the Proposed Scheme. These junction design models are supplied with traffic flow information from the LAM and from the micro-simulation model for the Proposed Scheme. The LAM, Micro-simulation and local junction models contain consistent design, transport demand, signal phasing and staging information. Further information is contained in TIA Appendix 2 (Junction Design Report).

4.3.1.5.1 Role of the Junction Design Models

The junction design models have been used to inform junction design considerations as part of the formulation of the Preliminary Design for the Proposed Scheme. The junction models have been developed for standalone junction assessments and for combinations of secondary (off-line to Proposed Scheme) junctions. The junction models have been used in combination with the Proposed Scheme micro-simulation model at 'hot-spot' locations for operational testing and 'proof of concept' development of the preferred design.

The junction design models are important supporting design tools for analysis of the design proposals and have informed the development of signal plans and phasing at junctions along the Proposed Scheme. The junction models have been used to inform the LAM and Proposed Scheme micro-simulation model, with information such as design amendments, signal plans and timings being fed back in the iterative process where appropriate.

As part an iterative process, the resultant scheme designs were then re-modelled in the ERM, LAM and micro-simulation models to understand the strategic and corridor specific issues and inform the preparation of the TIAs and EIARs and the planning submission for the Proposed Scheme.

5. Baseline Environment

This Section provides an overview of the existing traffic and transport conditions within the redline boundary of the Proposed Scheme. The baseline conditions have been informed by several site visits of the local environment, comprehensive traffic surveys, and a desktop review of the most recent aerial photography.

Overall cycling infrastructure provision on the corridor consists of 24% cycle priority westbound / outbound (8% cycle track, 16% cycle lane), with 17% eastbound / inbound (8% cycle track, 9% cycle lane).

5.1 Bus Journey Times

Bus services along the Proposed Scheme currently operate within a constrained and congested environment, with 67% priority westbound / outbound and 77% priority eastbound / inbound on the corridor. An examination of Automatic Vehicle Location (AVL data, collected by the NTA) indicates that the current standard deviation for journey times of buses on the corridor is 10 minutes. With any further increases in traffic levels, this variability of bus speeds is expected to be exacerbated, thus impacting further on bus passengers. In addition, longer and less reliable bus services will require operators to use additional buses to maintain headways to fill gaps created in the timetable. Aligned to this, the small number of remaining sections of unprioritised bus network at key locations can lead to bunching of buses which, in turn, means stops can become overcrowded, creating delays in boarding and alighting and an unbalanced use of bus capacity.

5.2 Traffic Count Data

5.2.1 Junction Turning Counts (JTCs)

Table 5.1 displays the JTCs collected for the Proposed Scheme, the locations of which are shown in Diagram 5.1 and Diagram 5.2. The results demonstrate that the busiest junction in the study area is the M50 junction (135,051 daily movements). The next busiest junctions are:

- R148/Kennelsfort Road (60,982 daily movements);
- R148/South Circular Road (58,034 daily movements);
- R148/Lucan Road at Applegreen (50,893 daily movements); and

- R148/Lucan Road at Chapelizod (47,803 daily movements).

Table 5.1: JTC Locations and Daily, AM and PM Movements

Junction ID	Junction Name	Type	Daily Movements (veh)	AM Peak Hour Movements (veh)	PM Peak Hour Movements (veh)
6-1	R835 Lucan Road/R136	Signals	27846	2010	1891
6-2	R835/N4 on slip (Woodies)	Roundabout	12520	815	756
6-3	R136/N4 off slip	Signals	23502	1671	1682
6-4	N4 slip/R136	Signals	32524	2205	2518
6-5	N4 on slip/R113	Signals	24253	2066	1663
6-6	Kennelsfort Road/R148 Chapelizod Bypass	Signals	60982	4450	4052
6-7	Lucan Road/R148 Chapelizod Bypass	Signals	50893	3812	3297
6-8	Chapelizod Bypass/R833 Con Colbert Road	Signals	36196	2454	2306
6-9	Con Colbert Road /Memorial Road	Signals	47032	3212	3334
6-10	Con Colbert Road / St John's Rd W	Signals	58034	3841	4186
6-11	R148 Con Colbert Road /HSQ	Signals	30316	1777	2146
6-12	St John's Rd W /Military Road	Signals	31576	1858	2237
6-13	St John's Rd W /Stevens Lane	Signals	30453	1921	2007
6-14	Frank Sherwin Bridge/Victoria Quay	Signals	40333	2323	3140
6-15	Wolfe Tone Quay/Frank Sherwin Bridge	Priority	29934	2290	2170
6-16	Fonthill (Hermitage Clinic), Dublin	Priority	6337	575	545
6-17	R113/N4 slip	Priority	33659	2680	2316
6-18	M50, Dublin, Ireland	Priority	135051	9940	10012
6-19	R112/R148 Chapelizod Bypass	Priority	47803	3462	3071
6-20	S Circular Road/Kilmainham Lane	Signals	25550	1925	1690
6-21	Bridgefoot Street/Thomas Street	Signals	27290	2038	1961
6-22	Ellis Street/Ellis Quay	Signals	21289	2003	1085
6-23	Watling Street/Usher's Island	Signals	28886	1620	2518
6-24	Blackhall Pl/Ellis Quay	Signals	28419	2242	1806
6-25	James Joyce Bridge/Usher's Island	Signals	30675	1435	2688
6-26	Queen Street/Arran Quay	Signals	28293	2329	1574

Junction ID	Junction Name	Type	Daily Movements (veh)	AM Peak Hour Movements (veh)	PM Peak Hour Movements (veh)
6-27	Liam Mellow's Bridge/Usher's Quay	Priority	34158	1789	2904
6-28	Con Colbert Road/Chapelizod Bypass	Priority	42656	2946	3008
6-29	R113/Fonthill Rd.	Priority	41151	2826	3259

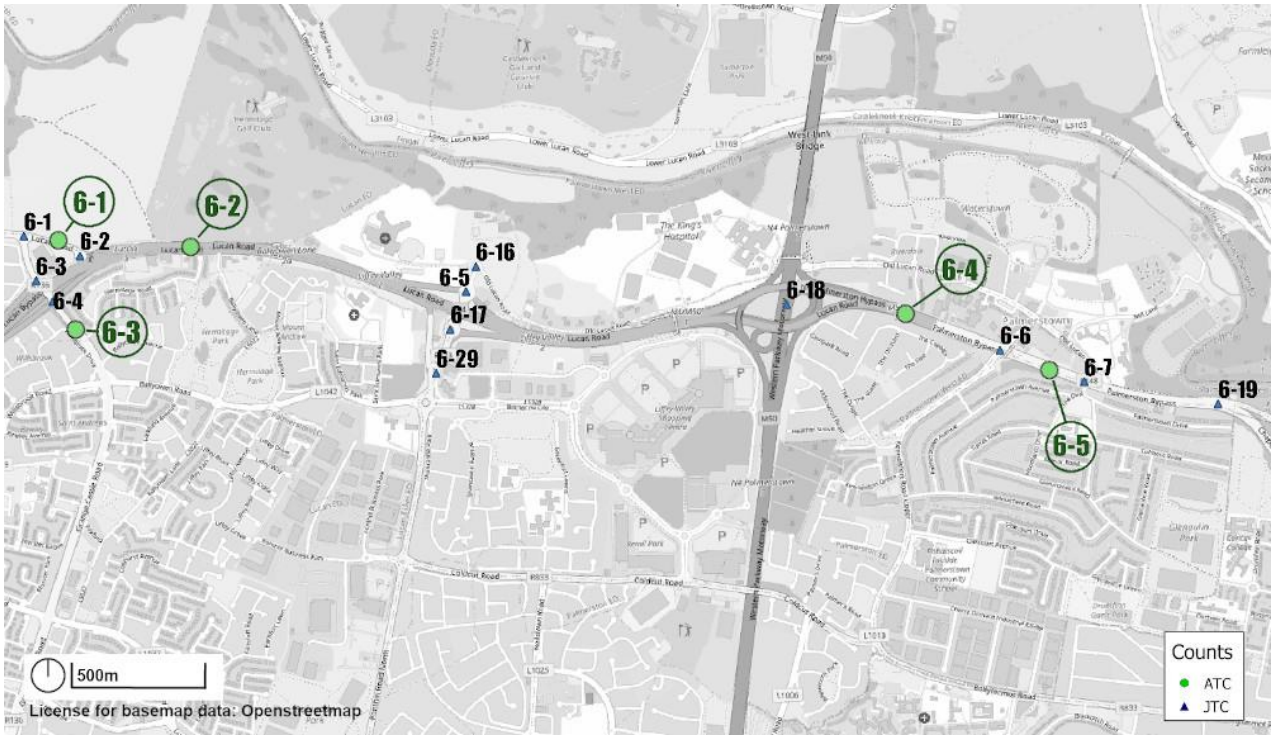

Diagram 5.1 ATC and JTC Traffic Count Locations (1)

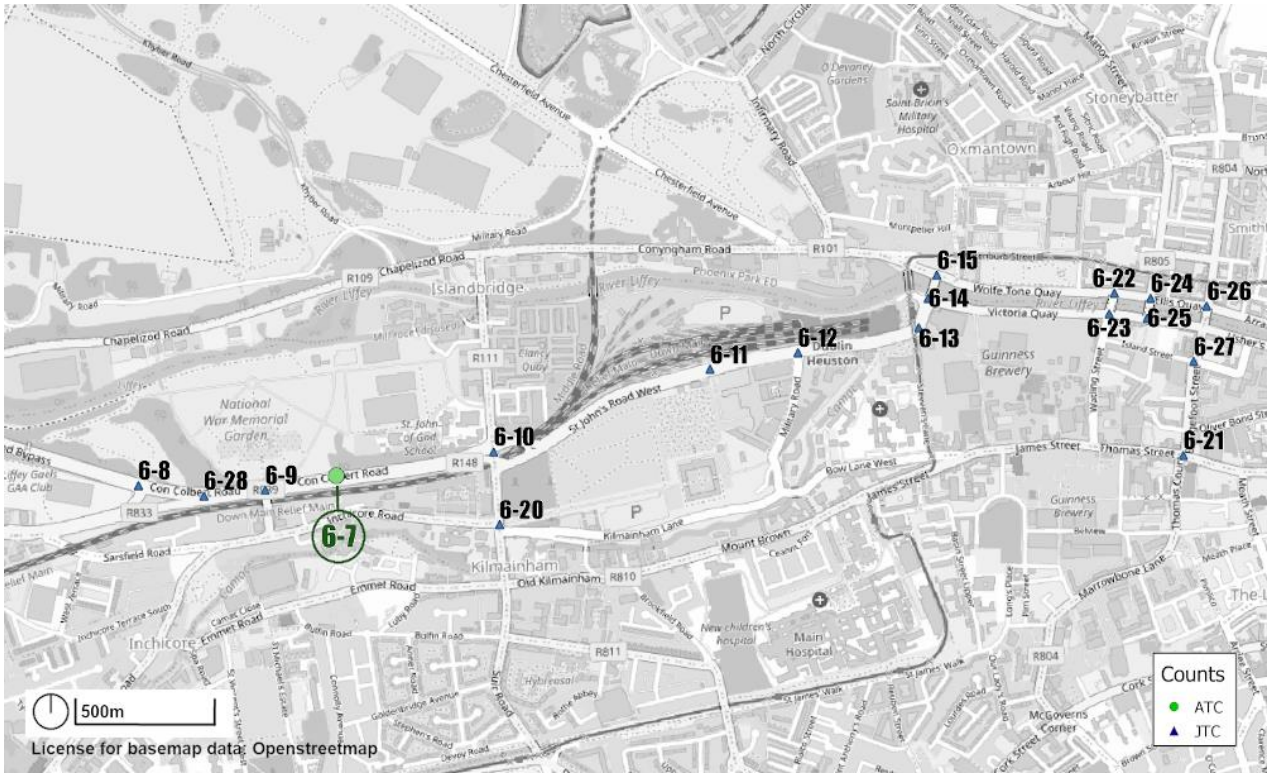

Diagram 5.2 ATC and JTC Traffic Count Locations (2)

5.2.2 Automatic Turning Counts (ATCs)

Table 5.2 displays the ATCs collected for the Proposed Scheme, the locations of which are shown in in Diagram 5.1 and Diagram 5.2. The highest ATC daily flows were recorded on the N4, to the west of Fonthill Road. ATC counts at Locations 6.1A and 6.1B did not have reliable counts for a full week and were excluded from the dataset.

Table 5.2: ATC Locations and Daily, AM and PM Movements

ATC Identifier	ATC Location	Direction	Daily Movements (veh)	AM Peak Hour Movements (veh)	PM Peak Hour Movements (veh)
6.1A	Lucan Road west of Woodies	Eastbound	excluded	excluded	excluded
6.1B		Westbound	excluded	excluded	excluded
6.2A	N4 west of Fonthill	Eastbound	49709	4315	2838
6.2B		Westbound	52274	2433	4735
6.3A	R136 Ballyowen Road	Northbound	11699	871	834
6.3B		Southbound	12915	867	1051
6.4A	R148 east of M50	Eastbound	28581	2380	1734
6.4B		Westbound	27870	1919	2048
6.5A	R148 at Applegreen	Eastbound	24249	2054	1413
6.5B		Westbound	25380	1598	1800
6.6A	Chapelizod Bypass	Eastbound	16270	1351	779

ATC Identifier	ATC Location	Direction	Daily Movements (veh)	AM Peak Hour Movements (veh)	PM Peak Hour Movements (veh)
6.6B		Westbound	17975	905	1345
6.7A	Con Colbert Road east of South Circular Road	Eastbound	19563	921	1516
6.7B		Westbound	23594	1790	1301

5.3 Baseline Conditions

5.3.1 Overview

In describing the baseline conditions, the Proposed Scheme has been divided into three sections in accordance with the proposed design, as outlined within all other disciplines of the subject application. The three sections are shown in Diagram 5.3 as follows:

- Section 1 - N4 Junction 3 to M50 Junction 7 – N4 Lucan Road – N4 Lucan Road;
- Section 2 - M50 Junction 7 to R148 Con Colbert Road – Palmerstown bypass and Chapelizod bypass; and
- Section 3 – R148 Con Colbert Road to City Centre (Frank Sherwin Bridge) – Con Colbert Road and St John's Road West.

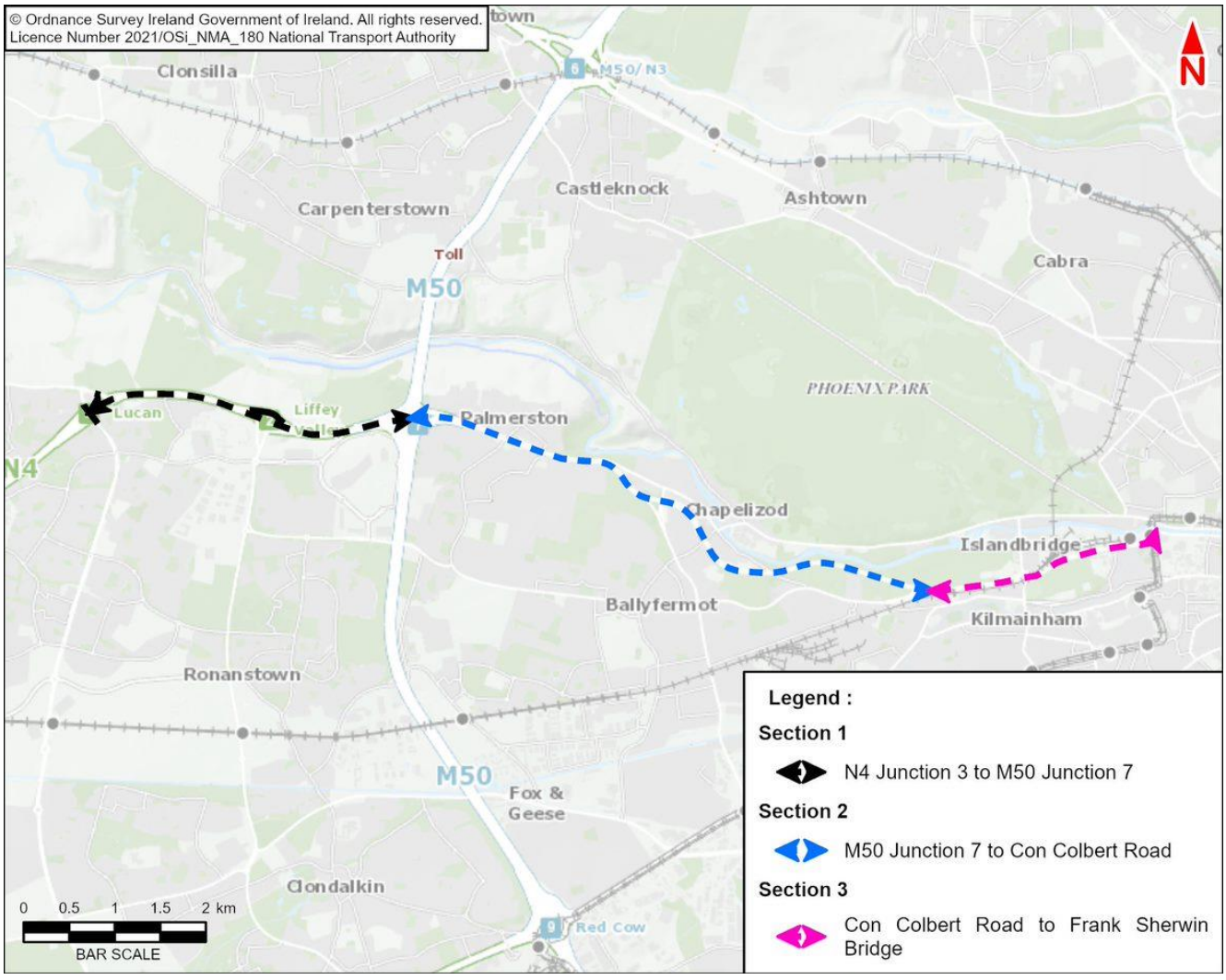

Diagram 5.3 Sections of Proposed Scheme for the Baseline Environment Review

5.3.2 Section 1 – N4 Junction 3 to M50 Junction 7 – N4 Lucan Road

This Section outlines the baseline environment for walking, cycling, bus services, general traffic and parking / loading facilities along Section 1 of the Proposed Scheme.

Section 1 of the Proposed Scheme is approximately 2.8km in length and begins at Junction 3 of the N4 Lucan Road at the R835 Lucan Road / R136 Ballyowen Road junction and ends at the crossing with the M50 at Junction 7. It passes Ballydowd to its south, Hermitage Golf Club to its north, and Liffey Valley Shopping Centre to the south before Junction 7 with the M50.

In addition, Section 1 of the Proposed Scheme includes Hermitage Road, which it is proposed will be designated as a "Quiet Street" to provide an alternative link between the Hermitage Estate and the two-way facility on the north side of the N4, via the existing shared bridge by the Mount Andrews Estate/St. Loman's

The Liffey Valley Shopping Centre (LVSC) is one of the key attractors along this section for pedestrians, cyclists, buses, and private and service vehicles. It is located to the south of the Proposed Scheme and can be accessed by pedestrians and cyclists via a shared overbridge over the N4, which connects Old Lucan Road, and eastbound bus stops on the N4 to the LVSC. There is no direct road access to the LVSC from the N4. Vehicles travelling to and from LVSC primarily do so from N4 Junction 2 and R113 Fonthill Road North.

5.3.2.1 Pedestrian Infrastructure

In general, and in relation to the surrounding land use, the pedestrian facilities along Section 1 of the Proposed Scheme are considered to be adequate, in accordance with DMURS.

For the majority approximately of its length on this sections the N4 Lucan Road has continuous footpaths of approximately 2.0m – 3.0m in width on both sides of the road with street lighting columns situated along the carriageway at approximately 40.0m intervals. Although the standard width for a shared facility is 3m, given the low numbers of pedestrians likely to walk alongside the N4, this provision is still considered to be adequate

The R136 Ballyowen Road has a footpath of approximately 2.0m wide on the eastern side of the road, leading to a footbridge over the N4. Hermitage Road has footpaths of approximately 1.8m wide on both sides of the road with street lighting and there is pedestrian link between Hermitage Road and Ballyowen Lane through Hermitage Park.

Uncontrolled crossings across priority junctions at side roads benefit from dropped kerbs. The locations of the pedestrian crossings are illustrated in Figure 6.3a in TIA Appendix 3 (Maps).

Further details of the baseline pedestrian facilities (i.e. routing, directness, accessibility, crossing and footpath widths) at each junction along Section 1 of the Proposed Scheme is included in TIA Appendix 4.1 (Pedestrian Infrastructure Assessment).

Controlled or grade-separated crossing facilities can be found at the following locations:

- There are four cross-carriageway bridges throughout the extent of Section 1 of the Proposed Scheme:
  - The first is located on the eastern side of the R136 Ballyowen Road, as it crosses over the N4 carriageway. This is a separate structure to the road bridge, and runs alongside the road bridge. The usable width of the bridge is 3m, which is wider than the 2m footways to the north and south;
  - The Mount Andrew Estate overbridge is located in the midsection, connecting to the inbound bus stop at the bridge and the shared foot/cycle path along the northern side of the N4. The shared cycle / pedestrian bridge is accessed via ramps, and has a useable width of 2m, which is below the standard 3m width for shared facilities; and
  - Lastly, a shared cycle / pedestrian bridge crosses the N4 Lucan Road between The King's Hospital School and Liffey Valley Shopping Centre, which also provides a connection to the inbound bus stops on the southern side of the N4. The bridge is accessed from the north side by ramps, and from the south side by ramps and steps. It has a useable width of 2m, which is below the standard 3m width for shared facilities.

- There are signalised crossings on two out of three arms of the R835 Lucan Road / R136 Ballyowen Road; the R835 Lucan Road East arm with a three-stage staggered crossing and the R136 Ballyowen Road arm with a four-stage crossing;
- There is a signalised pedestrian crossing of the N4 Lucan Road westbound off-slip at the junction with the R136 Ballyowen Road;
- There is a signalised pedestrian crossing of the Hermitage Road arm at the junction with the R136 Ballyowen Road; and
- There is a signalised crossing at the end of the inbound off-slip at N4 Junction 2 (at the R113 Fonthil Road North / N4 on/off-slips four-arm roundabout), leading to the Hermitage Medical Clinic.

There are also several uncontrolled pedestrian crossings along Section 1 of the Proposed Scheme which benefit from tactile paving and dropped kerbs.

5.3.2.2 Cycling Facilities

There are cycle lanes in both directions on the R136 Ballyowen Road between the N4 overbridge and R835 Lucan Road. Across the overbridge itself there are no cycle facilities, apart from an advanced stop line on the southbound direction. Between Hermitage Road and the N4 overbridge, there is a southbound 1.5m wide on-road cycle lane, but no northbound cycle facilities.

On the R835 Lucan Road, between the R136 Ballyowen Road junction and the N4, there is a short eastbound section of shared bus / cycle lane immediately to the east of the junction.

From the roundabout with Lucan Retail Park Car Park, there is a shared facility for pedestrians and cyclists along the northern side of the on-slip to the N4 Lucan Road. This continues alongside the N4 Lucan Road carriageway, between R835 Lucan Road and R113 Fonthill Road North, and varies between 2m and 3m in width. The standard width for a shared facility is 3m.

Heading westbound from the R113 Fonthill Road North, there is a shared facility for pedestrians and cyclists adjacent to the N4 Lucan Road. This runs as far as Mount Andrew Estate overbridge, beyond which an on-road cycle lane continues westbound along the N4 Lucan Road off-slip (R136 Ballyowen Road exit).

The remainder of this section between the R113 Fonthill Road North and the M50 interchange has both eastbound and westbound bus lanes but no dedicated cycle facilities. An off-road cycle track passes over the M50 via the shared pedestrian / cycle bridge, connecting the Liffey Valley Shopping Centre with Old Lucan Road to the north-east of M50 Junction 7.

There are no signal controlled crossing facilities for cyclists at any junctions within Section 1. Ten bike lockers are located on the northern footway to the west of the R835 Lucan Road / R136 Ballyowen Road junction. Five ‘Sheffield’ cycle stands are located at Bus Stop 2234, 80m to the east of the same junction.

The existing cycle facilities along Section 1 of the Proposed Scheme are illustrated in Figure 6.4a in TIA Appendix 3 (Maps).

5.3.2.3 Bus Infrastructure

5.3.2.3.1 Bus Priority Measures

Dedicated bus lanes are present at the following locations:

- On R136 Ballyowen Road southbound between the N4 overbridge and Hermitage Road;
- On R136 Ballyowen Road northbound across the N4 overbridge;
- On R136 Ballyowen Road between the N4 eastbound off-slip and R835 Lucan Road, where 80m-long northbound and southbound bus lanes are present;
- On the N4 Lucan Road eastbound between the R136 Ballyowen Road and the M50 interchange;
- On the N4 Lucan Road eastbound off-slip heading towards the Fonthill Interchange; and

- On the N4 Lucan Road westbound from the M50 interchange to a point 700m to the east of the R136 Ballyowen Road slip road.

5.3.2.3.2 Bus Stop Facilities

There are currently nine bus stops throughout along Section 1 of the Proposed Scheme. Four of these stops are located along the N4 Lucan Road eastbound, inbound to the City Centre, and, five are on the westbound, outbound side. The inbound stops are:

- Stop 2234, on R835 Lucan Road at the Lucan Retail Park, 90m from Ballyowen Road;
- Stop 2236 on N4 Lucan Road close to Mount Andrew Court;
- Stop 5056 on the R113 eastbound off-slip; and
- Stop 2239 on N4 Lucan Road at the Liffey Valley Centre.

The outbound stops are:

- Stop 2213, on N4 Lucan Road at the Liffey Valley Centre;
- Stop 2214 on N4 Lucan Road close to Toyota Liffey Valley;
- Stop 2215 on N4 Lucan Road at St Loman's Hospital;
- Stop 2216 on N4 Lucan Road at Ballyowen Lane; and
- Stop 4599 on the R136 off slip.

Table 5.3: outlines the availability of bus stop facilities at the existing nine bus stops along Section 1 of the Proposed Scheme.

Table 5.3: Section 1 – Availability of Bus Stop Facilities (of a Total Nine Bus Stops)

Bus Stop Facility	Number of Bus Stops in Baseline with Facility	Percentage of Bus Stops in Baseline with Facility
RTPI	3	33%
Weekly Timetable information	8	89%
Shelter	7	78%
Seating	5	56%
Accessible Kerbs	8	89%
Indented Drop Off Area	5	56%

In total, 78% of bus stops have a shelter, and 89% of stops have accessible kerbs. A third of stops provide Real Time Passenger Information (RTPI). RTPI provision in the area is concentrated in areas of greater footfall, i.e. Lucan Retail Park and Liffey Valley Shopping Centre. The existing bus facilities along Section 1 of the Proposed Scheme are in Figure 6.5a in TIA Appendix 3 (Maps).

The bus services that operate along Section 1 are outlined Table 5.4.

Table 5.4: Section 1 – Bus Service Frequency

Service	Route	Typical Service Frequency	
		Weekday	Weekend
C1	Sandymount, Lucan, Ballyowen, Adamstown	20 minutes	30 minutes
C2	Sandymount, Palmerstown, Lucan, Ballyowen, Adamstown	20 minutes	30 minutes
C3	Ringsend, Palmerstown, Lucan, Leixlip, Maynooth	30 minutes	30 minutes
C4	Ringsend, Palmerstown, Lucan, Celbridge, Maynooth	30 minutes	30 minutes

Service	Route	Typical Service Frequency	
		Weekday	Weekend
C5	Ringsend, Chapelizod, Lucan, Leixlip, Maynooth	5 services (all between 0:35 and 4:35)	5 services (all between 0:35 and 4:35)
C6	Ringsend, Chapelizod, Lucan, Celbridge, Maynooth	5 services (all between 0:05 and 4:05)	5 services (all between 0:05 and 4:05)
X25	Bellfield, Donnybrook, Lucan, Maynooth	3-5 services	No Services
X26	Maynooth, Leixlip, Lucan, Smithfield, Dublin City South	3 services (all between 7:10 and 7:40)	No Services
X28	Bellfield, Donnybrook, Lucan, Celbridge	5 Services	No Services
P29	Ringsend, Palmerston, Ballyowen, Lucan, Adamstown	4 Services	No Services
X30	Bellfield, Donnybrook, Ballyowen, Lucan, Hillcrest	2 Services	No Services
X31	Dublin City South, Palmerstown, Lucan, Leixlip, Louisa Valley	3 Services	No Services
120	Connolly Station, Lucan, Straffan, Clane, Derrintum, Edenderry	30 minutes	30 minutes
B120	Connolly Station, Celbridge, Straffan, Clane, Newbridge	3 Services	2 Services
F120	Connolly Station, Liffey Valley, Clane, Prosperous, Newbridge	1 Service	No Services
X120	Connolly Station, Liffey Valley, Clane, Prosperous, Derrintum, Edenderry	2 Services	No Services
845	Birr, Kilcormac, Tullamore, Lucan, Donnybrook, Bellfield	4 Services	No Services
847	Portumna, Mucklagh, Maynooth, Lucan, Dublin, Donnybrook, Bellfield	1 Service	1 Service

The bus stops in this section serve Dublin Bus, Bus Éireann (BÉ), and BÉ Expressway routes, providing access to Heuston Station, Merrion Square, and express access to University College Dublin (UCD). There are regional services also available, linking this section to Mullingar, Ballina, and Sligo.

5.3.2.4 General Traffic

The main road junctions within Section 1 of the Proposed Scheme are:

- R136 Ballyowen Road / Hermitage Road;
- R136 Ballyowen Road / N4 westbound on / off-slip roads;
- R136 Ballyowen Road / N4 eastbound off-slip road;
- R136 Ballyowen Road / R835 Lucan Road;
- R835 Lucan Road / Lucan Retail Park / Hermitage Golf Club roundabout;
- R835 Lucan Road / N4 Lucan Road;
- N4 Lucan Road / Liffey Valley; and
- N4 Lucan Road / M50 Junction 7.

The characteristics of each major junction is described in turn below, alongside satellite images which are extracts from Figure 6.6 in TIA Appendix 3 (Maps).

R136 Ballyowen Road / Hermitage Road three-arm signalised junction: The R136 Ballyowen Road North arm has two traffic lanes and an on-road cycle lane approaching the junction. The inside lane is a bus lane until approximately 25.0m before the stop line where it permits left turning vehicles onto Hermitage Road. The right lane is for ahead movements. There are two lanes exiting the junction onto this arm. The approach and exit lanes are separated by a central reservation.

The R136 Ballyowen Road South arm has three traffic lanes and an on-road cycle lane approaching the junction. The inside lane is a bus lane and the middle lane is for general traffic ahead movements. The right lane is a flare lane of approximately 40.0m long and has a separate signal phase to the ahead movements. There is a storage

box in the centre of the junction for right turners. There are two traffic lanes and a cycle lane exiting the junction onto this arm. The approach and exit lanes are separated by a central reservation.

The Hermitage Road arm has one lane approaching and exiting the junction which are separated at the stop line by a traffic island.

In the centre of the junction there are two yellow boxes which sit across the R136 Ballyowen Road northbound and southbound general traffic lanes. These characteristics are illustrated by Image 5.1

Image 5.1 R136 Ballyowen Road / Hermitage Road Junction

R136 Ballyowen Road / N4 westbound on / off-slip roads: Travelling north on the R136 Ballyowen Road towards Lucan Retail Park, the road firstly connects with the on and off slip roads of the N4 westbound carriageway at a signalised junction.

The R136 Ballyowen Road North is a bridge over the N4 approximately 80m in length and has two lanes approaching the junction, the left lane for ahead movements and the right lane for right turn movements onto the N4 Lucan Road on-slip. There are two lanes exiting the junction onto this arm, the inside of which is a bus lane. There is an advanced stacking location for cyclists on this arm.

The R136 Ballyowen Road South arm has two lanes approaching the junction, the right lane for ahead movements and the left lane for left turn movements onto the N4 Lucan Road on-slip. There are two lanes exiting the junction onto this arm, the inside of which is a bus lane.

The N4 Lucan Road off-slip is one-way travelling westbound and has three lanes approaching the junction, the left of which is for left turn movements onto the R136 Ballyowen Road South and is controlled by a separate signal head, and the centre and right lanes for ahead and right turn movements respectively controlled by the same signal head. There is an advanced stacking location for cyclists on this arm.

The N4 Lucan Road on-slip is one-way comprising two lanes which join the N4 Lucan Road travelling eastbound. There is a yellow box in the centre of the junction. This junction is shown in Image 5.2.

Image 5.2 R136 Ballyowen Road / N4 westbound on / off-slip roads Junction

R136 Ballyowen Road / N4 eastbound off-slip road: The R136 Ballyowen Road then connects with the eastbound off-slip of the N4 at a signalised junction at the northern end of the bridge. The northern approach to this junction has two 3.5m wide lanes and a cycle lane which ceases at the junction. A cycle lane also commences at the southern approach to the junction and continues into the northern exit arm. This junction is shown in Image 5.3.

Image 5.3 R136 Ballyowen Road / N4 eastbound off-slip road Junction

R136 Ballyowen Road / R835 Lucan Road three-arm signalised junction: At the north-west periphery of the Retail Park, R136 Ballyowen Road meets R835 Lucan Road with a two-way carriageway approximately 12.5m in width. This width increases towards the mouth of the junction on the northbound approach as two arms split to offer left and right-hand turns. Each of these turning lanes are approximately 3.5m in width and are influenced by toucan crossings at the signalised junction.

From the perspective of the eastbound approach to this junction, there is a three-arm entry to the junction. The central lane is approximately 2.5m in width and provides a continuation eastbound. The right-turn lane is also 2.5m in width and is a feeder lane approximately 20m in length. The northern-most lane is a bus lane which surpasses the aforementioned junction along its own alignment by approximately 20m and is controlled by a separate signal and toucan crossing.

On the westbound approach to this junction, the approximately 3.5m wide single-lane carriageway provides left-turn access to R136 Ballyowen Road via a slip lane approximately 4.0m in width, adjacent to a 1.5m cycle lane. The surrounding approaches to this junction are subject to 50km/h speed limits.

The existing junction layouts surrounding Lucan Retail Park are illustrated in Image 5.4.

Image 5.4 R136 Ballyowen Road / R835 Lucan Road Junction

R835 Lucan Road / Lucan Retail Park / priority roundabout: R835 Lucan Road has a two-lane approach to the roundabout, with the Retail Park and arm and public road arm to the east (which provided access to Hermitage Golf Club), each comprising a single land on approach.

The eastbound off-slip to the N4 forms the eastern arm of the roundabout, and is a one-way exit. This junction is shown in Image 5.5.

Image 5.5 R835 Lucan Road / Lucan Retail Park / Hermitage Golf Club Priority Roundabout Junction

R835 Lucan Road / N4 Lucan Road: The R835 Lucan Road enters the N4 Lucan Road eastbound carriageway via an approximately 5.0m wide slip lane. A merging lane severs the preceding bus lane for a length of approximately 160m before returning to bus lane.

The N4 Lucan Road then assumes a three-lane carriageway in addition to a bus lane in both directions, with a total width of 13.0m to 14.0m in width. Along the westbound side of the carriageway, there is an additional lane segregated from the main N4 Lucan Road carriageway by bollards, which continues south-west, ending at the

Junction 3 exit from the N4 Lucan Road onto R136 Ballyowen Road. The N4 Lucan Road carriageway is subject to a speed limit of 80 km/h.

The existing layout of this junction is illustrated in Image 5.6.

Image 5.6 R835 Lucan Road / N4 Lucan Road Junction

N4 Lucan Road / Liffey Valley: Following the eastbound alignment of this section, there are four points of entrance and exit to provide access to Liffey Valley and Fonthill to the south. On the eastbound approach, there is an approximately 260m slip exit, comprising of a single-lane carriageway in addition to bus and cycle lane, to a total width of approximately 7.0m. Upon re-entry to the N4 Lucan Road alignment on the eastbound approach, a single-lane carriageway of approximately 4.0m in width severs the preceding bus lane for approximately 170m before returning to bus lane.

These junctions are illustrated in Image 5.7 and Image 5.8.

Image 5.7 N4 Lucan Road and Liffey Valley Eastbound Junctions, West Section

Image 5.8 N4 Lucan Road and Liffey Valley Eastbound Junctions, East Section

On the westbound approach, a single-lane exit of approximately 3.5m splits into two arms to provide left and right-hand turns via the subsequent roundabout. Upon re-entry to the N4 Lucan Road along the westbound alignment, a 4.0m lane merges with the carriageway following a relatively short slip lane of approximately 50m. This severs the bus lane for a distance of 140m.

These junctions are illustrated in Image 5.9 and Image 5.10.

Image 5.9 N4 Lucan Road and Liffey Valley Westbound Junctions, East Section

Image 5.10 N4 Lucan Road and Liffey Valley Westbound Junctions, West Section

N4 Lucan Road / M50 Junction 7: Along the final extent of this section, the radial alignment of the N4 Lucan Road traverses the M50 to become the R148 Palmerstown/Chapelizod Bypass. On the eastbound approach, the typical three-lane and bus lane carriageway splits into a four-arm and bus lane entry to Junction 7. The two right-most of these lanes provide southbound access to the M50, whilst the two left-most lanes provide cross-carriageway access to the R148 Chapelizod Bypass. This two-lane carriageway is approximately 7.5m in width, widening to approximately 11m along the 140m merging area from M50 northbound traffic.

This junction is illustrated in Image 5.11.

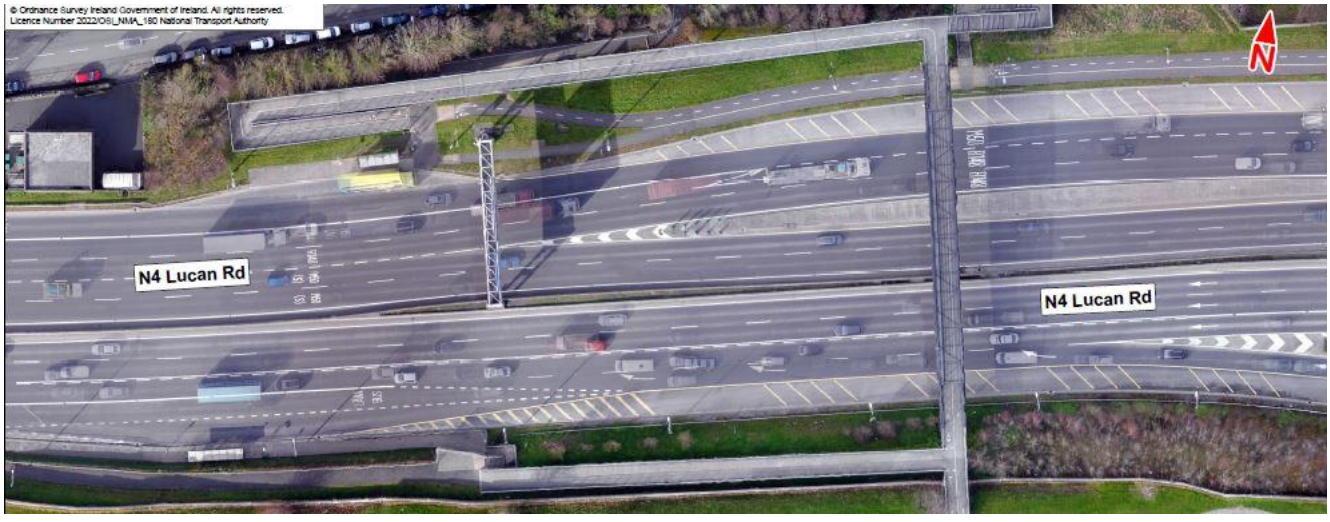

Image 5.11: N4 Lucan Road / M50 Junction 7 Eastbound Junctions

On the westbound approach a two-lane carriageway crosses the M50 carriageway at Junction 7 from R148 Chapelizod Bypass. This widens to approximately 11m when M50 southbound traffic merges with its alignment. From this merge point, three lanes are maintained for a distance of 285m, before the left-most lane is given bus priority. Following this westbound crossing of the M50, its northbound traffic merges with the N4 Lucan Road westbound alignment, breaking the preceding bus lane for a distance of 115m before it is resumed.

The existing layouts of these junctions are illustrated in Image 5.12 and Image 5.13.

Image 5.12 N4 Lucan Road / M50 Junction 7 Westbound Junctions, East Section

Image 5.13 N4 Lucan Road / M50 Junction 7 Westbound Junctions, West Section

5.3.2.5 Existing Car Parking / Loading

There is no parking or loading directly on the N4 Lucan Road.

On Hermitage Road, there is informal residential parking along the kerb, however, most residential properties have private off-street parking in driveways.

On Old Lucan Road between the R113 Fonthill Road North and the M50 Interchange, there is currently the following parking provision:

- There are currently approximately 78 informal, unmarked parking spaces on the south side of Lucan Old Road in the vicinity of the Deadman's Inn. The parked cars in this location appear to comprise primarily of customers accessing the nearby commercial / restaurant land uses, but also include commuters either parking to use bus services, or to car share with other drivers.
- Approximately 50 parking spaces in the car park at The Deadman's Inn.
- A further 81 informal, unmarked, parking spaces are located on both sides of the Old Lucan Road, between the roundabout at Junction 2 of the N4 and the King's Hospital School. Observations suggest that parked vehicles appear to relate to either commuters using the bus services on the N4, or customers accessing the Liffey Valley Shopping Centre via the footbridge.

5.3.3 Section 2 – M50 Junction 7 to R148 Con Colbert Road – Palmerstown bypass and Chapelizod bypass

This section outlines the baseline environment for walking, cycling, bus services, general traffic and parking / loading facilities along Section 2 of the Proposed Scheme, between Junction 7 of the M50 and its junction with the R148 Con Colbert Road, in the vicinity of Kilmainham. This section is approximately 4.8km in length and runs along R148 Palmerston / Chapelizod Bypass, traversing the M50 and passing to the south of Palmerstown Village. The route then bypasses Chapelizod to the north, as well as Ballyfermot, and Inchicore to the south, before ending at the R833 Con Colbert Road junction to Kilmainham / Inchicore.

5.3.3.1 Pedestrian Infrastructure

In relation to the surrounding land use, the pedestrian facilities along Section 2 of the Proposed Scheme are considered to be adequate and reflect the inter-urban nature of much of the route. Eastbound from the M50, there is no footpath provision along the R148 Palmerston Bypass until the road meets Kennelsfort Road Upper / Lower, where it provides access to the northern and southern portions of Palmerstown Village. Eastbound from Kennelsfort Road Upper / Lower, there is a footpath on the southern side of the R148 Chapelizod Bypass up to The Oval.

Between The Oval and the R112 Lucan Road off-slip, there are footpaths of approximately 2.0m wide on both sides of the road. Beyond which, there are no further footpath facilities directly alongside the R148 Chapelizod Bypass for the remainder of Section 2 of the Proposed Scheme.

Along Old Lucan Road which runs parallel to the R148 Palmerstown Bypass on the northern side, there are footpaths of approximately 2.0m on both sides of the road.

The section of footpath on the northern side of the carriageway between Old Lucan Road at the eastern end of Palmerstown Village and the R112 Lucan Road is approximately 3.0m wide and is a shared facility for pedestrians and cyclists.

There are several pedestrian crossings along Section 2 of the Proposed Scheme, both signalised and uncontrolled. Controlled or grade-separated crossing facilities can be found at the following locations:

- There is a cross-carriageway shared pedestrian / cycle bridge over the M50 to the north of the M50 interchange, connecting Old Lucan Road. It has a compliant usable width of 3m.
- Another cross-carriageway pedestrian bridge provides north-south movement from Palmerstown Village to the residential areas south of the R148 Palmerstown Bypass, perpendicular to the Kennelsfort Road Upper / Lower Junction;
- At the R148 Palmerstown Bypass / Kennelsfort Road Lower junction, signalised pedestrian crossing facilities are provided across Kennelsfort Road Lower, and the eastern arm of the R148.
- At the R148 Palmerstown Bypass / The Oval junction, signalised pedestrian crossing facilities are provided across the eastern arm of the R148. Crossings across Old Lucan Road and The Oval are uncontrolled.
- There is a cross-carriageway pedestrian bridge over the R148 Chapelizod Bypass approximately 400m west of the R833 Con Colbert Road, linking the Liffey Valley Tow Path with the Liffey Gaels Park and residential / commercial amenities of Ballyfermot and Inchicore.

There are also several uncontrolled pedestrian crossings along Section 2 of the Proposed Scheme which benefit from tactile paving and dropped kerbs.

The location of controlled and uncontrolled pedestrian crossings along Section 2 of the Proposed Scheme are shown in Figure 6.3b in TIA Appendix 3 (Maps).

5.3.3.2 Cycling Infrastructure

Continuous shared bus / cycle lanes commence approximately 520m to the east of the M50 interchange and continue along the R148 Palmerstown / Chapelizod Bypass for the full length of Section 2 of the Proposed Scheme. For a section of approximately 350m along the northern side of the R148 there is an off-road shared

facility for pedestrians and cyclists between the eastern end of the Palmerstown Bypass and the western end of the Chapelizod Bypass.

There are no cycle facilities along Old Lucan Road or Kennelsfort Road Lower. There is a cycle lane on Kennelsfort Road Upper on the approach to the R148 junction. There are no cycle parking nor designated cycle hire scheme parking racks within Section 2 of the Proposed Scheme.

The existing cycle facilities along Section 2 of the Proposed Scheme are illustrated in Figure 6.4b in TIA Appendix 3 (Maps).

5.3.3.3 Bus Infrastructure

5.3.3.3.1 Bus Priority Measures

The following bus priority measures are present:

- Dedicated bus lanes on the R148 Palmerstown / Chapelizod Bypass eastbound, commencing at a point 170.0m west of Kennelsfort Road Lower, and continuing to the R833 Con Colbert Road; and
- Dedicated bus lanes on the R148 Palmerstown / Chapelizod Bypass westbound, commencing at R833 Con Colbert Road, and continuing to a point 170.0m west of Kennelsfort Road Upper.

5.3.3.3.2 Bus Stop Facilities

There are currently five bus stops along Section 2 of the Proposed Scheme. The inbound stops are:

- Stop 2241 on R148 Palmerstown Bypass, 75m to the east of Kennelsfort Road Lower; and
- Stop 2242 on R148 Palmerstown Bypass, 60m to the east of the Lucan Road junction.

The outbound stops are:

- Stop 2201 on R148 Palmerstown Bypass, 50m to the west of the Parkway West filling station;
- Stop 7239 on R148 Palmerstown Bypass, 80m to the west of The Oval; and
- Stop 4401 on R148 Palmerstown Bypass, 60m to the east of Kennelsfort Road Upper.

Bus stops along Old Lucan Road (which runs parallel to R148 Palmerstown Bypass), and Kennelsfort Road Lower are as follows:

- Stop 4361 on Kennelsfort Road Lower, 80m to the north of R148 Palmerstown Bypass;
- Stop 2212 on Kennelsfort Road Lower, 120m to the north of R148 Palmerstown Bypass;
- Stop 4360 on Lucan Road, 10m to the west of Robin Villas;
- Stop 7165 on Lucan Road, 70m to the west of Robin Villas,
- Stop 4359 on Lucan Road, 30m to the west of Hollyville Lawn.
- Stop 4357 on Lucan Road, 140m to the west of Hollyville Lawn.

The level of facilities is detailed in Table 5.5: .

Table 5.5: Section 2 – Availability of Bus Stop Facilities (of a Total Eleven Bus Stops)

Bus Stop Facility	Number of Bus Stops in Baseline with Facility	Percentage of Bus Stops in Baseline with Facility
RTPI	2	18%
Weekly Timetable information	9	82%
Shelter	4	36%
Seating	4	36%

Bus Stop Facility	Number of Bus Stops in Baseline with Facility	Percentage of Bus Stops in Baseline with Facility
Accessible Kerbs	5	45%
Indented Drop Off Area	0	0%

The level of facilities found at each bus stop is considered to be poor. Only 36% of stops have a shelter and / or seating, and less than 20% have real-time information.

The existing bus facilities along Section 2 of the Proposed Scheme are shown Figure 6.5b in TIA Appendix 3 (Maps). The bus services that operate along Section 2 are outlined in Table 5.6: .

Table 5.6: Section 2 – Bus Service Frequency

Service	Route	Typical Service Frequency	
		Weekday	Weekend
C1	Sandymount, Lucan, Ballyowen, Adamstown	20 minutes	30 minutes
C2	Sandymount, Palmerstown, Lucan, Ballyowen, Adamstown	20 minutes	30 minutes
C3	Ringsend, Palmerstown, Lucan, Leixlip, Maynooth, Davidstown	30 minutes	30 minutes
C4	Ringsend, Palmerstown, Lucan, Celbridge, Maynooth	30 minutes	30 minutes
C5	Ringsend, Chapelizod, Lucan, Leixlip, Dodstown	5 services (all between 0:35 and 4:35)	5 services (all between 0:35 and 4:35)
C6	Ringsend, Chapelizod, Lucan, Cellbridge, Maynooth	5 services (all between 0:05 and 4:05)	5 services (all between 0:05 and 4:05)
18	Palmerstown, Ballyfermot, Crumlin, Ballsbridge, Sandymount	20 minutes	30 minutes
26	Merrion Square, Phoenix Park, Islandbridge, Chapelizod, Palmerstown, Liffey Valley	15 minutes	20 minutes
P29	Ringsend, Palmerstown, Ballyowen, Lucan, Adamstown	4 Services	No Services
D51	Dublin City, Ronanstown, Nangor, Clondalkin	1 Service	No Services
52	Ballina, Castlebar, Tuam, Eyre Square	3 hours	3 hours
A76	Tallaght, Clondalkin, Ronanstown, Palmerstown, Ballyfermont, Blanchardstown	7 Services	7 Services

The bus stops in this section serve Dublin Bus, Bus Éireann, and BÉ Expressway routes, providing access to Heuston Station, Merrion Square, Sandymount and express access to University College Dublin (UCD). There are regional services also available, linking this section to Mullingar, Ballina, and Sligo.

5.3.3.4 General Traffic

The existing major junctions along Section 2 of the Proposed Scheme comprise the following:

- M50 Junction 7 / R148 Palmerstown Bypass;
- R148 Palmerstown Bypass / Kennelsfort Road;
- Kennelsfort Road Lower / Old Lucan Road;
- R148 Palmerstown Bypass / The Oval;
- R148 Chapelizod Bypass / R112 Lucan Road;
- R148 Chapelizod Bypass / R112 Kylemore Road (Ballyfermot); and

- R148 Chapelizod Road / R833 Con Colbert Road.

The characteristics of each major junction is described in turn below, alongside satellite images which are extracts from Figure 6.6 in TIA Appendix 3 (Maps).

M50 Junction 7 / R148 Palmerstown Bypass: On the eastbound approach, the M50 provides access from the north via a single-lane, which is approximately 4.0m in width. From the south and western routes (M50 and N4, respectively), access is provided via a two-lane carriageway, approximately 6.5m in width. On the westbound approach, these dimensions and alignments are mirrored. This portion of the section is subject to 60km/h speed limits in both directions. The M50 Junction 7 / R148 Palmerstown Bypass is illustrated in Image 5.14.

Image 5.14 M50 Junction 7 / R148 Palmerstown Bypass Junction

R148 Palmerstown Bypass / Kennelsfort Road: The R148 Palmerstown Bypass intersection with Kennelsfort Road represents the most complex of junctions along this section. On the eastbound approach, Kennelsfort Road provides access to Palmerstown Village through a left-turn in the north, and the residential core of Palmerstown via right-turn in the south.

This access is facilitated by a four-arm carriageway on the eastbound side. With a total carriageway width of 15.0m on this side, the central two lanes provide onwards eastward movement at the signalised junction. The left-turn into Palmerstown Village is provided via one lane which severs the bus lane 50.0m prior to the junction. The traffic is signalised at a recess of 20.0m before the junction entrance.

The right-turn into south Palmerstown is facilitated by a feeder lane of 130.0m in length and is signalised separately from the left turn lanes.

The westbound approach turns onto Kennelsfort Road mirror that of the eastbound. Access to R148 Palmerstown Bypass from Kennelsfort Road is facilitated by a 3.0m wide slip lane from the south (adjacent to a 3.0m wide north-south lane along Kennelsfort Road). From the north, access to the R148 Palmerstown Bypass is facilitated by a two-arm carriageway, providing eastbound and westbound access via signalised junction. The Kennelsfort Road Junction is illustrated in Image 5.15.

Image 5.15 R148 Palmerstown Bypass / Kennelsfort Road Upper and Lower Junction

Kennelsfort Road Lower / Old Lucan Road: This is a simple priority junction, located 160m to the north east of the R148 Palmerstown Bypass / Kennelsfort Road junction. Kennelsfort Road Lower forms the minor arm. Each of the roads has a single lane approach, and yellow box markings are present across the whole junction. The Kennelsfort Road Junction is illustrated in Image 5.16.

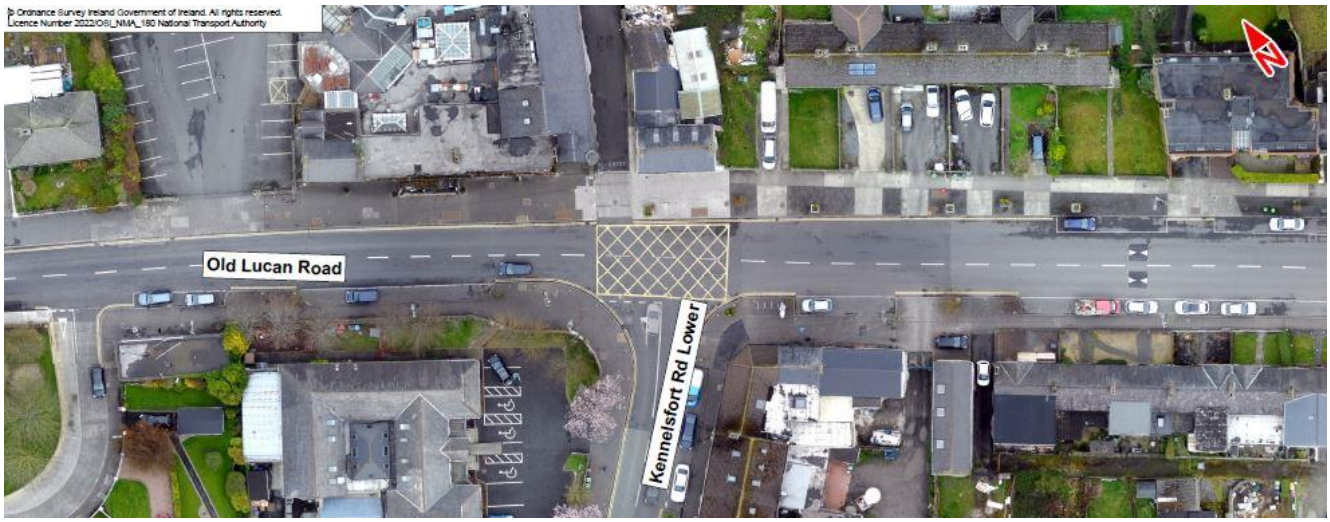

Image 5.16: Kennelsfort Road Lower / Old Lucan Road Junction

R148 Palmerstown Bypass / The Oval: This junction on the eastbound progression of this section is located at the access to The Oval / Palmerstown Drive to the south and Lucan Road to the north. From the R148 Palmerstown Bypass, the right-turn to The Oval from the eastbound side is facilitated by a four-arm junction (including bus lane) approximately 14.0m in width. A right-turn signalised feeder lane approximately 100.0m in length provides flows into a single-lane entrance to The Oval and Palmerstown Drive. There is no entry to Lucan Road from the R148 Palmerstown Bypass as it is one-way.

From The Oval / Palmerstown Drive, left and right-hand turns are permitted through lanes approximately 3m in width. Both turns are signalised and influenced by the staggered toucan crossings on the eastern arm of the junction.

On the westbound approach of the section, left-turn access to The Oval is facilitated by a 3.5m width lane which forms part of a three-arm approach to the junction, severing a bus lane approximately 100m prior to the junction entrance. There is also a feeder lane approximately 30m in length. The Oval Junction is illustrated in Image 5.17.

Image 5.17 R148 Palmerstown Bypass / The Oval Junction

R148 Chapelizod Bypass / R112 Lucan Road: The R148 Chapelizod Bypass provides access to Chapelizod Village via a left-turn arm of approximately 70m on its eastbound approach. This arm is approximately 3.5m in width. This junction is shown in Image 5.18.

Image 5.18 R148 Chapelizod Bypass / R112 Lucan Road Junction

This portion of R148 Chapelizod Bypass is characterised by the express nature of the radial route, whereby there are few entrance / exits points, and no mid-point junctions or interruptions.

The carriageway is two-lane in both directions, in addition to a bus lane on both the eastbound and westbound carriageways. Both directions average 9.5m to 10.0m in carriageway width and are subject to an 80km/h speed limit and 60km/h in areas adjacent to junctions, detailed below.

R148 Chapelizod Bypass / R112 Kylemore Road (Ballyfermot): There is a single-lane carriageway in addition to a bus lane which merges with the R148 Chapelizod Bypass on its westbound direction. This is approximately 6.5m in width, and the entry lanes are provided with a 2m buffer upon merging with R148 Chapelizod Bypass to protect adjacent traffic against the out-swing of bus traffic. The westbound junction from Ballyfermot is illustrated in Image 5.19.

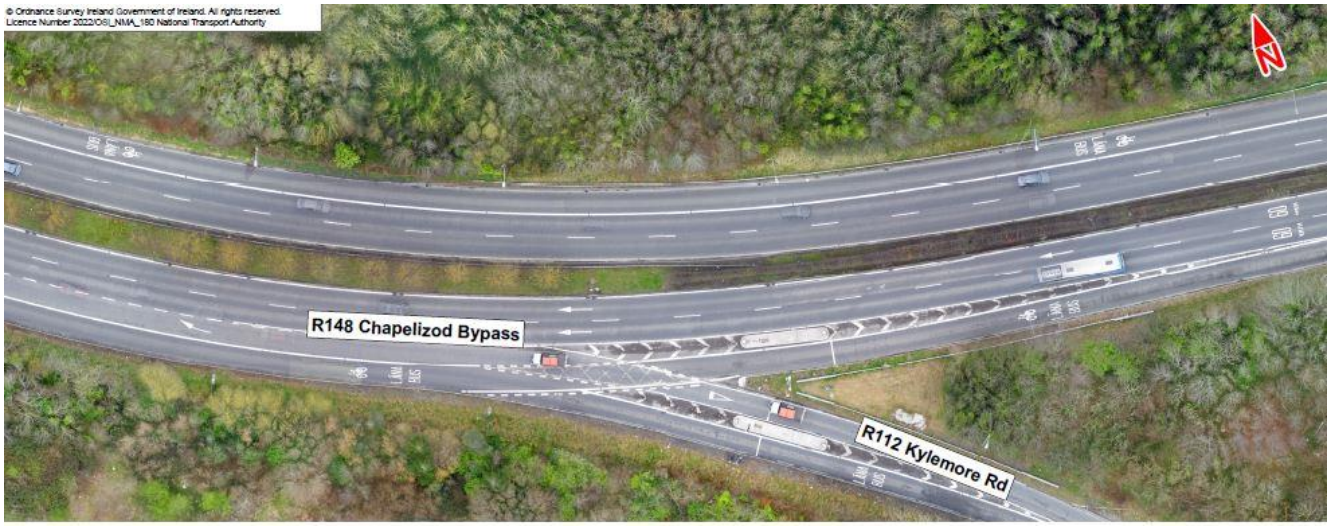

Image 5.19 Ballyfermot Junction (Westbound)

R148 Chapelizod Road / R833 Con Colbert Road: The remaining segment of the R148 Chapelizod Bypass along this section is comprised by two junctions providing access to and from R833 Con Colbert Road. On the eastbound approach, R833 Con Colbert Road feeds the R148 Chapelizod Bypass via a right-turn two-lane carriageway, approximately 7.5m in width and a signalised junction. On the westbound approach, the R148 Chapelizod Bypass provides left-turn access to R833 Con Colbert Road from the bus lane, which is severed at a 12m recess to the turn entrance. The R833 Con Colbert Road provides a left-turn access point to the R148 Chapelizod Bypass from a 4m wide feeder lane at a signalised junction. The junction with R833 Con Colbert Road is shown in Image 5.20 and Image 5.21.

Image 5.20 R833 Con Colbert Road Junction (West)

Image 5.21: R833 Con Colbert Road Junction (East)

5.3.3.5 Existing Parking and Loading

There is no parking or loading directly along the R148 Chapelizod Bypass.

On Old Lucan Road between the M50 Interchange and the R148 Chapelizod Bypass / Lucan Road junction, and on Kennelsfort Road Lower, between Old Lucan Road and R148 Chapelizod Bypass, the existing conditions for parking and loading are as follows:

- There is currently space for approximately 194 vehicles to park informally on Old Lucan Road between the M50 interchange and Palmerstown Village (Kennelsfort Road Lower) in unmarked, kerbside locations. Just over half of this space is on the north side of the road, where there is space for approximately 106 vehicles;
- There are currently 18 permit / pay & display spaces and one disabled space on Kennelsfort Road Lower; and
- Between Palmerston Village and R148 Palmerstown Bypass, there are currently 62 permit / pay & display spaces on Lucan Old Road, which are located in parallel bays to both the north and south of the road. There are also two disabled spaces on the north kerb in this section.

5.3.4 Section 3 – R148 Con Colbert Road to City Centre (Frank Sherwin Bridge) – Con Colbert Road and St John's Road West

This Section outlines the baseline environment for walking, cycling, bus services, general traffic and parking / loading facilities along Section 3 of the Proposed Scheme, between the junction with the R148 Con Colbert Road and Frank Sherwin Bridge.

This section of the Proposed Scheme is approximately 2.0km in length and comprises the final segment of the R148 Chapelizod Bypass, passing through Kilmainham and Islandbridge, before terminating alongside Heuston Station before Frank Sherwin Bridge.

5.3.4.1 Pedestrian Infrastructure

There are considered to be adequate pedestrian facilities along this section as there are footpaths on either side of the carriageway of approximately 1.8m wide and street lighting throughout.

On the southern side of the R148 Con Colbert Road / St John's Road West, the surrounding land use is predominantly residential while the area to the north is characterised by public amenities such as Heuston Station and the Irish National War Memorial Gardens. The railway line runs parallel to the road between the R148 Con Colbert and the residential areas to the south, before running underneath the R148 Con Colbert Road / R111

South Circular Road / R148 So John's West Road junction to continue along the northern side of the R148 St John's Road West.

There are several pedestrian crossings along Section 3 of the Proposed Scheme, both signalised and uncontrolled. Controlled or grade-separated crossing facilities can be found at the following locations:

- At the R148 Con Colbert Road / R839 Memorial Road signalised junction, there are signalised crossings on the western arm of R148 Con Colbert Road and the R839 Memorial Road arm, The R148 Con Colbert Road crossing is staggered in two stages and with refuge island and guardrails;
- At the R148 Con Colbert Road / R111 South Circular Road signalised junction, signalised pedestrian crossings are present across all arms. The crossing of the R111 South Circular Road South arm is staggered in two stages. The R148 Con Colbert Road West arm and R111 South Circular Road North arm crossings are three stages. The R148 Con Colbert Road East crossing is in four stages;
- At the R148 St John's Road West / Heuston South Quarter (HSQ) Car Park signalised junction, there are signalised pedestrian crossings provided on the eastern arm of the R148 St John's Road West which is staggered in three stages with two guardrails, and the HSQ access staggered in two stages with a traffic island;
- At the R148 St John's Road West / Military Road signalised junction, signalised pedestrian crossings are provided on the eastern arm of the R148 St John's Road West, which is staggered in two stages with and guardrails, and on the HSQ access (direct crossing);
- There are two pelican crossings of the R148 St John's Road West at Heuston Station. The first is opposite the southern entrance to the station, the second provides access to the main entrance on the east side of the building. Both crossings are staggered in two stages and have a central refuge island with guardrails; and
- At the R148 St John's Road West / Victoria Quay / Frank Sherwin Bridge where the Proposed Scheme ends, there is a signalised crossing of R148 St John's Road which is staggered in two stages with guardrails. The crossing of the R148 St Johns Road left turn lane (onto Victoria Quay) is uncontrolled, as is the crossing of the Victoria Quay arm.

The location of controlled and uncontrolled pedestrian crossings along Section 1 of the Proposed Scheme are shown in Figure 6.3c in TIA Appendix 3 (Maps).

5.3.4.2 Cycling Infrastructure

Between R148 Con Colbert Road and the R111 South Circular Road junction, there are shared bus / cycle lanes in both directions on R148 Con Colbert Road, apart from a short westbound section to the west of Con Colbert Road, where an on-road cycle lane is present.

At the R148 St John's Road / R111 South Circular Road junction, there is an on-road cycle lane on the R148 which travels eastbound through the junction and continues for approximately 100m beyond the junction where the shared bus / cycle lane recommences. The shared bus / cycle lane continues eastbound until Military Road, after which. a 1.5m wide cycle lane begins and runs for the remainder of Section 3 of the Proposed Scheme. On the R111, cycle lanes through the junction in both directions are present, separated from the vehicle lanes by bollards.

Travelling westbound from Heuston Station there is a 1.5m wide cycle lane that runs as far as the HSQ Access junction, which then becomes a shared bus / cycle lane, terminating approximately 110.0m west of the R148 St John's Road / R111 South Circular Road junction. The shared bus / cycle lane then begins again approximately 75m to the west of the junction and continues westbound to the R148 Con Colbert Road (the beginning of Section 3 of the Proposed Scheme).

Cycle parking is present at Heuston Station with five Sheffield stands (accommodating 10 bicycles) on the south side of the R148 St. John's Road West, and eight Sheffield stands (accommodating 16 bicycles) on the north side of the carriageway. There are also approximately 18 Sheffield stands (accommodating 36 bicycles) to the rear of the station near to the River Liffey, and a Dublin Bike stand of 24 bicycles on the south quay, immediately west of Seán Heuston Bridge.

The existing cycle facilities along Section 3 of the Proposed Scheme are illustrated in TIA Appendix 3 (Maps).

5.3.4.3 Bus Infrastructure

5.3.4.3.1 Bus Priority Measures

The following bus priority measures are present:

- Dedicated bus lanes on the R148 Con Colbert Road eastbound from the R148 Con Colbert Road, breaking as the R148 passes through the R111 South Circular Road junction, then recommencing along the R148 St John's Road West, to the east of the junction, and continuing to Heuston Station; and
- Dedicated bus lanes on the R148 St John's Road West westbound from the HSQ access, breaking as the R148 passes through the R111 South Circular Road junction, then recommencing along the R148 Con Colbert Road, to the west of the junction, and running continuously to the R148 Con Colbert Road.

5.3.4.3.2 Bus Stop Facilities

There are currently six bus stops between R833 Con Colbert Road and Frank Sherwin Bridge. Three of these stops are located on the eastbound direction inbound, and three on the westbound direction, outbound.

The inbound stops are:

- Stop 7435, on R148 Con Colbert Road, 100m to the east of R839 Memorial Road;
- Stop 2722 on R148 Con Colbert Road, 230m to the west of South Circular; and
- Stop 4413 / 135421 at Heuston Station.

The outbound stops are:

- Stop 2637 / 135401 at Heuston Station.
- Stop 2721 on R148 Con Colbert Road, 165m to the west of R111 South Circular; and
- Stop 7012 on R148 Con Colbert Road, 100m to the east of R839 Memorial Road.

Table 5.7: outlines the availability of bus stop facilities at the existing six bus stops along Section 3 of the Proposed Scheme.

Table 5.7: Section 3 – Availability of Bus Stop Facilities (of a Total Six Bus Stops)

Bus Stop Facility	Number of Bus Stops in Baseline with Facility	Percentage of Bus Stops in Baseline with Facility
RTPI	2	33%
Weekly Timetable information	2	33%
Shelter	2	33%
Seating	2	33%
Accessible Kerbs	2	33%
Indented Drop Off Area	0	0%

There is considered to be a poor level of passenger facilities at the existing bus stops along this section as only a third of stops have seating, shelters and timetable information.

The existing bus facilities along Section 3 of the Proposed Scheme are illustrated in Figure 6.5c in TIA Appendix 3 (Maps). The bus services that operate along Section 3 are outlined in Table 5.8:

Table 5.8: Section 3 – Bus Service Frequency

Service Route	Route	Typical Service Frequency	
		Weekday	Weekend
C1	Sandymount, Lucan, Ballyowen, Adamstown	20 minutes	30 minutes
C2	Sandymount, Palmerstown, Lucan, Ballyowen, Adamstown	20 minutes	30 minutes

Service Route	Route	Typical Service Frequency	
		Weekday	Weekend
C3	Ringsend, Palmerstown, Lucan, Leixlip, Maynooth	30 minutes	30 minutes
C4	Ringsend, Palmerstown, Lucan, Celbridge, Maynooth	30 minutes	30 minutes
X25	Bellfield, Donnybrook, Lucan, Maynooth	3-5 services	No Services
X27	Bellfield, Ballsbridge, Coolock, Darndale, Clare Hall	1-2 services	No Services
X28	Bellfield, Donnybrook, Lucan, Celbridge	5 services	No Services
P29	Ringsend, Palmerston, Ballyowen, Lucan, Adamstown	4 services	No Services
X30	Bellfield, Donnybrook, Ballyowen, Lucan, Hillcrest	2 services	No Services
X31	Dublin City South, Palmerstown, Lucan, Leixlip, Louisa Valley	3 services	No Services
X32	Malahide, Portmarnock, Fairview, Dublin Square South, Donnybrook, Bellfield	1 service	No Services
40	Charlestown, Finglas, Glasnevin, Phibsborough, Dublin City South, Ballyfermot, Liffey Valley	15 minutes	20-30 minutes
D51	Dublin City, Ronanstown, Nangor, Clondalkin	1 service	No Services
52	Ballina, Castlebar, Tuam, Eyre Square	3 hours	3 hours
X69	Dublin City South, Tallaght, Rathcoole	1 service	No Services
79	Dublin City, Ballyfermot, Parkwest, Ballyfermot	20-30 minutes	30 minutes
A79	Dublin City, Ballyfermot, Parkwest	30 minutes	30 minutes
845	Birr, Kilcormac, Tullamore, Lucan, Donnybrook, Bellfield	4 services	No Services
847	Portumna, Mucklagh, Maynooth, Lucan, Dublin, Donnybrook, Bellfield	1 service	1 service
860	Temple Bar, Dublin City, Islandbridge, Parkwest	30 minutes	No Services

5.3.4.4 General Traffic

The existing major junction arrangements along Section 3 of the Proposed Scheme comprises the following:

- R148 Con Colbert Road / Memorial Road;
- R148 Con Colbert Road / R111 South Circular Road;
- R148 St John's Road West / HSQ Entrance;
- R148 St John's Road West / Military Road; and
- R148 St John's Road West / Heuston Station / Frank Sherwin Bridge.

The characteristics of each major junction is described in turn below, alongside satellite images which are extracts from Figure 6.6 in TIA Appendix 3 (Maps).

R148 Con Colbert Road / Memorial Road three-arm signalised junction: The first junction encountered on the eastbound approach of this section is at Memorial Road. This one-way, two-lane carriageway is bounded by the R148 Con Colbert Road and Inchicore Road to the south and is 5m in width. Northbound movement only is permitted along this road, with two-lane right-turn access onto the R148 Con Colbert Road provided while the left-turn is permitted from one lane.

The Memorial Road junction is illustrated in Image 5.22.

Image 5.22 R148 Con Colbert Road / Memorial Road Junction

R148 Con Colbert Road / R111 South Circular Road four-arm signalised junction: On the eastbound approach, the R148 Con Colbert Road intersects the R111 South Circular Road with a three-lane carriageway, offering southbound merging with R111 South Circular Road via three signalised junctions along its rotation.

Right-turn access is not permitted from R111 South Circular Road onto the R148 Con Colbert Road. This movement can only be made in the westbound direction via left-turn from the south, and via three signalised junctions from the north.

The R148 Con Colbert Road and South Circular Road intersection is illustrated in Image 5.23.

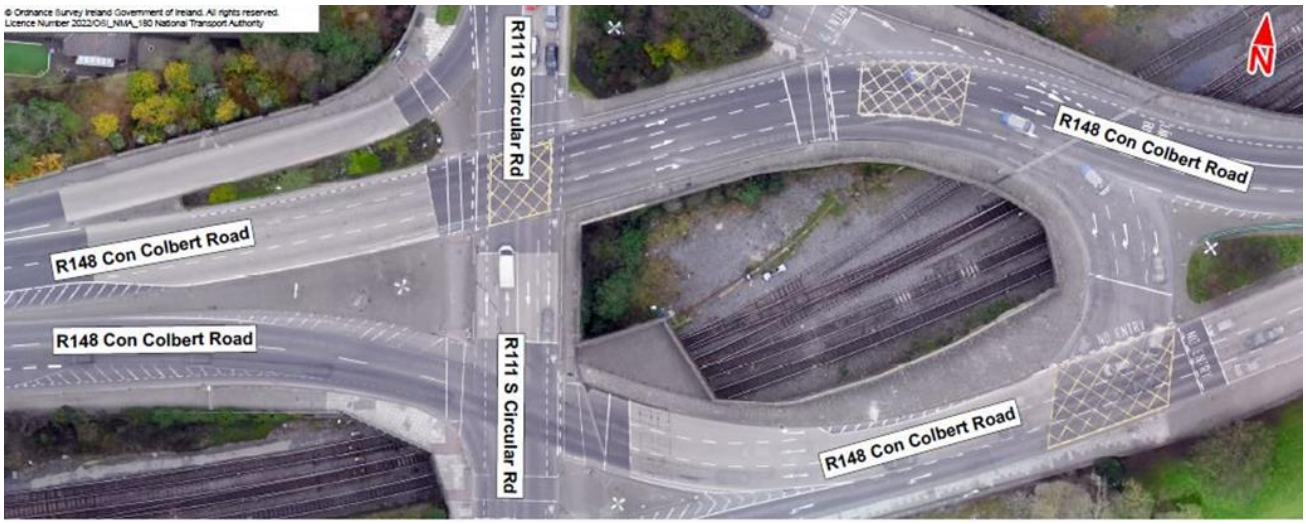

Image 5.23 R148 Con Colbert Road and South Circular Road

R148 St John's Road West / HSQ Entrance three-arm signalised junction: Beyond the R111 South Circular Road on the eastbound approach, the R148 St John's Road West assumes a one-lane carriageway alongside a bus lane, at 8.5m in total width. On the westbound side, there is a two-lane carriageway in addition to a bus lane, with a total width of 9.0m. An additional arm is provided for the right-turn signalised entrance to the HSQ complex, while the left-turn option is accessed via a slip lane approximately 13.0m in length.

The characteristics of this junction are illustrated in Image 5.24.

Image 5.24 R148 St John's Road West / HSQ Entrance

R148 St. John's Road West / Military Road three-arm signalised junction: The signalised junction with Military Road is accessed from both directions. It feeds into the R148 St. John's Road West from the south via two-lane carriageway approximately 6m in width and has a southbound single-lane carriageway of approximately 3.0m in width. The northbound traffic from Military Road at this location is recessed at a depth of 10.0m from the mouth of the junction to allow for the appropriate movement of larger vehicles.

There is a yellow box in the centre of the junction across the R148 St. John's Road West two eastbound traffic lanes. The R148 St. John's Road West and Military Road Junction is illustrated in Image 5.25.

Image 5.25 R148 St. John's Road West and Military Road Junction

R148 St John's Road West / Victoria Quay / Frank Sherwin Bridge four-arm signalised junction: The R148 St John's Road West has two lanes approaching the junction, for straight ahead and left turn movements, and a mandatory cycle lane segregated from the vehicular lanes by bollards. There is no right turn from this arm onto the R148 Victoria Quay (eastern arm) which travels in the westbound direction only. From the R148 Victoria Quay, there are two vehicular lanes and a cycle lane segregated by bollards existing the junction onto the R148 St John's Road West arm. No other arms of the junction allow turning movements onto this arm.

The R148 Victoria Quay eastern arm of the junction has three approach lanes, the left of which is a bus lane alongside a segregated cycle lane. There is a designated cycle lane and priority signals from this arm that routes across the junction to facilitate right turn cycle movements to Frank Sherwin Bridge.

The Victoria Quay western arm has one vehicular lane approaching and existing the junction and cycle lanes in both directions, albeit, only the westbound cycle lane is segregated from vehicles. All traffic is only permitted to turn left onto Frank Sherwin Bridge from Victoria Quay.

The Frank Sherwin Bridge arm is one-way for northbound movements and comprises two wide vehicular lanes and a cycle lane segregated by bollards.

The characteristics of this junction are illustrated in Image 5.26. It is noted that the junction was upgraded in August 2021 and the satellite imagery was taken prior to this, therefore the image below reflects the previous junction layout.

Image 5.26 R148 St John's Road West / Victoria Quay / Heuston Station and Frank Sherwin Bridge

5.3.4.5 Existing Parking and Loading

There is currently the following parking provision on Section 3 of the Proposed Scheme:

- Three Permit parking / Pay and Display spaces, and two EV charging spaces on the south side of St John's Road at Heuston Station;
- Two separate lengths of taxi queuing lanes on the eastbound approach to Heuston Station. The first begins opposite the Royal Hospital Kilmainham Gardens and has space for 20 taxis to queue. The second taxi queuing lane begins after the right-turn entrance to the HSQ complex and has space for 23 taxis. There is also a taxi stand off-road and contained within a continuous bay next to Heuston Station which has space for 18 taxis; and
- There are 10 informal, general, parking spaces on St John's Road, comprising eight spaces at Military Road, and two spaces immediately north of the gardens at the Royal Kilmainham Hospital (RKH).

6. Potential Impacts

6.1.1 Characteristics of the Proposed Scheme

The characteristics of the Proposed Scheme are described in detail in Chapter 4 (Proposed Scheme Description) of this EIAR.

6.1.2 'Do Nothing' Scenario

With regards to this Traffic and Transport chapter, the 'Do Nothing' scenario means there would be no changes to existing transport infrastructure, so infrastructure provision for buses, pedestrians and cyclists would remain the same. The streetscape would continue to be based around the movement and parking requirements of private cars instead of people. High levels of traffic are associated with discouraging pedestrian and cyclist activity and this activity would be further discouraged as traffic congestion remains the same or increases. The baseline

situation of congestion and journey time reliability issues for buses would also continue, and potentially be exacerbated over time as traffic congestion increases in line with travel demand growth.

6.1.3 'Do Minimum' Scenario

The 'Do Minimum' scenario represents the likely traffic and transport conditions of the direct and indirect study areas **without** the Proposed Scheme in place. This scenario forms the reference case by which to compare the Proposed Scheme ('Do Something'). The opening year for the Proposed Scheme is assumed to be 2028, with a design assessment year (opening + 15 years) assumed to be 2043.

For the qualitative analysis the assessment is in relation to the conditions of the existing transport network, which have been outlined in Section 5 (Baseline Environment) corresponding with a Do Nothing scenario. As a result of the COVID-19 pandemic a number of temporary transport mobility measures have been implemented. Due to their temporary status, the measures are not considered a permanent long-term feature of the receiving environment and as such have not been considered in the impact assessments.

For the quantitative analysis (i.e. the transport modelling elements of the impact assessment), the Do Minimum scenario is based on the 'likely' conditions of the transport network and includes for any known permanent improvements or changes to the road or public transport network that have taken place, been approved or are planned for implementation. The transport schemes and demand assumptions within the Do Minimum scenario are detailed below.

6.1.3.1 Do Minimum Transport Schemes

The core reference case (Do Minimum) modelling scenarios (Opening year - 2028 and Design year - 2043) are based on the progressive roll-out of the Greater Dublin Area (GDA) Transport Strategy 2016-2035 (GDA Strategy), with a partial implementation by 2028, in line with National Development Plan (NDP) investment priorities and the full implementation by 2043.

The GDA Strategy provides an appropriate transport receiving environment for the assessment of the Proposed Scheme for the following reasons:

- The GDA Strategy is the approved statutory transportation plan for the region, providing a framework for investment in transport within the region up to 2035;
- The GDA Strategy provides a consistent basis for the 'likely' future receiving environment that is consistent with Government plans and Policies National Planning Framework (NPF) and National Development Plan (NDP); and
- Schemes within the GDA Strategy are a means to deliver the set of objectives of the GDA Strategy. The sequencing and delivery of the strategy is defined by the implementation plan, but the optimal outcome of aiming to accommodate all future growth in travel demand on sustainable modes underpins the Strategy.

The Do Minimum scenarios (in both 2028 and 2043) include all other elements of the BusConnects Programme of projects (apart from the CBC 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+ Programme, Luas Green Line capacity enhancement and the Greater Dublin Area Cycle Network Plan implementation (excluding BusConnects CBC elements). As outlined above, the 2043 Do Minimum scenario assumes the full implementation of the GDA Strategy schemes, so therefore assumes that proposed major transport schemes such as MetroLink, DART+ Tunnel, Luas line extensions to Lucan, Finglas and Bray are all fully operational.

TIA Appendix 1 (Transport Modelling Report) contains further information on the modelling assumptions contained within the Do Minimum scenario including the full list of transport schemes included.

6.1.3.2 Do Minimum Transport Demand

The transport demand changes for the 2028 and 2043 assessment years have been included in the analysis contained within this chapter, using travel demand forecasting, which accounts for increases in population and economic activity, in line with planned growth contained within the NPF, Regional Spatial and Economic Strategy (RSES) for the Eastern and Midland region and the local development plans for the GDA local authorities.

It is envisaged that the population will grow by 11% up to 2028 and 25% by 2043 (above 2016 census data levels). Similarly, employment growth is due to increase by 22% by 2028 and 49% by 2043 (Source: NTA Reference Case Planning Sheets 2028, 2043). The assessment also assumes that goods vehicles (HGVs and LGVs) continue to grow in line with forecasted economic activity with patterns of travel remaining the same. For example, the assessment assumes a 45% and 77% increase in goods traffic versus the base year in 2028 and 2043 respectively.

The GDA Strategy (along with existing supply side capacity constraints e.g., parking availability, road capacity etc.) has the effect of limiting the growth in car demand on the road network into the future. This is shown diagrammatically in Diagram 6.1.

Total trip demand (indicated by the dashed line) will increase into the future in line with demographic growth (population and employment levels etc.). To limit the growth in car traffic and to ensure that this demand growth is catered for predominantly by sustainable modes, a number of measures will be required, that include improved sustainable infrastructure and priority measures delivered as part of the NDP/GDA Strategy. In addition to this, demand management measures will play a role in limiting the growth in transport demand, predominantly to sustainable modes only. The result will be only limited or no increases overall in private car travel demand. The Proposed Scheme will play a key role in this as part of the wider package of GDA Strategy measures.

In general, total trip demand (combining all transport modes) will increase into the future in line with population and employment growth. A greater share of the demand will be by sustainable modes (Public Transport (PT), Walking, Cycling). Private car demand may still grow in some areas but not linearly in line with demographics, as may have occurred in the past.

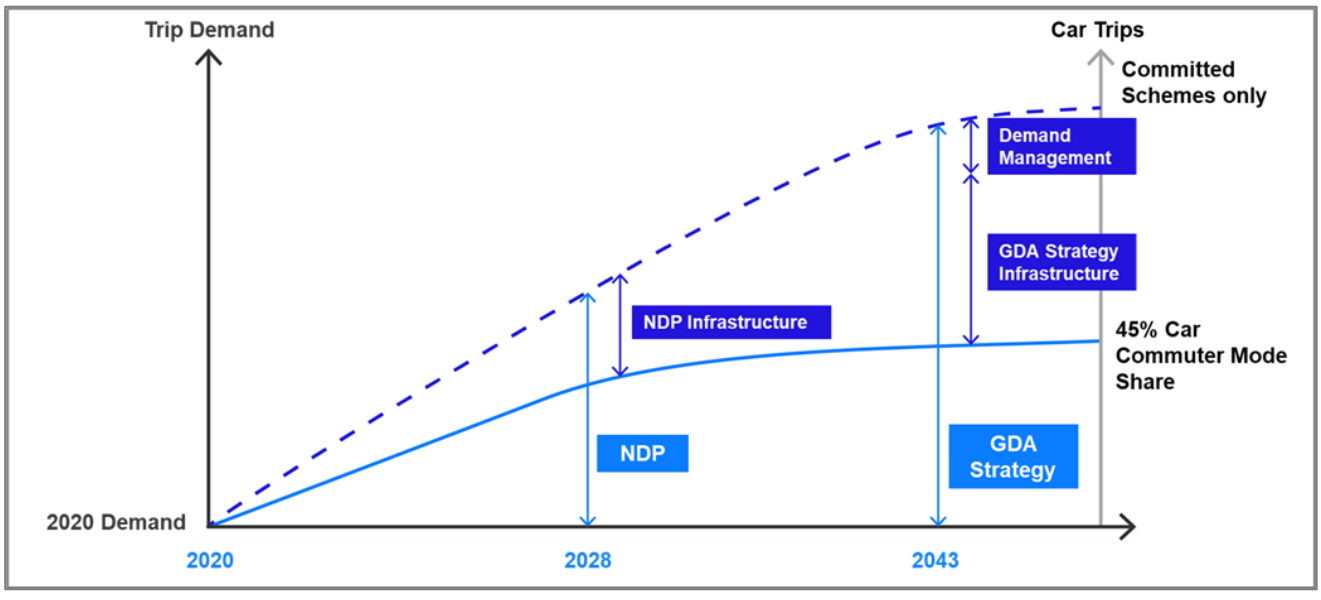

Diagram 6.1 Trip Demand Growth and the GDA Strategy

In terms of the transport modelling scenarios for the traffic and transport assessment, as per the Strategy proposals, there are no specific demand management measures included in the Do Minimum scenario in the 2028 Opening year, other than constraining parking availability in Dublin at existing levels. For the design year, 2043 scenario, a proxy for a suite of demand management measures is included in the Do Minimum in line with the target to achieve a maximum 45% car driver commuter mode share target, across the GDA, as outlined in the Strategy.

6.1.4 'Do Something' Scenario

The Do Something scenario represents the likely conditions of the direct and indirect study areas with the Proposed Scheme in place. The traffic and transport elements of the Proposed Scheme are presented in detail in Chapter 4 (Proposed Scheme Description) of the EIAR.

6.2 Construction Phase

This section considers the potential temporary traffic and transport impacts that construction of the Proposed Scheme will have on the direct and indirect study areas during the construction phase.

Chapter 5 (Construction) has been prepared to demonstrate the likely approach that will be taken to construct the Proposed Scheme, while it also provides an overview of the construction activities necessary to undertake the works, including information on proposed Construction Compounds, construction plant and equipment. This assessment, as outlined herein, provides an overview of the potential traffic and transport impacts of the Construction Phase based on the information set out in Chapter 5 (Construction).

A Construction Environmental Management Plan (CEMP) has also been prepared and is included as Appendix A5.1 in Volume 4 of this EIAR. The CEMP will be updated by the NTA prior to the commencement of the Construction Phase, so as to include any additional measures required pursuant to conditions attached to any decision to grant approval. The CEMP has regard to the guidance contained in the TII Guidelines for the Creation, Implementation and Maintenance of an Environmental Operating Plan, and the handbook published by Construction Industry Research and Information Association (CIRIA) in the UK, Environmental Good Practice on Site Guide, 4th Edition (CIRIA 2015).

All of the content provided in the CEMP will be implemented in full by the appointed contractor and its finalisation will not affect the robustness and adequacy of the information presented and relied upon in this EIAR.

As with any construction project, the appointed contractor will be obliged to prepare a comprehensive Construction Traffic Management Plan (CTMP). In preparing the CTMP for the proposed works, the appointed contractor will be required to give consideration where practicable to facilitate and identify opportunities for the maximum movement of people during the construction period through implementing the following hierarchy of transport mode users:

- Pedestrians;
- Cyclists;
- Public Transport; and
- General Traffic.

Access will be maintained for emergency vehicles along the Proposed Scheme, throughout the Construction Phase.

6.2.1.1 Description of Construction Works

The Proposed Scheme has been divided into three principal sections. The division line between sections has been determined by grouping similar carriageway types together. These sections have been further subdivided into seven sub-sections, according to the types of construction works required. The sections / sub-sections are the following (as shown in Diagram 6.2: Locations of Proposed Construction Subsections).

Table 6.1: Proposed Construction Subsections

Proposed Scheme Sections	Construction Phase Subsections	Extent of Works
N4 Junction 3 to M50 Junction 7 – N4 Lucan Road	Section 1a – R136 Ballyowen Road	400m
	Section 1b – R835 Lucan Road	250m
	Section 1c – Hermitage Road and Hermitage Park, Lucan	600m
	Section 1d - N4 Junction 3 to Junction 2	1,400m
	Section 1e – Old Lucan Road (west of M50)	750m
	Section 1f – N4 Junction 2 to M50 Junction 7	2000m
M50 Junction 7 to R148 Con Colbert Road – Palmerstown bypass and Chapelizod bypass	Section 2a – Old Lucan Road (east of M50) and Kennelsfort Road Lower	1,100m
	Section 2b – R148 Palmerstown Bypass	500m
	Section 2c – R148 Chapelizod Bypass Bus Stops and Chapelizod Hill Road Bridge	Structure
	Section 2d – Remainder of R148 Chapelizod Bypass	Road Marking and Signage
R148 Con Colbert Road to City Centre (Frank Sherwin Bridge)	Section 3a – R148 Con Colbert Road	1,000m
	Section 3b – R148 Con Colbert Road / South Circular Road junction	Junction
	Section 3c – R148 St John's Road West (excluding Heuston Station)	1,000m
	Section 3d – R148 St John's Road West (including Heuston Station)	150m

Given the length and varying nature of each subsection it is proposed to establish several Construction Compounds for the duration of the works. These areas will be used to store construction materials, cater for employee facilities and may also provide limited space for employee parking. Diagram 6.2 illustrates the extent of each subsection of the works.

Diagram 6.2 Locations of Proposed Construction Subsections

6.2.1.2 Construction Programme

An outline, indicative programme for the Proposed Scheme is provided in Chapter 5 (Construction) of Volume 2 of this EIAR. The Proposed Scheme is estimated to require some 24 months (approximately) to complete, however, individual activities will have shorter durations. Works are envisaged to proceed concurrently on multiple work-fronts to minimise the overall construction duration.

6.2.1.3 Construction Route

Access to and egress from the Construction Compounds is envisaged to be along dedicated construction vehicle routes. It is assumed that all national roads and regional roads in the immediate vicinity of the Proposed Scheme would be used by construction vehicles.

The following National Roads and Regional Roads will be utilised as construction vehicle routes during the construction period (as shown in Diagram 6.3):

- National Road Network;
  - M50 Motorway;
  - N4 Lucan Road;

The following regional roads will be utilised as construction vehicle routes during the construction period (as shown in Diagram 6.3.

- Regional Road Network;

- R111
- R112
- R113
- R136
- R148
- R833, and
- R835

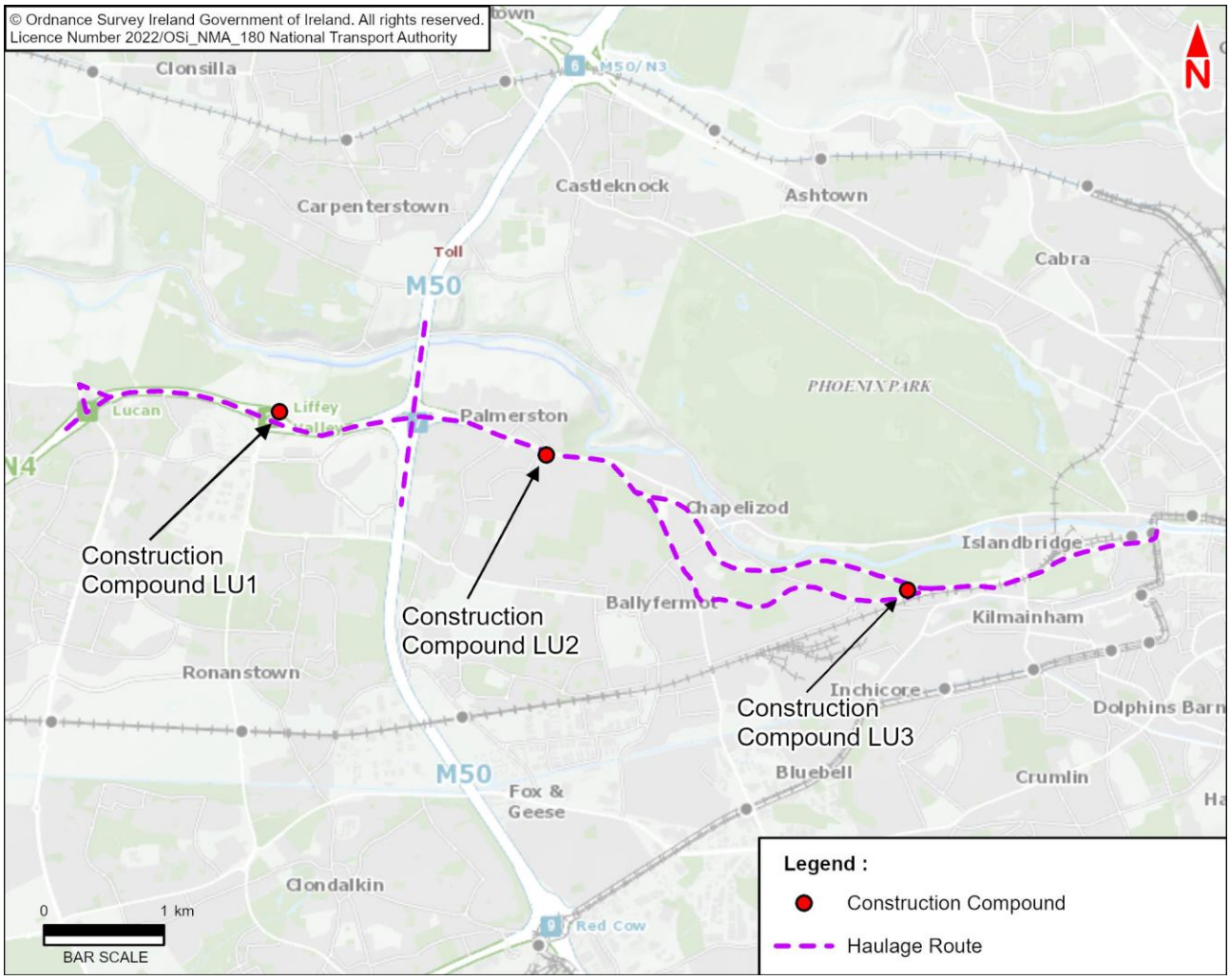

Diagram 6.3 Proposed Construction Routes and Compounds

6.2.1.4 Potential Construction Impact

6.2.1.4.1 Overview

Construction of the Proposed Scheme has the potential to impact people's day-to-day activities along the corridor while the works are underway. Chapter 5 (Construction) and the CEMP (Appendix A5.1 of Volume 4 of this EIAR), identify impactful activities, considers their effect, and identifies mitigation measures to reduce or remove their impact insofar as practicably possible.

For construction activities on or adjacent to public roads, all works will be undertaken in accordance with Department of Transport's 'Traffic Signs Manual, Chapter 8 Temporary Traffic Measures and Signs for Roadworks' and associated guidance. Chapter 5, Construction contains temporary traffic management proposals for the proposed scheme. These proposals maintain safe distance between road users and road workers, depending on the type of construction activities taking place and existing site constraints. Temporary diversions, and in some instances temporary road closures, may be required where a safe distance cannot be maintained to

undertake Works necessary to complete the Proposed Scheme. All road closures and diversions will be determined by the NTA, who may liaise with the local authority and An Garda Siochana, as necessary. The need for temporary access restrictions will be confirmed with residents and businesses prior to their implementation.

6.2.1.4.2 Pedestrian Provisions

As described in Chapter 5 (Construction) pedestrians may be temporarily impacted by construction activities along the Proposed Scheme corridor. Pedestrian diversions and temporary surface footpaths will be used to facilitate pedestrian movements around work areas. Access to local amenities, such as to bus stops, traffic crossings, private dwellings, and businesses, may be temporarily altered but access will be maintained.

Due consideration will be given to pedestrian provisions in accordance with Section 8.2.8 of the DTTS Chapter 8, Temporary Traffic Measures and Signs for Roadworks of the Traffic Signs Manual (DTTS 2019a) and the DTTS Temporary Traffic Management Design Guidance (DTTS 2019b), to ensure the safety of all road users, in particular pedestrians (including able-bodied pedestrians, wheel-chair users, mobility impaired pedestrians, pushchair users etc.). Therefore, where footpaths are affected by construction, a safe route will be provided past the works area, and where practicable, this provision will match existing facilities for pedestrians. Due consideration will also be given to the need for temporary ramps, and measures for accessible users, where changes in elevation are temporarily introduced to facilitate works and footpath diversions. Entrance points to the construction zone will be controlled as required. The impact is considered to be **Low** for pedestrians.

6.2.1.4.3 Cycling Provisions

Cyclists may be temporarily impacted by construction activities along the Proposed Scheme corridor. As part of Temporary Traffic Management arrangements, the appointed Contractor will give due consideration to cyclist provision in accordance with Section 8.2.8 of the DTTS Chapter 8, Temporary Traffic Measures and Signs for Roadworks of the Traffic Signs Manual (DTTS 2019a) and the DTTS Temporary Traffic Management Design Guidance (DTTS 2019b), including the use of site-based risk assessments. Therefore, where 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 cyclists will be made. The impact is considered to be **Medium** for cyclists.

6.2.1.4.4 Public Transport Provisions

Existing public transport routes will be maintained throughout the duration of the Construction Phase of the Proposed Scheme (notwithstanding potential for occasional road closures / diversions as described in Chapter 5 (Construction) of this EIAR. Wherever practicable, bus services will be prioritised over general traffic. However, the temporary closure of sections of existing dedicated bus lanes may be required to facilitate the construction of new bus priority infrastructure that is being developed as part of the Proposed Scheme. Some existing bus stop locations will need to be temporarily relocated to accommodate the works. In such cases, bus stops will be safely accessible to all users and all temporary impacts on bus services will be determined in consultation with the NTA and the service providers. The impact is considered to be **Low** for public transport users

6.2.1.4.5 Parking and Loading

Parking and loading locations may be temporarily impacted by construction activities along the Proposed Scheme corridor. There may be temporary restrictions to on-street parking and loading facilities. The appointed contractor will discuss temporary traffic management measures with the road authority and directly affected residents/business with the aim of minimising disruption. The impact is considered to be **Low** on parking and loading.

6.2.1.4.6 General Traffic Redistribution

The Proposed Scheme will be constructed to ensure the mitigation of disturbance to residents, businesses and existing traffic. Localised temporary lane or road closures may be required for short periods. Details of indicative temporary traffic management measures to facilitate construction of the Proposed Scheme are included in Chapter 5 (Construction). All road closures and diversions will be determined by the NTA, who may liaise with the local authority and An Garda Siochana, as necessary. It should be noted that access will be maintained for emergency vehicles along the Proposed Scheme, throughout the Construction Phase.

Significant impacts due to general traffic redistribution away from the direct study area are not anticipated during the Construction Phase based on the intended nature of the progressive works along the corridor whereby traffic flows are to be maintained in both directions. There may be a requirement for some localised temporary lane closures for short durations of the day, which will involve consultation between the appointed contractor and relevant authorities. A temporary 3-month restriction on through traffic on Chapelizod Hill Road will be required, however, which will be managed with localised diversion routes. Access for general traffic to existing residential and commercial units immediately adjacent to the Proposed Scheme is to be accommodated throughout the Construction Phase.

The appointed contractor will develop a CTMP that gives due consideration to provision of local access requirements and designates appropriate diversion routes in the case where localised temporary closures are required. Overall, for these reasons, the impact on general traffic redistribution is anticipated to be **Medium** due to the temporary nature of any restrictions. The anticipated lane closures, road closures, and diversions that may be required during the Construction Phase of the Proposed Scheme are detailed in Chapter 5 (Construction).

6.2.1.4.7 Construction Traffic Generation

Site Operatives: As described in Chapter 5 (Construction) of this report, there will typically be 250 to 270 staff directly employed across the Proposed Scheme, rising to 300 staff at peak construction.

Typical work hours on site are between 07:00 and 23:00 with staff working across early and late shifts. The adopted shift patterns help minimise travel by personnel during the peak hour periods of 08:00 to 09:00 and 17:00 to 18:00

The appointed contractor will prepare a Construction Stage Mobility Management Plan (CSMMP) which will be developed prior to construction, as described in Appendix A5.1 CEMP in Volume 4 of the EIAR, to actively discourage personnel from using private vehicles to travel to site. The CSMMP will promote the use of public transport, cycling and walking by personnel. Private parking at the Construction Compounds will be limited. Vehicle-sharing will be encouraged, subject to public health guidelines, where travel by private vehicle is a necessity e.g. for transporting heavy equipment. A combination of CSMMP measures, as well as work shift patterns, means that fewer than 10 trips by private vehicle are envisaged to and from site during peak periods.

Heavy Goods Vehicles (HGVs): Additional construction traffic will be generated during the construction phase of the Proposed Scheme, for the purpose of the following:

- Clearance of existing site material and waste;
- Deliveries of construction material;
- Removal of construction waste material.

Chapter 5 (Construction) in Volume 2 of this EIAR, provides a breakdown of the expected operation for the construction of the Proposed Scheme during each subsection. It should be noted that the CTMP will control vehicular movement along the construction route, including restrictions on the number of HGVs accessing and egressing the construction works throughout the day to mitigate the impacts to general traffic on the surrounding road network. Based on construction activities associated with the proposed scheme a maximum of 19 HGV trips will access / egress the construction works during the AM and PM Peak Hours.

Overall Peak Hour Impacts: Table 6.2: identifies the anticipated maximum construction traffic generation by site operatives and HGVs during the AM and PM Peak Hours.

Table 6.2: Anticipated Maximum Construction Traffic Generation during Construction Phase

Peak Hour	Arrivals (veh)		Departures (veh)		Total Two-Way Traffic Flows (vehicles)
	Car / Van	HGV	Car / Van	HGV	
AM Peak Hour	10	19	0	19	48
PM Peak Hour	0	19	10	19	48

Given that the above impacts are below the vehicle thresholds set out in TII's Guidelines for Transport Assessments, it is considered appropriate to define the potential general traffic impacts of the construction phase to be **Low**. Therefore, no further analysis is required for the purpose of this assessment.

6.2.1.5 Construction Phase Summary

Table 6.3 presents a summary of the predicted impacts of the Proposed Scheme during construction phase.

Table 6.3: Summary of Construction Phase Predicted Impacts

Assessment Topic	Effect	Predicted Impact
Walking	Restrictions to pedestrians along Proposed Scheme.	Low Negative
Cycling	Restrictions to cyclists along Proposed Scheme	Medium Negative
Bus	Restrictions to public transport along Proposed Scheme.	Low Negative
Parking and Loading	Restrictions to parking / loading along Proposed Scheme.	Low Negative
General Traffic	Restrictions to general traffic along Proposed Scheme	Medium Negative
	Additional construction traffic flows upon surrounding road network	Low Negative

6.3 Operational Phase

6.3.1 Overview

As previously noted, the impact assessment for the Operational Phase has been outlined in terms of a qualitative (walking, cycling, bus infrastructure and parking / loading) and quantitative (bus journey times / reliability, general traffic and people movements) impact analysis, which are outlined in the following sections.

6.3.2 Qualitative Assessment

6.3.2.1 Qualitative Assessment Methodology

The structure of the qualitative assessment is consistent with the Baseline Environment (Section 5) where the Proposed Scheme has been split into five sections. This has allowed for a more detailed analysis of the quality of the infrastructure proposals per section. The approach for each qualitative assessment is outlined below.

6.3.2.1.1 Pedestrian Infrastructure

The impacts to the quality of the Pedestrian Infrastructure as a result of the Proposed Scheme have been considered with reference to any changes to the existing pedestrian facilities along footpaths and crossing locations within the direct study area. Reference has been made to the overall changes along the full length of the Proposed Scheme and the impact assessment primarily focuses only on the pedestrian facilities at junctions to provide a direct comparison between the Do Minimum and Do Something scenarios.

Where the Proposed Scheme introduces a change to a junction layout, the potential impact on pedestrians has been assessed using a set of criteria, which has been derived from a set of industry standards and guidance listed in Section 3. Table 6.4 outlines the assessment criteria for each junction.

Table 6.4: Pedestrian Junction Assessment Criteria

Aspect	Indicator
Routing	Are pedestrian crossings (signalised or uncontrolled) available on all arms?
Directness	Where crossings are available, do they offer direct movements which do not require diversions or staggered crossings i.e., no or little delay required for pedestrians to cross in one direct movement?
Vehicular speeds	Are there measures in place to promote low vehicular speeds, such as minimally sized corner radii and narrow carriageway lane widths?
Accessibility	Where crossings exist, are there adequate tactile paving, dropped kerbs (or raised table treatment) and road markings for pedestrians (including able-bodied, wheelchair users, mobility impaired and pushchairs)?
Widths	Are there adequate footpath and crossing widths in accordance with national standards?

A LoS rating has been applied to each junction for both the Do Minimum and Do Something scenarios based on whether the above indicators have been met. Table 6.5: displays the LoS rating based on the number of indicators met.

Table 6.5: Pedestrian Junction Assessment LoS

LoS	Indicators Met (of a Total of 5)
A	5
B	4
C	3
D	2
E	1
F	0

When comparing the Do Minimum and Do Something scenarios for pedestrians, the terms outlined in Table 6.6 have been used to describe the potential impact, based on the changes in the Qualitative Pedestrian LoS rating.

Table 6.6: Description of Impact for Pedestrian Qualitative Assessment

Magnitude of Impact	Change in LoS Rating
High	4 to 5
Medium	2 to 3
Low	1
Negligible	0

6.3.2.1.2 Cycling Infrastructure

The potential impacts to the quality of the cycling infrastructure as a result of the Proposed Scheme have been considered with reference to the changes in physical provision for cyclists provided during the Do Minimum and Do Something scenarios. The NTA's National Cycle Manual's Quality of Service (QoS) Evaluation criteria (NTA, 2011) have been adapted for use in assessing the cycling qualitative impact along the Proposed Scheme. The refined cycling facilities criteria are as follows:

- **Segregation:** a measure of the separation between vehicular traffic and cycling facilities;
- **Number of adjacent cyclists / width:** the capacity for cycling two abreast and / or overtaking ('2+1' accommodates two abreast plus one overtaking); and

Junction Treatment: a measure of the treatment of cyclist traffic at existing junctions. Table outlines the assessment criteria with reference to the corresponding LoS ratings.

Table 6.7: Cycling Assessment Criteria

LoS	Segregation	No. of adjacent cyclists/width		Junction treatment
A+	High degree of separation. Minimal delay	2+1	2.5m	Cyclists get green signal priority at signalised junctions / has priority across uncontrolled junctions
A	Well separated at mid-link with some conflict at intersections	1+1	2.0m	Toucan crossings at signalised junctions for cyclists along CBC / Protected junctions not already classified as A+ for junction treatment
B	On-road cycle lanes or carriageway designated as 'quiet cycle routes'	1+1	1.75m	Cyclists share green time with general traffic and cycle lanes continue through the junction, for junctions not already classified as A or A+ for junction treatment
C	Bicycle share traffic or bus lanes	1+0	1.25m	Cyclists share green time with general traffic with cycle facilities (advanced stacking locations / cycle lanes)

LoS	Segregation	No. of adjacent cyclists/width		Junction treatment
				available up to the junction but do not continue through
D	No specific bicycle facilities	1+0	0.75m	No specific bicycle facilities

As the cycle provision varies along the corridor, each section of the Proposed Scheme has been further separated into smaller subsections in order to apply the cycling assessment criteria appropriately.

When comparing the Do Minimum and Do Something scenarios for cyclists, the terms outlined in Table 6.8 have been used to describe the potential impact, based on the changes in the Qualitative Cycling LoS rating.

Table 6.8: Description of Impact for Cycling Qualitative Assessment

Magnitude of Impact	Change in LoS Rating
High	3 to 4
Medium	2
Low	1
Negligible	0

6.3.2.1.3 Bus Infrastructure

The implementation of the Proposed Scheme will result in changes in the quality of bus infrastructure provision along the route, including dedicated bus lanes and bus stop upgrades / relocations. Improvement in bus priority measures will reduce the interaction between buses and general traffic and reduce the likelihood of delays.

The qualitative impact assessment has been undertaken based on the following factors:

- Provision of bus lanes;
- Bus stop provision; and
- Changes to the existing bus stop facilities:
  - Real-time information;
  - Timetable information;
  - Shelters;
  - Seating;
  - Accessible kerbs (containment Kassel kerbs); and
  - Removal of indented drop off areas, where appropriate.

The magnitude of impact of the Proposed Scheme, applied to the qualitative review of the above factors, is set out in Table 6.9.

Table 6.9: Magnitude of Impact for Bus Users Qualitative Assessment

Impact	Description of Impact / Proposed Changes
High positive	Significant benefit for bus stop users with no disbenefits
Medium positive	Positive impact for bus stop users with benefits outweighing any minor disbenefits.
Low positive	Slight benefit for users with benefits outweighing any disbenefits.
Negligible impact	Marginal impact to user buses where any benefits or disbenefits are offset.
Low negative	Slight negative impact for users with disbenefits marginally outweighing benefits.
Medium negative	Negative impact for bus users with benefits not outweighing any disbenefits.

Impact	Description of Impact / Proposed Changes
High negative	Complete removal of provision.

6.3.2.1.4 Parking and Loading

The potential impacts of the Proposed Scheme on parking and loading provision have been assessed through a comparison of the availability of spaces or lengths of bay in the Do Minimum and Do Something scenarios. The assessment considers the impact of any changes on the general availability of parking and loading in the vicinity of the Proposed Scheme. It classifies parking into the following categories:

- Designated Paid Parking;
- Permit Parking;
- Disabled Permit Parking;
- Loading / Unloading (in designated Loading Bays);
- Loading / Unloading (outside designated Loading Bays);
- Taxi Parking (Taxi Ranks);
- Commercial vehicles parked for display (car sales); and
- Informal Parking (i.e. parking alongside the kerb which is unrestricted).

This qualitative assessment has also taken into account nearby parking, which is defined as alternative parking locations along side roads within 200 – 250m of the Proposed Scheme.

Significance ratings for the impacts of any changes in parking provision have been generated for each specific instance of change and for each section of the Proposed Scheme. The ratings are based upon professional judgement and experience and consider:

- The magnitude of change in parking availability;
- The availability of alternative parking; and
- Nearby land uses, such as businesses.

Note that the parking and loading assessment has been undertaken as a qualitative analysis based on the above criteria and does not generate a resulting LoS rating.

6.3.2.1.5 Section 1 – N4 Junction 3 to M50 Junction 7 – N4 Lucan Road

6.3.2.1.5.1 Pedestrian Infrastructure

The key infrastructure improvements to pedestrian links along Section 1 of the Proposed scheme are summarised as follows:

- Provision of a new bridge over the N4 at Junction 3 delivering a separate cycle track and footway, replacing the existing structure;
- Provision of a new uncontrolled raised table crossing at the access to Hermitage Golf Club;
- Proposed resurfacing and upgrade to the footways on Old Lucan Road, and provision of regular raised tables as part of traffic calming measures covering a 670m section in total (Chainage: G50 – H200);
- Provision of a new raised table pedestrian crossing to the east of roundabout which provides access to the Hermitage Medical Clinic;
- A new footbridge (Chainage A2200) which will provide access between Liffey Valley Shopping Centre and the proposed eastbound bus stops on N4 Lucan Road and provision of a new uncontrolled raised table pedestrian crossing of Old Lucan Road linking to the footbridge; and
- Provision of a new raised table pedestrian crossing linking to the existing shared foot / cycle bridge over the N4 Lucan Road to Liffey Valley Shopping Centre which will be retained.

The assessment of the qualitative impacts on the pedestrian facilities at the junctions along Section 1 of the Proposed Scheme are summarised in Table 6.10. A detailed breakdown of the assessment at each impacted junction, including a list of the junctions which experience no change, can be found in TIA Appendix 4.1 (Pedestrian Infrastructure Assessment).

Table 6.10: Section 1 – Pedestrian Qualitative Assessment

Junction	Chainage	Do Minimum LoS	Do Something LoS	Impact
N4 westbound on/off-slips /R136 Ballyowen Road	N368	D	C	Low Positive
R136 Ballyowen Road / R835 Lucan Road	B254	D	B	Medium Positive
N4 / Ballyowen Lane	A700	C	B	Low Positive
N4 / Saint Loman's Hospital Access	A1175	C	B	Low Positive
N4 Lucan Road / Liffey Valley junction (eastbound on / off northern dumb-bell)	A305	E	C	Medium Positive
Section Summary		**D**	**B**	**Medium Positive**

The results in Table 6.10 demonstrate that the Proposed Scheme will have a long-term positive impact on the quality of the pedestrian infrastructure at road junctions within Section 1.

The Do Minimum LoS range between C and E. In the Do Something scenario, three of the five junctions have been assessed as B, as a result of improvements such as the provision of more direct crossings and the incorporation of features which will reduce vehicle speeds. The Proposed Scheme will improve pedestrian facilities at five of the eight junctions assessed.

Overall, a **Medium Positive effect** is anticipated along Section 1 of the Proposed Scheme, during the operational phase.

6.3.2.1.5.2 Cycling Infrastructure

This assessment outlines the changes to the quality of cycling provision along Section 1 of the Proposed Scheme.

The key cycling improvements along Section 1 of the Proposed Scheme can be summarised as follows:

- Provision of a 3.25m wide two-way cycle track over a new bridge structure on the eastern side of R136 Ballyowen Road between the R835 Lucan Road and Hermitage Road where there is currently a 1.2m cycle lane on both sides of the road between the N4 overbridge and R835 Lucan Road, and no provision between the N4 overbridge and Hermitage Road. This will allow continuous two-way cycling, where cyclists currently either use the road, or share with pedestrians.
- Provision of separate and segregated crossing facilities for cyclists and pedestrians at the R136 Ballyowen Road / R835 Lucan Road junction;
- Continuous cycle lanes through the junction at the R136 Ballyowen Road / Hermitage Road junction, including a right turn lane for cyclists travelling northbound along the R136 Ballyowen Road South to link to the two-way cycle lane on the eastern side of the R136 Ballyowen Road;
- A proposed continuous 3.0m wide two-way cycle track on the north side of the R835 Lucan Road between R136 Ballyowen Road and N4 Lucan Road, where there is currently no cycle provision. There is a short on-road section along the public road which provides access to Hermitage Golf Club road;
- Heading eastbound, a proposed continuous 3.5m wide two-way cycle track on the north side of N4 Lucan Road between Lucan Bypass and N4 Junction 2
- Heading eastbound, a proposed continuous 3.0m wide two-way cycle track on the south side of the Old Lucan Road between N4 Junction 2 and the existing cycle track that crosses the M50 via an existing overbridge just north of M50 Junction 7. This will include a new toucan crossing of Fonthill Road North at Junction 2 of the N4, linking the two sections of new two-way cycle tracks.

- Currently there is an eastbound shared cycle / pedestrian facility as far as the overbridge near St Andrews Court, and then either a shared bus / cycle lane to M50 Junction 7, or use of the quieter (in terms of traffic levels) Old Lucan Road as an alternative route. The new cycle track will link into the existing N4 pedestrian / cycle bridge that serves the Liffey Valley shopping centre, with ramps providing a step-free link from Old Lucan Road to the N4 Liffey Valley overbridge for cyclists.
- Heading westbound, a proposed 3.5m wide two-way cycle track will be provided on the northern side of the N4 Lucan Road, between Fonthill Road North and the N4 Junction 3. Cyclists will have a choice to stay on the two-way cycle track all the way to the N4 Junction 3, or to go as far as Hermitage Bridge and use the existing shared foot / cycle bridge (St Lomans Footbridge) over the N4 at the Mount Andrews Estate. From the Mount Andrews Estate, cyclists can reach Ballyowen Lane (and the Quiet Street along Hermitage Way) via the network of residential streets and a pedestrian priority link at Mount Andrew Place.
- Formalising a 'Quiet Street' cycle route of 700m in length between the N4 and R136 Ballyowen Road along Ballyowen Lane and Hermitage Road, as an alternative to the N4 westbound off slip. 'Quiet' in this respect refers to streets with lower traffic volumes.

Table 6.11 outlines the cycling qualitative assessment along Section 1 of the Proposed Scheme, which sets out the overall Do Minimum LoS and the Do Something LoS and the impact. TIA Appendix 4.2 (Cycling Impact Assessment) outlines in further detail the methodology behind each LoS rating given to the Do Minimum and Do Something scenarios.

Table 6.11: Section 1 – Cycling Impact during Operational Phase

Location	Chainage	Do Minimum LoS	Do Something LoS	Impact
R136 Ballyowen Road: Hermitage Road to N4 overbridge	B0 – B250	C	A+	High Positive
Lucan Road: R136 Ballyowen Road to N4	C0 – D300	C	A	Medium Positive
N4 Lucan Road: Lucan Bypass to Fonthill Road	A550 – F0	B	A+	Medium Positive
Old Lucan Road: Fonthill Road North to M50 J7	F0 – I500	C	A	Medium Positive
Hermitage Road: R136 Ballyowen Road to Ballyowen Lane		C	B	Low Positive
Section Summary		**C**	**A**	**Medium Positive**

The results in Table 6.11 demonstrate that the Proposed Scheme will have an overall long-term positive impact on the quality of the cycling infrastructure along Section 1.

The LoS for four of the five sub-sections in the Do Minimum scenario has been assessed as C, indicating that the existing facilities are generally adequate, but not of a particularly high standard. The LoS in the Do Something scenario show improvements on every sub-section, with all sub-sections (with the exception of the 'Quiet Street' on Hermitage Road) being brought up to an LoS of A or A+ by the Proposed Scheme, primarily as the result of the introduction of dedicated off-road cycle tracks along the majority of Section 1.

Overall, a **Medium Positive** impact is anticipated along Section 1 of the Proposed Scheme, during the operational phase.

6.3.2.1.5.3 Bus Infrastructure

This assessment outlines the changes to bus stop infrastructure along Section 1 of the Proposed Scheme. It assesses any changes in the number or location of stops, and any changes to bus stop facilities.

There are currently nine bus stops throughout the extent of this section. Four of these stops are located along the N4 Lucan Road eastbound, inbound to the City Centre, and, five are on the westbound, outbound side.

Under the proposals, the existing nine stops, four inbound and five outbound, will be retained.

Double-length bus stops will be provided at Lucan Retail Park (Stop 2234), and at the westbound stop at St Loman's Hospital (Stop 2215). Single bays currently exist at both of these locations.

Triple-length bus stops will be provided on both the eastbound (Stop 2239) and westbound (Stop 2213) carriageways at the stops that serve LVSC, which will be moved some 150m further to the west and will be adjacent to the proposed new footbridge across the N4. This will provide a much more direct route to the shopping centre than the existing footbridge and ramps, and a direct route to the proposed bus interchange at LVSC

Table 6.12 summarises the proposed changes to bus stop facilities in Section 1 of the Proposed Scheme.

Table 6.12: Section 1 – Overview of Changes in Bus Stop Facilities

Bus Stop Facility	Do Minimum		Do Something		Comment
	No. of Stops	Percentage of Stops	No. of Stops	Percentage of Stops	
RTPI	3	33%	9	100%	RTPI added to all bus stops.
Timetable information	8	89%	9	100%	Timetable information added to be provided at all bus stops.
Shelter	7	78%	9	100%	Shelters to be provided at all bus stops.
Seating	5	56%	9	100%	Seating to be provided at all bus stops.
Accessible Kerbs	8	89%	9	100%	Accessible kerbs added to all bus stops.
Indented Drop Off Area	5	56%	6	67%	Stops on the N4 will be located in lay-bys, allowing buses to pull in from this busy route. The remaining stops will be located in-line within bus lanes.
Total Stops	9		9		

All of the stops on the Proposed Scheme route will have real-time information, shelters, seating and accessible kerbs. Six stops will be located in in dented drop-off areas. The remaining three stops are inline within the bus lane.

The lengthening of bus stops at four locations, and improvements in the provision of real-time information, shelters, seating and accessible kerbs throughout Section 1 of the Proposed Scheme is assessed as providing an overall positive impact for bus passengers, particularly those accessing Liffey Valley.

Taking into account the provision of bus lanes, pedestrian accessibility and bus stop facilities outlined within this section, Table 6.13 below outlines the bus qualitative assessment along Section 1 of the Proposed Scheme.

Table 6.13: Section 1 – Bus Qualitative Impact during Operational Phase

Section	Chainage	Description of Impact	Impact
N4 Junction 3 to M50 Junction 7 – N4 Lucan Road	A000 - A2850	Existing stops either retained or slightly relocated. Improvements in the quality of bus stop facilities in this section, particularly in increased provision of real-time information.	Medium positive

The improvement of bus facilities, primarily real-time information and seating, throughout Section 1 of the Proposed Scheme is assessed as providing a **Medium Positive** impact for bus passengers.

6.3.2.1.5.4 Parking and Loading

The Proposed Scheme will impact on existing parking along Section 1. The areas of parking changes are as follows:

- There are currently approximately 78 informal, unmarked parking spaces on the south side of Lucan Old Road in the vicinity of the Deadman's Inn. The parked cars in this location appear to comprise primarily of customers accessing the nearby commercial / restaurant land uses, but also include commuters either parking to use bus services, or to car share with other drivers.
- A further 81 informal, unmarked, parking spaces are located on both sides of the Old Lucan Road, between the roundabout at Junction 2 of the N4 and the King's Hospital School. Observations suggest

that parked vehicles appear to relate to either commuters using the bus services on the N4, or customers accessing the Liffey Valley Shopping Centre via the footbridge.

- Under the proposals, all of the informal spaces on the south side of Lucan Old Road will be removed to allow the provision of a continuous 3m-wide, two-way, cycle track, with the exception of 14 spaces at the eastern end of the road. Parking will be prohibited along the full length of the southern section of the road adjacent to the two-way cycle way to ensure there are no conflicts between parked cars and cycle users. Of the 45 spaces on the north side of the road, 37 will remain. There are 3,600 free parking spaces available at the Liffey Valley Shopping Centre, which is approximately 300m-500m away. Approximately 50 parking spaces in the car park at The Deadman's Inn remain unaffected. These locations represent an alternative option for some of the vehicles parked in the east section of Lucan Old Road. Although the spaces that are lost on Old Lucan Road are not associated within a particular property or commercial business, the number of spaces that are being removed is considered to result in a **Medium** impact.

Table 6.14 presents a summary of the parking and loading spaces during the Do Minimum and Do Something scenarios and the resulting change in parking along Section 1.

Table 6.14: Section 1 – Change in Parking Provision

Street	Parking Type	Number of Parking Spaces		
		Do Minimum	Do Something	Change
Lucan Old Road *(between N4 Junction 2 and M50 interchange)*	Informal	159	51	-108
Total		159	51	-108

As shown in Table 7.14, 159 parking spaces along Section 1 of the Proposed Scheme will be affected, of which 108 spaces will be removed. This is assessed as a **Medium Negative** impact.

6.3.2.1.6 Section 2 – M50 Junction 7 to R148 Con Colbert Road – Palmerstown bypass and Chapelizod bypass

6.3.2.1.6.1 Pedestrian Infrastructure

The key infrastructure improvements to pedestrian links along Section 2 of the Proposed Scheme are summarised as follows:

- Proposed new signalised crossing of the R148 Palmerstown Bypass on the east side of the Kennelsfort Road Lower junction; currently pedestrians have to use the footbridge, which will be retained;
- Proposed resurfacing and upgrade to the footways on Old Lucan Road, and provision of regular raised tables across both Old Lucan Road and side roads as part of traffic calming measures, covering an 800m section in total (Chainage: J100 - J900);
- Provision of three new uncontrolled raised table crossings of Old Lucan Road between the M50 and Riversdale Avenue (Chainage: J250 – J500); one to the east of the existing pedestrian and cycle bridge over the M50 which is to be retained, a second to the west of Hollyville Lawn, and the third to the west of Riverside Drive;
- Provision of two new raised table crossings between Riversdale Avenue and Waterstown Avenue (Chainage: J500 – J750);
- Proposed resurfacing and upgrade to the footways on Old Lucan Road in the vicinity of Kennelsfort Road Lower, covering a 350m section in total (Chainage: K0 – L50);
- A proposed new raised table and toucan crossing of the Old Lucan Road East arm at the priority junction with Kennelsfort Road Lower;
- Provision of a raised table crossing of Old Lucan Road to the west of Mill Lane;
- Proposed resurfacing and upgrade to the footways on the R112 Lucan Road, and provision of regular raised tables as part of traffic calming measures, covering an 300m section (Chainage: A4450 – A4700); and
- A proposed new toucan crossing with a raised table on the R112 Lucan Road approximately 280m east of the R148 Chapelizod Bypass.

The impact assessment for the proposed junction upgrades are outlined in Table 6.15. A detailed breakdown of the assessment at each impacted junction, including a list of the junctions which experience no change, can be found in TIA Appendix 4.1 (Pedestrian Infrastructure Assessment).

Table 6.15: Section 2 – Pedestrian Qualitative Assessment

Junction	Chainage	Do Minimum LoS	Do Something LoS	Impact
Old Lucan Road / Hollyville Lawn	J325	D	B	Medium Positive
Old Lucan Road / Riverside Drive	J430	D	B	Medium Positive
Old Lucan Road / Riversdale Avenue	J500	D	A	Medium Positive
Old Lucan Road / Rose View	J710	D	B	Medium Positive
Old Lucan Road / Waterstown Avenue	J770	D	A	Medium Positive
Old Lucan Road / Kennelsfort Road Lower	J886	C	A	Medium Positive
R148 Palmerstown Bypass / Kennelsfort Road Upper / Lower	A3660	E	B	Medium Positive
Old Lucan Road / Mill Lane	K150	D	B	Medium Positive
R148 Palmerstown Bypass / Old Lucan Road / The Oval	A4000	E	B	Medium Positive
Section Summary		**D**	**B**	**Medium Positive**

The results in Table 6.15 demonstrate that the Proposed Scheme will have a long-term positive impact on the quality of the pedestrian infrastructure at road junctions within Section 2.

The Do Minimum LoS range between C and E, with eight of the ten junctions being assessed as C or D. In the Do Something scenario, the Proposed Scheme will improve pedestrian facilities at each of the ten junctions assessed., with all having an assessed LoS of either A or B. This is a result of substantial improvements in the provision of dropped kerbs and tactile paving, compliant footpath and crossing widths and features which will reduce vehicle speeds, such as raised tables.

Overall, a **Medium Positive** impact is anticipated along Section 2 of the Proposed Scheme, during the operational phase, which aligns with the overarching aim to provide enhanced walking infrastructure on the corridor

6.3.2.1.6.2 Cycling Infrastructure

The key cycling improvements along Section 2 of the Proposed Scheme can be summarised as follows:

- Proposed 3.0m wide two-way cycle tracks along the northern side of Old Lucan Road and the eastern side of Kennelsfort Road Lower and Upper (2.5m-3.0m wide) in the vicinity of the N4 Lucan Road where currently no cycling facilities exist;
- A proposed 2.5m-3.0m wide, two-way cycle track along the northern side of Old Lucan Road between Kennelsfort Road Lower and R112 Lucan Road which connects with Primary Cycle Route 6.
- Provision of toucan crossings at the following locations:
  - On the Old Lucan Road East arm of the junction with Kennelsfort Road Lower; and
  - On Kennelsfort Road Upper immediately south of the junction with the N4 Lucan Road.

- Provision of a two-way signalised cycle crossing alongside (but separate from) the signalised pedestrian crossing on the N4 Lucan Road East arm of the N4 / Kennelsfort Road Upper and Lower four-arm signalised junction;
- Proposed 1.5m-wide contraflow cycle lane travelling eastbound for a section of approximately 135m along the Chapelizod Hill Road which routes underneath the R148 Chapelizod Bypass overbridge; and
- Proposed 2.0m wide cycle tracks in both directions along the R148 Con Colbert Road, leading to the junction with the R148 Chapelizod Road. A cycle lane will be provided through the junction to facilitate right turns for cyclists onto the R148 Chapelizod Road travelling eastbound with a request button for cycle signal.

Table 6.16 presents the impact results for the cycling infrastructure assessment along Section 2 of the Proposed Scheme, which sets out the overall Do Minimum LoS and the Do Something LoS and the impact. TIA Appendix 4.2 (Cycling Impact Assessment) outlines in further detail the methodology behind each LoS rating given to the Do Minimum and Do Something scenarios.

Table 6.16: Section 2 – Cycling Impact during Operational Phase

Location	Chainage	Do Minimum LoS	Do Something LoS	Impact
Old Lucan Road / N4: M50 Junction 7 to The Oval.	I500 – K275	C	A	Medium Positive
Section Summary		**C**	**A**	**Medium Positive**

The results in Table 6.16 demonstrate that between M50 J7 and The Oval junction, the Proposed Scheme will improve the LoS from C to A, introducing cycle facilities where none currently exists. Between The Oval and Con Colbert Road, cyclists will not be permitted to use the Chapelizod Bypass, with no corresponding cycling infrastructure proposed. The primary east-west cycle route in this area is through Chapelizod Village itself.

Overall, a **Medium Positive** is anticipated along Section 2 of the Proposed Scheme, during the operational phase.

6.3.2.1.6.3 Bus Infrastructure

There are currently five bus stops along this section, two inbound and three outbound. Heading outbound from the City Centre, Stop 2201 on R148 Chapelizod Bypass, 50m to the west of the Parkway West filling station, will be removed. This will result in a slight local disbenefit for residents of the area around Palmerstown Drive, for whom the nearest westbound bus stop will be at The Oval, approximately 200m to the west.

Two new double-length stops will be added on R148 Chapelizod Bypass close to Chapelizod Hill Road (which routes underneath the bypass). Ramps and steps will be constructed to link the bus stops with Chapelizod Hill Road to enable pedestrian access. These stops will help provide greater access for residents and businesses from the Chapelizod area to the Proposed Scheme.

The existing bus stops on the R148 Palmerstown Bypass at Kennelsfort Road and The Oval are to be lengthened and relocated to allow the provision of bus lay-bys.

Table 6.17 summarises the proposed changes to bus stop facilities in Section 2 of the Proposed Scheme.

Table 6.17: Section 2 – Overview of Changes in Bus Stop Facilities

Bus Stop Facility	Do Minimum		Do Something		Comment
	No. of Stops	Percentage of Stops	No. of Stops	Percentage of Stops	
RTPI	2	40%	6	100%	RTPI added to all bus stops.
Timetable information	5	100%	6	100%	Timetable information to be provided at all bus stops.

Bus Stop Facility	Do Minimum		Do Something		Comment
	No. of Stops	Percentage of Stops	No. of Stops	Percentage of Stops	
Shelter	4	80%	6	100%	Shelters to be provided at all bus stops.
Seating	4	80%	6	100%	Seating to be provided at all bus stops.
Accessible Kerbs	5	100%	6	100%	Accessible kerbs added to all bus stops.
Indented Drop Off Area	0	0%	6	100%	All stops on the R148 will be located in lay-bys, allowing buses to pull in from this busy route.
Total Stops	5		6		One more bus stop in total along R148 Chapelizod Bypass.

All of the bus stops on the Proposed Scheme will incorporate shelters, seating, real-time information and have accessible kerb, and all will have indented drop-off areas.

In addition to the changes presented above, there will also be changes on Old Lucan Road, which runs parallel to R148 Palmerstown Bypass, and Kennelsfort Road Lower. The bus stops on Old Lucan Road (Stops 4357, 4359, 4360 and 7165) to the west of Kennelsfort Lower will be rationalised into one eastbound and one westbound stop (both inline) that will be located centrally between Mill Lane and Waterstown Avenue.

The two existing stops on Kennelsfort Road Lower (Stops 2212 and Stop 4361) will also be removed as part of the rationalization of bus stops along the corridor.

Taking into account the provision of bus lanes, pedestrian accessibility and bus stop facilities outlined within this section, Table 6.18 below outlines the bus qualitative assessment along Section 2 of the Proposed Scheme.

Table 6.18: Section 2 – Bus Qualitative Impact during Operational Phase

Section	Chainage	Description of Impact	Impact
M50 Junction 7 to Con Colbert Road	A2850 - A7550	New pair of bus stops provided on R148 Chapelizod Bypass close to Chapelizod Hill Road. Improvements in the quality of bus stop facilities in this section. Bus stops on Old Lucan Road and Kennelsfort Road Lower rationalized.	Medium Positive

The provision of the new stops close to Chapelizod Hill Road, along with the improvements to facilities at the existing stops in Section 2 of the Proposed Scheme is assessed as providing an overall Medium positive impact for bus passengers, which takes into account the rationalization of stops on Old Lucan Road and Kennelsfort Road.

The improvement of bus facilities, primarily real-time information and seating, throughout Section 2 of the Proposed Scheme is assessed as providing a **Medium Positive** impact for bus passengers.

6.3.2.1.6.4 Parking and Loading

The Proposed Scheme will impact on existing parking along Section 2 of the Proposed Scheme. The areas of parking changes are as follows:

- There is currently space for approximately 194 vehicles to park informally on Old Lucan Road between the M50 interchange and Palmerstown Village (Kennelsfort Road Lower). All of the 108 spaces on the north side of the road will be removed to accommodate a proposed 3m-wide, 2-way, cycle track to the north of the road. Double-yellow lines will be introduced to prevent any vehicles parking on the kerb and partially blocking the cycle track. All of the existing informal and paid parking spaces on the south of the road will be retained. The residential properties in this area all have

private driveways, and the spaces that will be lost are not associated with any specific residential or commercial properties. The overall impact at this location is considered to be **Low**.

- There are currently 18 permit / pay & display spaces and one disabled space on Kennelsfort Road Lower. The 16 spaces on the west side of the road will be retained. The three pay and display spaces, and one disabled space on the east side of the road will be removed to allow provision of a 3.0m wide, two-way, cycle track running from Lucan Old Road across R148 Palmerstown Bypass, to Kennelsfort Road Upper. The overall impact at this location is considered to be **Low**.
- Between Palmerston Village and R148 Palmerstown Bypass, there are currently 62 permit / pay & display spaces on Lucan Old Road, which are located in parallel bays to both the north and south of the road. There are also two disabled spaces on the north kerb in this section. These spaces are likely to be used by local residents, and those accessing local businesses. Under the proposals, all of the 29 spaces on the north side of Old Lucan Road would be removed to allow provision of a 3.0m wide, two-way, cycle track alongside the northern footpath. Private properties and business on the north side of the road, between Kennelsfort Road Lower and Mill Lane, have off-street parking available, comprising approximately seven parking spaces. All but one of these residential properties has a private driveway, and the two businesses (Ulster Bank and the Coach House) have private car parks. 14 additional spaces, including one disabled space, are proposed to be created on the south side of the road by converting some of the existing parallel parking to perpendicular spaces, and narrowing the footway. In total this would allow for the provision of 47 spaces, plus two accessible spaces. The overall loss of parking in this location would be 15 permit / pay & display spaces. The overall impact at this location is considered to be **Low.**

Table 6.19 presents a summary of the parking and loading spaces during the Do Minimum / Do Something scenarios and the resulting change in parking along Section 2.

Table 6.19: Section 2 – Change in Parking Provision

Street	Parking Type	Number of Parking Spaces		
		Do Minimum	Do Something	Change
Old Lucan Road (between M50 interchange and Kennelsfort Road Lower)	Informal	194*	88	-106
Kennelsfort Road Lower (between Old Lucan Road and R148 Palmerstown Bypass)	Permit / Pay & Display	18	16	-2
	Disabled	1	0	-1
Old Lucan Road (between Kennelsfort Road Lower and Palmerstown Bypass)	Permit / Pay & Display	62	47	-15
	Disabled	2	2	0
Total		**277**	**153**	**-124**

*Total capacity of unmarked, kerbside space

The proposed amendments to parking / loading will result in a loss of 124 spaces along Section 2. This is assessed as a **Low Negative** impact.

6.3.2.1.7 Section 3 – R148 Con Colbert Road to City Centre (Frank Sherwin Bridge) – Con Colbert Road and St John's Road West

6.3.2.1.7.1 Pedestrian Infrastructure

The key infrastructure improvements to pedestrian links along Section 3 of the Proposed Scheme are summarised as follows:

- Proposed conversion of the two-stage staggered pelican crossing of the R148 St John's Road West to the west of Heuston Station to a direct crossing with a raised table;
- Proposed conversion of the two-stage staggered pelican crossing of the R148 St John's Road West at the south-eastern corner of Heuston Station to a direct toucan crossing; and

- Significant pedestrian improvements at the R148 / R111 South Circular Road junction, where a more compact junction, with more direct crossings, is proposed.

The results of the junction assessment are summarised in Table 6.20. A detailed breakdown of the assessment at each impacted junction, including a list of the junctions which experience no change, can be found in TIA Appendix 4.1 (Pedestrian Infrastructure Assessment).

Table 6.20: Section 3 – Pedestrian Qualitative Assessment

Junction	Chainage	Do Minimum LoS	Do Something LoS	Magnitude of Impact
R148 Con Colbert Road / Memorial Road	A7850	C	B	Low Positive
R148 Con Colbert Road / R111 South Circular Road / St R148 John's Road West	A8650	D	A	Medium Positive
R148 St John's Road West / Heuston South Quarter	A9100	D	B	Medium Positive
R148 St John's Road West / Military Road	A9300	D	B	Medium Positive
Section Summary		**D**	**B**	**Medium Positive**

The results in Table 6.20 demonstrate that the Proposed Scheme will have a long-term positive impact on the quality of the pedestrian infrastructure at road junctions within Section 3.

The Do Minimum LoS are either C or D, with three of the four junctions being assessed as D. In the Do Something scenario, pedestrian infrastructure at each of the junctions has been improved. The R148 Chapelizod Bypass / R111 South Circular / St R148 John's Road West signalised junction fulfils all of the LoS criteria, and has been assessed as an 'A' rating, as a result of the provision of direct crossings, reductions in vehicle speeds, and improvements to footpath and crossing widths.

Overall, a **Medium Positive** impact is anticipated along Section 3 of the Proposed Scheme, during the operational phase.

6.3.2.1.7.2 Cycling Infrastructure

This assessment outlines the changes to the quality of cycling provision along Section 3 of the Proposed Scheme. The key cycling improvements can be summarised as follows:

- Provision of continuous 2.0m-wide cycle tracks in both directions between the R833 Con Colbert Road and R111 South Circular Road (reducing to 1.75m wide at junctions), which continue through signalised junctions, replacing shared bus / cycle lanes. The proposed improvements for cyclists at the South Circular Road junction are particularly marked;
- Proposed addition of a toucan crossing for cyclists across the R148 Con Colbert Road West at Memorial Road;
- Proposed addition of a toucan crossings for cyclists across R148 St John's Road West at HSQ (eastern arm) and Military Road respectively. Proposed addition of a cycle reservoir for cyclists turning onto R148 St John's Road West from Military Road; and
- Provision of continuous 2.0m wide cycle tracks in either direction between R111 South Circular Road and Frank Sherwin Bridge, replacing a combination of shared bus / cycle lanes and on-road cycle lanes; and
- Upgrade of the existing pedestrian crossing to a toucan crossing across St John's Road to the east of Heuston Station.

Table 6.21 presents the overall Do Minimum LoS and Do Something LoS ratings for each segment within Section 3 of the Proposed Scheme, along with the resultant Impact Assessments. TIA Appendix 4.2 (Cycling Impact Assessment) outlines in further detail the methodology behind each LoS rating given to the Do Minimum and Do Something scenarios.

Table 6.21: Section 3 - Cycling Impact during Operational Phase

Location	Chainage	Do Minimum LoS	Do Something LoS	Impact
R148 Con Colbert Road: R148 Chapelizod Bypass to R111 South Circular Road.	Chainage A7600 – A8450	C	B	Low Positive
R148 St John's Road West: R111 South Circular to Frank Sherwin Bridge.	Chainage A8450 – A9618	C	B	Low Positive
Section Summary		**C**	**B**	**Low Positive**

The results in Table 6.21 demonstrate that the Proposed Scheme will have an overall long-term positive impact on the quality of the cycling infrastructure along Section 3.

The LoS for each sub-section in the Do Minimum scenario has been assessed as C, indicating that the existing facilities are generally adequate, but not of a particularly high standard. The LoS in the Do Something scenario show improvements in both sub-sections, with all sub-sections as a result of the introduction of continuous off-road cycle tracks throughout Section 3.

Overall, a **Low Positive** impact is anticipated along Section 3 of the Proposed Scheme, during the operational phase.

6.3.2.1.7.3 Bus Infrastructure

This assessment outlines the changes to bus stop infrastructure along Section 3 of the Proposed Scheme. It assesses any changes in the number or location of stops, and any changes to bus stop facilities.

There are currently six bus stops between R833 Con Colbert Road and Frank Sherwin Bridge. Three of these stops are located on the eastbound direction inbound, and three on the westbound direction, outbound.

Under the proposals, all of the existing stops will be retained, with all but the existing inbound stop at Heuston Station being relocated closer to pedestrian crossing facilities. This stop will be extended to a triple length stop. In addition, a new double-length outbound stop will be provided at Heuston Station, 100m to the east of existing Stop 2637.

Table 6.22 summarises the proposed changes to bus stop facilities in Section 3 of the Proposed Scheme.

Table 6.22: Section 3 – Overview of Changes in Bus Stop Facilities

Bus Stop Facility	Do Minimum		Do Something		Comment
	No. of Stops	Percentage of Stops	No. of Stops	Percentage of Stops	
RTPI	2	33%	7	100%	RTPI added to all bus stops.
Timetable information	2	33%	7	100%	Timetable information to be provided at all bus stops.
Shelter	2	33%	7	100%	Shelters to be provided at all bus stops.
Seating	2	33%	7	100%	Seating to be provided at all bus stops.
Accessible Kerbs	2	33%	7	100%	Accessible kerbs added to all bus stops.
Indented Drop Off Area	0	0%	2	29%	Inbound stop and outbound stops at Heuston Station will be located in indented drop-off areas. Remaining stops located inline within bus lanes.
Total Stops	6		7		Existing stops retained / relocated. Additional outbound stop at Heuston Station.

Existing bus stop facilities are limited, with only a third of stops having real-time information, shelters and seating. All of the stops on the Proposed Scheme route will have real-time information, shelters, seating and accessible kerbs. Two stops (Stop 4413 and the new Stop to the east of Stop 2637) will be located in indented drop-off areas, with the remaining stops being located inline in bus lanes.

Taking into account the provision of bus lanes, pedestrian accessibility and bus stop facilities outlined within this section, Table 6.23 below outlines the bus qualitative assessment along Section 3 of the Proposed Scheme.

Table 6.23: Section 3 – Bus Qualitative Impact during Operational Phase

Section	Chainage	Description of Impact	Impact
Con Colbert Road to Frank Sherwin Bridge	A7550 – A9709	Existing stops either retained or slightly relocated. Additional outbound stop at Heuston Station. Significant improvements in the quality of bus stop facilities in this section, particularly in increased provision of real-time information, shelters and seating.	High Positive

The lengthening of bus stops at four locations, the relocation of four stops closer to pedestrian crossing facilities and the new stop at Heuston Station, and improvements in the provision of real-time information, shelters, seating and accessible kerbs throughout Section 3 of the Proposed Scheme is assessed as providing an overall **High Positive** impact for bus passengers on this section of the route.

6.3.2.1.7.4 Parking and Loading

The Proposed Scheme will impact on existing parking along Section 3. The areas of parking changes are as follows:

- There are currently three Permit parking / Pay and Display spaces, and two EV charging spaces on the south side of St John's Road at Heuston Station. Under the proposals, these five spaces would be removed to allow the provision of a new, two stance bus-stop on the westbound carriageway. The two EV spaces would be relocated to the existing parking lay-by on the south side of St John's Road, between the Heuston South Quarter (HSQ) access and Military Road. The overall impact of this location is considered to be **Low**.
- There are currently two separate lengths of taxi queuing lanes on the eastbound approach to Heuston Station. The first begins opposite the Royal Hospital Kilmainham Gardens and has space for 20 taxis to queue. The second taxi queuing lane begins after the right-turn entrance to the HSQ complex and has space for 23 taxis. These taxi queuing lanes are on-street within the bus lane and are approximately 1.5m wide defined by road markings. There is a taxi stand off-road and contained within a continuous bay next to Heuston Station which has space for 18 taxis. Under the proposals, the 20-space Kilmainham Gardens taxi queuing lane would be removed to allow provision of a 1.5m cycle track alongside the eastbound carriageway, and also to ensure that buses can run freely along the proposed Bus Lane. The removal of the taxi queuing lane will not affect the provision of 18 space taxi rank at the station in the area and given the continued presence of the remaining queuing lane, with capacity for 23 taxis, the overall impact at this location is considered to be **Low**.
- There are 10 informal, general, parking spaces on St John's Road, comprising eight spaces at Military Road, and two spaces immediately north of the gardens at the Royal Kilmainham Hospital (RKH). The eight-space lay-by at Military Road will be reduced to a two-space lay-by and will contain the two electric vehicle charging points relocated from Heuston Station. The existing two-space lay-by at RKH will be removed, to allow the provision of a westbound 1.5m-wide cycle track to the south of St John's Road. The overall impact at these locations is considered to be **Low**.

Table 6.24 presents a summary of the parking and loading spaces during the Do Minimum / Do Something scenarios and the resulting change in parking along Section 3.

Table 6.24: Section 3 – Change in Parking Provision

Street	Parking Type	Number of Parking Spaces		
		Do Minimum	Do Something	Change
R148 St John's Road at Heuston Station	Permit / Pay & Display	3	0	-3
	EV Charging	2	2*	0

Street	Parking Type	Number of Parking Spaces		
		Do Minimum	Do Something	Change
R148 St John's Road *(between HSQ Access and Heuston Station)*	Taxi	61	41	-20
	Informal	10	0	-10
Total		**78**	**45**	**-33**

***relocated**

The proposed amendments to parking / loading result in a loss of 33 spaces along Section 3. This is assessed as a **Low Negative** impact.

6.3.2.1.8 Summary of Corridor-Wide Infrastructure Works

6.3.2.1.8.1 Pedestrian Infrastructure

The Proposed Scheme will increase the number of controlled pedestrian crossings from 20 in the Do Minimum to 28 in the Do Something scenario, equating to a 71% increase. Additionally, there will be an increase in the number of raised table crossings on side roads from 1 in the Do Minimum to 19 in the Do Something scenario, representing a significant increase.

6.3.2.1.8.2 Cycling Infrastructure

The Proposed Scheme will provide 6.45km inbound and 6.31km outbound of segregated cycle facilities which is an increase from only 0.73km in both directions in the Do Minimum scenario. In turn, there will be a decrease in non-segregated cycle facilities in the Do Something scenario compared to the Do Minimum as these facilities will be upgraded to segregated facilities in most cases.

Overall, total cycle facilities (segregated and non-segregated in both directions) will be increased from 3.81km to 13.44km as part of the Proposed Scheme. The proportion of cycle facilities which are segregated (including quiet street treatment) will increase from 38% in the Do Minimum to 95% in the Do Something scenario.

6.3.2.1.8.3 Bus Priority Infrastructure

The Proposed Scheme will provide 9.17km inbound and 8.6km outbound of bus lanes across the corridor. This is an increased from 7.45km inbound and 6.4km outbound in the Do Minimum scenario. This contributes to an increase of 28% in total bus priority measures in both directions in the Do Something scenario compared to the Do Minimum. Overall, the Proposed Scheme will provide bus priority measures along 93% of the corridor.

6.3.2.1.8.4 Parking & Loading

Total parking provision will be reduced by 265 spaces along the Proposed Scheme. The majority of this reduction is the removal of low use informal parking on sections of road where properties and businesses have off-street parking.

Aspects of the Proposed Scheme and network proposals are expected to mitigate the reduction in parking by reducing reliance on private cars due to availability of an improved bus network with journey reliability, by availability of improved cycling infrastructure, and by continued and managed use of private off-street parking.

Similarly, many properties along the Proposed Scheme have driveways, and residents should be encouraged to utilise their available off-road space for parking (rather than seek to park on-street). Improved compliance with parking and loading bay regulations, and management of loading activities will also assist in offsetting the reduction in on-street parking spaces. It is concluded that the overall impact of loss of parking space on these streets is limited and will be largely offset by the cumulative effect of mitigations.

6.3.3 Quantitative Assessment

This quantitative assessment has been prepared with reference to the modelling outputs obtained from the four-tiered modelling approach outlined in Section 4.3. The following assessment topics have been considered:

- People Movement

    - Peak Hour People Movement along the Proposed Scheme;
    - People Movements by Bus; and
    - Bus Boarding.
- Bus Network Performance Indicators:
    - Bus Journey Times; and
    - Bus Journey Time Reliability.
- General Traffic Network Performance Indicators:
    - Reductions in general traffic flows on the Direct Study Area; and
    - Redistributed flows and Junction Capacity Outputs on the Indirect Study Area.
- Overall Network-Wide Performance Indicators
    - Queueing;
    - Total Travel Times;
    - Total Travel Distance; and
    - Average Network Speed.

6.3.3.1 People Movement

In order to understand the benefit of the Proposed Scheme with regards to the Movement of People following the implementation of the proposed infrastructure measures, a quantitative People Movement assessment has been undertaken using outputs from the NTA ERM and LAM and comparing the Do Minimum and Do Something peak hour scenarios for each forecast year (2028, 2043).

The assessment of People Movement includes the following metrics:

- The average number of people moved by each transport mode (i.e., Car, Bus, Walking and Cycling) along the corridor in the inbound and outbound direction. This metric is compared for the Do Minimum and Do Something scenarios in the AM and PM peak hours for each forecast year (2028, 2043). This metric provides an estimate of the modal share changes along the route as a result of the Proposed Scheme measures; and
- People Movement by Bus:
    - AM and PM peak hour Bus Passenger Loadings along the Proposed Scheme for each forecast year (2028, 2043); and
    - Total Passengers Boarding Buses on bus routes that use any part of the Proposed Scheme for each forecast year (2028, 2043).

6.3.3.1.1 Peak Hour People Movement along the Proposed Scheme

To determine the impact that the Proposed Scheme has on modal share in the direct study area as a result of its implementation, the weighted average number of people moved by each mode (Car, Bus, Active Modes) has been extracted from the ERM / LAM. The analysis compares the Do Minimum and Do Something scenarios both in the inbound and outbound direction in the AM and PM peak hours (8-9am, 5-6pm) for each forecast year (2028, 2043).

As outlined previously, the same demographic assumptions (population, employment levels) are included in both the Do Minimum and Do Something scenarios. The bus network and frequency assumptions are also the same in both scenarios and are in line with the BusConnects bus network proposals. It is acknowledged, therefore, that the assessment is conservative in terms of the level of people movement that is predicted in the Do Something scenario. The Do Something scenario will facilitate opportunities to increase bus network capacity operating along the corridor due to the extensive priority provided. 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. In the absence of the delivery of the Proposed Scheme, growth along this key corridor would continue to contribute to increased congestion and operational issues on the road network. The Proposed scheme delivers a reliable alternative to car-based travel that can support future sustainable growth and provide a positive contribution towards reducing carbon emissions.

6.3.3.1.1.1 2028 AM Peak Hour People Movement

Diagram 6.4 illustrates the People Movement by mode inbound towards the City Centre during the AM Peak Hour in 2028.

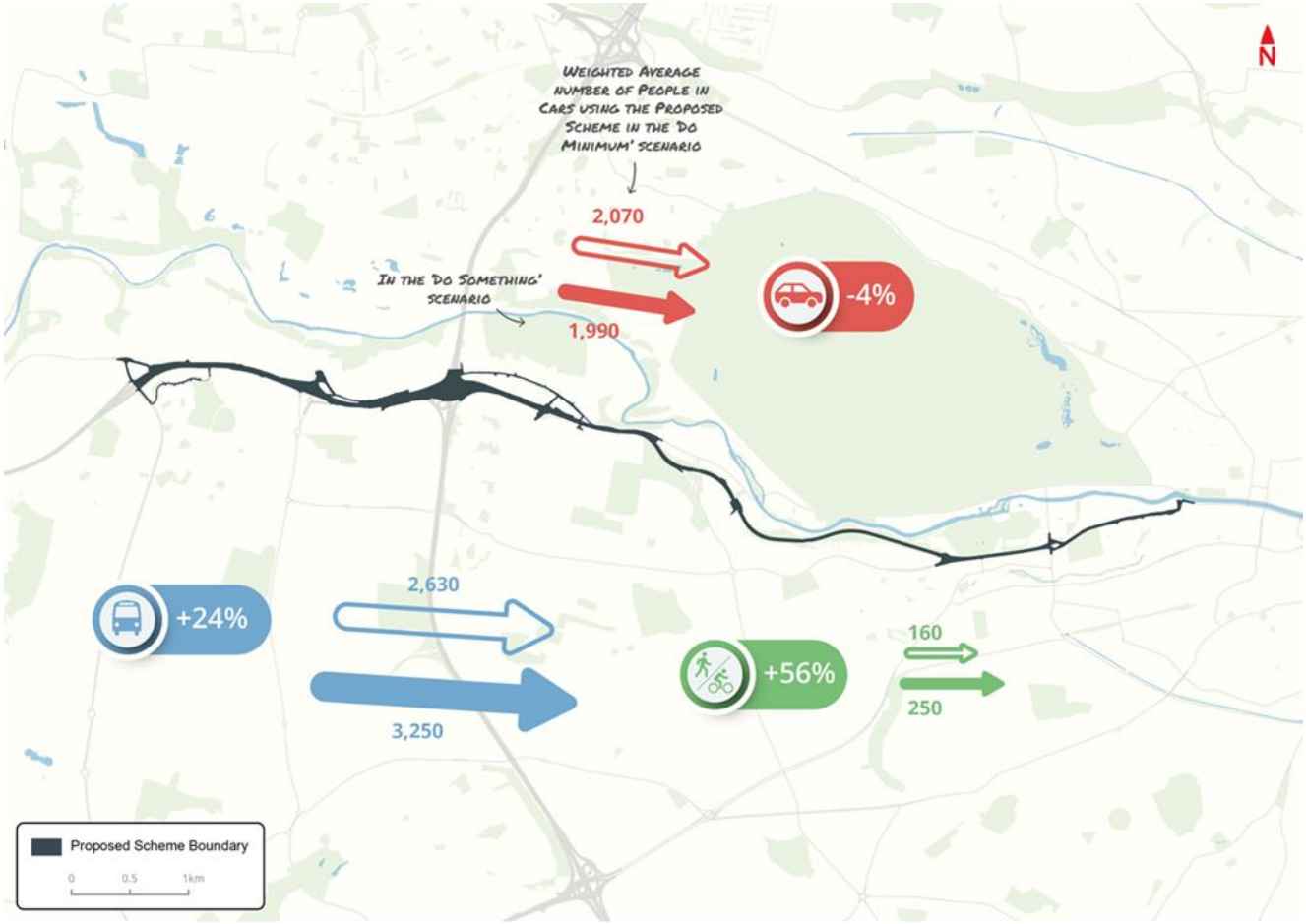

Diagram 6.4 Average People Movement by Mode during 2028 AM Peak Hour

As indicated in Diagram 6.4, there is a reduction of 4% in the number of people travelling via car, an increase of 24% in the number of people travelling via bus and an increase of 56% in people walking or cycling along the Proposed Scheme during the AM Peak Hour.

It should be noted that the model predicts limited change in total walking trips between each scenario. This is due to the fact that growth in walk trips is offset by some walking trips in the Do Minimum scenario transferring to public transport and cycling as a result of the improved provision for these modes with any new pedestrians transferring from car replacing these trips.

The Proposed Scheme will facilitate a step change in the level of segregated cycling provision in comparison with existing conditions along the entire length of the corridor. The transport modelling is conservative in terms of the predicted cycling mode share. The Proposed Scheme has been designed to cater for much higher levels of cycling uptake than modelled outputs, to cater for long-term trends in travel behaviours as people make sustainable travel lifestyle choices, which would otherwise not be achievable in the absence of the Proposed Scheme.

Table 6.25 outlines the difference in modal split between the Do-Minimum and Do-Something scenarios for each mode of travel in an inbound direction towards the City Centre during the AM Peak Hour. The results indicate a 13% increase in people moved as a result of the Proposed Scheme and 25% increase in people moved by sustainable modes (Public Transport, Walk, Cycle).

Table 6.25: Modal Shift of 2028 AM Peak Hour along Proposed Scheme

Direction	Time Period	Mode of Transport	Do Minimum		Do Something		Difference	
			Hourly Trips	Modal Split (%)	Hourly Trips	Modal Split (%)	Hourly Trips	Difference (%)
Inbound towards the City Centre	AM Peak Period	General Traffic	2,070	43%	1,990	36%	-80	-4%
		Public Transport	2,630	54%	3,250	59%	620	24%
		Walking	140	3%	140	3%	0	0%
		Cycling	20	0%	110	2%	90	450%
		Combined Walk/Cycle	160	3%	250	5%	90	56%
		Tot. Sustainable Modes	**2,790**	**57%**	**3,500**	**64%**	**710**	**25%**
		Total	**4,860**	**100%**	**5,490**	**100%**	**630**	**13%**

6.3.3.1.1.2 2028 PM Peak Hour People Movement

Diagram 6.5 illustrates the People Movement by mode travelling outbound from the City Centre during the PM Peak Hour.

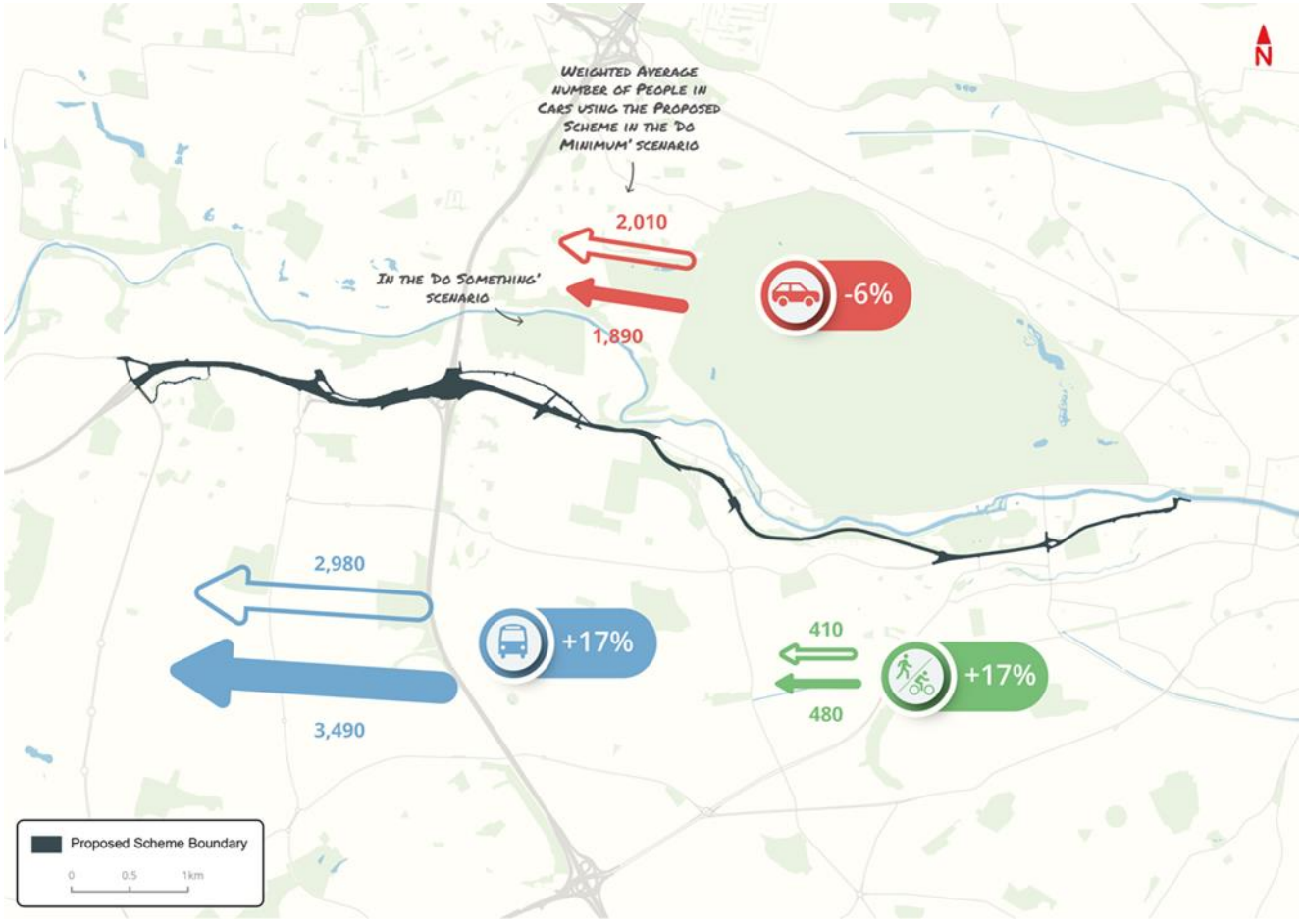

Diagram 6.5 Average People Movement by Mode during 2028 PM Peak Hour

As indicated in Diagram 6.5 there is a reduction of 6% in the number of people travelling via car, an increase of 17% in the number of people travelling via bus and an increase of 17% in the number of people walking or cycling along the Proposed Scheme during the PM Peak Hour. Table 6.26 outlines the difference in modal split between the Do-Minimum and Do-Something scenarios for each mode of travel in an outbound direction from the City Centre during the PM Peak Hour. The results indicate an 9% increase in people moved as a result of

the Proposed Scheme and 17% increase in people moved by sustainable modes (Public Transport, Walk, Cycle).

Table 6.26: Modal Shift of 2028 PM Peak Hour along Proposed Scheme

Direction	Time Period	Mode of Transport	Do Minimum		Do Something		Difference	
			Hourly Trips	Modal Split (%)	Hourly Trips	Modal Split (%)	Hourly Trips	Difference (%)
Outbound from the City Centre	PM Peak Period	General Traffic	2,010	37%	1,890	32%	-120	-6%
		Public Transport	2,980	55%	3,490	60%	510	17%
		Walking	400	7%	400	7%	0	0%
		Cycling	10	0%	80	1%	70	700%
		Combined Walk/Cycle	410	8%	480	8%	70	17%
		Tot. Sustainable Modes	**3,390**	**63%**	**3,970**	**68%**	**580**	**17%**
		Total	**5,400**	**100%**	**5,860**	**100%**	**460**	**9%**

6.3.3.1.1.3 2043 AM Peak Hour People Movement

Diagram 6.6 illustrates the People Movement by mode inbound towards the City Centre during the AM Peak Hour in 2043.

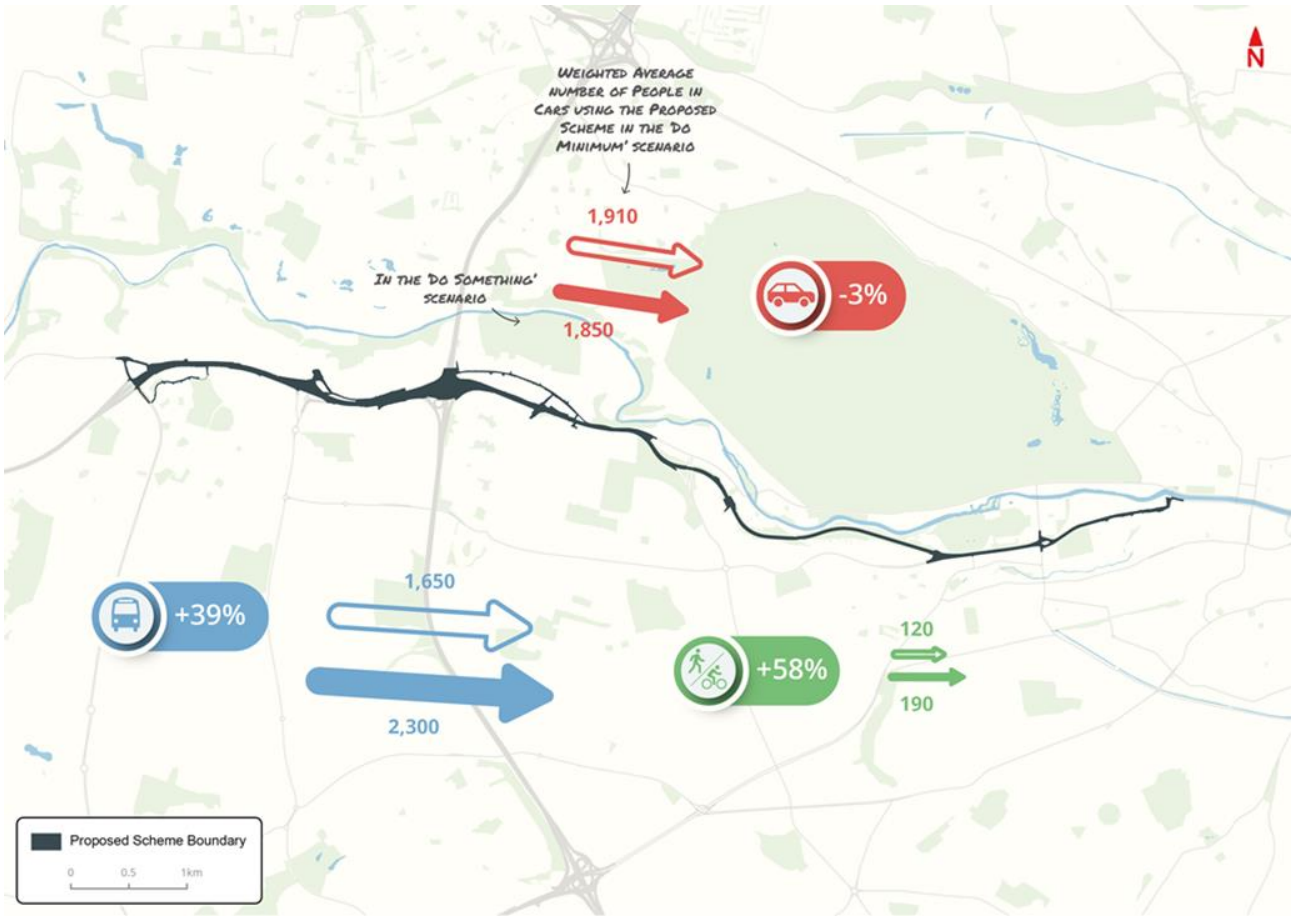

Diagram 6.6 Average People Movement by Mode during 2043 AM Peak Hour

As indicated in Diagram 6.6 there is a decrease of 3% in the number of people travelling via car, an increase of 39% in the number of people travelling via bus and an increase of 58% in the number of people walking and

cycling along the Proposed Scheme during the AM Peak Hour. Table 6.27 outlines the difference in modal split between the Do-Minimum and Do-Something scenarios for each mode of travel in an inbound direction towards the City Centre during the AM Peak Hour. The results indicate a 18% increase in people moved as a result of the Proposed Scheme and a 41% increase in people moved by sustainable modes (Public Transport, Walk, Cycle).

Table 6.27: Modal Shift of 2043 AM Peak Hour along Proposed Scheme

Direction	Time Period	Mode of Transport	Do Minimum		Do Something		Difference	
			Hourly Trips	Modal Split (%)	Hourly Trips	Modal Split (%)	Hourly Trips	Difference (%)
Inbound towards the City Centre	AM Peak Period	General Traffic	1,910	52%	1,850	43%	-60	-3%
		Public Transport	1,650	45%	2,300	53%	650	39%
		Walking	100	3%	100	2%	0	0%
		Cycling	20	1%	90	2%	70	350%
		Combined Walk/Cycle	120	3%	190	4%	70	58%
		Tot. Sustainable Modes	**1,770**	**48%**	**2,490**	**57%**	**720**	**41%**
		Total	**3,680**	**100%**	**4,340**	**100%**	**660**	**18%**

6.3.3.1.1.4 2043 PM Peak Hour People Movement

Diagram 6.7 illustrates the People Movement by mode travelling outbound from the City Centre during the PM Peak Hour in 2043.

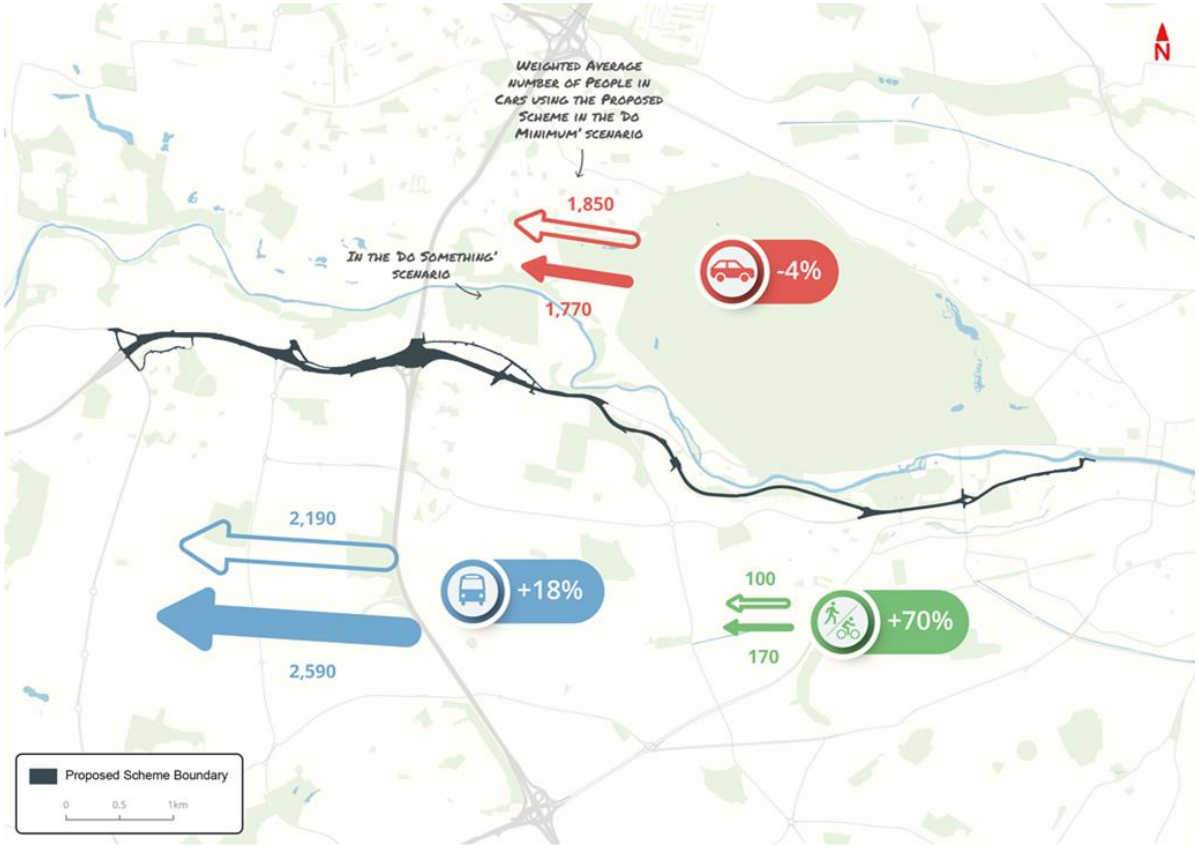

Diagram 6.7 Average People Movement by Mode during 2043 PM Peak Hour

As indicated in Diagram 6.7, there is a decrease of 4% in the number of people travelling via car, an increase of 18% in the number of people travelling via bus and an increase of 70% in the number of people walking and cycling along the Proposed Scheme during the PM Peak Hour. Table 6.28 outlines the difference in modal split between the Do-Minimum and Do-Something scenarios for each mode of travel in an outbound direction from

the City Centre during the PM Peak Hour. The results indicate an 9% increase in people moved as a result of the Proposed Scheme and 21% increase in people moved by sustainable modes (Public Transport, Walk, Cycle).

Table 6.28: Modal Shift of 2043 PM Peak Hour along Proposed Scheme

Direction	Time Period	Mode of Transport	Do Minimum		Do Something		Difference	
			Hourly Trips	Modal Split (%)	Hourly Trips	Modal Split (%)	Hourly Trips	Difference (%)
Outbound from the City Centre	PM Peak Period	General Traffic	1,850	45%	1,770	39%	-80	-4%
		Public Transport	2,190	53%	2,590	57%	400	18%
		Walking	100	2%	110	2%	10	10%
		Cycling	10	0%	60	1%	50	500%
		Combined Walk/Cycle	100	2%	170	4%	70	70%
		Tot. Sustainable Modes	**2,290**	**55%**	**2,760**	**61%**	**470**	**21%**
		Total	**4,150**	**100%**	**4,530**	**100%**	**390**	**9%**

6.3.3.1.2 People Movement by Bus

The following section presents the ERM demand outputs for People Movement by Bus in terms of passenger loadings along the corridor. The results indicate that the improvements in bus priority infrastructure with the Proposed Scheme in place show a substantial increase in Bus patronage during the peak hours.

6.3.3.1.2.1 2028 AM Peak Hour Bus Passengers

Diagram 6.8 presents the passenger loading profile comparing the 'Do-Minimum' and 'Do-Something' scenarios in the AM Peak Hour in the inbound direction in 2028.

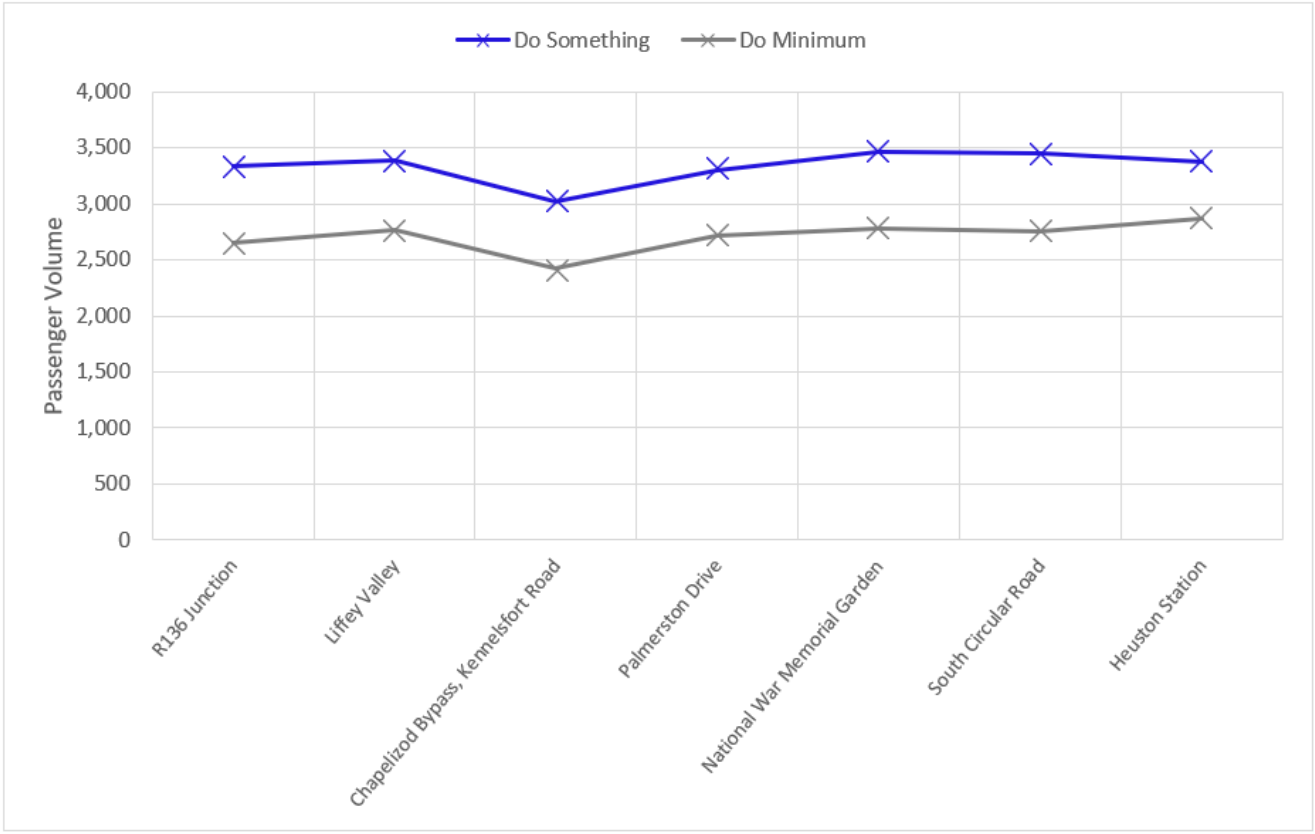

Diagram 6.8 2028 AM Peak Hour Passenger Volume Along Proposed Scheme (inbound direction)

Diagram 6.8 shows higher levels of bus passenger loadings all along the Proposed Scheme with a peak loading at the National War Memorial Garden where the volume of passengers reaches 3,500 in the AM Peak hour, compared to approximately 2,800 in the 'Do-Minimum' scenario.

The increase in bus passenger is consistent all along the Proposed Scheme with an estimated 600 to 800 additional passengers on the corridor, compared to the 'Do-Minimum' scenario.

6.3.3.1.2.2 2028 PM Peak Hour Bus Passengers

Diagram 6.9 presents the passenger loading profile comparing the 'Do-Minimum' and 'Do-Something' scenarios in the PM Peak Hour in the outbound direction in 2028.

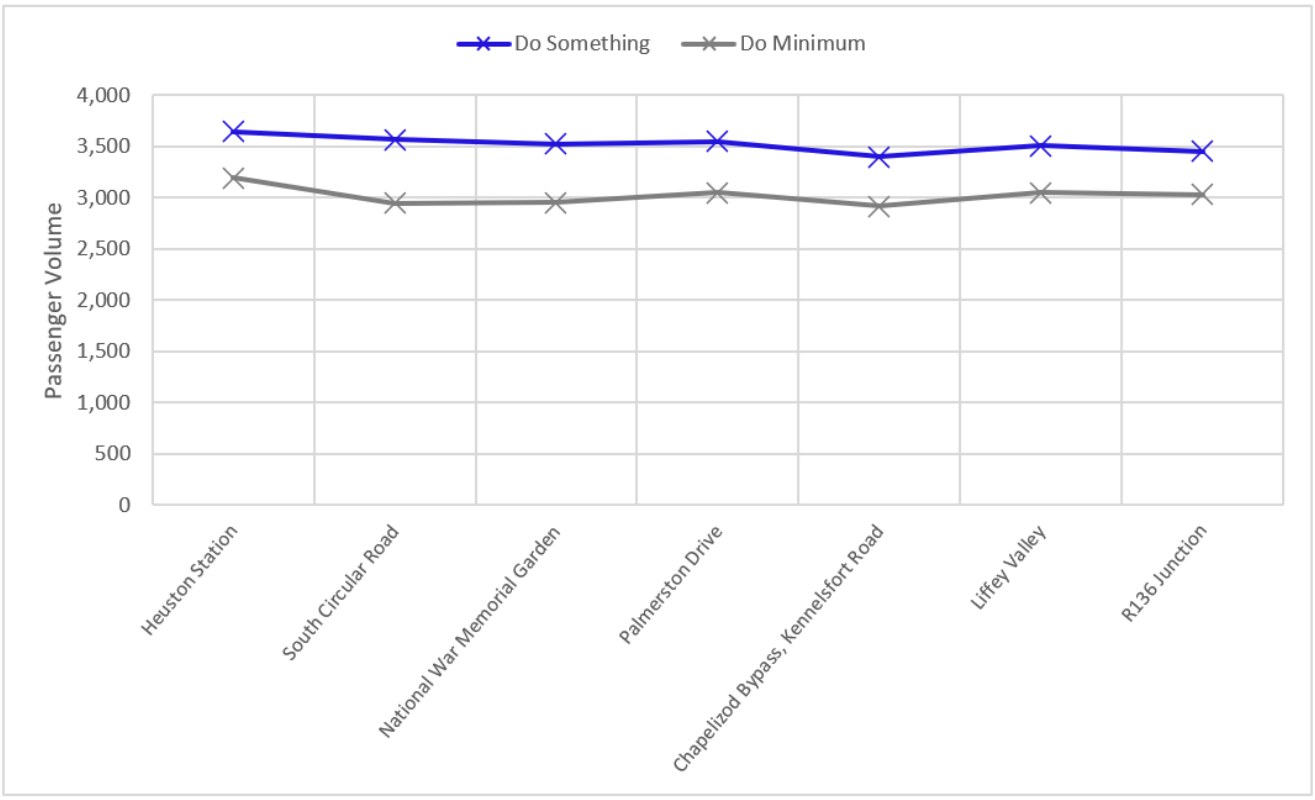

Diagram 6.9 2028 PM Peak Hour Passenger Volume Along Proposed Scheme (outbound direction)

Diagram 6.9 shows higher levels of bus passenger loadings all along the Proposed Scheme with approximately 3,500 bus passengers in the 'Do-Something' scenario, compared to approximately 3,000 bus passengers in the 'Do-Minimum' scenarios.

6.3.3.1.2.3 2043 AM Peak Hour Bus Passengers

Diagram 6.10 presents the passenger loading profile comparing the 'Do-Minimum' and 'Do-Something' scenarios in the AM Peak Hour in the inbound direction in 2043.

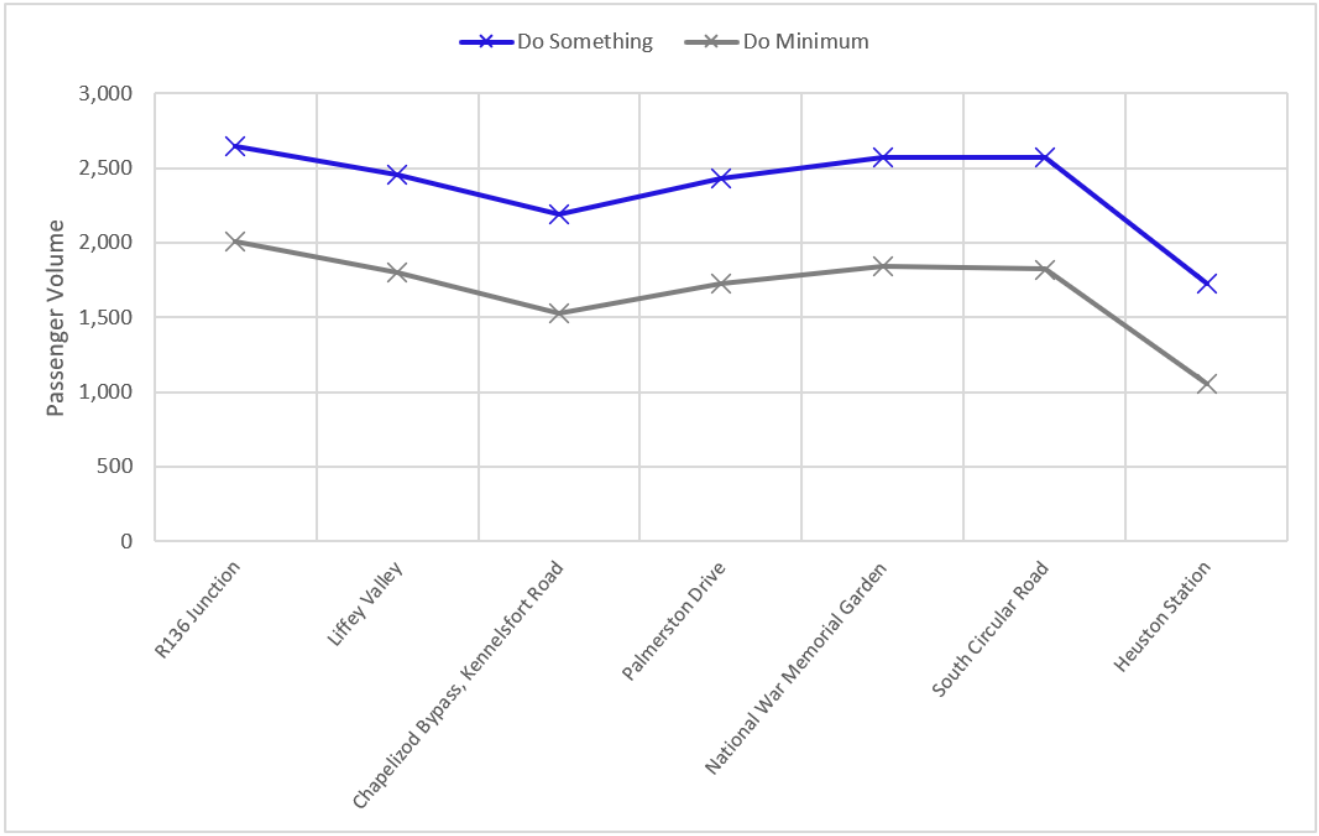

Diagram 6.10 2043 AM Peak Hour Passenger Volume Along Proposed Scheme (inbound direction)

Diagram 6.10 shows higher levels of passenger loadings along the Proposed Scheme with a peak at the R136 Junction where the volume of passengers reaches 2,650 in the AM Peak hour, compared to approximately 2,000 in the 'Do-Minimum' scenario.

The increase in bus passengers remains at a high level along the Proposed Scheme with approximately 600 to 700 additional passengers on the corridor, compared to the 'Do-Minimum' scenario.

6.3.3.1.2.4 2043 PM Peak Hour Bus Passengers

Diagram 6.11 presents the passenger loading profile comparing the 'Do-Minimum' and 'Do-Something' scenarios in the PM Peak Hour in the outbound direction in 2043.

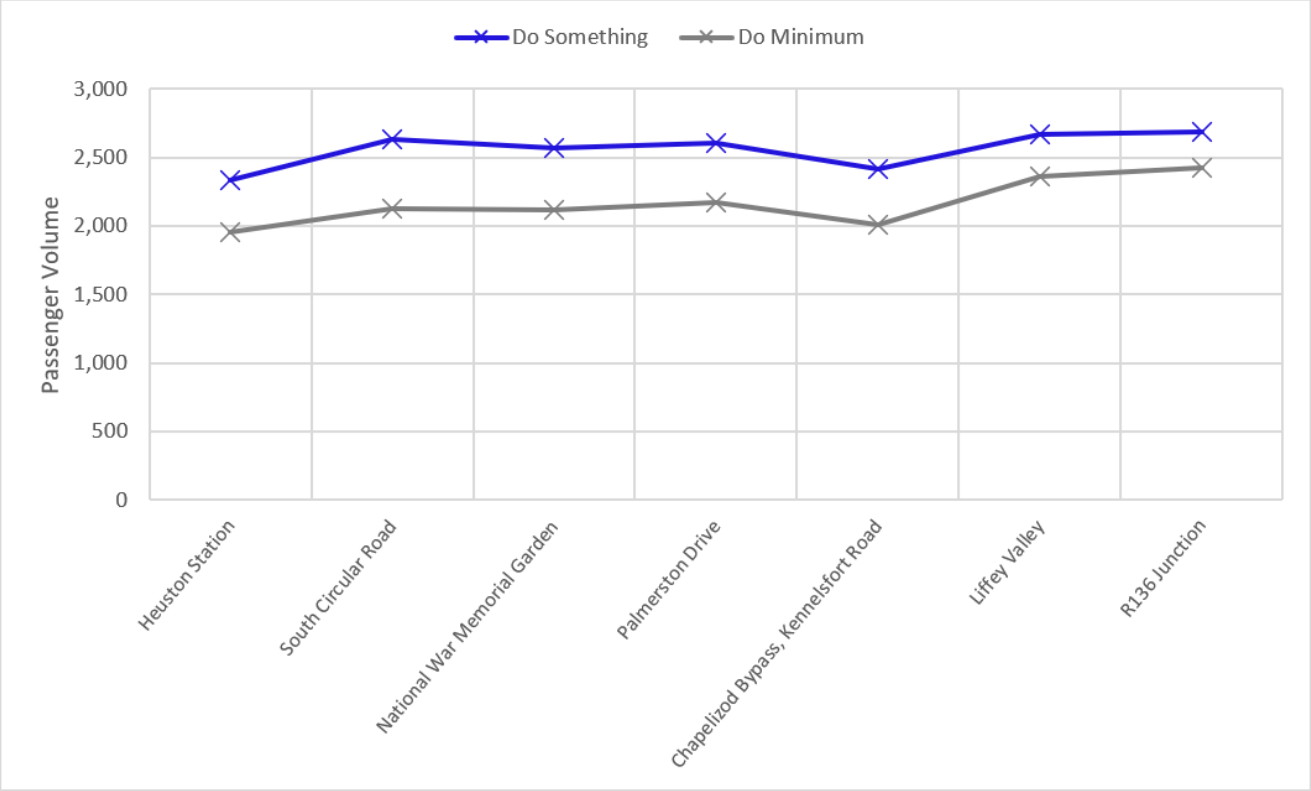

Diagram 6.11 2043 PM Peak Hour Passenger Volume Along Proposed Scheme (outbound direction)

Diagram 6.11 shows a peak in the number of passengers at the R136 Junction, where the bus loadings reach approximately 2,700 passengers in the 'Do-Something' scenario, compared to 2,400 passengers in the 'Do-Minimum'.

The increase in bus passenger is consistent all along the Proposed Scheme with approximately 400 additional passengers on most of the corridor, compared to the 'Do-Minimum' scenario.

6.3.3.1.2.5 Bus Boardings

Since many bus services commence and end further away from the direct alignment of the Proposed Scheme, an additional assessment has been undertaken to compare the Do Minimum and Do Something total passengers boarding on bus routes that use any part of the Proposed Scheme (including those stops not directly on the Proposed Scheme) in both 2028 and 2043 forecast years. The results for the 2028 Opening Year scenario are indicated in Table 6.29.

Table 6.29: 2028 Peak Hour Bus Boardings on Routes using the Proposed Scheme (inc. boarding at stops outside Proposed Scheme)

Time Period	Do Minimum	Do Something	Difference in Boardings	Difference (%)
AM Peak Hour	14,710	15,380	670	4.6%
PM Peak Hour	13,800	14,530	730	5.3%

Table 6.29 shows that there will be a 4.6% increase in people boarding bus routes which use the Proposed Scheme during the AM Peak Hour. This represents an addition of 670 passengers in the AM Peak hour.

In the PM Peak hour, there will be a 5.3% increase in people boarding bus routes which use the Proposed Scheme, representing an additional 730 passengers.

The results for the 2043 Design Year scenario are indicated in Table 6.30.

Table 6.30: 2043 Peak Hour Bus Boardings on Routes using the Proposed Scheme (inc. boarding at stops outside Proposed Scheme)

Time Period	Do Minimum	Do Something	Difference in Boardings	Difference (%)
AM Peak Hour	13,410	14,260	850	6.3%
PM Peak Hour	12,820	13,440	620	4.8%

Table 6.30 shows that there will be a 6.3% increase in people boarding bus routes which use the Proposed Scheme during the AM Peak Hour. This represents an addition of 850 passengers in the AM Peak hour.

In the PM Peak hour, there will be a 4.8% increase in people boarding bus routes which use the Proposed Scheme, representing an additional 620 passengers.

6.3.3.1.3 People Movement - Significance of Impact

The significance of the effect on the movement of People by sustainable modes with the Proposed Scheme in place has been appraised qualitatively, taking into account the changes in mode share, demand changes by mode along the Proposed Scheme as well as bus usage presented above. The impact of the Proposed Scheme has been adjudged to deliver a **High Positive impact** in terms of People Movement by sustainable modes. The Proposed Scheme can be shown to deliver significant improvements in people movement by sustainable modes along the Proposed Scheme corridor, particularly by bus, with reductions in car mode share due to the enhanced sustainable mode provision.

The findings of the People Movement assessment demonstrate that the Proposed Scheme aligns fully with the aims and objectives of the CBC Infrastructure Works, to 'provide enhanced walking, cycling and bus infrastructure on this key access corridor in the Dublin region, that will enable and deliver efficient, safe, and integrated sustainable transport movement along the corridor'.

6.3.3.1.4 Operational Impacts for Bus Users

6.3.3.1.4.1 Overview

The impacts of the Proposed Scheme for Bus Users have been assessed based on journey times and reliability metrics extracted from the micro-simulation model of the Proposed Scheme corridor.

Due to the stochastic nature of the micro-simulation software, model outputs based on the average of 10 simulation seed runs (minimum of 5 recommended as per Transport for London (2010) Traffic Modelling Guidelines) have been calculated between the point of Proposed Scheme entry and exit and compared against the corresponding Do Minimum scenarios.

6.3.3.1.4.2 Bus Journey Time and Reliability changes as a result of the Proposed Scheme

To give an overview of how the Proposed Scheme will impact on bus journey times along the corridor, outputs for the C1 service, which traverses the entire length of the Proposed Scheme, have been extracted from the model. As outlined in Section 6.1.3, the assessment is based in the context of the full implementation of the BusConnects network re-design in both the Do Minimum and Do Something scenarios, with the Proposed Scheme servicing the C-Spine services.

Inbound Direction

Average journey times for the inbound C1 service in 2028 Opening Year and in 2043 Design Year can be seen in Table 6.31 (inbound direction of travel). A breakdown of the changes in average journey times for all other bus services using the Proposed Scheme can be found in TIA Appendix 4.3 (Average Bus Journey Times).

Table 6.31: C1 Service Bus Average Journey Times (Inbound Direction)

Peak Hour	Do Minimum (minutes)	Do Something (minutes)	Difference (minutes)	% Difference
2028 AM	25.1	18.0	-7.1	-28%
2028 PM	20.4	17.4	-3.0	-15%
2043 AM	25.4	18.2	-7.1	-28%
2043 PM	20.6	17.4	-3.1	-15%

Additional information regarding the range of journey times (minimum, maximum, average and standard deviation) for inbound C1 buses in the Do Minimum (red) and Do Something (blue) can be seen in Table 6.32 and Diagram 6.12 below. Each dot in the diagram represents the journey time for each individual bus in each scenario. A larger range of journey times are an indication of lower levels of reliability in a given scenario.

Table 6.32: C1 Service – Range of Journey Times (Inbound Direction)

Peak Hour	Do Minimum				Do Something			
	MIN	MAX	AVG	STDEV	MIN	MAX	AVG	STDEV
2028 AM	20.2	33.4	25.1	2.6	15.3	20.5	18.0	1.1
2028 PM	17.2	25.6	20.4	1.3	15.1	19.5	17.4	1.1
2043 AM	19.0	31.9	25.4	2.6	15.0	22.1	18.2	1.1
2043 PM	17.9	24.4	20.6	1.4	14.9	20.6	17.4	1.1

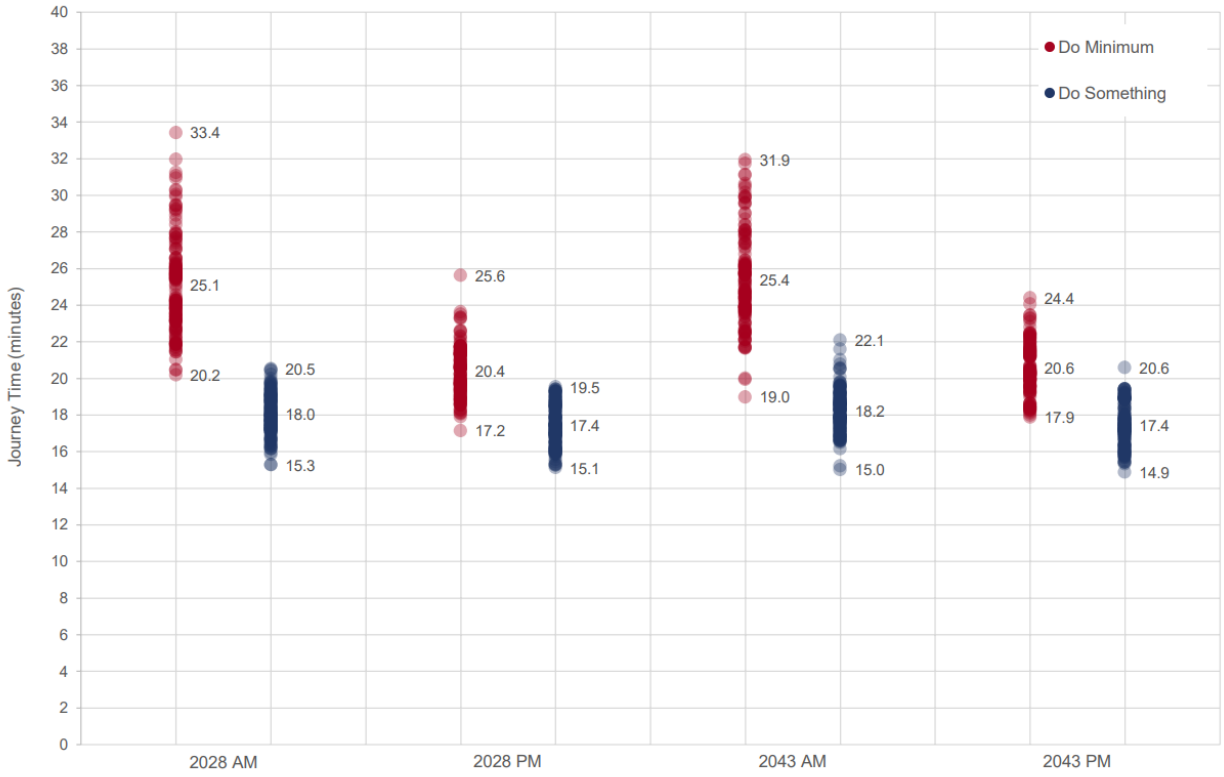

Diagram 6.12 C1 Bus Journey Times (Inbound Direction)

Based on the results presented in Table 6.32, the Proposed Scheme will deliver average inbound journey time savings for C1 service bus passengers of 7.1 minutes (28%) in 2028 and 2043. Furthermore, results presented in Diagram 6.12 suggest an improvement in bus journey time reliability in all four scenarios as indicated by the reduced ranges of journey times achieved with the individual durations focused much closer to the average journey times (lower standard deviation) in the Do Something scenario (blue dots) with the Proposed Scheme in place compared to the more dispersed range in the Do Minimum scenario (red dots).

Note that the variation in journey times shown above are based on one set of predicted flows for the Do Minimum and Do Something scenario. Traffic flows fluctuate daily which would mean that the variation in journey times would be much greater in the Do Minimum with any increases in traffic flows compared to the protection of journey time reliability provided by the bus priority measures that comprise the Proposed Scheme.

A comparison of average Do Minimum and Do Something journey times for the inbound C1 service are also illustrated in the cumulative time-distance graphs shown in Diagram 6.13 to Diagram 6.16.

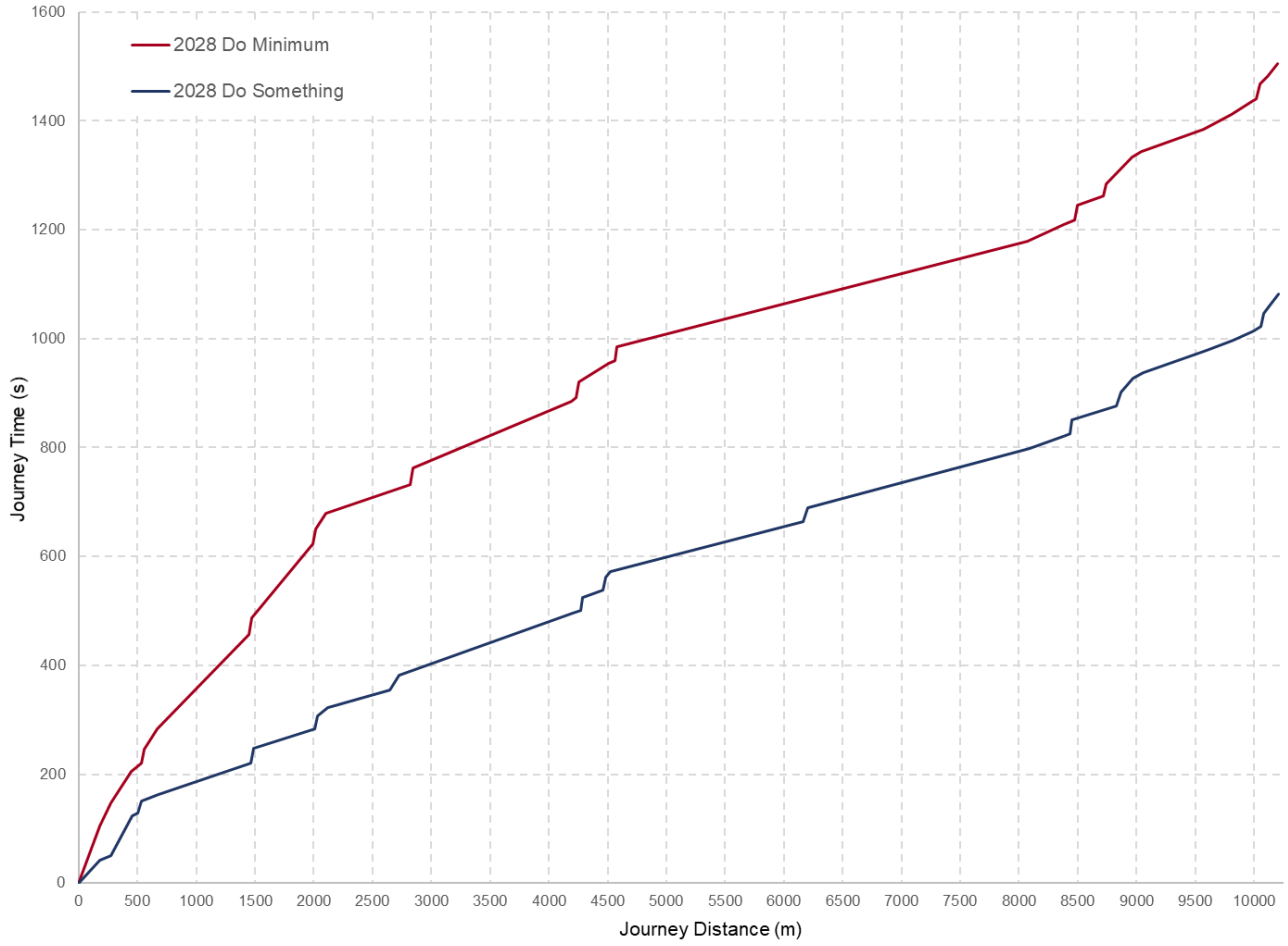

Diagram 6.13 C1 Bus Journey Time (2028 AM, Inbound)

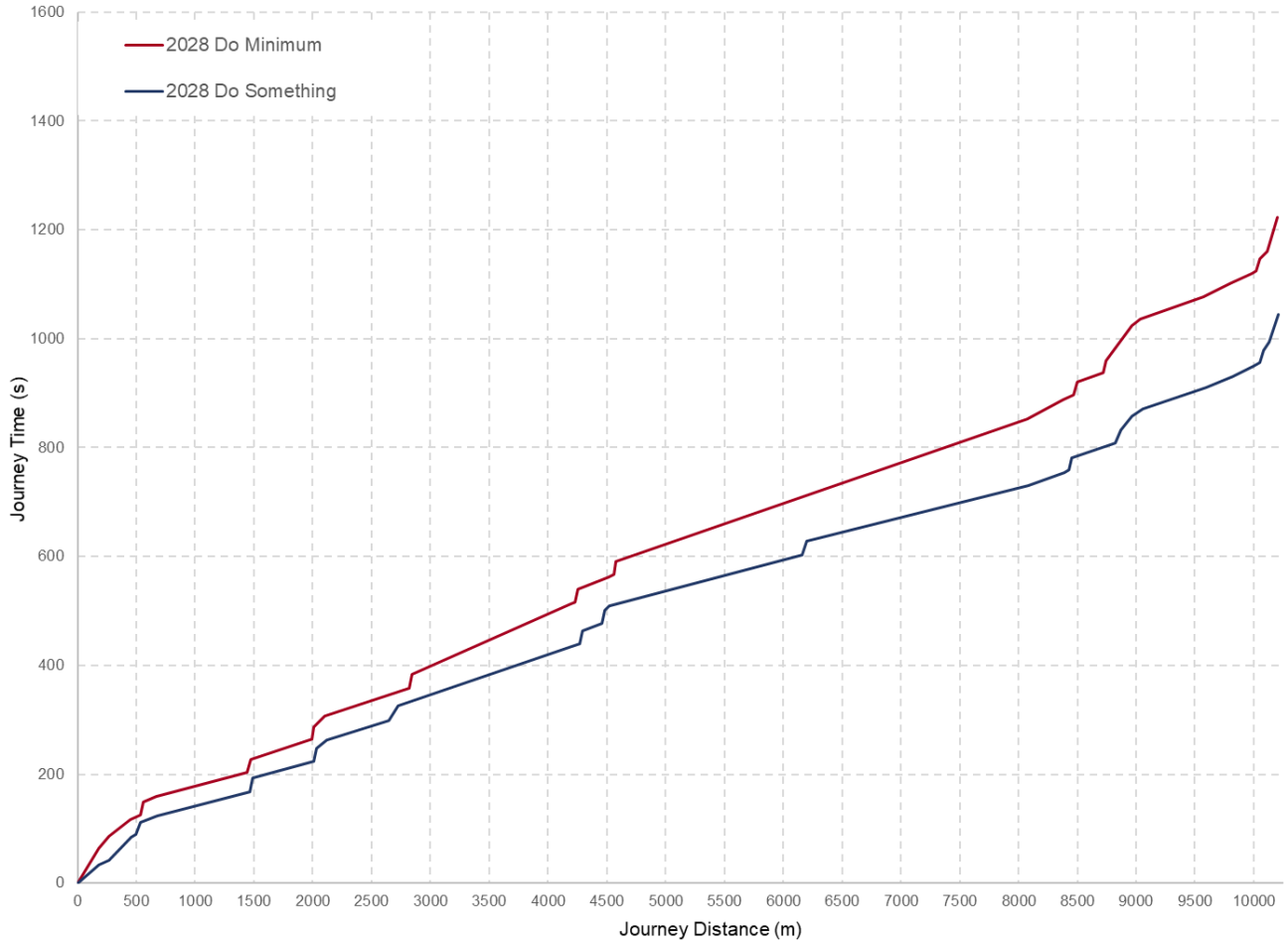

Diagram 6.14 C1 Bus Journey Time (2028 PM, Inbound)

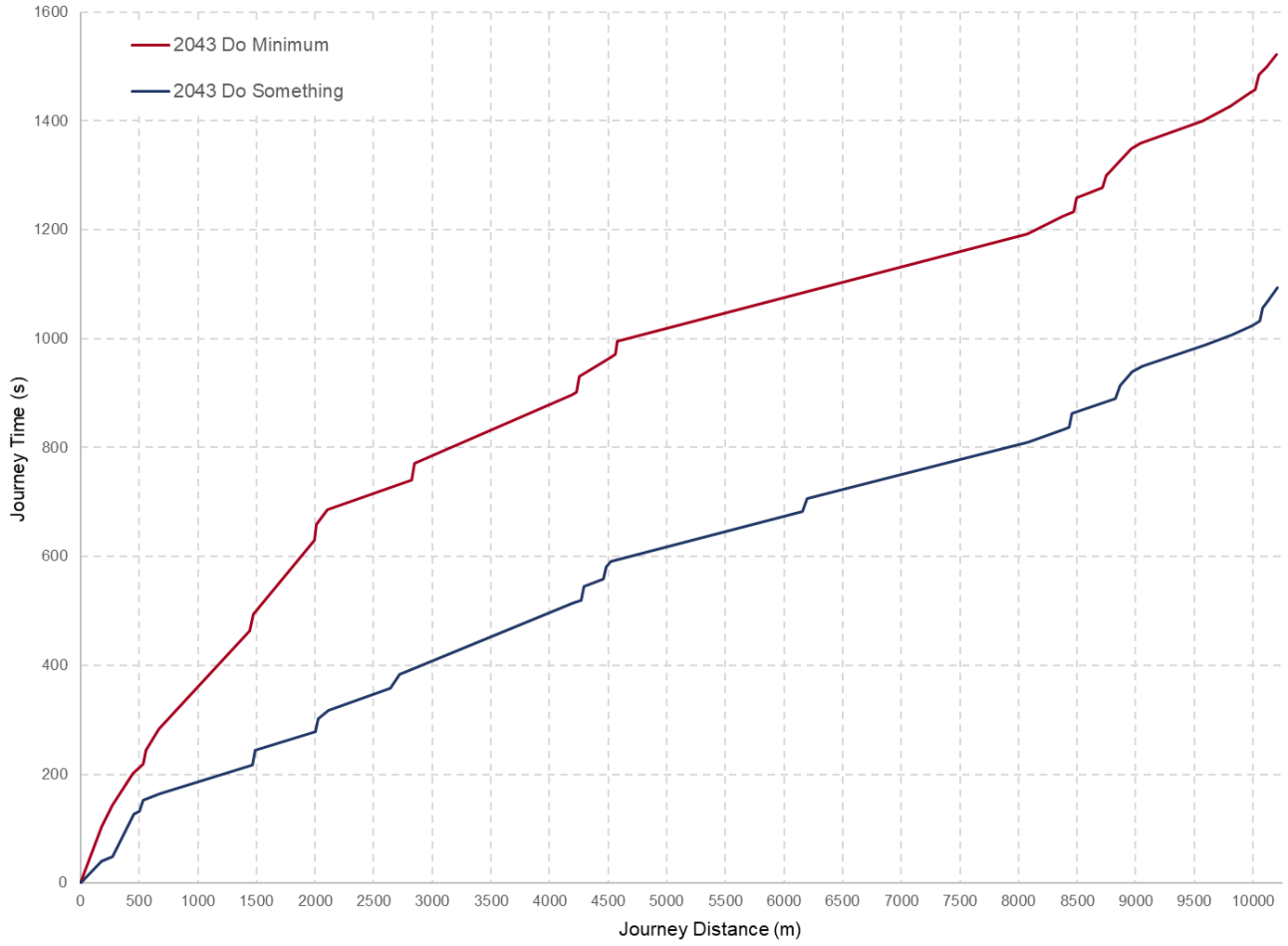

Diagram 6.15:C1 Bus Journey Time (2043 AM, Inbound)

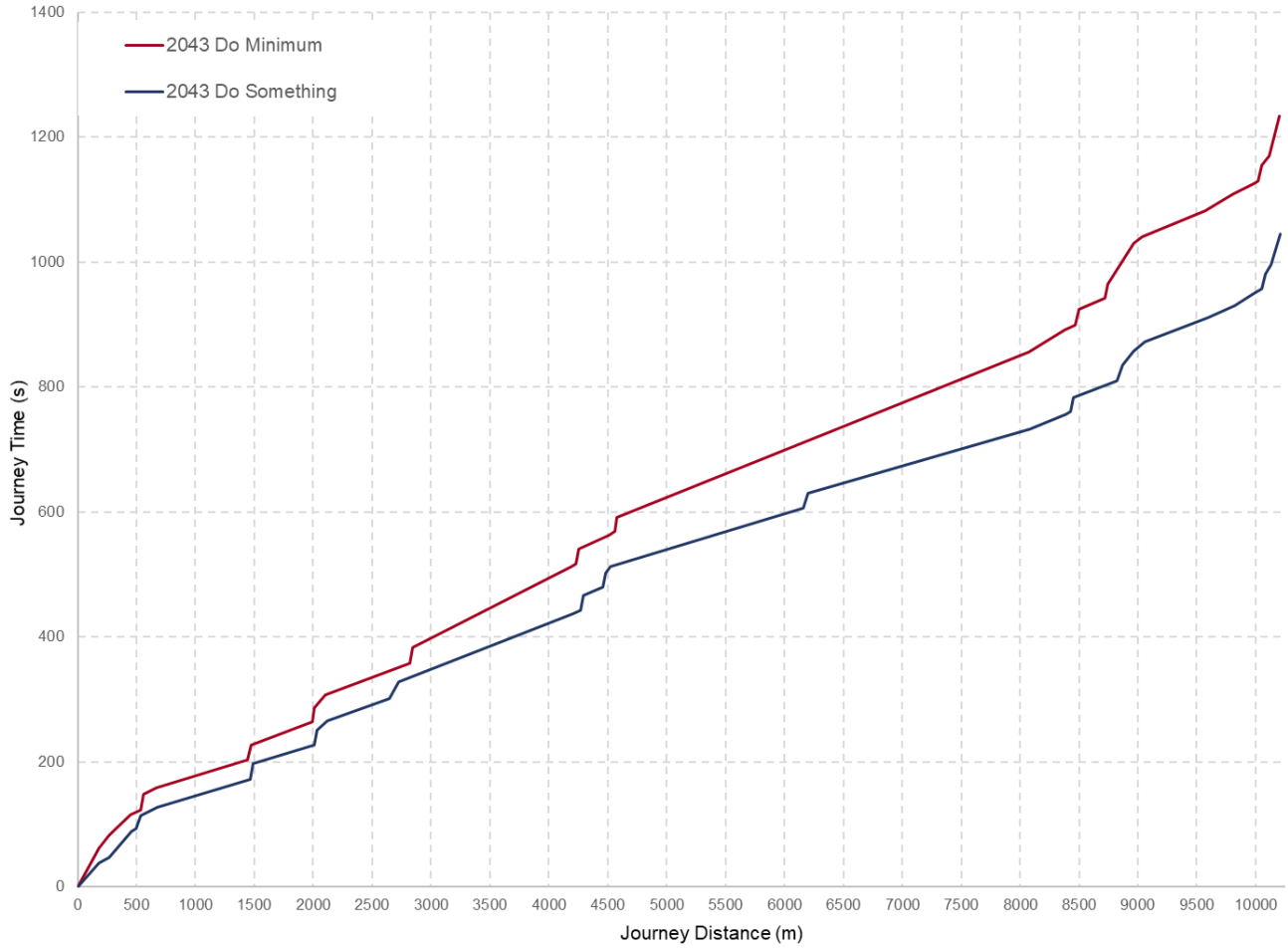

Diagram 6.16: C1 Bus Journey Time (2043 PM, Inbound)

Based on the results presented in Diagram 6.13 to Diagram 6.16, the Proposed Scheme is expected to deliver bus journey time savings in both the AM and PM peaks. The most notable savings can be seen between the R835 Lucan Road and N4 Junction 2. This is due to the introduction of a segregated bus lane running adjacent to the N4 which bypasses delays at the Junction 3 merge and Junction 2 diverge. In the case of the AM peak, significant journey time and reliability savings are predicted in the Proposed Scheme versus the Do Minimum

Outbound Direction

Average journey times for the outbound C1 service in 2028 Opening Year and in 2043 Design Year can be seen in Table 6.33. A breakdown of the changes in average journey times for all other bus services using the Proposed Scheme can be found in TIA Appendix 4.3 (Average Bus Journey Times).

Table 6.33: C1 Service Bus Journey Times (Outbound Direction)

Peak Hour	Do Minimum (minutes)	Do Something (minutes)	Difference (minutes)	% Difference
2028 AM	18.3	17.5	-0.7	-4%
2028 PM	20.8	18.9	-1.9	-9%
2043 AM	18.4	17.4	-1.0	-6%
2043 PM	20.9	18.6	-2.4	-11%

Additional information regarding the range of journey times (minimum, maximum, average and standard deviation) for outbound C1 buses in the Do Minimum (red) and Do Something (blue) can be seen in Table 6.34 and Diagram 6.17 below. Each dot represents the journey time for each individual bus in each scenario. A larger range of journey times are an indication of lower levels of reliability.

Table 6.34:C1 Service – Range of Journey Times (Outbound Direction)

Peak Hour	Do Minimum				Do Something			
	MIN	MAX	AVG	STDEV	MIN	MAX	AVG	STDEV
2028 AM	15.1	21.2	18.3	1.2	15.8	20.0	17.5	0.9
2028 PM	17.7	23.6	20.8	1.2	16.2	21.5	18.9	1.0
2043 AM	15.9	22.6	18.4	1.2	15.9	19.8	17.4	0.8
2043 PM	16.7	24.6	20.9	1.3	15.8	21.3	18.6	1.1

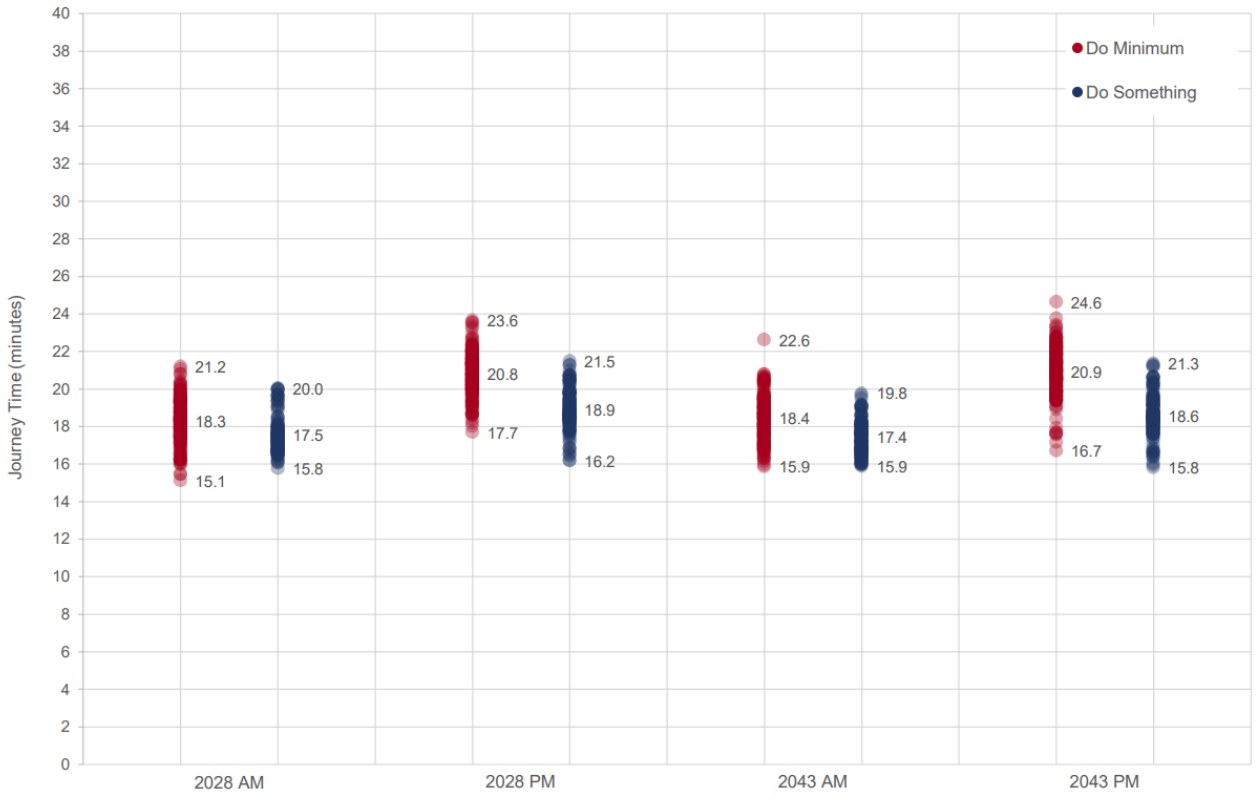

Diagram 6.17: C1 Bus Journey Times (Outbound Direction)

Based on the results presented in Table 6.33, the Proposed Scheme will deliver average outbound journey time savings for C1 service bus passengers of up to 1.9 minutes (9%) in 2028 (PM) and 2.4 minutes (11%) in 2043 (PM). Furthermore, results presented in Diagram 6.17 suggest an improvement in bus journey time reliability in all four scenarios as indicated by the reduced ranges of journey times achieved with the durations focused much closer to the average journey times (lower standard deviation) in the Do Something scenario (blue dots) with the Proposed Scheme in place compared to the more dispersed range in the Do Minimum scenario (red dots).Note that the variation in journey times shown above are based on one set of predicted flows for the Do Minimum and Do Something scenario. Traffic flows fluctuate daily which would mean that the variation in journey times would be much greater in the Do Minimum with any increases in traffic flows compared to the protection of journey time reliability provided by the bus priority measures that comprise the Proposed Scheme.

A comparison of average Do Minimum and Do Something journey times for the C1 service for the outbound direction of travel illustrated in the cumulative time-distance graphs shown in Diagram 6.18 to Diagram 6.21.

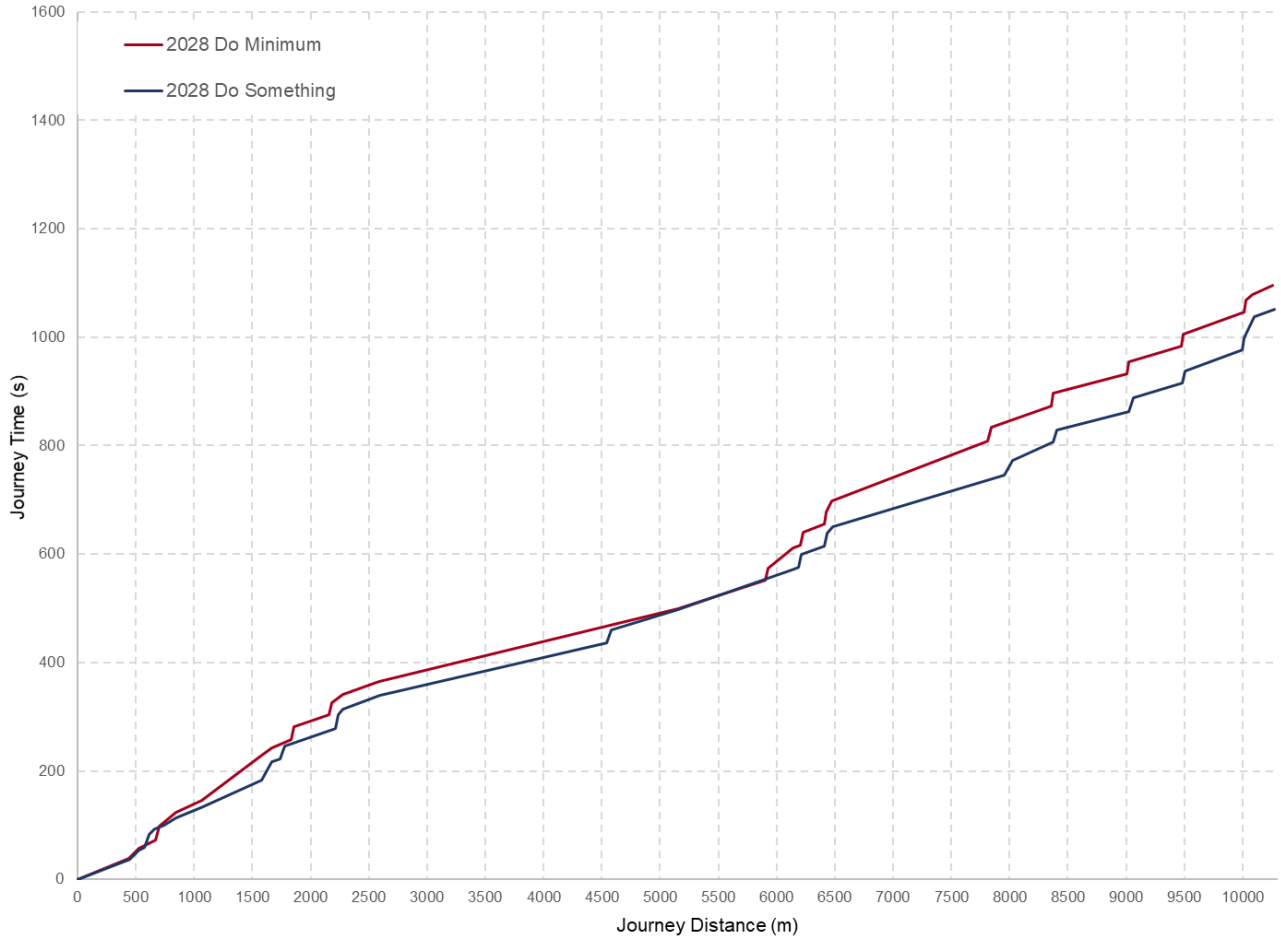

Diagram 6.18: C1 Bus Journey Time (2028 AM, Outbound)

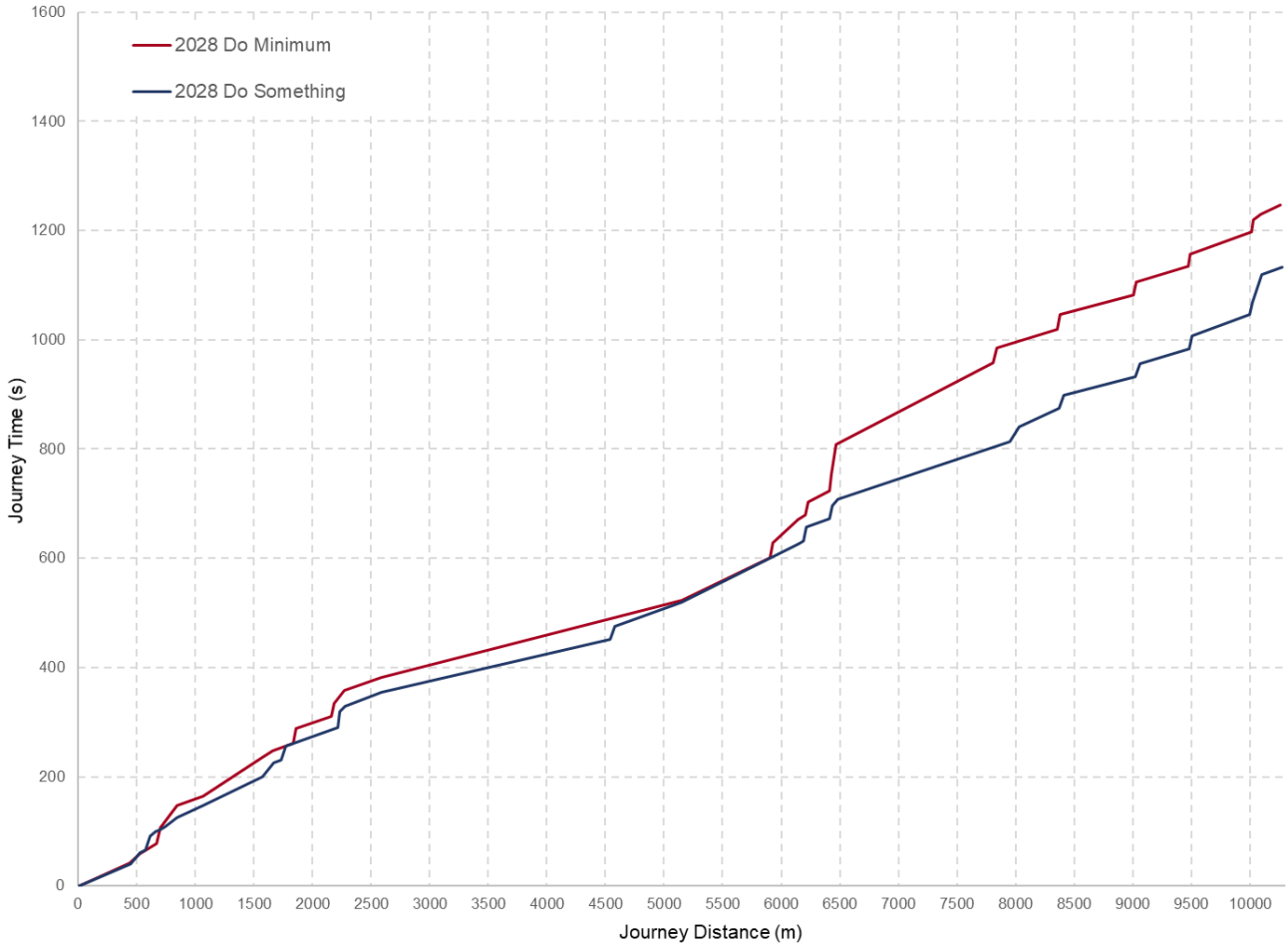

Diagram 6.19: C1 Bus Journey Time (2028 PM, Outbound)

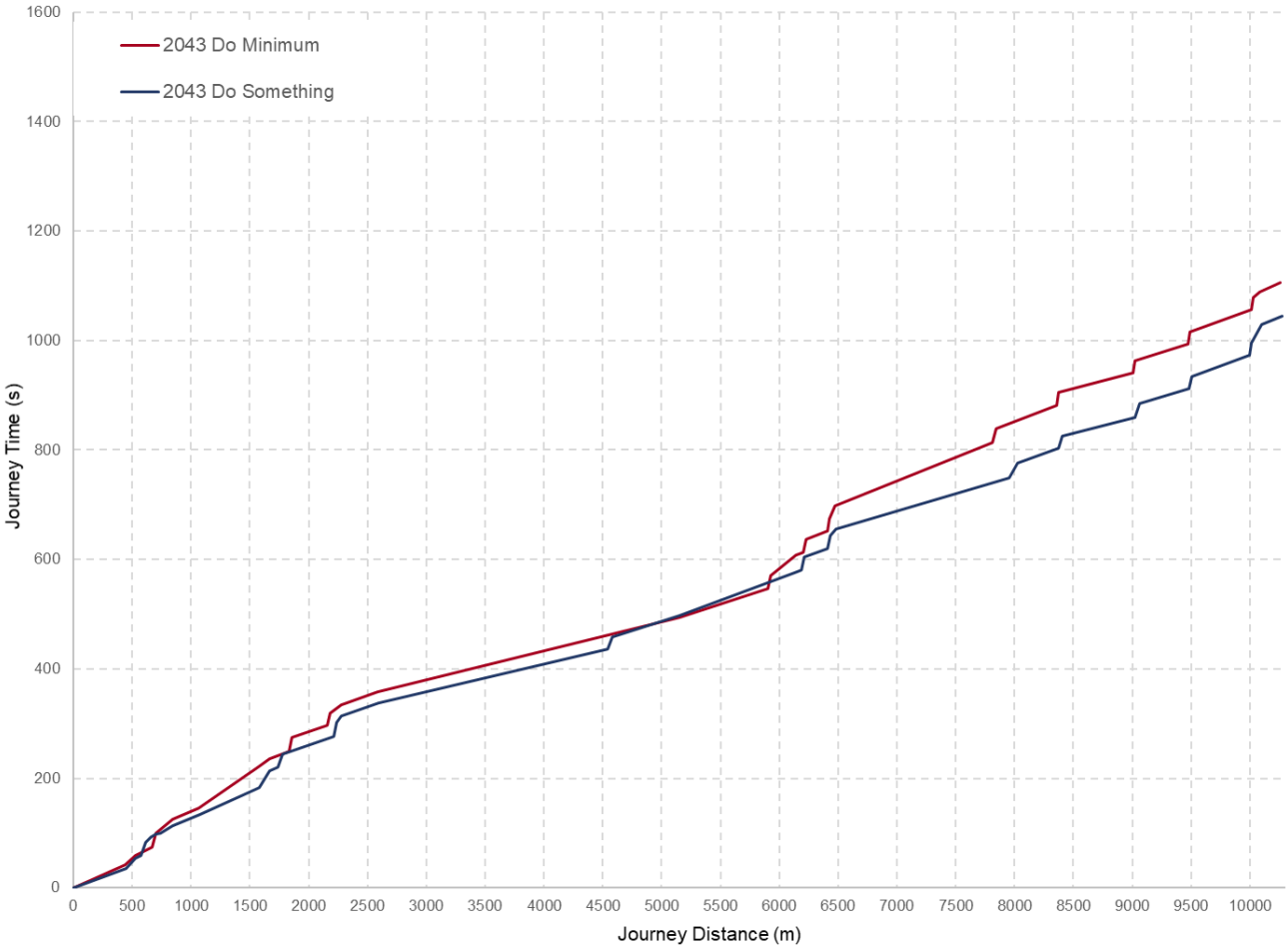

Diagram 6.20: C1 Bus Journey Time (2043 AM, Outbound)

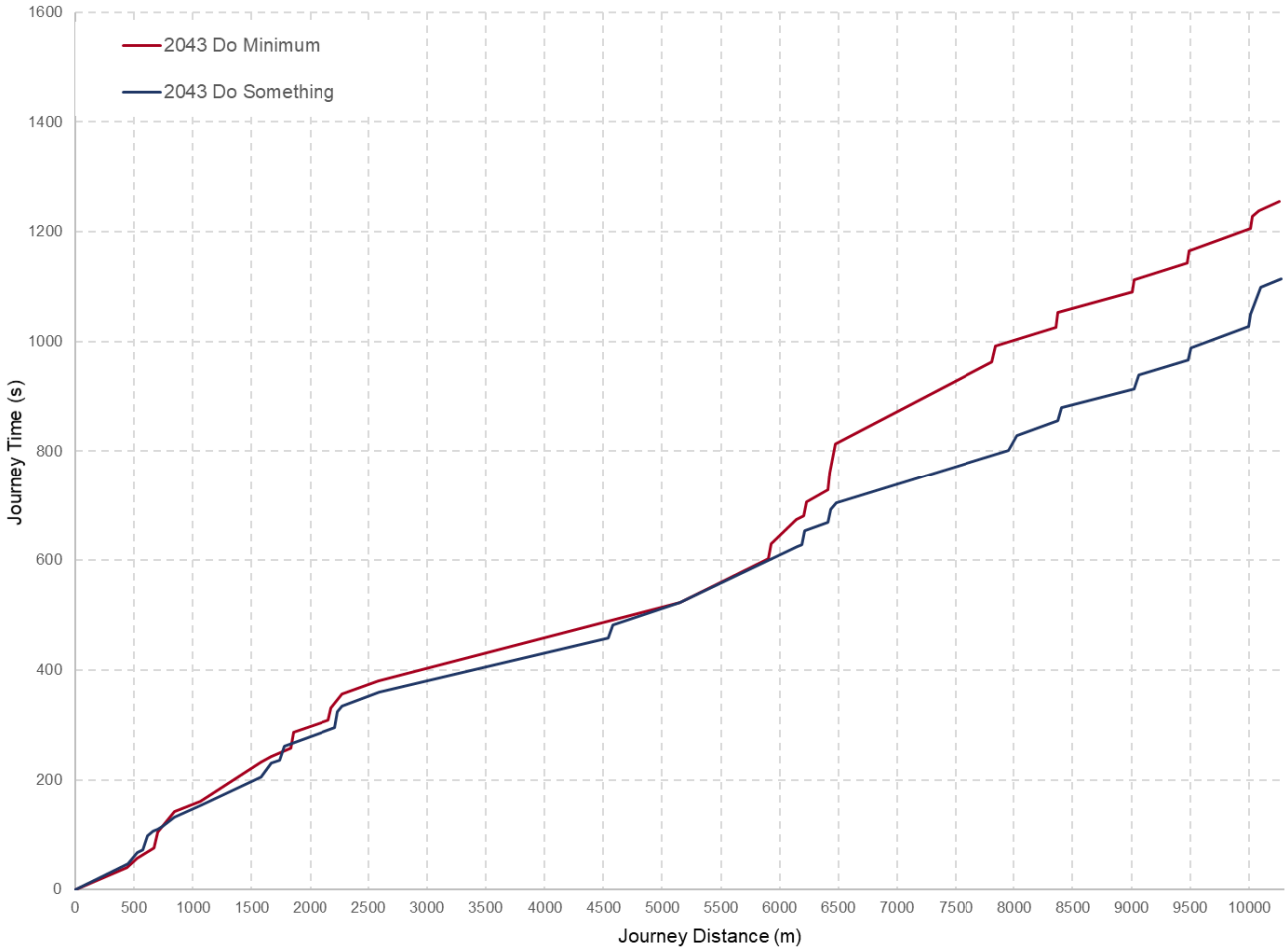

Diagram 6.21: C1 Bus Journey Time (2043 PM, Outbound)

Based on the results presented in Diagram 6.18 to Diagram 6.21, the Proposed Scheme is expected to deliver good bus journey time savings in both the AM and PM peak. The most notable journey time savings can be seen in the PM peak on the outbound approaches to the R111 South Circular Road gyratory and the R148 Chapelizod Bypass junction with The Oval. In both cases, the introduction of bus lanes up to the junction stopline can be seen to result journey time and reliability savings versus the Do Minimum.

6.3.3.1.4.3 Total Journey Time Changes for all Proposed Scheme Bus Services

The change in total bus journey time for all buses travelling along the Proposed Scheme, is shown in Table 6.35 in vehicle minutes.

Table 6.35 Total Bus Journey Time

Peak Hour	Do Minimum (vehicle.minutes)	Do Something (vehicle.minutes)	Difference (vehicle.minutes)	%Difference
2028 AM	1594.4	1293.4	-301.0	-19%
2028 PM	1283.5	1154.5	-129.0	-10%
2043 AM	1599.3	1302.4	-296.9	-19%
2043 PM	1286.9	1136.4	-150.5	-12%

Based on the results presented in Table 6.35, modelling shows that the Proposed Scheme will reduce total bus journey times along the Proposed Scheme by up to 19% in 2028 and 2043. Based on the AM and PM peak hours alone, this equates to **c7.2 hours** of savings in 2028 and **c7.5 hours** in 2043 combined across all buses when compared to the Do Minimum. On an annual basis this equates to approximately **5,400 hours** of bus vehicle savings in 2028 and **5,600 hours** in 2043, when considering weekday peak periods only.

6.3.3.1.5 Bus Users Assessment Summary

The findings of the Bus User assessment shows that the Proposed Scheme fully aligns with the aims and objectives of the CBC Infrastructure Works, to 'Enhance the capacity and potential of the public transport system by improving bus speeds, reliability and punctuality through the provision of bus lanes and other measures to provide priority to bus movement over general traffic movements'.

The significance of impact on bus users of the Proposed Scheme has been appraised using a qualitative assessment, taking the changes in journey time and journey reliability metrics presented above into consideration. The Proposed Scheme is considered to deliver a **High Positive** impact overall.

6.3.3.1.6 Increased Bus Frequency - Resilience Sensitivity Analysis

6.3.3.1.6.1 Background

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 Bus Connects 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 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 Proposed Scheme from implementation into the future. The resilience provided by the Proposed Scheme 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 below.

6.3.3.1.6.2 Resilience Testing

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.

To assess the resilience of the Proposed Scheme to cater for additional bus service frequency provision whilst maintaining a high level of bus journey time reliability, a separate analysis was undertaken in the Proposed Scheme micro-simulation model. In this analysis, the service frequency, in both directions of travel, was increased to achieve a 10 buses per hour increase, at the busiest section, to assess whether the Proposed Scheme could cater for this increased service frequency whilst maintaining a high level of journey time reliability. The analysis was undertaken in the 2028 Minimum and Do Something models to assess whether the bus priority infrastructure was having the desired impact of protecting bus journey time reliability.

The bus service frequency, along the busiest section, in the 2028 Do Minimum model and in the 2028 Do Something Resilience testing models is outlined in Table 6.36: below.

Table 6.36: Resilience Testing Bus Service Frequency Scenario Testing

Scenario	Inbound (Buses per Hour)	Outbound (Buses per Hour)
Do Minimum	55	43
Do Something	55	43
Do Minimum - Additional Services Resilience Test	65	53
Do Something - Additional Services Resilience Test	65	53

Table 6.37: outlines the average journey times for the inbound Lucan to City Centre C1 service in the 2028 Opening Year.

Table 6.37: C1 Service – Average Bus Journey Times

Direction	Do Minimum (minutes)	Do Minimum (Additional Services) (minutes)	% Difference	Do Something (minutes)	Do Something - Additional Services (minutes)	% Difference
2028 Inbound AM	25.1	26.0	3.6%	18.0	18.3	1.5%
2028 Outbound PM	20.8	21.1	1.7%	18.9	19.0	0.6%

The results of the scenario testing with an additional 10 buses per direction per hour operating along the Proposed Scheme in the 2028 Opening Year are presented graphically in Diagram 6.22 below. The diagram displays the maximum, minimum and average journey times for each of the D1 bus services modelled.

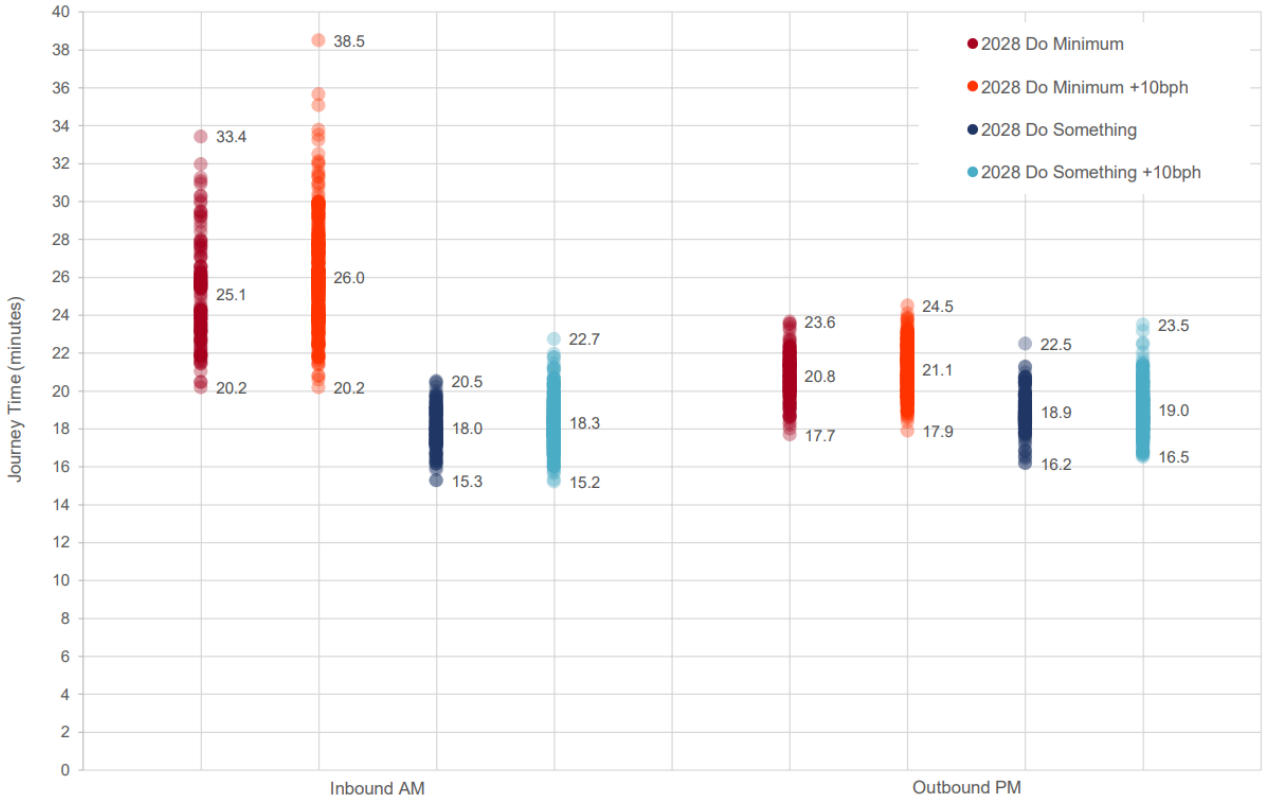

Diagram 6.22: Resilience Testing Bus Journey Time Reliability Indicators – Scenario Testing- Opening Year (2028)

As can be seen from Table 6.37: and Diagram 6.22, the results indicate that even with an additional 10 services operating per direction per hour along the Proposed Scheme, a high level of journey time reliability is maintained in the Do Something scenarios, comparable with the core scenario results. The results indicate limited change in journey times in the Do Something Resilience sensitivity test per bus. In the Do Minimum Resilience sensitivity test, however, bus journey time reliability is more severely impacted with additional services in place. The sensitivity test undertaken indicates that with the additional bus services in place in the Do Minimum scenario a larger change in bus journey times, with the maximum journey time per bus increasing by approximately 5 mins. This highlights the benefit that the Proposed Scheme infrastructure improvements can provide in protecting bus journey time reliability and consistency, as passenger demand continues to grow into the future.

It must be noted that it was assumed the general traffic levels included in each scenario would remain static. If traffic levels were to increase (typical daily variations are in the order of +/- 15%) then the bus priority infrastructure would further protect journey time reliability and resilience in comparison with the Do Minimum scenario.

6.3.3.1.7 General Traffic Assessment

6.3.3.1.7.1 Overview

The Proposed Scheme 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 will likely create some level of trip redistribution onto the surrounding road network.

It should be noted that 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 reasonable 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, and delayed car ownership trends that are emerging.

The assessment also assumes that goods vehicles (HGVs and LGVs) continue to grow in line with forecasted economic activity with patterns of travel remaining the same. For example, the assessment assumes a 45% and 77% increase in goods traffic versus the base year in 2028 and 2043 respectively. This is considered a very conservative assumption. It should be noted, however, that the 2021 Climate Action Plan (CAP) (DCCAE 2021) includes reference to a freight strategy for the region which will seek to further integrate smart technologies in logistics management and may include the regulation of delivery times as far as practicable to off-peak periods to limit traffic congestion in urban areas. The plan outlines measures to manage the increase in delivery and servicing requirements as the population grows, which may include the development of consolidation centres to limit the number of 'last-mile' trips made by larger goods vehicles with plans for higher use of smaller electric vans or cargo bikes for 'last-mile' deliveries in urban areas. As proposals for the above are at a pre-planning stage, it was not possible to account for them in the assessments and a worst-case assessment has been undertaken based on continued growth in goods traffic.

The purpose of this section is to assess the overall impact that any redistributed general traffic will have on both the direct and indirect study areas. It should be noted that the impacts presented in this chapter are based on the final Preliminary Design for the Proposed Scheme which includes embedded mitigation to limit environmental and traffic and transport impacts to a minimal level as part of the iterative design development work described previously above.

To determine the impact that the Proposed Scheme has in terms of general traffic redistribution on the direct and indirect study areas, the LAM Opening Year 2028 model results have been used to identify the difference in general traffic flows between the Do Minimum and Do Something scenarios and the associated level of traffic flow difference as a result of the Proposed Scheme. The assessment has been considered with reference to both the reductions and increases in general traffic flows along road links.

Reduction in General Traffic: For this assessment, the reductions in general traffic flows have been described as a positive impact to the environment.

The majority of instances where a reduction in general traffic flow occurs are located along or adjacent to the Proposed Scheme (i.e. the direct study area), where there are measures to improve priority for bus, cycle and walking facilities.

Localised junction models have been developed using industry standard modelling packages such as LinSig and Junctions 9 to determine the appropriate staging, phasing, green times and operational capacity at all junctions along the direct study area. These junction models have been developed using consistent traffic flows as predicted and modelled in the ERM / LAM and micro-simulation model using the iterative traffic modelling process described in Section 3 of this TIA. The full outputs of the results are included in TIA Appendix 2 (Junction Design Report).

Increase in General Traffic: To determine the impact that the Proposed Scheme has in terms of an increase in general traffic flows on the direct and indirect study areas, a more robust assessment has been undertaken, with reference to TII's Traffic and Transport Assessment Guidelines (May 2014).

This document is considered best practice guidance for the assessment of transport impacts related to changes in traffic flows due to proposed developments and is an appropriate means of assessing the impact of general traffic trip redistribution on the surrounding road network.

Diagram 6.23 provides a snapshot from the guidance which outlines "Advisory Thresholds for Traffic and Transport Assessment Where National Roads are Affected".

Where applications affect national roads a Transport Assessment should be requested if the thresholds in Table 2.2, below, are exceeded.

Table 2.2 Advisory Thresholds for Traffic and Transport Assessment Where National Roads are Affected

Vehicle Movements	*100 trips in / out combined in the Peak Hours for the proposed development*
	Development traffic exceeds 10% of turning movements at junctions with and on National Roads.
	Development traffic exceeds 5% of turning movements at junctions with National Roads if location has potential to become congested or sensitive.

Diagram 6.23 Extract from the Traffic and Transport Assessments Guidelines (PE-PDV-02045, May 2014)

The basis of the guidance is to assess the impacts of additional trips that have been generated as part of a new development (for example, a new housing estate etc.). Noting that the guidance relates to National Roads only, for the purpose of this assessment, the principles of the guidance have been adapted for the assessment of the Proposed Scheme. This has been achieved by extending the threshold to cover all road types[1] in the vicinity of the Proposed Scheme, not only National Roads. This ensures a robust and rigorous assessment has undertaken and that potential impacts on more localised or residential streets have been captured as part of the assessment.

The impact assessment of increases to the general traffic flows has used the following thresholds based on the above guidelines:

- **Local / Regional Roads:** Traffic redistribution results in an increase above 100 combined flows (i.e. in a two-way direction) along residential, local and regional roads in the vicinity of the Proposed Scheme in the AM and PM Peak Hours;
- The threshold aligns with an approximate 1 vehicle per minute increase per direction on any given road. This is a very low level of traffic increase on any road type and ensures that a robust assessment of the impacts of redistributed traffic has been undertaken.
- **National Roads:** Traffic exceeds 5% of the combined turning flows at junctions with or on national roads in the AM and PM Peak Hours as a result of traffic redistribution comparing the Do Minimum to the Do Something scenario with the Proposed Scheme in place.
- The guidelines indicate that a 10% threshold may be used, however, to ensure a rigorous assessment in this instance the lower 5% threshold for turning movements has been utilised.

Where road links have been identified as experiencing additional general traffic flow increases which exceed the above thresholds, a further assessment has been undertaken by way of a traffic capacity analysis on the associated junctions along the affected links. This further assessment is outlined in the following sections.

[1] Part II of The Roads Act 1993 sets out the current classification of roads as National (National Primary and National Secondary), Regional and Local (Local Tertiary and Local Secondary). The road types are governed by the default speed limit of the road. National Roads are TII owned whilst Regional and Local Roads are owned by the associated Local Authority.

6.3.3.1.7.2 General Traffic Flow Difference – AM Peak Hour

Diagram 6.24 (extract from Figure 6.7 in TIA Appendix 3 (Maps)) illustrates the difference in traffic flows on the road links in the AM Peak Hour for the 2028 Opening Year. Please see TIA Appendix 4.4 (General Traffic Assessment) for the full LAM outputs.

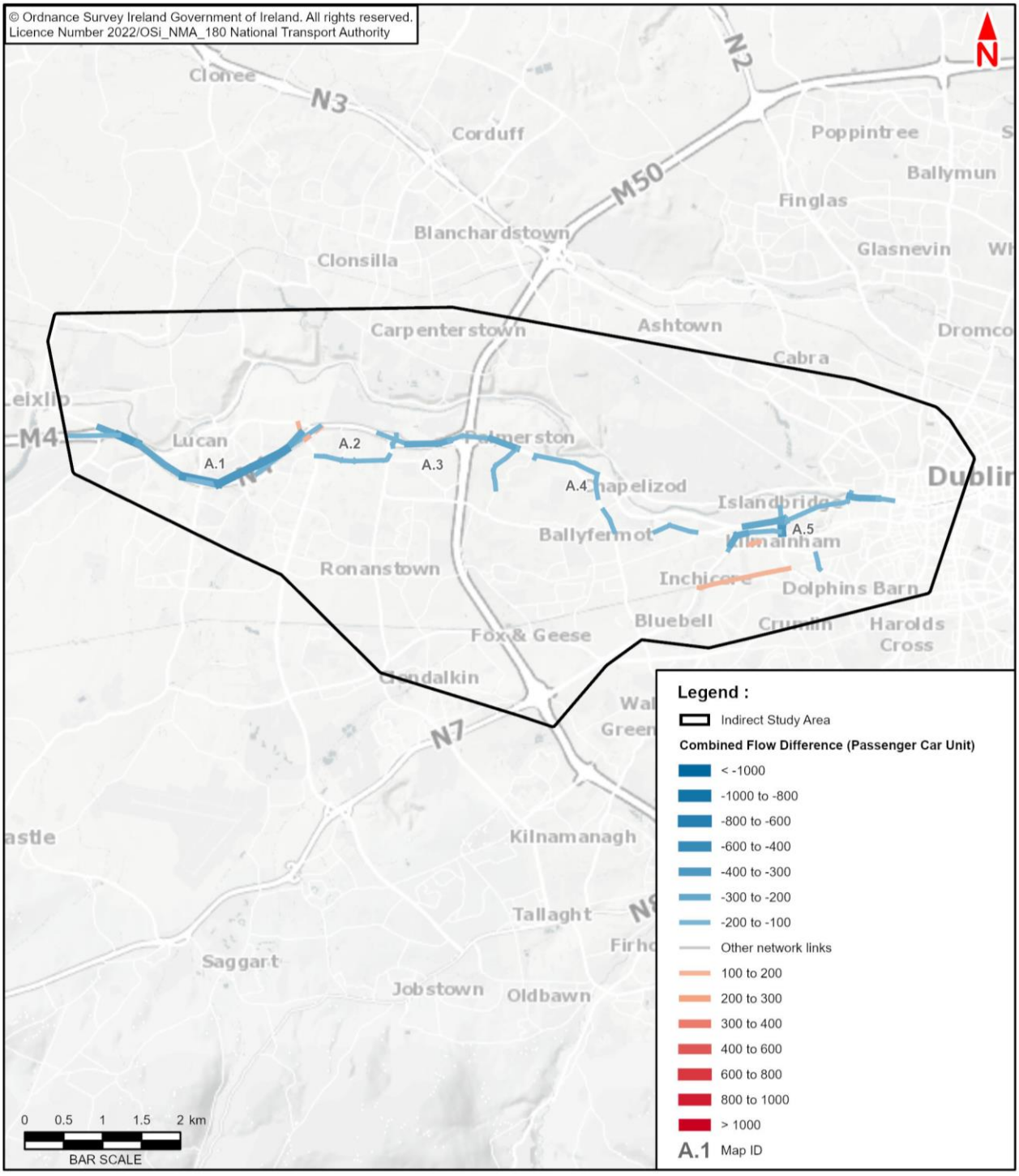

Diagram 6.24 Flow Difference on Road Links (Do Minimum vs. Do Something), AM Peak Hour, 2028 Opening Year

6.3.3.1.7.3 Impact on Direct Study Area (AM Peak Hour)

Direct Reductions in General Traffic: The LAM indicates that, during the 2028 Opening Year scenario, there are reductions in general traffic noted along the Proposed Scheme during the AM Peak Hour, as illustrated by the blue lines in Diagram 6.24, which indicates where a reduction of at least -100 combined traffic flows occurred in the model.

The key reductions in traffic flows during the 2028 AM Peak Hour are outlined in Table 6.38.

Table 6.38: Road Links that Experience a Reduction of at least -100 Combined Flows during 2028 AM Peak Hour (Direct Study Area)

Section	Map I.D.	Road Name	Do Minimum Flows (pcu)	Do Something Flows (pcu)	Flow Difference (pcu)
Section 1 – N4 Junction 3 to M50 Junction 7	A2	Fonthill Road North	935	791	-144
	A2	N4 Eb Between J2 Off and On Slips	4,068	3,949	-119
	A3	N4 Eb After J2	4,507	4,252	-255
	A3	R148 Eb On Approach to M50 J7	2,795	2,537	-259
Section 2 – M50 Junction 7 to R833 Con Colbert Road	A4	Lucan Road	847	726	-121
	A4	R112 Lucan Road at Chapelizod Village	916	799	-117
	A4	R148 East of Old Lucan Rd Jct	2,342	2,217	-125
	A4	R148 Eb Through M50 J7	2,245	2,055	-191
	A4	R148 Lucan Road Eb West Of Kennelsfort Road Lower	2,719	2,506	-213
	A4	The Oval	496	388	-108
Section 3 – R833 Con Colbert Road to Frank Sherwin Bridge	A5	Con Colbert Road	1,970	1,721	-249
	A5	Con Colbert Road Eb West Of South Circular Road	1,970	1,721	-249
	A5	St Johns Road West	1,527	1,289	-238
	A5	St John's Road West Wb West Of Military Road	770	642	-128

As shown in Table 6.38 the traffic reductions vary between -108 and -259 combined flows, with the largest reduction occurring at R148 Eb On Approach to M50 J7.

Direct Increases in General Traffic: The red lines in Diagram 6.24 indicate where the LAM predicts that an increase of at least +100 combined traffic flows will occur. These are presented in Table 6.39.

Table 6.39: Road Links that Experience an Increase of at least +100 Combined Flows during 2028 AM Peak Hour (Direct Study Area)

Section	Map ID	Road Name	Do Minimum Flows (pcu)	Do Something Flows (pcu)	Flow Difference (pcu)
Section 1 – N4 Junction 3 to M50 Junction 7	A.1	R136 Ballyowen Road between N4 and Lucan Road	1,375	1,523	+148
	A.1	N4 WB off slip at Junction 3	509	689	+180

Table 6.39 shows that there are predicted to be increases at two links on the Proposed Scheme, ranging from +148 to +180 combined peak hour flows.

6.3.3.1.7.4 Impact on Indirect Study Area (AM Peak Hour)

Indirect Reductions in General Traffic: In addition to the general traffic flow reductions occurring along the direct study area, there are key reductions in general traffic noted along certain road links within the indirect study area during the AM Peak Hour. The key reductions in traffic flows along the indirect study area during the AM Peak Hour are outlined in Table 6.40.

Table 6.40: Road Links that Experience a Reduction of ≥100 Combined Flows during AM Peak Hour (Indirect Study Area)

Section	Map I.D.	Road Name	Do Minimum Flows (pcu)	Do Something Flows (pcu)	Flow Difference (pcu)
Section 1 –M50 Junction 7 to west	A1	M4 Eb At J5, Between Eb Off and On Slips	4,509	4,396	-113
	A1	M4 Eb At J5, Just Before Eb Off Slip	3,558	3,450	-108
	A1	M4 J5 Sb On Slip	1,741	1,541	-200
	A1	N4 Through Jct 4	4,372	4,036	-336
	A1	N4 Btw Jct 3 and Jct 4	2,511	2,365	-146
	A1	N4 Eb just After J4A Off Slip	4,956	4,658	-298
	A1	N4 Eb To East of J5	5,279	4,971	-308
	A1	N4 J3 Eb Between Off and On Slip	4,213	4,110	-103
	A1	N4 J3 Nb Just Before Nb Off Slip	4,789	4,419	-370
	A1	N4 J3 Nb Off Slip	576	309	-267
	A1	N4 West of Jct 4	4,972	4,676	-296
	A2	Ballyowen Lane	534	411	-123
	A2	Ballyowen Road	1,066	868	-198
	A2	Fonthill Road North	935	791	-144
	A2	St Loman's Road	824	685	-139
Section 2 – M50 Junction 7 to R833 Con Colbert Road	A4	Ballyfermot Road	1,107	1,005	-102
	A4	Kennelsfort Road Upper	987	830	-158
	A4	Kylemore Road	854	709	-145
	A4	Lucan Road	847	726	-121
	A4	Lucan Road Between Chapelizod Bypass and Kylemore Road	870	752	-118
	A4	Sarsfield Road	1,149	1,026	-123
Section 3 – R833 Con Colbert Road to Frank Sherwin Bridge	A5	Frank Sherwin Bridge	1,264	1,113	-151
	A5	Grattan Crescent North of Inchicore Terrace South	1,347	1,147	-200
	A5	Grattan Crescent South of Inchicore Terrace South	810	590	-220
	A5	Grattan Crescent	810	590	-220
	A5	Inchicore Road	809	537	-273
	A5	South Circular Road	1,843	1,514	-329
	A5	Usher's Island	1,139	971	-169
	A5	Victoria Quay	1,078	862	-216

As indicated in Table 6.40, the traffic reductions vary between -102 and -336 combined flows along the surrounding road links.

Indirect Increases in General Traffic: The road links which experience additional traffic volumes of over 100 combined flows are illustrated by the orange / red lines in Diagram 6.24. These road links have been identified as experiencing traffic volumes above the additional traffic threshold and therefore require further analysis. The road links and associated flow difference between the Do Minimum and Do Something scenarios during the AM Peak Hour are outlined in Table 6.41.

Table 6.41: Road Links where the 100 Flow Additional Traffic Threshold is Exceeded (AM Peak Hour)

Section	Map I.D.	Road Name	Do Minimum Flows (pcu)	Do Something Flows (pcu)	Flow Difference (pcu)
Section 3 – R833 Con Colbert Road to Frank Sherwin Bridge	A5	Emmet Road	919	1,025	+107
	A5	Davitt Road	1,123	1,312	+188

Table 6.41 shows that there are predicted to be increases at two links on the Proposed Scheme, ranging from +107 to +188 combined peak hour flows. Both of these roads are classified as Regional roads.

6.3.3.1.7.5 National Roads – 5% Threshold Impact Assessment (AM Peak Hour)

The assessment methodology specifically for national roads stipulates that traffic exceeding 5% of the combined turning flows at junctions on or with national roads as a result of traffic redistribution associated with the Proposed Scheme requires further assessment.

The inbound flow differences between the Do Minimum and Do Something scenarios during the AM peak hour at the National road junctions within the indirect study area are presented in Table 6.42.

Table 6.42: National Road Links Traffic Threshold Assessment (AM Peak Hour)

Junction	Total Do Minimum Inbound Flows (pcu)	Total Do Something Inbound Flows (pcu)	Difference (pcu)	Percentage Difference
M50 Junction 9	5824	5841	17	0.3%
M50 Junction 7	8369	8103	-266	-3.2%
N4 Junction 5	3280	3194	-86	-2.6%
N4 Junction 4a	1771	1816	45	2.5%
N4 Junction 4	2326	2352	26	1.1%
N4 Junction 3	3181	3064	-117	-3.7%
N4 Junction 2	3814	3755	-59	-1.6%

The results in Table 6.42 demonstrate that, in the AM peak hour, traffic flows at national roads junctions are expected to change by between -3.7% and +2.5%.

The highest impact predicted for total inbound flows between the Do Minimum and Do Something scenarios in the AM peak hour is a 2.5% increase at N4 Junction 4A, comfortably below the 5% threshold.

Overall, the Proposed Scheme is expected to have a negligible effect on turning flows at junctions with national roads in the AM peak hour.

No further assessment into the junctions with national roads during the AM peak hour has been undertaken, except for instances where the 100 vehicle threshold for additional traffic is exceeded, as shown in Table 6.42.

6.3.3.1.8 General Traffic Flow Difference – PM Peak Hour

Diagram 6.25 (extract from Figure 6.8 in TIA Appendix 3 (Maps)) illustrates the difference in traffic flows on road links in the PM Peak Hour for the 2028 Opening Year. TIA Appendix 4.4 (General Traffic Assessment) provides further details of the LAM outputs.

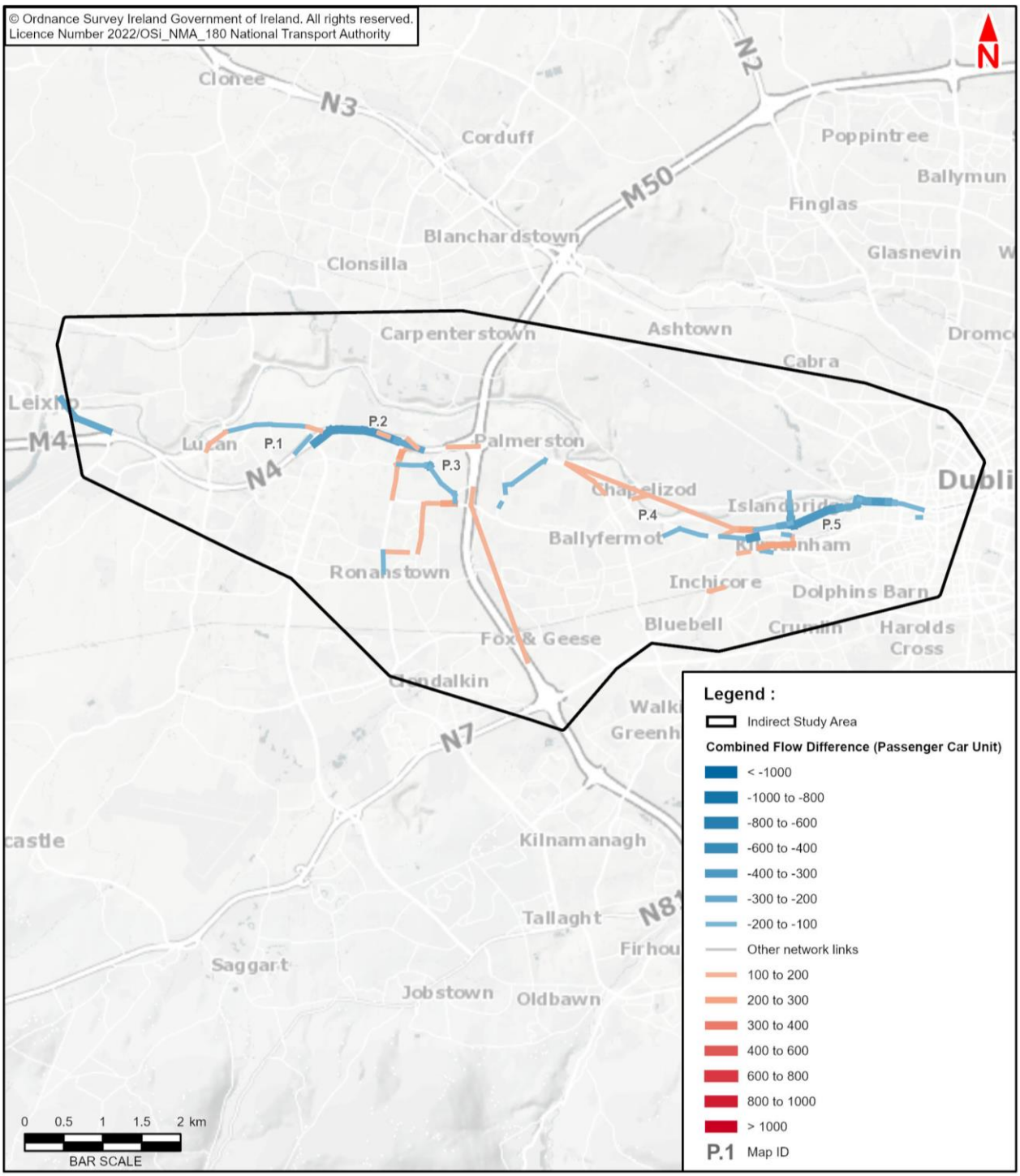

Diagram 6.25 Flow Difference on Road Links (Do Minimum vs. Do Something), PM Peak Hour, 2028 Opening Year

6.3.3.1.8.1 Impact on Direct Study Area (PM Peak Hour)

Direct Reductions in General Traffic Flows: The LAM indicates that during the 2028 Opening Year scenario, there are key reductions in general traffic noted along the Proposed Scheme during the PM Peak Hour, as illustrated by the blue lines in Diagram 6.25, which indicates where a reduction of at least -100 combined traffic flows occurs.

The key reductions in traffic flows during the 2028 PM Peak Hour are outlined in Table 6.43.

Table 6.43: Road Links that Experience a Reduction of at least ≥100 Combined Flows during PM Peak Hour (Direct Study Area)

Section	Map I.D.	Road Name	Do Minimum Flows	Do Something Flows	Flow Difference
			(pcu)	(pcu)	(pcu)
Section 1 – N4 Junction 3 to M50 Junction 7	P2	N4 Wb onto R136 Sb Slip	857	495	-362
	P2	N4 between Jct 2 and Jct 3	4,526	4,214	-312
	P3	N4 through Jct 2	3,534	3,312	-222
Section 2 – M50 Junction 7 to R148 Con Colbert Road – Palmerstown Bypass and Chapelizod Bypass	P4	The Oval	407	232	-175
Section 3 – R148 Con Colbert Road to City Centre (Frank Sherwin Bridge)	P5	St John's Road West WB West Of Military Road	1,378	995	-362
	P5	St Johns Road West	1,281	925	-383
	P5	Victoria Quay	1,906	1,584	-356
	P5	Con Colbert Road	1,499	1,368	-131

As indicated in Table 6.43 the traffic reductions vary between -175 and -362 combined flows.

Increases in General Traffic Flows: The red lines in Diagram 6.25 indicate where the LAM predicts that an increase of at least +100 combined traffic flows will occur. These are presented in Table 6.44.

Table 6.44: Road Links that Experience an Increase of at least +100 Combined Flows during PM Peak Hour (Direct Study Area)

Orientation	Map ID	Road Name	Do Minimum Flows (pcu)	Do Something Flows (pcu)	Flow Difference (pcu)
Section 1 – N4 Junction 3 to M50 Junction 7	P2	Lucan Road	847	952	105
	P2	N4 Eb Between J3 And J4	3,007	3,136	129
	P3	Fonthill Road North to Lucan Road Inbound Slip	1,056	1,157	143
	P3	N4 Onto M50 South Slip	1,411	1,514	103
Section 2 – M50 Junction 7 to R148 Con Colbert Road – Palmerstown Bypass and Chapelizod Bypass	P4	R148 Chapelizod Bypass (Eb between the Oval and Con Colbert Road)	765	878	113
	P4	R148 Chapelizod Bypass (Wb)	1,869	1,990	121
Section 3 – R148 Con Colbert Road to City Centre (Frank Sherwin Bridge)	P5	R148 Chapelizod Bypass Eb after Con Colbert Road	1,051	1,292	241

Table 6.44 shows that there are predicted to be slight increases on seven links on the Proposed Scheme route itself, ranging from +105 to +241 combined peak hour flows.

6.3.3.1.8.2 Impact on Indirect Study Area (PM Peak Hour)

Reductions in General Traffic Flows: In addition to the general traffic flow reductions occurring along the direct study area, there are key reductions in general traffic noted along certain road links within the indirect study area during the 2028 PM Peak Hour. The key reductions in traffic flows along the indirect study area during the PM Peak Hour are outlined in Table 6.45.

Table 6.45: Road Links that Experience a Reduction of at least -100 Combined Flows during PM Peak Hour (Indirect Study Area)

Orientation	Map ID	Road Name	Do Minimum Flows (pcu)	Do Something Flows (pcu)	Flow Difference (pcu)
Section 1 – N4 Junction 3 to M50 Junction 7	P1	N4 J3 Nb Off Slip	278	141	-137
	P1	Leixlip Road	1,180	970	-209
	P1	Lucan Road	1,654	1,468	-187
	P1	Chapel Hill	884	760	-124
	P2	Fonthill Road North	2,443	2,341	-102
	P3	Fonthill Road	951	772	-179
Section 2 – M50 Junction 7 to R148 Con Colbert Road – Palmerstown Bypass and Chapelizod Bypass	P4	Kennelsfort Road Upper	885	759	-126
	P4	Ballyfermot Road Between O'Hogan Road and Saint Laurence Road	1,175	1,061	-114
	P4	Sarsfield Road	550	405	-145
	P4	Turret Road	227	115	-112
	P4	Wheatfield Road	389	279	-110
Section 3 – R148 Con Colbert Road to City Centre (Frank Sherwin Bridge)	P5	Victoria Quay	1,906	1,584	-321
	P5	Inchicore Road	355	205	-150
	P5	South Circular Road North of St John's Road	1,499	1,200	-299
	P5	Usher's Island	1,756	1,543	-214
	P5	Bulfin Road	397	259	-138
	P5	Usher's Quay	1,858	1,745	-113
	P5	Con Colbert Road	1,499	1,368	-131

As indicated in Table 6.45, the traffic reductions vary between -102 and -321 combined flows along the surrounding road links.

Increases in General Traffic Flows: The key road links which experience additional traffic volumes in the PM Peak Hour are illustrated by the red lines in Diagram 6.25. These red lines indicate where an increase in at least 100 combined flows are occurring. The key increases in traffic flows along the indirect study area during the PM Peak Hour are outlined in Table 6.46.

Table 6.46: Road Links that Experience an Increase of at least +100 Combined Flows (PM Peak Hour)

Orientation	Map I.D.	Road Name	Do Minimum Flows (pcu)	Do Something Flows (pcu)	Flow Difference (pcu)
Section 1 – N4 Junction 3 to M50 Junction 7	P1	R109 Main Street	878	1,012	134
	P2	R113 Fonthill Road North (South of St Loman's Road)	1,687	1,886	199

Orientation	Map I.D.	Road Name	Do Minimum Flows (pcu)	Do Something Flows (pcu)	Flow Difference (pcu)
	P2	R113 Fonthill Road North (North of St Loman's Road)	2,819	3,020	202
	P3	Neilstown Road	888	1,041	153
	P3	Coldcut Road	1,515	1,638	123
	P3	Lucan Newlands Road	455	595	140
	P3	N4 Wb Off Slip to R113 Fonthill Road North	1,284	1,441	157
	P4	M50 Btw N4 And N7 Jct	6,175	6,275	100
Section 2 – M50 Junction 7 to R148 Con Colbert Road – Palmerstown Bypass and Chapelizod Bypass	P4	Sarsfield Road	336	444	108
	P4	Davitt Road	1,199	1,308	110
Section 3 – R148 Con Colbert Road to City Centre (Frank Sherwin Bridge)	P4	Chapelizod Road	1,093	1,230	137
	P4	R112 Slip to Wb R148	704	866	162
	P5	Emmet Road	898	1,114	216
	P5	South Circular Road	1,231	1,359	128

As outlined in Table 6.46, the key road links which experience additional traffic flows vary between +100 and +216 combined flows along the surrounding road links, during the PM Peak Hour. As described in Section 6.3.3.1.7, these road links have been identified as experiencing additional traffic volumes over the threshold for further assessment.

6.3.3.1.8.3 National Roads – 5% Threshold Impact Assessment (PM Peak Hour)

The inbound flow differences between the Do Minimum and Do Something scenarios during the PM Peak Hour at the National road junctions within the indirect study area are presented in Table 6.47.

Table 6.47: National Road Links Traffic Threshold Assessment (PM Peak Hour)

Junction	Total Do Minimum Inbound Flows (pcu)	Total Do Something Inbound Flows (pcu)	Difference (pcu)	Percentage Difference
M50 Junction 9	17,601	17,556	-46	-0.3%
M50 Junction 7	8,898	8,775	-123	-1.4%
N4 Junction 5	2,825	2,757	-68	-2.4%
N4 Junction 4a	1,883	1,844	-39	-2.1%
N4 Junction 4	2,099	2,139	39	1.9%
N4 Junction 3	2,963	2,654	-309	-10.4%
N4 Junction 2	3,633	3,744	111	3.1%

Table 6.47 shows in total, two of the seven assessed junctions are expected to experience slight increases in inbound traffic as a result of the scheme, but in each instance, this is less than 5%. that the highest impact predicted for total turning flows between the Do Minimum and Do Something scenarios in the PM peak hour is a 3.1% increase at N4 Junction 2, below the 5% threshold. Inbound traffic flows at the remaining five junctions are predicted to decrease.

Overall Impact on Indirect Study Area: In the PM peak hour, the redistributed traffic as a result of the Proposed Scheme results in a Slight negative impact on 14 links, and Positive Slight impacts, where traffic is predicted to reduce, on 19 links. The results show that overall, more links are expected to experience a reduction in traffic as a result of the scheme, which on balance is assessed as a **Negligible** impact. The Proposed Scheme is expected to have a negligible effect on National roads within the Indirect Study area.

6.3.3.1.9 General Traffic Impact Assessment

This section details the magnitude of the impacts as a result of the redistributed general traffic on the indirect study area. Note that further assessment is presented in Chapter 6 (Traffic and Transport) in Volume 2 of this EIAR which considers the junction sensitivities and the significant of effect.

To understand the magnitude impact of the redistributed traffic, operational capacities have been extracted from the LAM.

The capacity of junctions within the LAM are expressed in terms of Volume to Capacity ratios (V / C ratios). The V / C ratios represent the operational efficiency for each arm of a junction. For the purpose of this TIA, operational capacity outputs of a junction have been identified with reference to the busiest arm which experiences the maximum V/C ratio.

A V / C ratio of below 85% indicates that traffic is operating well, with spare capacity, and does not experience queuing or delays throughout the hour. A value of 85% to 100% indicates that traffic is approaching its theoretical capacity and may experience occasional queues and delays within the hour. A value of over 100% indicates that traffic is operating above its theoretical capacity and experiences queues and delays regularly within the hour. The junctions have been described in the ranges outlined in Table 6.48.

Table 6.48: Junction Volume / Capacity Ranges

V / C Ratio	Traffic Condition
≤85%	A junction is operating well within theoretical capacity.
85% - 100%	A junction is approaching theoretical capacity and may experience occasional queues and delays.
≥100%	A junction is operating above its theoretical capacity and experiences queues and delays regularly.

When comparing the V / C ratios during the Do Minimum and Do Something scenarios for the key junctions, the terms outlined in Table 6.49 have been used to describe the impact.

Table 6.49: Magnitude of Impact for Redistributed Traffic

		Do Something		
		≤85%	85% - 100%	≥100%
Do Minimum	≤85%	Negligible	Low Negative	High Negative
	85% - 100%	Low Positive	Negligible	Medium Negative
	≥100%	Medium Positive	Low Positive	Negligible

As indicated in Table 6.49, the changes in V / C ratios between the Do Minimum and Do Something scenarios result in either a positive, negative or negligible magnitude of impact.

6.3.3.1.9.1 General Traffic Impact Assessment (2028 Opening Year) – Indirect Study Area - AM Peak Hour

The contents of Table 6.50 outline the V / C ratios at the key local / regional road junctions in the AM Peak Hour for the 2028 Opening Year and the resultant magnitude of impact and significance of effect at each junction. The location of these junctions and the V / C ratio comparison between the Do Minimum and Do Something scenarios in the 2028 AM Peak Hour are illustrated in Figure 6.9 in TIA Appendix 3 (Maps).

Table 6.50: Volume over Capacity Ratios at Key Junctions (Do Minimum vs. Do Something), AM Peak, 2028 Opening Year

Road Name	Junction Name	DM Max V / C Ratio			DS Max V / C Ratio			Magnitude of Impact
		<85%	85% - 100%	>100%	<85%	85% - 100%	>100%	
Davitt Road	Davitt Road / Davitt Road / Benbulbin Road	✓			✓			Negligible
	Davitt Road / Davitt Road / Kilworth Road	✓			✓			Negligible
	Dolphin Road / Slievenamon Road / Dolphin Road / Davitt Road	✓			✓			Negligible
Emmet Road	Myra Close / Emmet Road / Emmet Road	✓			✓			Negligible
	Emmet Road / Bulfin Road	✓			✓			Negligible
Naas Road	Naas Road / Davitt Road		✓			✓		Negligible

The results of the junction analysis shown in Table 6.50 demonstrate that five of the six junctions are predicted to operate with a maximum VoC ratio of below 85% during the AM Peak Hour in the 2028 Opening Year and the Proposed Scheme. At the Naas Road / Davitt Road junction, the junction is expected to perform with a maximum VoC ratio of between 85% and 100% in both the Do Minimum and Do Something scenarios.

A Negligible impact is predicted at each of the six junctions, and no capacity issues (where the max VoC ratio is greater than 100%) are predicted to arise at any junctions.

The junction analysis contained within the EIAR considers the sensitivity of each of the above junctions and combines this with the predicted magnitude of impact to produce an overall significance of effects.

Full details of this assessment can be found in Section 6.4 of this EIAR.

6.3.3.1.9.2 General Traffic Impact Assessment (2028 Opening Year) – Indirect Study Area - PM Peak Hour

The contents of Table 6.51 outline the V / C ratios at the key local / regional road junctions in the PM Peak Hour for the 2028 Opening Year at junctions where the impact is assessed as low or higher. The full set of results for all junctions assessed is contained within TIA Appendix 4.4 (General Traffic Assessment).

Table 6.51: Volume over Capacity Ratios at Key Junctions (Do Minimum vs. Do Something), PM Peak, 2028 Opening Year

Road Name	Junction Name	DM Max V / C Ratio			DS Max V / C Ratio			Magnitude of Impact
		<85%	85% - 100%	>100%	<85%	85% - 100%	>100%	
Chapelizod Road	Main Street / Chapelizod Road		✓			✓		Negligible
	Chapelizod Hill Road / St Laurence Road / Lucan Road			✓			✓	Negligible
Coldcut Road	Coldcut Road / Fonthill Road	✓				✓		Low Negative
	Coldcut Road / Neilstown Road	✓			✓			Negligible
Davitt Road	Naas Road / Davitt Road		✓			✓		Negligible
	Davitt Road / Davitt Road / Kilworth Road	✓			✓			Negligible
Emmet Road	Grattan Crescent / Tyrconnell Road / Emmet Road		✓			✓		Negligible
	Emmet Road / St Vincent Street West / Emmet Road	✓			✓			Negligible

Road Name	Junction Name	DM Max V / C Ratio			DS Max V / C Ratio			Magnitude of Impact
		<85%	85% - 100%	>100%	<85%	85% - 100%	>100%	
	Emmet Road / Bulfin Road	✓			✓			Negligible
Fonthill Road North Rdbt	Fonthill Road North / St Loman's Road	✓			✓			Negligible
Lucan Newlands Road	Lucan Newlands Road / R113 Fonthill Road North / R113		✓			✓		Negligible
	Lucan Newlands Road / Rowlagh Park	✓			✓			Negligible
Neilstown Road	Neilstown Road / Coldcut Road / Coldcut Road	✓			✓			Negligible
	St Marks Avenue / Neilstown Road / Neilstown Road	✓			✓			Negligible
	Neilstown Road / Collinstown Road / Neilstown Road	✓			✓			Negligible
	Neilstown Road / St Mark's Avenue	✓			✓			Negligible
	Lucan Newlands Road / Neilstown Road	✓			✓			Negligible
R109 Main Street	Leixlip Road / Main Street	✓			✓			Negligible
	R109 / Lower Main Street / Lower Main Street	✓			✓			Negligible
	Chapel Hill / Lower Main Street / R109	✓			✓			Negligible
R112 Slip to Wb R148	R112 WB R148 on-slip / Kylemore Road	✓			✓			Negligible
R113 Fonthill Road North (North of St Loman's Road)	R113 SB on slip to Fonthill Road North SB	✓			✓			Negligible
R113 Fonthill Road North (South of St Loman's Road)	R113 Fonthill Road North / Saint Loman's Road			✓			✓	Negligible
Sarsfield Road	Sarsfield Road / Ballyfermot Road	✓			✓			Negligible
South Circular Road	Emmet Road / Old Kilmainham / South Circular Road / South Circular Road	✓			✓			Negligible
	South Circular Road / Inchicore Road / Kilmainham Lane	✓				✓		Low Negative

The results of the junction analysis shown in in Table 6.51 demonstrate that the majority of junctions are predicted to operate with a maximum VoC ratio of below 85% during the PM Peak Hour in the 2028 Opening Year and the Proposed Scheme.

Capacity issues (where the max VoC exceeds 100%) are predicted at the following junctions:

- Chapelizod Hill Road / St Laurence Road / Lucan Road signalized junction (14158) – operates above 100% during both the Do Minimum and Do Something scenario.
- Fonthill Road North / Saint Loman's Road roundabout node (25129) – operates above 100% during both the Do Minimum and Do Something scenario.

The junction analysis contained within the EIAR considers the sensitivity of each of the above junctions and combines this with the predicted magnitude of impact to produce an overall significance of effects.

Full details of this assessment can be found in Section 6.4 of this EIAR.

6.3.3.1.9.3 General Traffic Impact Assessment (2043 Design Year) – Indirect Study Area – AM Peak Hour

The contents of Table 6.52 outline the V / C ratios at the key local / regional road junctions in the AM Peak Hour for the 2043 Design Year at junctions where the impact is assessed as low or higher. The full set of results for all junctions assessed is contained within TIA Appendix 4.4 (General Traffic Assessment).

Table 6.52: Volume over Capacity Ratios at Key Junctions (Do Minimum vs. Do Something), AM Peak, 2043 Opening Year

Road Name	Junction Name	DM Max V / C Ratio			DS Max V / C Ratio			Magnitude of Impact
		<85%	85% - 100%	>100%	<85%	85% - 100%	>100%	
Davitt Road	Davitt Road / Davitt Road / Benbulbin Road	✓			✓			Negligible
	Davitt Road / Davitt Road / Kilworth Road	✓			✓			Negligible
	Dolphin Road / Slievenamon Road / Dolphin Road / Davitt Road	✓			✓			Negligible
Emmet Road	Myra Close / Emmet Road / Emmet Road	✓			✓			Negligible
	Emmet Road / Bulfin Road	✓			✓			Negligible
Naas Road	Naas Road / Davitt Road		✓			✓		Negligible

The results of the junction analysis shown in Table 6.52 demonstrate that five of the six of the assessed junctions are predicted to operate with a maximum VoC ratio of below 85% during the AM Peak Hour in the 2043 Opening Year and the Proposed Scheme. At the Naas Road / Davitt Road junction, the junction is expected to perform with a maximum VoC ratio of between 85% and 100% in both the Do Minimum and Do Something scenarios.

Capacity issues (Max VoC ratios greater than 100%) are not predicted to arise at any junctions and a **Negligible** impact is predicted at each of the six junctions assessed.

Considering this, no further assessment into mitigation measures is required for junctions in the AM Peak Hour of the 2043 Design Year.

6.3.3.1.9.4 General Traffic Impact Assessment (2043 Design Year) – Indirect Study Area – PM Peak Hour

The contents of Table 6.53 outlines the V / C ratios at the key local / regional road junctions in the PM Peak Hour for the 2043 Design Year at junctions where the impact is assessed as low or higher. The full set of results for all junctions assessed is contained within TIA Appendix 4.4 (General Traffic Assessment).

Table 6.53: Volume over Capacity Ratios at Key Junctions (Do Minimum vs. Do Something), PM Peak, 2043 Opening Year

Road Name	Junction Name	DM Max V / C Ratio			DS Max V / C Ratio			Magnitude of Impact
		<85%	85% - 100%	>100%	<85%	85% - 100%	>100%	
Chapelizod Road	Main Street / Chapelizod Road /		✓			✓		Negligible
	Chapelizod Hill Road / St Laurence Road / Lucan Road			✓			✓	Negligible
Coldcut Road	Coldcut Road / Fonthill Road	✓				✓		Low Negative
	Coldcut Road / Neilstown Road	✓			✓			Negligible
Davitt Road	Naas Road / Davitt Road		✓			✓		Negligible
	Davitt Road / Davitt Road / Kilworth Road	✓			✓			Negligible
Emmet Road	Grattan Crescent / Tyrconnell Road / Emmet Road		✓			✓		Negligible
	Emmet Road / St Vincent Street West / Emmet Road	✓			✓			Negligible
	Emmet Road / Bulfin Road	✓			✓			Negligible
Fonthill Road North Rdbt	Fonthill Road North / St Loman's Road	✓			✓			Negligible
Lucan Newlands Road	Lucan Newlands Road / R113 Fonthill Road North / R113			✓			✓	Negligible
	Lucan Newlands Road / Rowlagh Park	✓			✓			Negligible
Neilstown Road	Neilstown Road / Coldcut Road / Coldcut Road	✓			✓			Negligible
	St Marks Avenue / Neilstown Road / Neilstown Road	✓			✓			Negligible
	Neilstown Road / Collinstown Road / Neilstown Road	✓			✓			Negligible
	Neilstown Road / St Mark's Avenue	✓			✓			Negligible
	Lucan Newlands Road / Neilstown Road	✓			✓			Negligible
R109 Main Street	Leixlip Road / Main Street	✓			✓			Negligible
	R109 / Lower Main Street / Lower Main Street	✓			✓			Negligible
	Chapel Hill / Lower Main Street / R109	✓			✓			Negligible
R112 Slip to Wb R148	R112 WB R148 on-slip / Kylemore Road	✓			✓			Negligible
R113 Fonthill Road North (North of St Loman's Road)	R113 SB on slip to Fonthill Road North SB	✓			✓			Negligible
R113 Fonthill Road North (South of St Loman's Road)	R113 Fonthill Road North / Saint Loman's Road			✓			✓	Negligible
Sarsfield Road	Sarsfield Road / Ballyfermot Road	✓			✓			Negligible

Road Name	Junction Name	DM Max V / C Ratio			DS Max V / C Ratio			Magnitude of Impact
		<85%	85% - 100%	>100%	<85%	85% - 100%	>100%	
South Circular Road	Emmet Road / Old Kilmainham / South Circular Road / South Circular Road	✓			✓			Negligible
	South Circular Road / Inchicore Road / Kilmainham Lane	✓			✓			Negligible

The results of the junction analysis illustrated in Table 6.53 demonstrate that the majority of junctions are operating with a maximum VoC ratio of below 85% during the PM Peak Hour in the 2043 Future Year and the Proposed Scheme.

Capacity issues are predicted at the following junctions:

- Chapelizod Hill Road / St Laurence Road / Lucan Road signalized junction (14158) – predicted to operate at 101% during both the Do Minimum and Do Something scenario.
- Lucan Newlands Road / Fonthill Road North / R113 (25375) – as per the junction above, predicted to operate at 101% during both the Do Minimum and Do Something scenario.

A Low Negative effect is predicted at the Coldcut Road / Fonthill Road signalised junction (Node 25100), which provides one of the access points into the Liffey Valley Shopping Centre, as a result of the max VoC ratio rising above 85% in the Do Something scenario. Closer inspection of the figures shows that the max VoC ratio is expected to increase by just 1%, from 85% to 86%, meaning that the impact as a result of the Proposed Scheme would be minimal.

A **Negligible** effect is predicted at 24 junctions, and an **Imperceptible** effect at four further junctions.

No further assessment into potential mitigation measures is therefore deemed to be required for junctions in the 2043 PM Peak Hour scenario.

6.3.3.1.10 Night-time Traffic Redistribution

The night-time period is defined as between 23:00 and 07:00. An analysis of traffic data during this period indicates that traffic levels are considerably lower and that junctions have a higher capacity for vehicular movement[2]. Automatic Traffic Counter data demonstrates that, typically, within Dublin the night-time period has approximately 19% of the traffic levels compared to the morning peak hour (08:00-09:00). As a result, during the night-time period junctions do not experience flows in excess of capacity which would result in queuing and in turn potential re-distribution of traffic to alternative routes to avoid congestion. Therefore, the impact of traffic redistribution due to any of the Proposed Schemes will be **Negligible** during the night-time period.

6.3.3.1.11 General Traffic Impact Assessment Summary – Indirect Study Area

Given the improvements to bus priority, walking and cycling as a result of the Proposed Scheme, there will likely be an overall reduction in operational capacity for general traffic along the direct study area. This may in turn result in some level of redistribution of general traffic away from the main corridor onto the surrounding road network.

[2] Less pedestrian, cycling and bus demand requirements leading to higher level of general traffic green time allocation per typical signal cycle

Using the TII guidelines as an indicator for best practice, the LAM Opening Year 2028 model results were used to identify the difference in traffic flows between the Do Minimum and Do Something scenarios. The following thresholds have been used to identify where a Transport Assessment is required:

- **Local / Regional Roads:** Traffic redistribution results in an increase above 100 combined flows (i.e. in a two-way direction) along residential, local and regional roads in the vicinity of the Proposed Scheme in the AM and PM peak hours; and
- **National Roads:** Traffic exceeds 5% of the combined turning flows at junctions with/ on/or with national roads in the AM and PM peak hours as a result of traffic redistribution comparing the Do Minimum to the Do Something scenario with the Proposed Scheme in place.

The threshold impact assessment identified the following roads that required further traffic analysis:

- **AM Peak Hour:** Emmet Road, Davitt Road, R136 Ballyowen Road and the N4 westbound off-slip at Junction 3.
- **PM Peak Hour:** R109 Main Street, R834 Lucan Road, N4 eastbound between J3 and J4, N4 westbound off-slip at J2, Coldcut Road, R113 Fonthill Road North, Neilstown Road, Lucan Newlands Road, Chapelizod Road, R148 Con Colbert Road, R148 Chapelizod Bypass, R148 St John's Road West, R111 South Circular Road, Emmet Road, Sarsfield Road and Davitt Road.

The general traffic impact assessment was undertaken by extracting operational capacities from the LAM at the key junctions along the above road links. To undertake a robust assessment, the operational capacity outputs have been presented with reference to the worst performing arm of a junction that experiences the maximum V / C ratio.

The overall results of this assessment can be summarised as follows:

- The majority of assessed junctions have VoC ratios of below 85%, i.e. they are operating within capacity for all assessed years in the Do Minimum and Do Something scenarios. This indicates that these junctions will be able to accommodate for the additional general traffic volumes redistributed, as a result of the Proposed Scheme and the impact is deemed **Negligible to Low negative**.

- No capacity issues are predicted at any identified junctions in the AM peak hour. Capacity issues (where the maximum VoC ratio is greater than 100%) are predicted to arise at the following junctions during the PM Peak Hour in the 2028 Opening Year and the 2043 Opening Year + 15 Years:

  - Chapelizod Hill Road / St Laurence Road / Lucan Road signalized junction (14158)

  - Fonthill Road North / Saint Loman's Road roundabout (25129)

At both of these junctions, operational performance is expected to be similar in the Do Minimum and Do Something scenarios therefore, the impact is considered to be **Negligible**.

Overall, it is determined that there will be a **Negligible** impact from the redistributed general traffic as a result of the Proposed Scheme. Given that the redistributed traffic will not lead to a significant deterioration of the operational capacity on the surrounding road network, no mitigation measures have been considered to alleviate the impact outside of the direct study area.

During the night-time lower traffic flows aligned with more vehicular capacity at junctions will reduce or eliminate traffic redistribution from the Proposed Scheme Corridor. Thus, the impact during this period will be **Negligible**.

In terms of the National roads 5% threshold impact assessment, the highest impact predicted for total inbound flows between the Do Minimum and Do Something scenarios is in the PM peak hour, where there is predicted to be 3.1% increase at N2 Junction 4. In the majority of cases, traffic flows at national road junctions are expected to decrease slightly, and overall the Proposed Scheme is expected to have a negligible effect on national road junctions within the indirect study area.

It should therefore be considered that the traffic congestion outlined in the impact assessment is acceptable with regard to the urban location of the area in the context of the increased movement of people overall and on sustainable modes in particular.

6.3.3.1.12 Network-Wide Performance Indicators for General Traffic (Indirect Study Area)

The traffic and transport analysis considers the impact that the Proposed Scheme will have on the road network, within the direct and indirect study areas. To further quantify the impact of the Proposed Scheme on the traffic and transport conditions, network-wide performance indicators have been extracted for the general traffic conditions beyond the defined study areas, covering the full LAM modelled area.

The following indicators have been provided for both scenarios:

- **Transient Queues** (pcu.hrs) represent delay caused by reduced speeds approaching junctions and by waiting time at junctions. It does not include delay created whilst stopped in queues at over capacity junctions;
- **Over Capacity Queues** (pcu.hrs) measures the time spent queuing as a result of junctions operating over capacity and is a measure of network congestion;
- **Total Travel Time** (pcu.hrs) is the sum of the time spent in transient queues, over capacity queues and link cruise time;
- **Total Travel Distance** (pcu.kms) is the total distance travelled by all the vehicles in the model; and
- **Average Network Speed** (km/hr) is the average speed of all the vehicles in the network over the modelled period. It's calculated by dividing total travel distance by total travel time.

The contents of Table 6.54 outline the impact that the Proposed Scheme will have on the wider transport network, beyond the defined study areas.

Table 6.54: Network-Wide Performance Indicators with Proposed Scheme in Place

Scenario	Metric	Do Minimum	Do Something	% Difference	Impact
2028 Opening Year AM Peak Hour	Transient Queues (pcu hr)	18,720	18,780	0.3%	Low Positive
	Over-capacity Queues (pcu hr)	5,363	5,306	-1.1%	
	Total Travel Times (pcu hr)	62,300	62,250	-0.1%	
	Total Travel Distance (pcu km)	2,020,000	2,018,000	-0.1%	
	Average Speed (km/h)	32.4	32.4	0.0%	
2028 Opening Year PM Peak Hour	Transient Queues (pcu hr)	17,990	18,080	0.5%	Low Positive
	Over-capacity Queues (pcu hr)	4,702	4,630	-1.5%	
	Total Travel Times (pcu hr)	58,990	58,840	-0.3%	
	Total Travel Distance (pcu km)	1,941,000	1,932,000	-0.5%	
	Average Speed (km/h)	32.9	32.8	-0.2%	
2043 Opening Year AM Peak Hour	Transient Queues (pcu hr)	18,070	18,160	0.5%	Negligible
	Over-capacity Queues (pcu hr)	5,227	5,266	0.7%	
	Total Travel Times (pcu hr)	61,570	61,640	0.1%	
	Total Travel Distance (pcu km)	2,059,000	2,056,000	-0.1%	
	Average Speed (km/h)	33.4	33.4	-0.3%	
2043 Opening Year AM Peak Hour	Transient Queues (pcu hr)	17,510	17,460	-0.3%	Negligible
	Over-capacity Queues (pcu hr)	4,464	4,507	1.0%	
	Total Travel Times (pcu hr)	58,060	57,840	-0.4%	
	Total Travel Distance (pcu km)	1,942,000	1,931,000	-0.6%	
	Average Speed (km/h)	33.4	33.4	-0.1%	

The results of the assessment demonstrate that the impacts to the network performance indicators range between -1.5% and +1%. A low positive impact is anticipated in the 2028 Peak Hour scenarios and a negligible impact is predicated in the 2043 Peak Hour scenarios.

6.3.4 Operational Phase Summary

Based on the information and analysis presented within Section 6.3 (Operational Phase), the assessment determines that the Proposed Scheme meets the above objectives and integrates within the receiving transport environment with minimal impacts during the Operational Phase. The assessment demonstrates the following:

This TIA demonstrates that the Proposed Scheme results in the following impacts:

- **Pedestrian Infrastructure:** The Proposed Scheme consists of measures to enhance the existing pedestrian infrastructure along the direct study area. All proposed facilities have been designed in accordance with PDGB which has been developed with cognisance to the relevant accessibility guidance. A LoS junction assessment was undertaken using a set of five criteria to determine the impact that the Proposed Scheme has for pedestrians. The results of the impacted junctions demonstrate that in the Do Minimum scenario, 73% of the junctions assessed has LoS ratings of C or D, with the exception of two B, three E and one F ratings. In the Do Something scenario, i.e. following the development of the Proposed Scheme, 82% of the assessed junctions had the highest A / B LoS ratings. The impacts of the improvements to the quality of the pedestrian infrastructure will be **Medium Positive** in all sections of the Proposed Scheme.

- **Cycling Infrastructure:** The Proposed Scheme also consists of measures to enhance the potential for cycling by providing safe infrastructure for cycling, segregated from general traffic (and pedestrians) wherever practicable along the direct study area. A LoS assessment was undertaken using an adapted version of the NTA's National Cycle Manual QoS Evaluation criteria. The results of the assessment demonstrate that the LoS in the Do Minimum scenario consists predominantly of C ratings, with the exception of one B rating. In the Do Something scenario, eight of the nine LoS ratings are the highest A+, A and B ratings, with the remainder being C rating. The impact of the improvements will be **Medium Positive** in sections 1 and 2 and **Low Positive** in Section 3 of the Proposed Scheme.

- **Bus Infrastructure:** The implementation of the Proposed Scheme will result in improvements in the quality of bus infrastructure provision in the direct study area. A qualitative impact assessment has been undertaken based on the provision of bus priority, pedestrian accessibility and changes to the bus stop facilities. The results of the assessment demonstrate that the impacts of the improvements to the quality of the bus infrastructure will be **Medium Positive** in Section 1 and 2, and **High Positive** in Section 3 of the Proposed Scheme.

- **Parking and Loading:** A qualitative impact assessment has been undertaken of the Proposed Scheme impacts on the existing parking and loading. The results of the assessment demonstrate that the changes to the parking and loading provision will result in an overall loss of 265 spaces (-108 spaces in Section 1, -124 spaces in Section 2 and -33 spaces in Section 3). Given the nature of the loss in parking (i.e. predominately low use informal parking on sections of road where properties and businesses have off road parking) and the availability of alternative spaces in the indirect study area, the impacts are expected to be **Medium Negative** in Section 1 and **Low Negative** in Section 2 and Section 3.

- **People Movement:** Given the proposed amendments to the pedestrian, cycling, bus and parking / loading infrastructure outlined above, the Proposed Scheme will have greater capacity to facilitate movement of people travelling through the corridor. A quantitative impact assessment has been undertaken using outputs from the NTA's modelling suite, comparing the Do Minimum and Do Something peak hour scenarios for each forecast year (2028, 2043). The results of the assessment demonstrate that there will be an increase in 13% and 9% of people travelling through the Proposed Scheme during the 2028 AM and PM Peak Hours respectively. During the 2043 scenario there will be an increase in 18% and 9% of people travelling through the Proposed Scheme during the AM and PM Peak Hours. The analysis also shows that there will be an increase in 4.6% and 5.3% of passengers boarding buses during the 2028 AM and PM Peak Hours respectively. During the 2043 scenario there will be an increase of 6.3% and 4.8% of passengers boarding buses during the AM and PM Peak Hours respectively. Overall, it is anticipated that the effects of the increases to the total number of people travelling through the Proposed Scheme will be **High Positive**.

- **Bus Network Performance Indicators:** A micro-simulation modelling assessment has been developed and network performance indicators of the bus operations along the 'end to end' corridor. The results of the assessment demonstrate that the total bus journey times on all modelled bus services will improve by up to 19% during the AM and PM Peak hours of the 2028 Opening Year and 2043 Design Year. Based on the AM and PM peak hours alone, this equates to c7.2 hours of savings in 2028 and c7.5 hours in 2043, when compared to the Do Minimum combined across all buses. On an annual basis this equates to approximately 5,400 hours of bus vehicle savings in 2028 and 5,600 hours in 2043, when considering weekday peak periods only. Journey time variation and reliability are shown to improve in all Do Something scenarios compared to the Do Minimum. Overall it is anticipated that the effects of the improvements to the network performance indicators for bus users along the Proposed Scheme will be **Medium Positive**.

- **General Traffic Network Performance Indicators:** There will be an overall reduction in operational capacity for general traffic along the direct study area, given the proposed infrastructural changes to the existing road layout outlined above. This reduction in operational capacity for general traffic will create some level of traffic redistribution from the Proposed Scheme onto the surrounding road network.

  The LAM Opening Year 2028 model results were used to identify the impact in traffic flows between the Do Minimum and Do Something scenarios. A reduction in general traffic flows along a road link has been described as a positive impact to the environment, and vice versa.

  The results of the assessment demonstrate that the surrounding road network has the capacity to accommodate the redistributed general traffic as a result of the Proposed Scheme. The majority of assessed junctions that required further traffic analysis have VoC ratios that are broadly similar before and after the Proposed Scheme.

  Overall, it has been determined that the impact of the reduction in general traffic flows along the Proposed Scheme will be **Low Positive** whilst the impact of the redistributed general traffic along the surrounding road network will be **Negligible.**

- **Network Wide Performance Indicators:** Given the impacts to the traffic conditions outlined above, there will be a knock-on effect to the operational efficiency of the road network beyond the direct and indirect study areas. A quantitative impact assessment has been undertaken using outputs from the NTA's ERM and LAM to determine the conditions to queuing, travel times, travel distances and network speeds during the Do Minimum and Do Something scenarios. The results of the assessment demonstrate that the impacts to the network performance indicators range between -1.5% and +1%. A **Low Positive** impact is anticipated in the 2028 Peak Hour scenarios and a **Negligible** impact is predicted in the 2043 Peak Hour scenarios.

- **Cumulative Assessment**: In general, total trip demand (combining all transport modes) will increase into the future in line with population and employment growth. A greater share of the demand will be by sustainable modes (Public transport, Walking, Cycling) as facilitated by the GDA Strategy implementation.

The analysis indicates that with the 12 BusConnects Proposed Schemes in place, there will be a high positive impact on sustainable mode share. The schemes will prevent any increase in private car traffic within the study area and will instead result in a reduction in car trips below 2020 levels.

In the 2028 Opening Year scenario, it is estimated that for people travelling within the 500m catchment area (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 and a 12% increase in public transport, 3% decrease in general traffic and a 12% increase in cycling trips each day (7am-7pm). 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 11% increase in public transport trips, 4% decrease in general traffic trips (i.e. motorists) and a 15% increase in cycling trips in the morning peak hour and a 9% increase in public transport, 5% decrease in general traffic and a 13% increase in cycling trips each day (7am-7pm).

General traffic levels reduce more in 2043 than 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 GDA

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 Proposed Schemes in the AM Peak Hour. The bigger increases occur in the inbound direction on the Blanchardstown to City Centre, the Rathfarnham to City Centre 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 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 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 9% respectively, and the increase in passengers boarding bus services will increase by 23% and 22% respectively.

Overall the Proposed Schemes are expected to deliver a **High Positive** cumulative impact on People Movement by sustainable modes.

The contents of Table 6.55 present a summary of the predicted impacts of the Proposed Scheme during the Operational Phase.

Table 6.55: Summary of Predicted Operational Phase Impacts

Assessment Topic	Effect	Predicted Impact
Pedestrian Infrastructure	Improvements to the quality of the pedestrian infrastructure along the Proposed Scheme.	Medium Positive in Sections 1, 2 and 3
Cycling Infrastructure	Improvements to the quality of the cycling infrastructure along the Proposed Scheme.	Medium Positive in Sections 1 and 2 and Low Positive in Section 3
Bus Infrastructure	Improvements to the quality of the bus infrastructure along the Proposed Scheme.	Medium Positive in Section 1 and 2 and High Positive in Section 3
Parking and Loading	A total loss of 265 parking / loading spaces along the Proposed Scheme.	Medium Negative in Section 1 and Low Negative in Section 2 and Section 3
People Movement	Increases to the total number of people travelling through the Proposed Scheme.	High Positive
Bus Network Performance Indicators	Improvements to journey time and reliability indicators for bus users along the Proposed Scheme.	Medium Positive
General Traffic Network Performance Indicators	Reduction in general traffic flows along the Proposed Scheme.	Low Positive
	Redistributed general traffic along the surrounding road network in the indirect study area as a result of the reduction of reserve capacity along the Proposed Scheme.	Negligible
Network Wide Performance Indicators	Changes in network-wide queuing capacity, travel times, travel distances and average network speeds beyond the direct and indirect study areas.	Negligible
Cumulative Assessment	The Proposed Scheme in tandem with other Core Bus Corridors and GDA Strategy schemes will facilitate substantial mode shift from car to sustainable modes.	High Positive

As outlined within Section 6.3 (Operational Phase) and summarised in Table 6.55 above the Proposed Scheme will deliver strong positive impacts to the quality of pedestrian, cycling and bus infrastructure during the Operational Phase providing for enhanced levels of People Movement in line with the scheme objectives. These improvements will help to provide an attractive alternative to the private car and promote a modal shift to walking, cycling and public transport, allowing for greater capacity along the corridor to facilitate the sustainable movement of people as population and employment levels grow in the future.

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, more reliable journey times which the Proposed Scheme provides. This in turn will support the future increase to the capacity of the bus network and 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. All of these changes combined will therefore cater for higher levels of future population and employment growth.

In the absence of the Proposed Scheme bus services will be operating in a more congested environment, leading to higher journey times for and lower reliability for bus journeys. This limits their attractiveness to users which will lead to reduced levels of public transport use, making the bus system less resilient to higher levels of growth. The absence of walking and cycling measures that the Proposed Scheme provides will also significantly limit the potential to grow those modes into the future.

On the whole, the Proposed Scheme will make a significant contribution to the overall aims of BusConnects, the GDA Strategy and allow the city to grow sustainably into the future, which would not be possible in the absence of the Proposed Scheme. Further summary and conclusions of the assessment can be found in Section 8.

7. Cumulative Assessment

7.1 Construction Stage Cumulative Effects

The assessment of cumulative effects associated with the Construction Phase of the Proposed Scheme is contained within Chapter 21 (Cumulative Impacts & Environmental Interactions) in Volume 2 of this EIAR.

7.2 Operational Stage Cumulative Impacts

7.2.1 Introduction

This chapter also reports the assessment of cumulative effects associated with the Operational Stage of the Proposed Scheme and other Proposed Core Bus Corridor Schemes. This includes the cumulative impacts of the Proposed Scheme on relevant transport receptors in combination with other existing and/or approved projects including all other Proposed BusConnects Schemes. The transport modelling undertaken as part of the Traffic and Transport assessment informs the cumulative impacts assessment of other environmental topics. Further details on the cumulative impacts of Air Quality, Climate, Noise and Vibration, Population and Human health are detailed within Chapter 21, Volume 2 of this EIAR.

7.2.2 Transport Schemes

As detailed in Section 4.3, the core reference case (Do Something) modelling scenarios (Opening year - 2028 and Design year - 2043) are based on the progressive roll-out of the Greater Dublin Area (GDA) Transport Strategy 2016-2035 (GDA Strategy), with a partial implementation by 2028, in line with (National Development Plan (NDP) investment priorities) and the full implementation by 2043. To this end, the modelling scenarios

developed for the operational assessment of the Proposed Scheme(s) inherently accounts for the cumulative effects of complementary committed and proposed transport schemes within the GDA region.

The GDA Strategy provides is an appropriate receiving environment for the assessment of cumulative effects for the following reasons:

- The GDA Strategy is the approved statutory transportation plan for the region, providing a framework for investment in transport within the region up to 2035;
- The GDA Strategy provides a consistent basis for the 'likely' future receiving environment that is consistent with Government plans and Policies (National Planning Framework (NPF) and National Development Plan (NDP); and
- Schemes within the GDA Strategy are a means to deliver the set of objectives of the GDA Strategy. The sequencing and delivery of the strategy is defined by the implementation plan, but the optimal outcome of aiming to accommodate all future growth in travel demand on sustainable modes underpins the Strategy.

7.2.3 Transport Demand

Cumulative transport demand for the 2028 and 2043 assessment years have been included in the analysis contained within this chapter, using travel demand forecasting, which accounts for increases in population and economic activity, in line with planned growth contained within the NPF, Regional Spatial and Economic Strategy (RSES) for the Eastern and Midland region and the local development plans for GDA local authorities.

It is envisaged that the population will grow by 11% up to 2028 and 25% by 2043 (above 2016 census data levels). Similarly, employment is due to grow by 22% by 2028 and 49% by 2043 (Source: NTA Reference Case Planning Sheets 2028, 2043).

7.2.3.1 Strategic Trip Demand Assessment

As described previously in section 6.1.3, the GDA Strategy (along with existing supply side capacity constraints e.g., parking availability, road capacity etc.) has the effect of limiting the growth in car demand on the road network into the future.

To limit the growth in car traffic and to ensure that this demand growth is catered for predominantly by sustainable modes, a number of measures will be required, that include improved sustainable transport infrastructure and priority measures delivered as part of the NDP/GDA Strategy. In addition to this, demand management measures will play a role in limiting the growth in transport demand, predominantly to sustainable modes only. The result will be only limited or no increases overall in private car travel demand. The Proposed Scheme will play a key role in this as part of the wider package of GDA Strategy measures.

In general, total trip demand (combining all transport modes) will increase into the future in line with population and employment growth. A greater share of this demand will be by sustainable modes (Public Transport (PT), Walking, Cycling). Private car demand may still grow in some areas but not linearly in line with demographics, as may have occurred in the past.

In terms of the transport modelling scenarios for the cumulative traffic and transport assessment, as per the Strategy proposals, there are no specific demand management measures included in the Do Minimum reference case (receiving environment) scenario in the 2028 Opening year, other than constraining parking availability in Dublin at existing levels. For the design year, 2043 scenario, a proxy for a suite of demand management measures is included in the Do Minimum in line with the target to achieve a maximum 45% car driver commuter mode share target, across the GDA, as outlined in the Strategy.

7.2.3.1.1 Trip Demand Growth within Study area of the Proposed Schemes.

To understand the background levels of demand growth within the study area of the Proposed Schemes in the assessment years (2028, 2043), the 24-hour demand outputs by mode from the NTA ERM have been analysed. A buffer of 500m beyond the extent of the Proposed Schemes has been chosen to capture the population that is

most likely to interact with the Proposed Schemes, and which could reasonably be exposed to cumulative effects in combination with other developments. Diagram 7.1 below shows the extent of this buffer area.

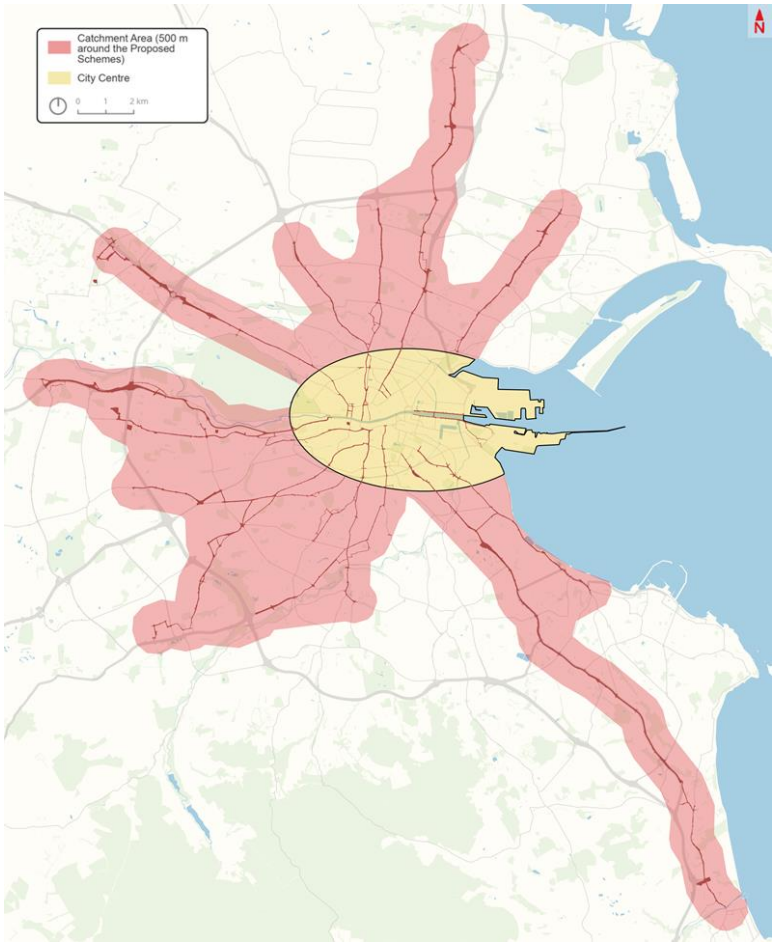

Diagram 7.1: 500m Buffer Area

Diagram 7.2 below outlines the changes in total trip demand, comparing car demand with sustainable mode demand (public transport, walking and cycling). The figures are presented for both 2028 and 2043 Do Minimum scenarios (i.e., without the Proposed Schemes in place) in relation to the 2020 ERM demand levels.

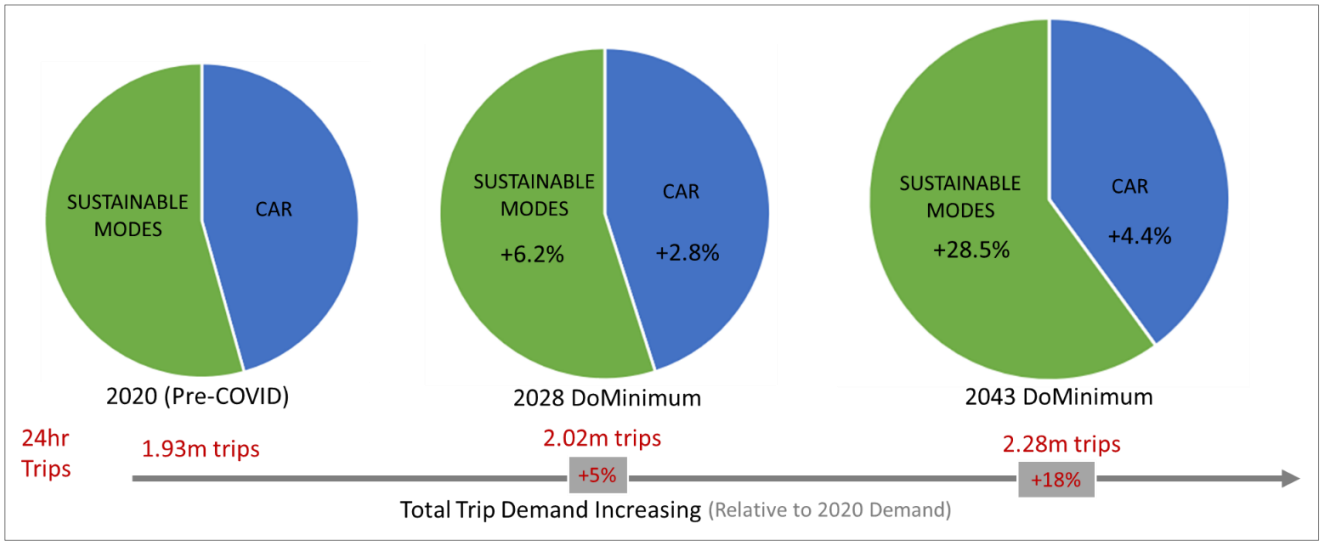

Diagram 7.2 Trip Demand Changes without the Proposed Schemes (in Relation to 2020 Demand)

As shown above, there are 1.93m trips[3] over a 24hr period within 500m of the Proposed Schemes. Total trip demand increases to 2.02m trips (5% increase) in 2028 and to 2.81m trips (+19% increase) in 2043.

In terms of the modal composition of the 5% increase in total demand in 2028, there will be a 6.2% increase in sustainable modes (PT, walk, cycle) and a 2.8% increase in private car demand above 2020 levels, without the Proposed Schemes in place. In 2043, the 18% increase in total trip demand (above 2020 levels) will be made up of a 28.5% increase in sustainable modes demand (PT, walk, cycle) and a 4.4% increase in private car demand, over 2020 (pre-COVID 19) levels. The analysis indicates that even without the Proposed Schemes in place, other GDA Transport Strategy measures and road network capacity constraints mean that private car demand is not growing at the same rate as overall travel demand, however, car traffic levels will still increase over current / 2020 traffic levels.

The overall share of Sustainable modes trips on the network will increase from 57% in 2020, to 58% in 2028 and to 62% in 2043 with corresponding reductions in the private car share of overall travel demand.

7.2.3.1.2 Impacts of BusConnects Proposed Scheme Works on Travel Demand Growth

A similar assessment has been undertaken comparing 24-hour car demand with sustainable mode demand (public transport, walking and cycling) for both the 2028 and 2043 Do Something scenarios (i.e., with all Proposed Schemes in place) in relation to the 2020 ERM demand levels (and is shown in Diagram 7.3 below).

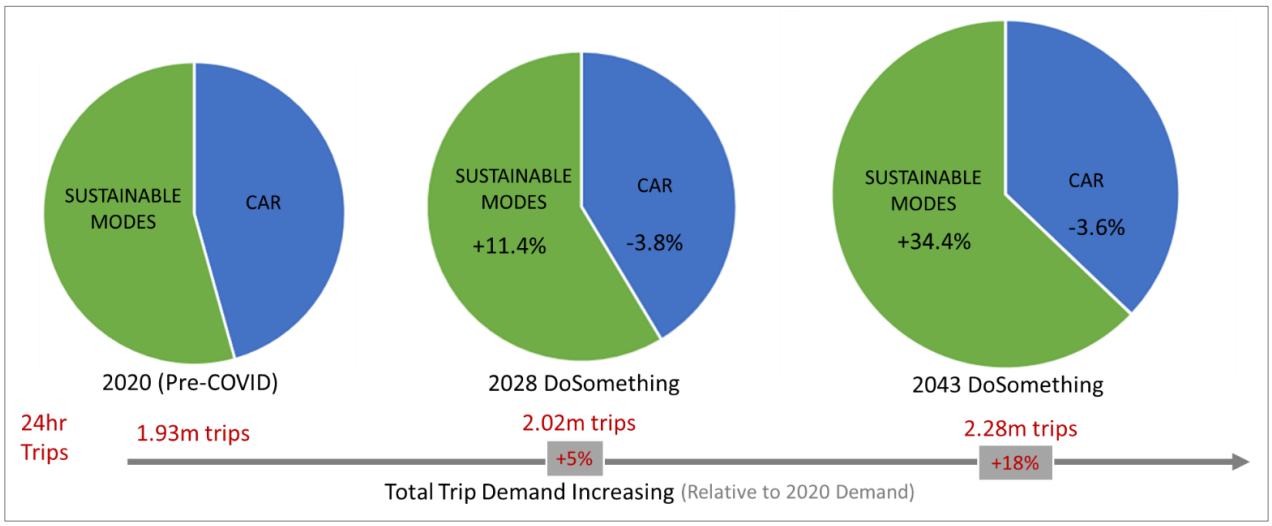

Diagram 7.3 Trip Demand Changes with the Proposed Schemes (in Relation to 2020 Demand)

As shown above, the same level of overall trip demand will occur, however, significantly higher levels of these trips will be made by sustainable modes due to the provision of the BusConnects Proposed Scheme Infrastructure Works. In terms of the modal composition of the 5% increase in total demand in 2028, there will be an 11.4% increase in sustainable modes (PT, walk, cycle) and a 3.8% decrease in private car demand compared to 2020 levels, with the Proposed Schemes in place. In 2043, the 18% increase in total trip demand (above 2020 levels) will be made up of a 33.4% increase in sustainable modes demand (PT, walk, cycle) and a 3.6% decrease in private car demand, compared to 2020 levels. The analysis indicates that the Proposed Schemes will have a significant impact on sustainable transport mode share. The schemes will prevent any increase in private car traffic within the study area and will instead result in a reduction in car trips below 2020 levels.

[3] Trips to/from ERM zones within a 500m distance from the Proposed Scheme to/from any destination

With the Proposed Schemes in place, the overall share of Sustainable modes trips on the network will increase from 57% in 2020, to 61% in 2028 and to 65% in 2043 with corresponding reductions in the private car share of overall travel demand.

7.2.4 People Movement Assessment

7.2.4.1 Overview

In order to understand the benefit with regards to the Movement of People following the full implementation of all 12 of the Proposed Schemes, a quantitative People Movement assessment has been undertaken using outputs of the modelling suite comparing the Do Minimum and Do Something Peak Hour scenarios for each forecast year (2028, 2043).

The assessment of People Movement includes the following metrics:

- Daily Mode share changes within a 500m catchment[4] of the Proposed Schemes comparing the Do Minimum and Do Something scenarios for trips to the City Centre and trips to any destination in the 2028 and 2043 assessment years;
- The average number of people moved by each transport mode (i.e., Car, Bus, Walking and Cycling) along the corridor in the inbound and outbound direction. This metric is compared for the Do Minimum and Do Something scenarios in the AM and PM peak hours for each forecast year (2028, 2043). This metric provides an estimate of the modal share changes on the direct CBC as a result of the Proposed Scheme measures; and
- People Movement by Bus:
    - Total Passengers Boarding Buses on bus routes that use any part of the Proposed Scheme for each forecast year (2028, 2043)

7.2.4.2 Daily People Movement by Mode (Mode Share)

Daily (07:00-19:00 – weekday) mode share data has been extracted from the ERM for zones within a 500m catchment of the Proposed Schemes comparing the Do Minimum and Do Something scenarios for each of the forecast years (2028, 2043).

Diagram 7.4 and Diagram 7.5 illustrate the mode share changes (% increase and absolute) comparing the Do Minimum and Do Something (All Proposed Schemes) scenarios for Car, Public Transport and Cycling for the following:

- People travelling from the catchment area of the Proposed Schemes to any destination within the catchment (inclusive of the City Centre) in the Morning Peak period (AM) (07:00-10:00) and All-day (07:00-19:00) period; and
- People travelling from the catchment area of the Proposed Schemes inbound towards the City Centre (defined as the Canal Cordon) in the Morning Peak period (AM) 07:00-19:00 period.

[4] 500m recommended maximum walking distance to Core Bus Corridors - “Buses In Urban Development”, CIHT 2018

7.2.4.2.1 2028 Demand Changes by Mode

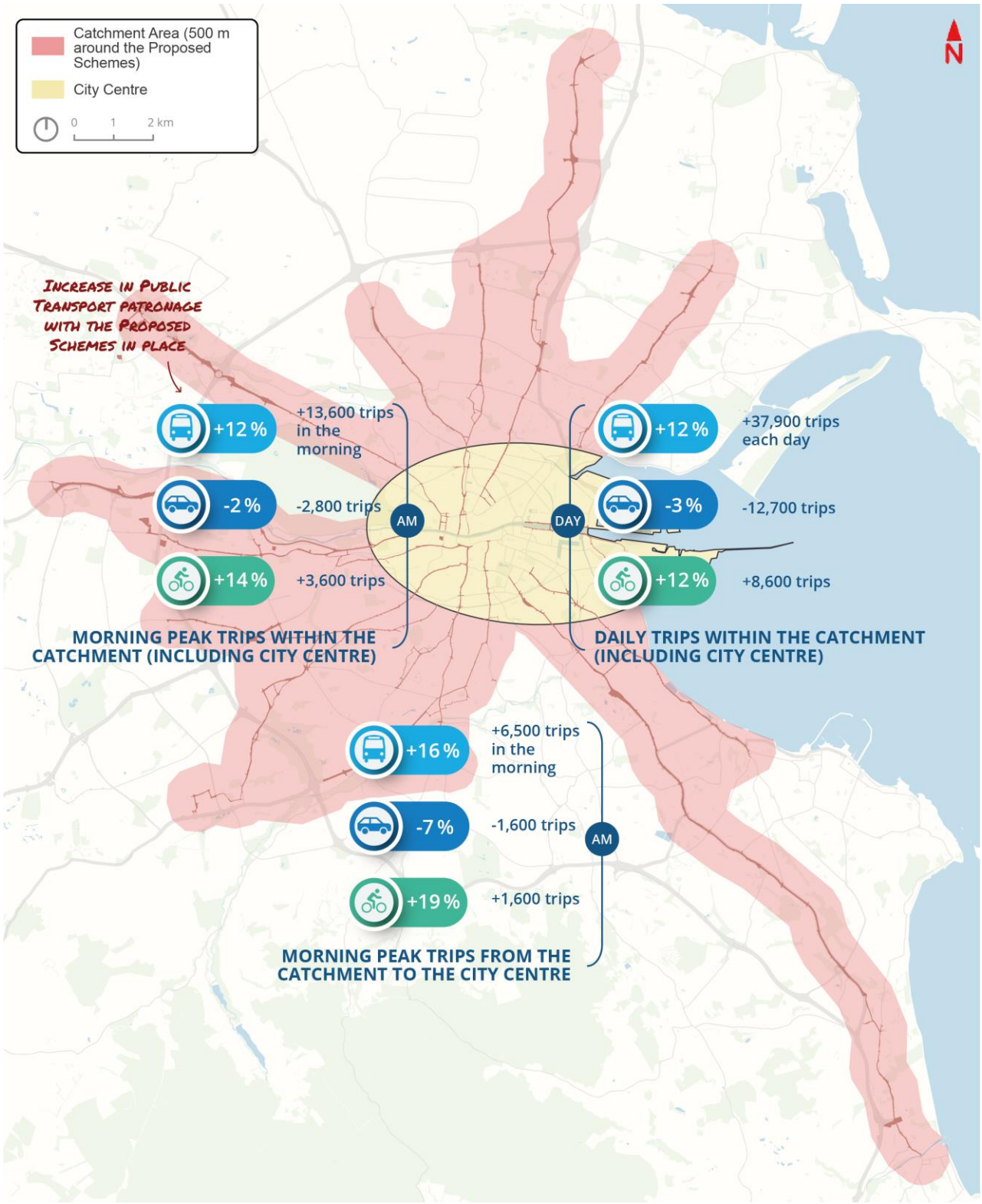

Diagram 7.4 Change in Trips by Mode within a 500m Catchment Area of the Proposed Schemes and the City Centre and Trips Originating from the Catchment Inbound to the City Centre in 2028

As indicated in Diagram 7.4, it is estimated that for people travelling within the 500m catchment area (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 morning peak period (07:00-10:00). Across the whole day

(07:00-19:00), there will be a 12% increase in public transport, 3% decrease in general traffic and a 12% increase in cycling trips.

It is also estimated that for people travelling inbound to the City Centre from the catchment area in the morning peak period there will be 16% increase in public transport trips, 7% decrease in general traffic trips (i.e. motorists) and a 19% increase in cycling trips.

Table 7.1 outlines the difference in trips and modal split between the Opening Year Do Minimum and Do Something scenarios for people travelling within the Catchment Area and the City Centre in the morning peak period and All-Day (07:00-19:00).

Table 7.1: 2028 Modal Share of Trips within a 500m Catchment Area from of the Proposed Schemes and the City Centre

Direction	Time Period	Mode of Transport	Do Minimum		Do Something		Difference	
			Daily Trips	Modal Split (%)	Daily Trips	Modal Split (%)	Daily Trips	Difference (%)
Within Catchment Area and City Centre	AM (07:00-10:00)	Public Transport	111,090	25.5%	124,700	27.7%	13,610	12.3%
		General Traffic	145,560	33.4%	142,730	31.7%	-2,830	-1.9%
		Cycling	25,670	5.9%	29,250	6.5%	3,580	13.9%
		Walking	154,000	35.3%	153,160	34.0%	-840	-0.5%
		Total	436,320	100%	449,840	100%	13,520	3.1%
Within Catchment Area and City Centre	Daily (07:00-19:00)	Public Transport	328,800	24.8%	366,730	27.0%	37,930	11.5%
		General Traffic	435,860	32.9%	423,140	31.2%	-12,720	-2.9%
		Cycling	70,680	5.3%	79,270	5.8%	8,590	12.2%
		Walking	487,880	36.9%	487,400	35.9%	-480	-0.1%
		Total	1,323,220	100%	1,356,540	100%	33,320	2.5%

As shown in Table 7.1, it is expected that there will be an approximate 3% (13,500) increase in People Movement within the Catchment Area (including City Centre) as a result of the Proposed Schemes in the morning peak period. The slight net increase in the total number of trips is due to the improved accessibility and reduced congestion for sustainable mode users provided with the Proposed Schemes in place. Over the whole day, approximately 46,000 additional trips will be made by bus and cycling.

It is also estimated that a modal shift will occur in the morning peak period consisting of an increase in Public Transport mode share from 25.5% to 27.7%, a decrease in general traffic share from 33.4% to 31.7% and an increase in the number of cyclists from 5.9% to 6.5%. The modal shift in the daily trips within the 500m catchment area and the City Centre will consist of an increase in Public Transport users from 24.8% to 27%, a decrease in general traffic share from 32.9% to 31.2% and an increase in the number of cyclists from 5.3% to 5.8%.

The number of walking trips is shown to remain broadly similar in the Do Something scenario. This is mainly due to a mode shift from walking to bus, due to the enhanced public transport provision in the Do Something scenario.

Table 7.2 outlines the difference in trips and modal split between the Opening Year Do Minimum and Do Something (All Proposed Schemes) scenarios for people travelling from the Catchment Area inbound towards the City Centre in the morning peak period.

Table 7.2: 2028 Modal Share of Trips Originating from a 500m Catchment Area from of the Proposed Schemes to the City Centre

Direction	Time Period	Mode of Transport	Do Minimum		Do Something		Difference	
			Daily Trips	Modal Split (%)	Daily Trips	Modal Split (%)	Daily Trips	Difference (%)
Within Catchment	AM	Public Transport	40,050	48.4%	46,500	52.5%	6,450	16.1%
		General Traffic	23,180	28.0%	21,540	24.3%	-1,640	-7.1%

Direction	Time Period	Mode of Transport	Do Minimum		Do Something		Difference	
			Daily Trips	Modal Split (%)	Daily Trips	Modal Split (%)	Daily Trips	Difference (%)
Area and City Centre	(07:00-10:00)	Cycling	8,530	10.3%	10,150	11.5%	1,620	19.0%
		Walking	11,030	13.3%	10,450	11.8%	-580	-5.3%
		Total	82,790	100%	88,640	100%	5,850	7.1%

As shown in Table 7.2, the modelling indicates that there will be an approximate 7% (6,000) increase in total People Movement travelling from the Catchment Area to the City Centre as a result of the Proposed Schemes in the morning peak period.

It is also indicated that a modal shift will occur consisting of an increase in Public Transport users from 48.4% to 52.5%, a decrease in general traffic mode share from 28% to 24.3% and an increase in the cycling mode share from 10.3% to 11.5% with the BusConnects Core Bus Corridors in operation.

7.2.4.2.2 2043 Demand Changes by Mode

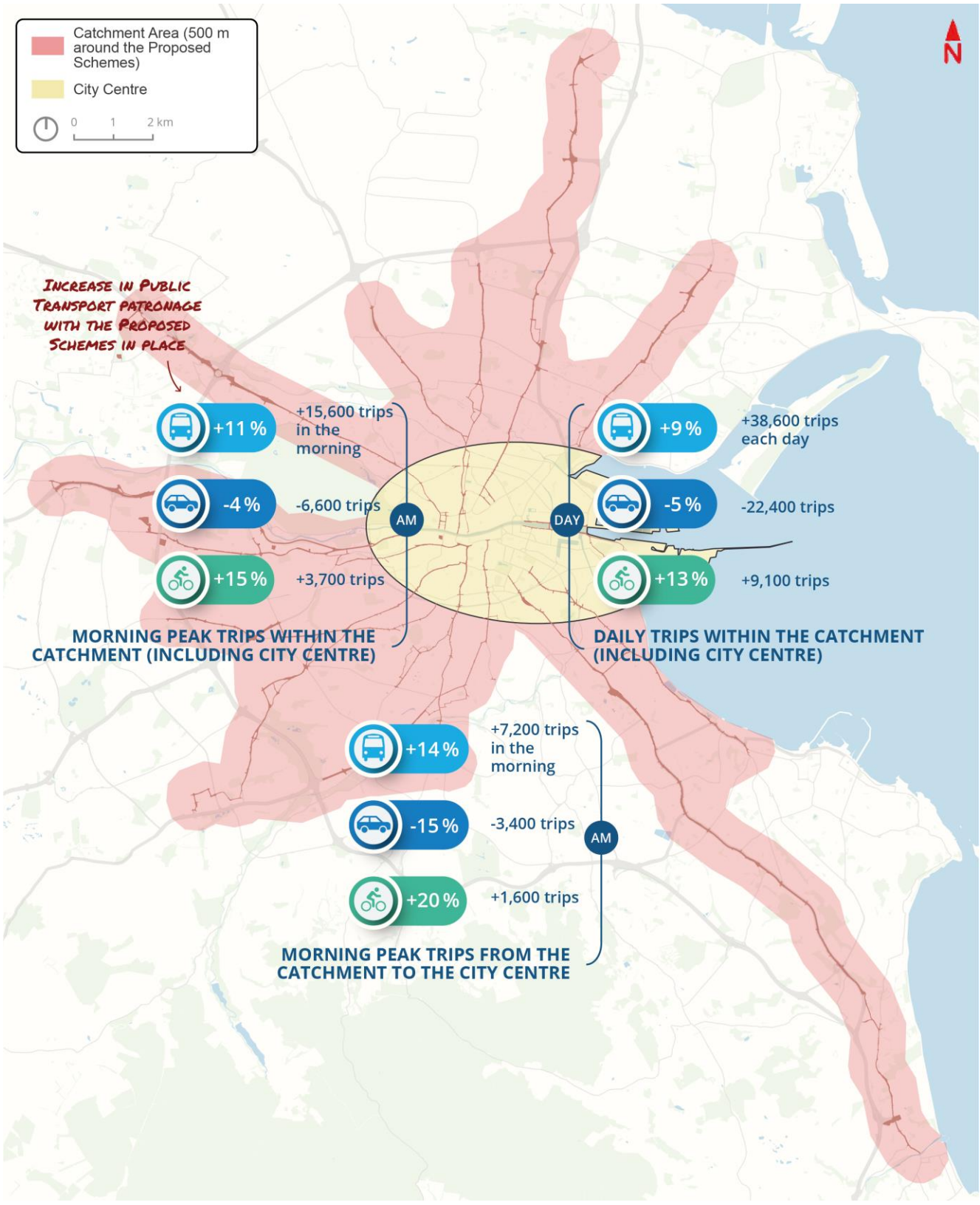

Diagram 7.5: Change in trips by mode within a 500m Catchment Area of the Proposed Schemes and the City Centre and Trips originating from the Catchment inbound to the City Centre in 2043

As indicated in Diagram 7.5, it is estimated that for people travelling within the 500m catchment area (including City Centre) there will be a 11% increase in public transport trips, 4% decrease in general traffic trips (i.e.

motorists) and a 15% increase in cycling trips in the morning peak period (07:00-10:00). Across the whole day (07:00-19:00), there will be a 9% increase in public transport, 5% decrease in general traffic and a 13% increase in cycling trips.

The modelling shows that for people travelling inbound to the City Centre from the Catchment Area in the morning peak period there will be a 14% increase in public transport trips, 15% decrease in general traffic trips (i.e., motorists) and a 20% increase in cycling trips.

Table 7.3 outlines the difference in trips and modal split between the Opening Year Do Minimum and Do Something (All Proposed Schemes) scenarios for people travelling within the Catchment Area and the City Centre in the morning peak period and All Day (07:00-19:00).

Table 7.3: 2043 Modal Shift of Trips within a 500m Catchment Area from of the Proposed Schemes and the City Centre

Direction	Time Period	Mode of Transport	Do Minimum		Do Something		Difference	
			Daily Trips	Modal Split (%)	Daily Trips	Modal Split (%)	Daily Trips	Difference (%)
Within Catchment Area and City Centre	AM (07:00-10:00)	Public Transport	144,880	29.4%	160,480	31.7%	15,600	10.8%
		General Traffic	156,670	31.8%	150,070	29.7%	-6,600	-4.2%
		Cycling	25,670	5.2%	29,410	5.8%	3,740	14.6%
		Walking	165,820	33.6%	165,890	32.8%	70	0.0%
		Total	493,040	100%	505,850	100%	12,810	2.6%
Within Catchment Area and City Centre	Daily (07:00-19:00)	Public Transport	444,900	29.4%	483,530	31.4%	38,630	8.7%
		General Traffic	473,200	31.3%	450,780	29.3%	-22,420	-4.7%
		Cycling	71,350	4.7%	80,400	5.2%	9,050	12.7%
		Walking	523,910	34.6%	526,400	34.2%	2,490	0.5%
		Total	1,513,360	100%	1,541,110	100%	27,750	1.8%

As shown in Table 7.3, it is expected that there will be an approximate 3% (12,800) increase in People Movement travelling within the Catchment Area (including City Centre) as a result of the Proposed Schemes in the morning peak period. The slight net increase in the total number of trips is due to the improved accessibility and reduced congestion for sustainable mode users provided with all the Proposed Schemes in place. Over the whole day, approximately 50,000 additional trips will be made by bus and cycling, which is a significant increase, when considering that other elements of the GDA Strategy will be place in 2043.

It is also estimated that a modal shift will occur in the morning peak period consisting of an increase in Public Transport share from 29.4% to 31.7%, a decrease in general traffic share from 31.8% to 29.7% and an increase in cycling from 5.2% to 5.8%. The modal shift in the daily trips within the 500m catchment area and the City Centre will consist of an increase in Public Transport users from 29.4% to 31.4%, a decrease in general traffic from 31.3% to 29.3% and an increase in cyclists from 4.7% to 5.2%.

General traffic is seen to have much higher levels of reduction in 2043 than when compared to 2028 due to the increased level of non-bus public transport infrastructure (MetroLink, Luas extensions and DART+ from the GDA 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 number of walking trips is shown to remain broadly similar in the Do Something scenario. This is mainly due to a mode shift from walking to bus, due to the enhanced public transport provision in the Do Something scenario.

Table 7.4 outlines the difference in trips and modal split between the Opening Year Do Minimum and Do Something (All Proposed Schemes) scenarios for people travelling from the Catchment Area inbound towards the City Centre in the morning peak period.

Table 7.4: 2043 Modal Shift of Trips originating from a 500m Catchment Area from of the Proposed Schemes to the City Centre

Direction	Time Period	Mode of Transport	Do Minimum		Do Something		Difference	
			Daily Trips	Modal Split (%)	Daily Trips	Modal Split (%)	Daily Trips	Difference (%)
Within Catchment Area and City Centre	AM	Public Transport	51,700	55.1%	58,880	59.8%	7,180	13.9%
		General Traffic	22,930	24.4%	19,490	19.8%	-3,440	-15.0%
		Cycling	7,940	8.5%	9,510	9.7%	1,570	19.8%
		Walking	11,240	12.0%	10,660	10.8%	-580	-5.2%
		Total	93,810	100%	98,540	100%	4,730	5.0%

As shown in Table 7.4 the modelling indicates that there will be an approximate 5% increase in total People Movement travelling from the Catchment Area to the City Centre as a result of the Proposed Schemes, in the morning peak period.

It is also indicated that a modal shift will occur consisting of an increase in Public Transport mode share from 55.1% to 59.8%, a decrease in general traffic mode share from 24.4% to 19.8% and an increase in the cycling mode share from 8.5% to 9.7%.

7.2.4.3 Peak Hour People Movement along the Proposed Schemes

To determine the cumulative impact that the Proposed Schemes will have on modal share changes on the direct study areas as a result of their implementation, the weighted average number of people moved by each mode (Car, Bus, Active Modes) has been extracted from the modelling suite. The analysis compares the Do Minimum and Do Something (All Proposed Schemes) scenarios both in the inbound and outbound direction in the AM and PM Peak Hour periods for each forecast years (2028, 2043).

7.2.4.3.1 2028 AM Peak Hour People Movement

Diagram 7.6 illustrates the average People Movement by mode, across all Proposed Schemes, inbound towards the City Centre during the AM Peak Hour in 2028.

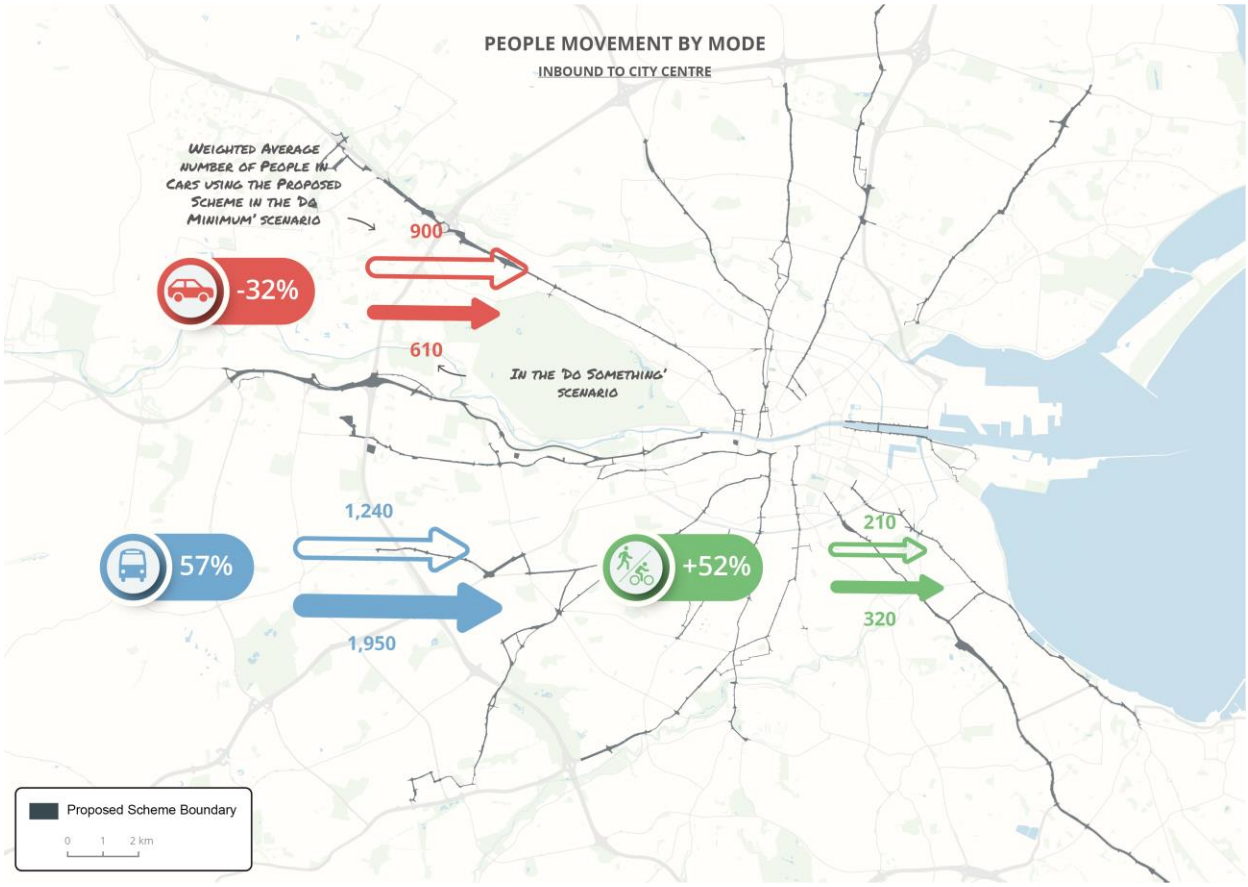

Diagram 7.6 People Movement by Mode during 2028 AM Peak Hour

As indicated in Diagram 7.6, on average across all Proposed Schemes, there is a predicted reduction of 32% in the number of people travelling via car, an increase of 57% in the number of people travelling via bus and an increase of 52% in people walking or cycling along the Proposed Schemes during the AM Peak Hour. It should be noted that the model predicts limited change in total walking trips between each scenario. This is due to the fact that walking trips in the Do Minimum scenario are also transferring to public transport and cycling due to the improved provision with any new walkers transferring from car replacing these trips.

The Proposed Schemes will facilitate a step change in the level of segregated cycling provision in comparison with existing conditions along the entire length of the corridor. The transport modelling undertaken, is therefore conservative in terms of the predicted cycling mode share. The Proposed Schemes have been designed to cater for much higher levels of cycling uptake and this will provide the opportunity for a significant increase in the movement of people travelling sustainably along the corridor, which would otherwise not be achieved in the absence of the Proposed Schemes.

Table 7.5 outlines the difference in modal split between the Do Minimum and Do Something scenarios for each mode of transport in an inbound direction towards the City Centre during the AM Peak Hour. The results indicate a 23% increase in total people moved as a result of the Proposed Schemes and a 57% increase in people moved by sustainable modes (Public Transport, Walk, Cycle).

Table 7.5: Modal Shift of 2028 AM Peak Hour along Proposed Schemes

Direction	Time Period	Mode of Transport	Do Minimum		Do Something		Difference	
			Hourly Trips	Modal Split (%)	Hourly Trips	Modal Split (%)	Hourly Trips	Difference (%)
Inbound towards the City Centre	AM Peak Period	General Traffic	900	38%	610	21%	-290	-32%
		Public Transport	1,240	53%	1,950	68%	710	57%
		Walking	140	6%	140	5%	0	0%
		Cycling	70	3%	180	6%	110	157%
		Sustainable Modes Total	**1,450**	**62%**	**2,270**	**79%**	**820**	**57%**
		Total (all modes)	**2,350**	**100%**	**2,880**	**100%**	**530**	**23%**

7.2.4.3.2 2028 PM Peak Hour People Movement

Diagram 7.7 illustrates the average People Movement by mode, across all Proposed Schemes, travelling outbound from the City Centre during the PM Peak Hour.

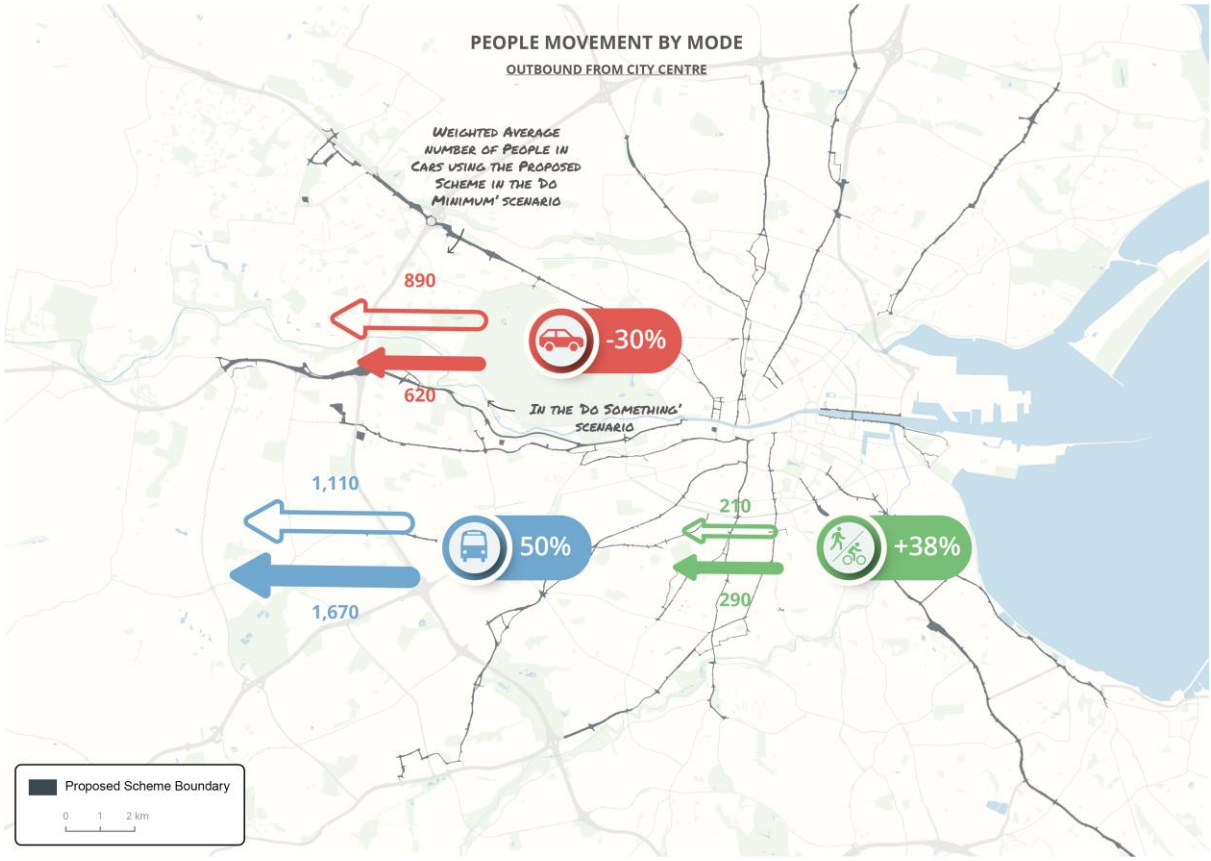

Diagram 7.7 People Movement by Mode during 2028 PM Peak Hour

As indicated in Diagram 7.7, on average across all Proposed Schemes, there is a predicted reduction of 30% in the number of people travelling via car, an increase of 50% in the number of people travelling via bus and an increase in 38% in the number of people walking or cycling along the Proposed Schemes during the PM Peak Hour.

Table 7.6 outlines the difference in modal split between the Do Minimum and Do Something (All Proposed Schemes) scenarios for each mode of transport in an outbound direction from the City Centre during the PM Peak Hour. The results indicate a 17% increase in total people moved as a result of the Proposed Schemes and a 48% increase in people moved by sustainable modes (Public Transport, Walk, Cycle).

Table 7.6: Modal Shift of 2028 PM Peak Hour along Proposed Schemes

Direction	Time Period	Mode of Transport	Do Minimum		Do Something		Difference	
			Hourly Trips	Modal Split (%)	Hourly Trips	Modal Split (%)	Hourly Trips	Difference (%)
Outbound from the City Centre	PM Peak Period	General Traffic	890	40%	620	24%	-270	-30%
		Public Transport	1,110	50%	1,670	65%	560	50%
		Walking	150	7%	140	5%	-10	-7%
		Cycling	60	3%	150	6%	90	150%
		Sustainable Modes Total	**1,320**	**60%**	**1,960**	**76%**	**640**	**48%**
		Total (All modes)	**2,210**	**60%**	**2,580**	**76%**	**370**	**17%**

7.2.4.3.3 2043 AM Peak Hour People Movement

Diagram 7.8 illustrates the average People Movement by mode, across all Proposed Schemes, inbound towards the City Centre during the AM Peak Hour in 2043.

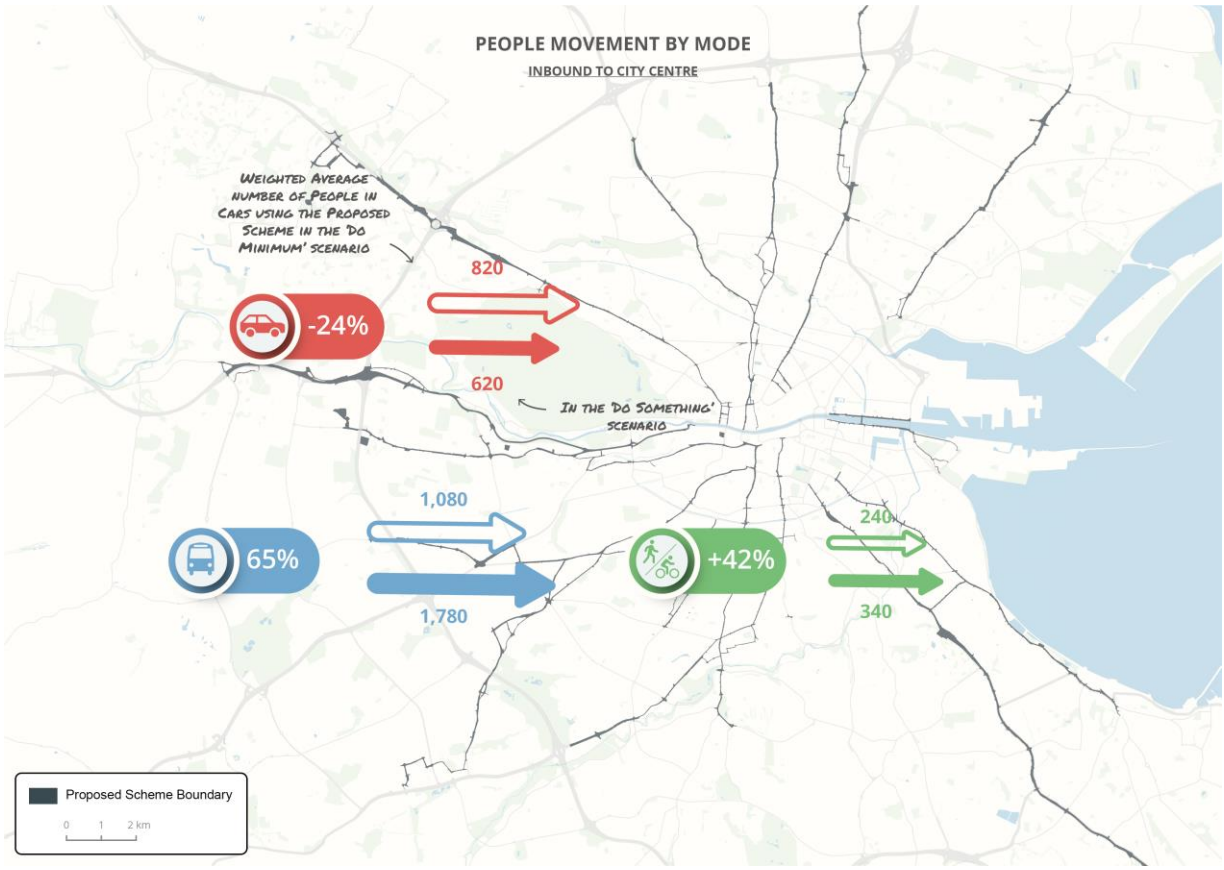

Diagram 7.8 People Movement by Mode during 2043 AM Peak Hour

As indicated in Diagram 7.8, on average across all Proposed Schemes, there is a predicted decrease of 24% in the number of people travelling via car, an increase of 65% in the number of people travelling via bus and an increase of 42% in the number of people walking and cycling along the Proposed Schemes during the AM Peak Hour.

Table 7.7 outlines the difference in modal split between the Do Minimum and Do Something (All Proposed Schemes) scenarios for each mode of transport in an inbound direction towards the City Centre during the AM Peak Hour. The results indicate a 28% increase in total people moved as a result of the Proposed Schemes and 61% increase in people moved by sustainable modes (Public Transport, Walk, Cycle).

Table 7.7: Modal Shift of 2043 AM Peak Hour along Proposed Schemes

Direction	Time Period	Mode of Transport	Do Minimum		Do Something		Difference	
			Hourly Trips	Modal Split (%)	Hourly Trips	Modal Split (%)	Hourly Trips	Difference (%)
Inbound towards the City Centre	AM Peak Period	General Traffic	820	38%	620	23%	-200	-24%
		Public Transport	1,080	50%	1,780	65%	700	65%
		Walking	170	8%	160	6%	-10	-6%
		Cycling	70	3%	180	7%	110	157%
		Sustainable Modes Total	**1,320**	**62%**	**2,120**	**77%**	**800**	**61%**
		Total (All modes)	**2,140**	**100%**	**2,740**	**100%**	**600**	**28%**

7.2.4.3.4 2043 PM Peak Hour People Movement

Diagram 7.9 illustrates the average People Movement by mode, across all Proposed Schemes, travelling outbound from the City Centre during the PM Peak Hour in 2043.

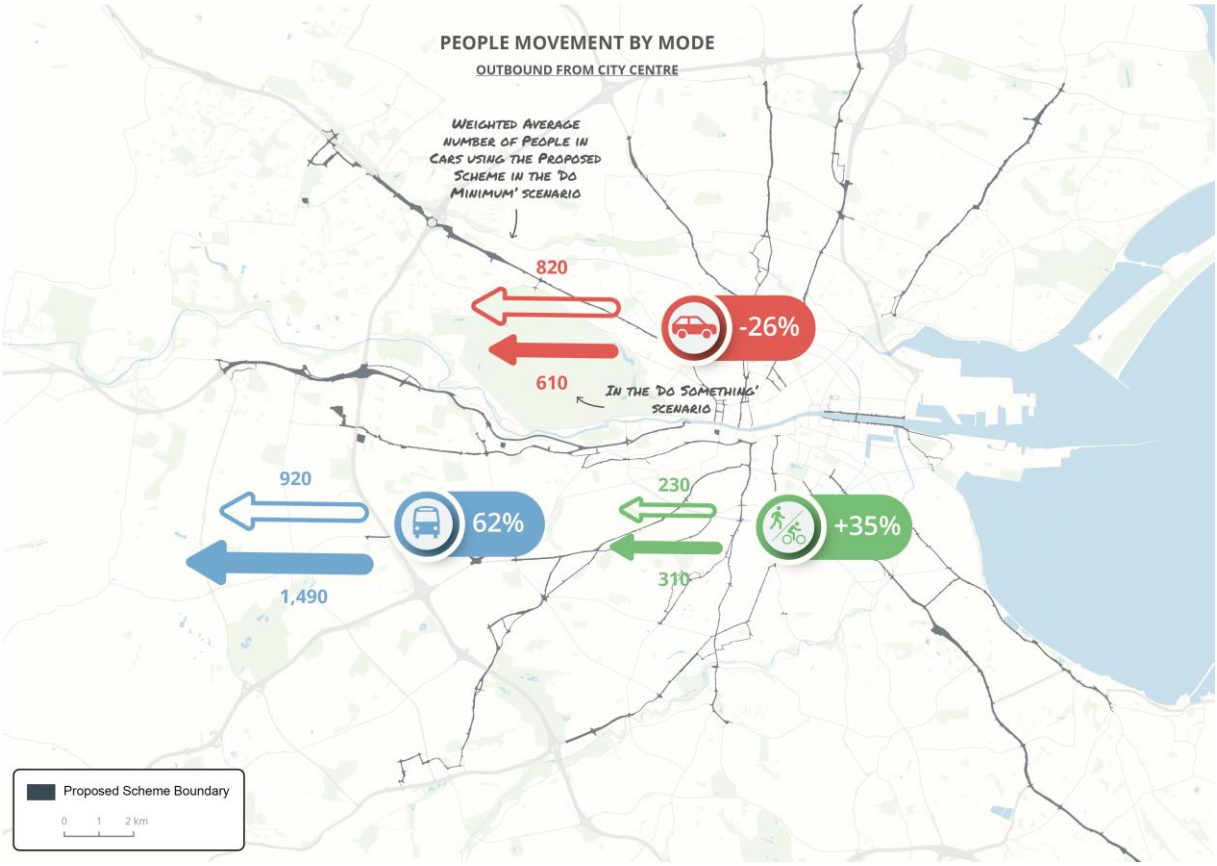

Diagram 7.9 People Movement by Mode during 2043 PM Peak Hour

As indicated in Diagram 7.9, on average across all Proposed Schemes, there is a predicted decrease of 26% in the number of people travelling via car, an increase of 62% in the number of people travelling via bus and an increase of 35% in the number of people walking and cycling along the Proposed Schemes during the PM Peak Hour in 2043.

Table 7.8 outlines the difference in modal split between the Do Minimum and Do Something (All Proposed Schemes) scenarios for each mode of transport in an outbound direction from the City Centre during the PM Peak Hour. The results indicate a 22% increase in total people moved as a result of the Proposed Schemes and a 57% increase in people moved by sustainable modes (Public Transport, Walk, Cycle).

Table 7.8: Modal Shift of 2043 PM Peak Hour along Proposed Schemes

Direction	Time Period	Mode of Transport	Do Minimum		Do Something		Difference	
			Hourly Trips	Modal Split (%)	Hourly Trips	Modal Split (%)	Hourly Trips	Difference (%)
Outbound from the City Centre	PM Peak Period	General Traffic	820	42%	610	25%	-210	-26%
		Public Transport	920	47%	1,490	62%	570	62%
		Walking	180	9%	180	7%	0	0%
		Cycling	50	3%	130	5%	80	160%
		Sustainable Modes Total	**1,150**	**58%**	**1,800**	**75%**	**650**	**57%**
		Total (All modes)	**1,970**	**58%**	**2,410**	**75%**	**440**	**22%**

7.2.4.4 Movement of People by Bus

The following section presents the modelling outputs for the Movement of People by Bus. The results indicate that the improvements in bus priority infrastructure with the Proposed Schemes in place results in a substantial increase in Bus patronage during the Peak Hours and throughout the day.

Diagram 7.10 to Diagram 7.13 present the difference in passenger loadings (Do Something minus Do Minimum loadings) on the Proposed Schemes in 2028 and 2043, AM and PM Peak Hours.

7.2.4.4.1 2028 AM Peak Hour Bus Passengers

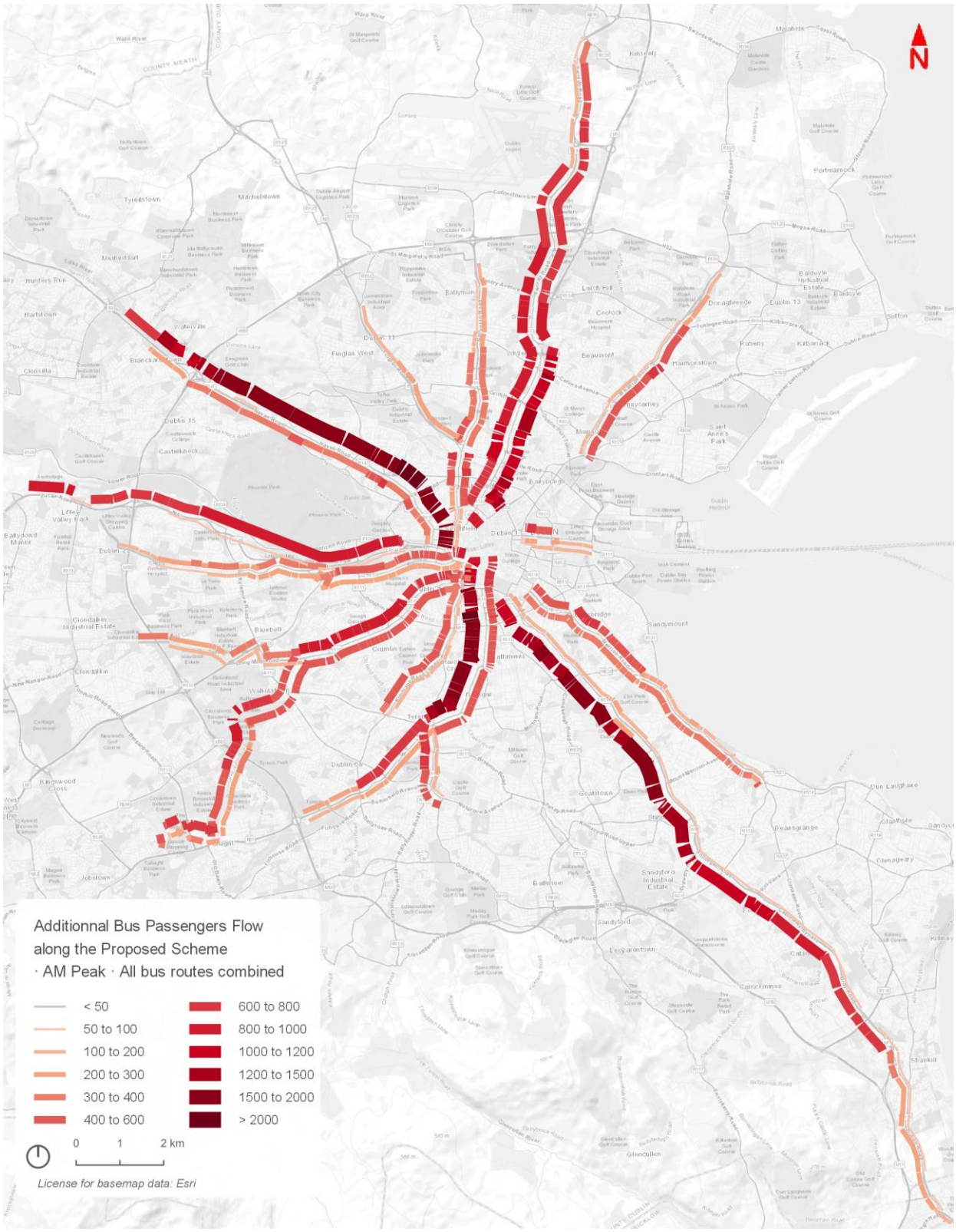

Diagram 7.10 AM Peak Hour Total Bus Passenger Flows Along the Proposed Schemes (All Bus Routes Combined)

As indicated in Diagram 7.10, there is a high growth in bus patronage along all the Proposed Schemes in the AM Peak Hour. Some of the bigger increases occur in the inbound direction on the Blanchardstown to City Centre, the Rathfarnham to City Centre 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. The Lucan to City Centre Scheme shows an increase of approximately 800 passengers in the inbound direction in the 2028 AM Peak Hour.

Since many bus services commence and end further away from the direct alignment of the Proposed Schemes, but still benefit from the improvements provided, an assessment has been undertaken to compare the total passengers boarding bus routes that use any part of the Proposed Scheme (including those stops not directly on the Proposed Scheme) in both 2028 and 2043 forecast years. Table 7.9 below displays the results for the 2028 AM Peak Hour for the Lucan to City Centre Scheme as well as for all Proposed Schemes.

Table 7.9: 2028 AM Peak Hour Bus Boardings on Routes using the Proposed Schemes (inc. boarding at stops outside Proposed Schemes)

Scheme	Do Minimum	Do Something	Difference in Boardings	Difference (%)
Lucan to City Centre Scheme	14,710	15,520	810	5.5%
All Schemes	85,990	101,760	15,770	18.3%

As shown above there will be a 5.5% increase in people boarding bus routes which any part of the Lucan Scheme during the AM Peak Hour. This represents an addition of 810 passengers.

There will be a 18.3% increase in people boarding bus routes which use any part of the Proposed Schemes, representing an additional 15,770 passengers due to the bus priority improvements.

7.2.4.4.2 2028 PM Peak Hour Bus Passengers

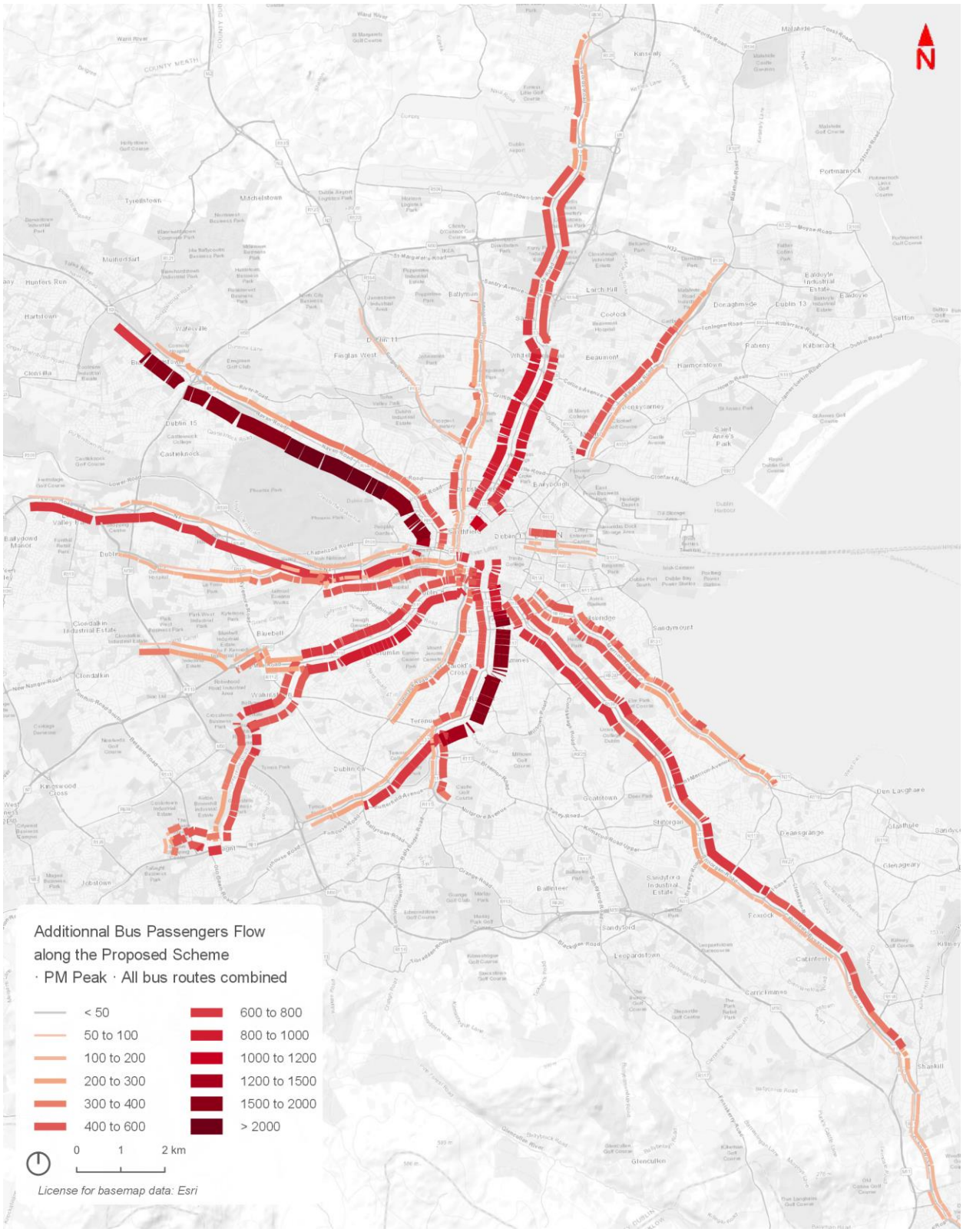

Diagram 7.11: PM Peak Hour Total Bus Passenger Flows Along the Proposed Schemes (All Bus Routes Combined)

As indicated in Diagram 7.11, there is a high growth in bus patronage along all the Proposed Schemes in the PM Peak Hour. Some of the bigger increases occur in the outbound direction on the Blanchardstown to City Centre and the Rathfarnham to City Centre where the loadings reach more than 2,000 additional passengers per hour

compared to the Do Minimum scenario. The Lucan to City Centre Scheme shows an increase of approximately 700 passengers in the outbound direction.

Table 7.10 presents the total passengers boarding bus routes that use any part of the Proposed Scheme (including those stops not directly on the Proposed Scheme) in the 2028 PM Peak Hour for the Lucan to City Centre Scheme as well as for all Proposed Schemes.

Table 7.10: 2028 PM Peak Hour Bus Boardings on Routes using the Proposed Schemes (inc. boarding at stops outside Proposed Schemes)

Scheme	Do Minimum	Do Something	Difference in Boardings	Difference (%)
Lucan to City Centre Scheme	13,800	14,950	1,150	8.3%
All Schemes	71,280	85,170	13,890	19.5%

As shown in Table 7.10, there will be a 8.3% increase in people boarding bus routes which use any part of the Lucan to City Centre Scheme during the PM Peak Hour. This represents an addition of 1,150 passengers.

There will be a 19.5% increase in people boarding bus routes which use any part of the Proposed Schemes, representing an additional 13,890 passengers due to the bus priority improvements.

7.2.4.4.3 2043 AM Peak Hour Bus Passengers

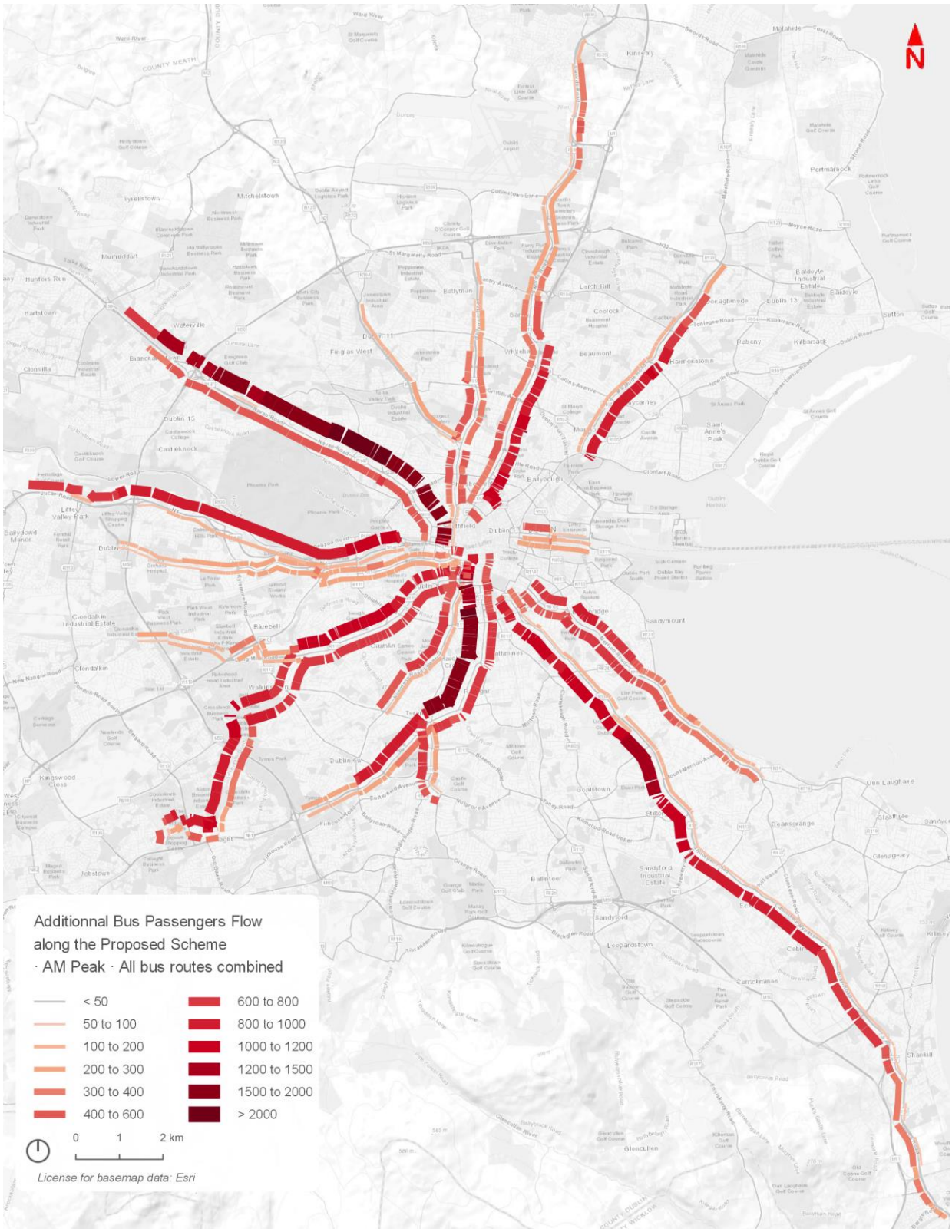

Diagram 7.12: AM Peak Hour Total Bus Passenger Flows Along the Proposed Schemes (All Bus Routes Combined)

As indicated in Diagram 7.12, there is a high growth in bus patronage along all the Proposed Schemes in the 2043 AM Peak Hour. Some of the bigger increases occur in the inbound direction on the Blanchardstown to City Centre and the Rathfarnham to City Centre where the loadings reach more than 2,000 additional passengers per

hour compared to the Do Minimum scenario. The Lucan to City Centre Scheme shows an increase of approximately 1,000 passengers in the inbound direction.

Table 7.11 presents the total passengers boarding bus routes that use any part of the Proposed Scheme (including those stops not directly on the Proposed Scheme) in the 2043 AM Peak Hour for the Lucan to City Centre Scheme as well as for all Proposed Schemes.

Table 7.11: 2043 AM Peak Hour Bus Boardings on Routes using the Proposed Schemes (inc. boarding at stops outside Proposed Schemes)

Scheme	Do Minimum	Do Something	Difference in Boardings	Difference (%)
Lucan to City Centre Scheme	13,410	14,700	1,290	9.6%
All Schemes	86,380	106,040	19,660	22.8%

As shown in Table 7.11, there will be a 9.6% increase in people boarding bus routes which use any part of the Lucan to City Centre Scheme during the AM Peak Hour. This represents an addition of 1,290 passengers in the AM Peak Hour.

There will be a 22.8% increase in people boarding bus routes which use any part of the Proposed Schemes, representing an additional 19,660 passengers due to the bus priority improvements.

7.2.4.4.4 2043 PM Peak Hour Bus Passengers

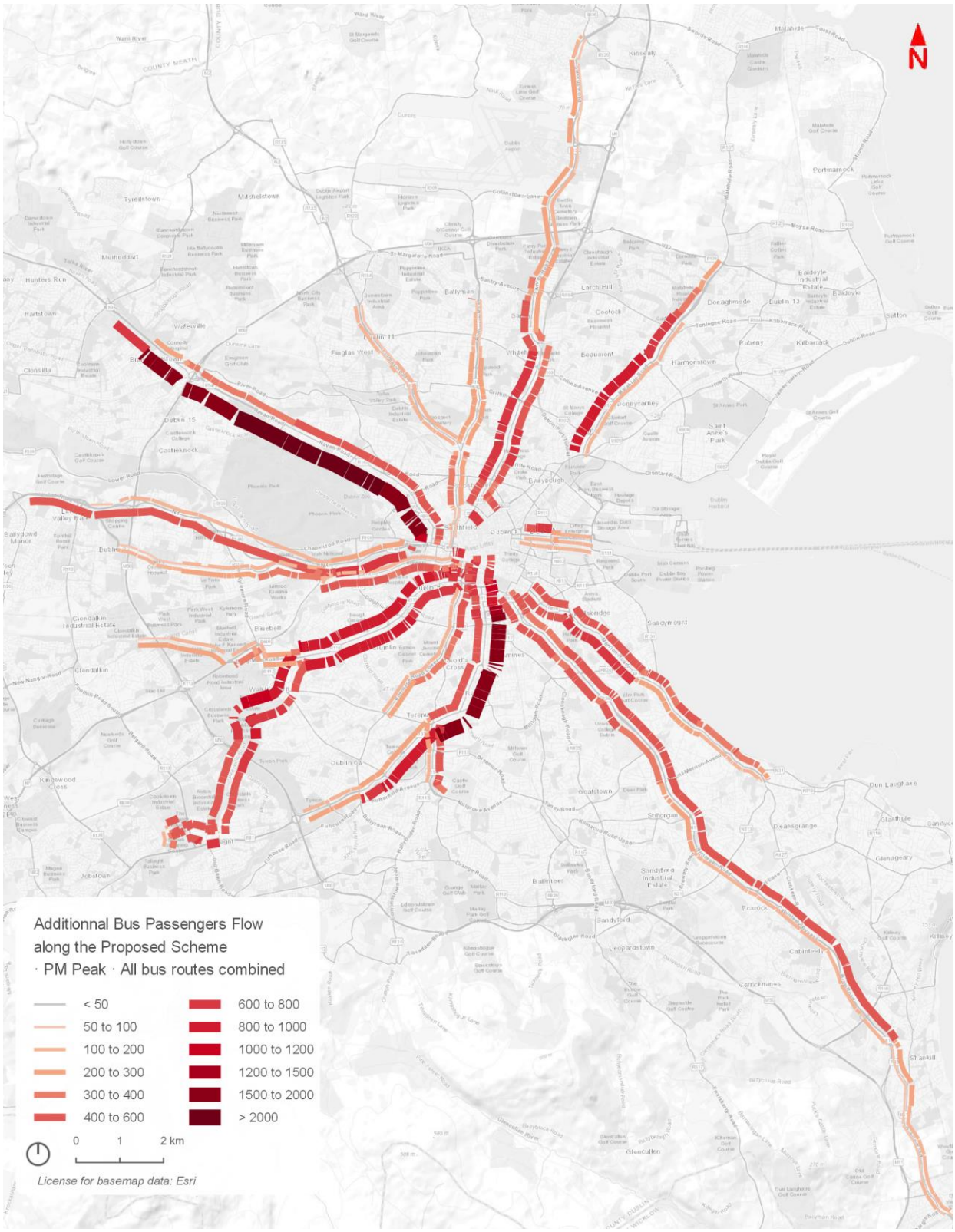

Diagram 7.13: PM Peak Hour Total Bus Passenger Flows Along the Proposed Schemes (All Bus Routes Combined)

As indicated in Diagram 7.13, there is a high growth in bus patronage along all the Proposed Schemes in the PM Peak Hour. Some of the bigger increases occur in the outbound direction on the Blanchardstown to City Centre and the Rathfarnham to City Centre where the loadings reach more than 2,000 additional passengers per hour

compared to the Do Minimum scenario. The Lucan to City Centre Scheme shows an increase of approximately 700 passengers in the outbound direction.

Table 7.12 presents the total boardings on bus routes that use any part of the Proposed Scheme (including those stops not directly on the Proposed Scheme) in the 2043 PM Peak Hour for the Lucan to City Centre Scheme as well as all Proposed Schemes.

Table 7.12: 2043 PM Peak Hour Bus Boardings on Routes using the Proposed Schemes (inc. boarding at stops outside Proposed Schemes)

Scheme	Do Minimum	Do Something	Difference in Boardings	Difference (%)
Lucan to City Centre Scheme	12,820	14,100	1,280	10.0%
All Schemes	72,910	89,280	16,370	22.5%

As shown in Table 7.12, there will be a 10% increase in people boarding bus routes which use any part of the Lucan to City Centre Scheme during the PM Peak Hour. This represents an addition of 620 passengers in the AM Peak Hour.

There will be a 22.5% increase in people boarding bus routes which use any part of the Proposed Schemes, representing an additional 16,370 passengers due to the bus priority improvements.

7.2.5 Integration with Other Public Transport Modes

The aim of the CBC Infrastructure Works is to provide improved walking, cycling and bus infrastructure, which will enable and deliver efficient, safe, and integrated sustainable transport movement along the corridor. In tandem with this aim a key objective of the Works applicable to the Proposed Scheme is to:

- Improve accessibility to jobs, education and other social and economic opportunities through the provision of improved sustainable connectivity and integration with other public transport services.

The modelling suite has been used to assess the change in connectivity and integration with other public transport services and the following section presents this assessment based on the following metrics:

- Total Boardings by Public Transport (PT) Mode (including non-bus modes);
- Level of interchange with other public transport services; and
- Average Public Transport Networkwide Travel Speeds.

7.2.5.1 Passenger Boardings by Public Transport Mode

The following section presents the number of passenger boardings by each of the PT sub-modes (Rail, Luas, Bus and Metro) within the Study Area. The results are presented in Table 7.13 for the Do Minimum and Do Something scenarios for the 2028 and 2043 assessment years in the AM and PM Peak Hour periods.

Table 7.13: 2028 AM Peak Hour PT Boardings

Public Transport Mode	Do Minimum	Do Something	Difference in Boardings	Difference (%)
Rail	26,060	25,820	-240	-1%
Luas	25,930	25,070	-860	-3%
Bus	81,790	95,710	13,920	17%
Total	**133,780**	**146,600**	**12,820**	**10%**

As presented in Table 7.13 with the Proposed Schemes in place, there will be an estimated 10% more passenger boardings across all PT services and 17% more boarding on bus services in the AM Peak Hour. The improved bus infrastructure results in slight reductions in boardings on Rail and Luas services, which will help provide additional resilience for these modes to accommodate future travel demand growth.

Table 7.14: 2028 PM Peak Hour PT Boardings

Public Transport Mode	Do Minimum	Do Something	Difference in Boardings	Difference (%)
Rail	30,150	30,990	840	3%
Luas	21,520	20,740	-780	-4%
Bus	72,370	85,730	13,360	18%
Total	**124,040**	**137,460**	**13,420**	**11%**

As presented in Table 7.14 with the Proposed Schemes in place, there will be an estimated 11% increase in total passengers boarding PT services and 18% more boardings on buses services in the PM Peak Hour in 2028. The improved bus infrastructure results in a slight reduction in boardings on Luas services, which will help provide additional resilience for this mode to accommodate future travel demand growth in the PM peak period. Rail boardings increase due to additional interchange between Rail and bus services.

Table 7.15: 2043 AM Peak Hour PT Boardings

Public Transport Mode	Do Minimum	Do Something	Difference in Boardings	Difference (%)
Rail	47,040	49,210	2,170	5%
Luas	37,560	34,890	-2,670	-7%
Bus	79,830	97,830	18,000	23%
Metro	18,520	17,960	-560	-3%
Total	**182,950**	**199,890**	**16,940**	**9%**

As presented in Table 7.15, with the Proposed Schemes in place, there will be a predicted 9% increase in total passengers boarding PT services and a 23% increase in boardings on bus services in the AM Peak Hour in 2043. The improved bus infrastructure results in slight reductions in boardings on Luas and MetroLink services, which will help provide additional resilience for these modes to accommodate future travel demand growth. Rail boardings increase due to additional interchange between Rail and bus services.

Table 7.16: 2043 PM Peak Hour PT Boardings

Public Transport Mode	Do Minimum	Do Something	Difference in Boardings	Difference (%)
Rail	55,240	56,730	1,490	3%
Luas	31,620	30,640	-980	-3%
Urban Bus	73,160	88,970	15,810	22%
Metro	14,290	13,760	-530	-4%
Total	**174,310**	**190,100**	**15,790**	**9%**

As presented in Table 7.16 with the Proposed Schemes in place, there will be an estimated 9% increase in total passengers boarding PT services and a 22% increase in boardings on bus services in the PM Peak Hour 2043. The improved bus infrastructure results in slight reductions in boardings on Luas and MetroLink services, which will help provide additional resilience for these modes to accommodate future travel demand growth. Rail boardings increase due to additional interchange between Rail and bus services.

7.2.5.1.1 Public Transport Interchange

To determine the impact the Proposed Schemes will have on the integration and complementarity between the different PT modes, the number of transfers between each PT modes (Bus, Rail, Luas and Metro) has been extracted from the modelling suite. The analysis compares the Do Minimum and Do Something in the AM Peak Hour for each forecast year (2028, 2043).

Table 7.17: 2028 AM Peak Hour Transfers between PT Modes

	Do Minimum					Do Something			
To:	**Bus**	**Rail**	**Luas**	**Total**		**Bus**	**Rail**	**Luas**	**Total**
Bus	3,840	3,330	6,900	**14,070**		4,500	3,350	7,020	**14,870**
Rail	3,710	60	1,800	**5,570**		4,080	60	1,560	**5,700**
Luas	5,090	450	400	**5,940**		5,280	340	310	**5,930**
Total	**12,640**	**3,840**	**9,100**	**25,580**		**13,860**	**3,750**	**8,890**	**26,500**

As shown in Table 7.17 the total number of transfers between PT modes will increase by 4% from 25,580 in the Do Minimum scenario to 26,500 in the Do Something scenario, Transfers from Rail and Luas to buses will increase by 6% from 8,800 to 9,360 with the Schemes in place. This highlights the increased level of accessibility and transfer opportunities facilitated by the Proposed Schemes.

The contents of Table 7.18 present the predicted AM Peak Hour transfers between each PT Mode (including Metrolink) in 2043.

Table 7.18: 2043 AM Peak Hour Transfers between PT Modes

	Do Minimum					Do Something				
To:	**Bus**	**Rail**	**Luas**	**Metro**	**Total**	**Bus**	**Rail**	**Luas**	**Metro**	**Total**
Bus	2,690	4,680	5,600	4,420	**17,390**	3,670	5,480	6,130	4,520	**19,800**
Rail	3,390	3,970	2,430	1,670	**11,460**	4,720	4,010	2,220	1,590	**12,540**
Luas	4,530	1,230	430	1,650	**7,840**	4,780	980	370	1,360	**7,490**
Metro	2,940	960	1,320	0	**5,220**	3,270	830	1,090	0	**5,190**
Total	**13,550**	**10,840**	**9,780**	**7,740**	**41,910**	**16,440**	**11,300**	**9,810**	**7,470**	**45,020**

As shown above, with the roll out of the GDA Strategy the level of interchange increases substantially in the period from 2028 to 2043 without the Proposed Schemes. The total number of transfers between PT modes is expected to increase by 7% from 41,910 in the Do Minimum scenario to 45,020 in the Do Something scenario (with the Proposed Schemes in place) with transfers from Rail, Luas and Metrolink to buses predicted to increase by 18% from 10,860 to 12,770. This highlights the increased level of accessibility and transfer opportunities facilitated by the Proposed Schemes.

7.2.5.2 Average Public Transport Network Wide Travel Speeds

In order to assess the travel time and integration efficiencies provided by the Proposed Schemes, an average per passenger PT network-wide travel speed metric has been extracted from the modelling suite[5]. The metric considers the average speed across all public transport modes for the entire Study Area which covers all Proposed Schemes.

Table 7.19: 2028 AM Peak Hour Average Journey Speed per PT Passenger (km/h)

Scenario	Do Minimum	Do Something	Speed Difference (%)
All Schemes Scenario	21.13	23.08	+9.2%

[5] This metric combines Public Transport Passenger Travel Time and Travel Distance and removes the variation in the number of trips between each scenario providing an indication of the overall efficiency of the PT network for each scenario.

As presented in Table 7.19, with all Proposed Schemes operational, the average speed per PT passenger is expected to grow by 9.2%, representing a substantial increase in the average travel speeds for all PT users in 2028.

Table 7.20: 2043 AM Peak Hour Average Journey Speed per PT Passenger (km/h)

Scenario	Do Minimum	Do Something	Speed Difference (%)
All Schemes Scenario	21.18	23.14	+9.3%

As presented in Table 7.20, with all Proposed Schemes operational, the average speed per PT passenger is expected to grow by 9.3%, representing a substantial increase in the average travel speeds for all PT users in 2043.

7.2.6 General Traffic

7.2.6.1 Overview

The Proposed Scheme and the other proposed Core Bus Corridor schemes aim to provide an attractive alternative to the private car and promote a modal shift to public transport, walking and cycling. As shown in the preceding sections, the transport modelling indicates, that there will be a significant level of modal shift from car to more sustainable modes of travel. It is anticipated there will be a reduction in general traffic (car) trips of approximately 13,000 and 22,500 on a typical weekday (7am-7pm) in 2028 and 2043 respectively. This represents the equivalent of the removal of up to 78km of traffic queues in 2028 and 135km by 2043 across the Dublin road network. For context, the queue reduction corresponds to approximately twice the length of the M50 motorway in 2028 and almost three times the length of the M50 in 2043. This reduction in car demand facilitated by the schemes will provide significant opportunities to manage the road network more effectively and promote greater movement of people by sustainable modes.

It is recognised, however, that there will be an overall reduction in operational capacity for general traffic along the direct study area of each scheme 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 Proposed Core Bus Corridor Schemes) will likely create some level of trip redistribution onto the surrounding road network.

When all Core Bus Corridor schemes are operational, however, more people will be able to move in a more effective and efficient manner by sustainable modes.

To demonstrate this effect, a scenario has been modelled whereby the Proposed Scheme as well as all other proposed Core Bus Corridor schemes are operational in both 2028 and 2043.

7.2.6.2 Assessment Considerations

It should be noted that the Do Minimum and Do Something scenarios assume that travel behaviour will remain broadly consistent over the assessment period (2028-2043) and that car demand data used for this assessment, represents a reasonable worst-case scenario. It is anticipated, however, that societal trends in the medium to long term may reduce car demand further due to the ongoing changes to travel behaviour which would include further shifts towards sustainable travel; flexibility in working arrangements brought on following COVID-19 restrictions; and delayed car ownership trends that are emerging.

Goods vehicles

The assessment also assumes that goods vehicles (HGVs and LGVs) continue to grow in line with forecasted economic activity with patterns of travel remaining the same. For example, the assessment assumes a 45% and 77% increase in goods traffic versus the base year in 2028 and 2043 respectively. This is considered a very conservative assumption. It should be noted, however, that the 2021 Climate Action Plan (CAP) (DCCAE 2021) includes reference to a freight strategy for the region which will seek to further integrate smart technologies in logistics management and may include the regulation of delivery times as far as practicable to off-peak periods to limit traffic congestion in urban areas. The plan outlines measures to manage the increase in delivery and

servicing requirements as the population grows, which may include the development of consolidation centres to limit the number of 'last-mile' trips made by larger goods vehicles with plans for higher use of smaller electric vans or cargo bikes for 'last-mile' deliveries in urban areas. As proposals for the above are at a pre-planning stage, it was not possible to account for them in the assessments and a worst-case assessment has been undertaken based on continued growth in goods traffic.

Cycling

The Proposed Scheme (and the other proposed 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. Improvements are 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 proposals. 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 of the Proposed Scheme to represent improvements with a cycling mode share of approximately 5-6% 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 should be noted, however, that the Proposed Scheme (and the other proposed Core Bus Corridor schemes) has been designed to cater for much higher levels of cycling uptake and the significant segregation and safety improvements to walking and 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 proposals. The background environment changes with regards to cycling segregation and safety improvements will encourage more people to cycle in greater numbers.

Demand Management

The GDA Transport Strategy, of which the Proposed Scheme (and the other proposed Core Bus Corridor Schemes) are 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 Proposed Scheme (and the other proposed 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 Corridors 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 proposed Core Bus Corridor schemes). A greater increase in sustainable mode share can be accommodated by the Core Bus Corridors which would in turn lead to further reductions in traffic levels, beyond those reported in this assessment.

7.2.6.3 General Traffic Flow Changes

To determine the impact that the Proposed Scheme (in combination with the other proposed Core Bus Corridor schemes) will have in terms of general traffic redistribution, the LAM Opening Year (2028) and Design Year (2043) model results have been used to identify the difference in general traffic flows between the Do Minimum and Do Something scenarios i.e. with and without all proposed Core Bus Corridor schemes in place.

As outlined in Section 6.3.3.1.7, the changes in traffic flows have been presented with reference to TII's Traffic and Transport Assessment Guidelines (May 2014) i.e., traffic redistribution resulting in an increase or decrease above 100 combined flows (i.e. in a two-way direction) along roads in the vicinity of the Core Bus Corridors in the

AM and PM Peak Hours are presented. The threshold aligns with an approximate 1 vehicle per minute increase or decrease per direction on any given road. This is a very low level of traffic change on any road type and ensures that a robust assessment of the changes in traffic levels are presented.

Diagram 7.14 and Diagram 7.15 below illustrate the difference in traffic flows (Do Minimum vs Do Something) on roads in the AM Peak Hour for the 2028 Opening Year and 2043 Design Year with the Proposed Scheme and all other proposed Core Bus Corridor schemes in place. The diagrams are extracts from Figure 6.13 and 6.15 in TIA Appendix 3 (Maps). Reductions in traffic flows are indicated by the blue lines with increases in traffic flow indicated by the red lines.

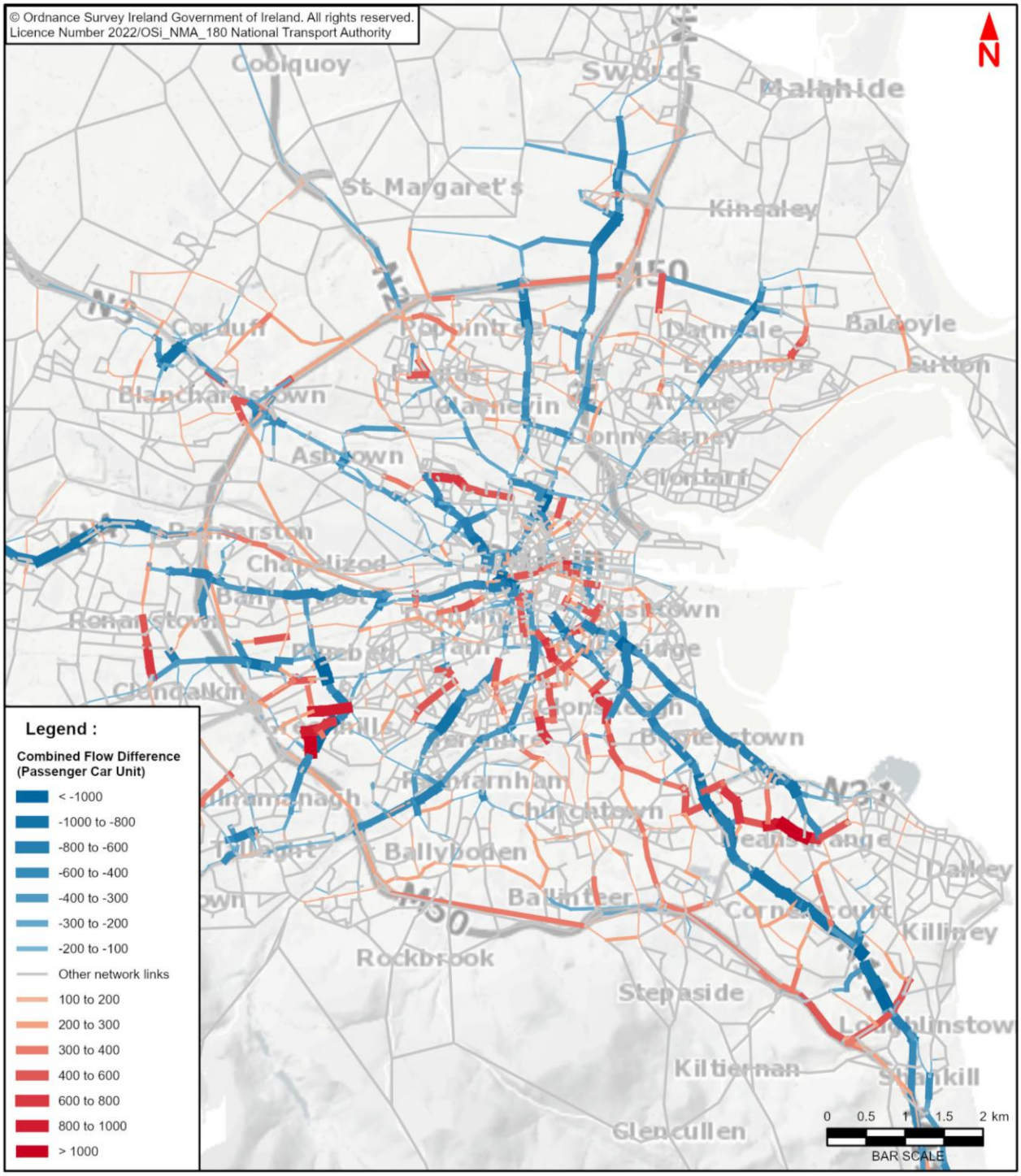

Diagram 7.14:Flow Difference on Road Links (Do Minimum vs. Do Something), AM Peak Hour, 2028 Opening Year – Cumulative Scenario

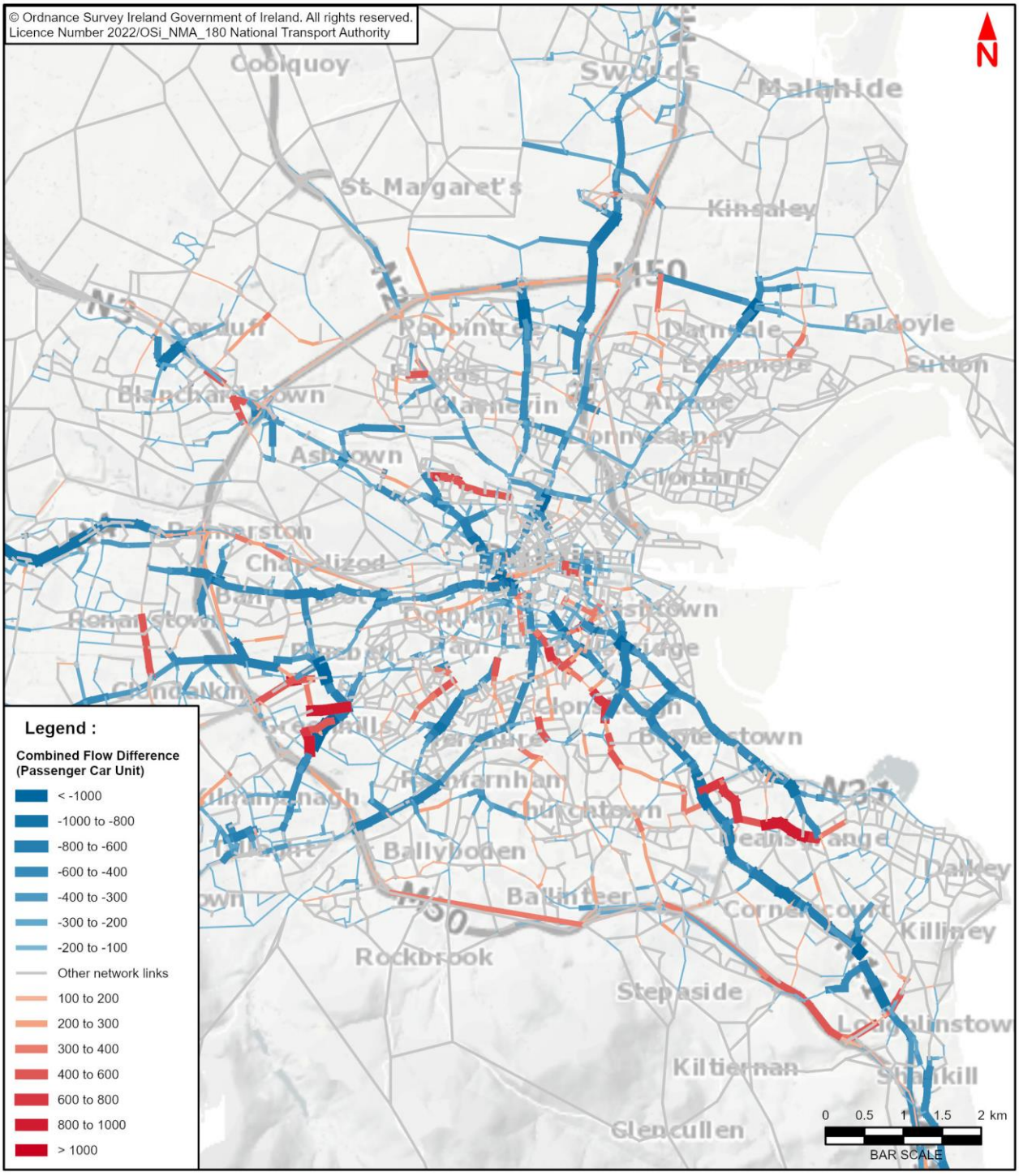

Diagram 7.15: Flow Difference on Road Links (Do Minimum vs. Do Something), AM Peak Hour, 2043 Design Year – Cumulative Scenario

Diagram 7.15 and Diagram 7.16 below illustrate the difference in traffic flows (Do Minimum vs Do Something) on roads in the PM Peak Hour for the 2028 Opening Year and 2043 Design Year with the Proposed Scheme and all other proposed Core Bus Corridor schemes in place. The maps are extracts from Figure 6.14 and 6.16 in TIA Appendix 3 (Maps). Reductions in traffic flows are indicated by the blue lines with increases in traffic flow indicated by the red lines.

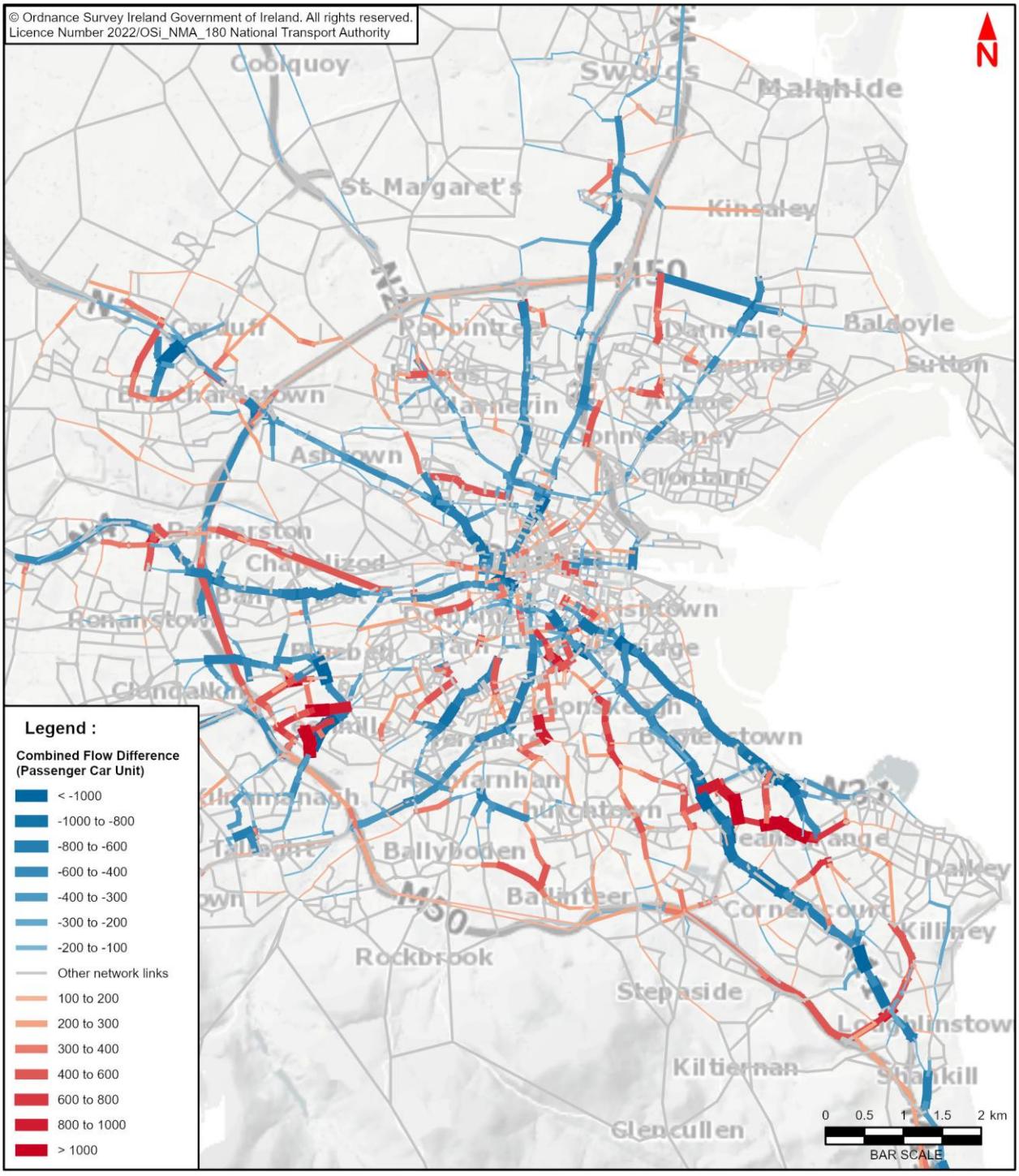

Diagram 7.16: Flow Difference on Road Links (Do Minimum vs. Do Something), PM Peak Hour, 2028 Opening Year – Cumulative Scenario

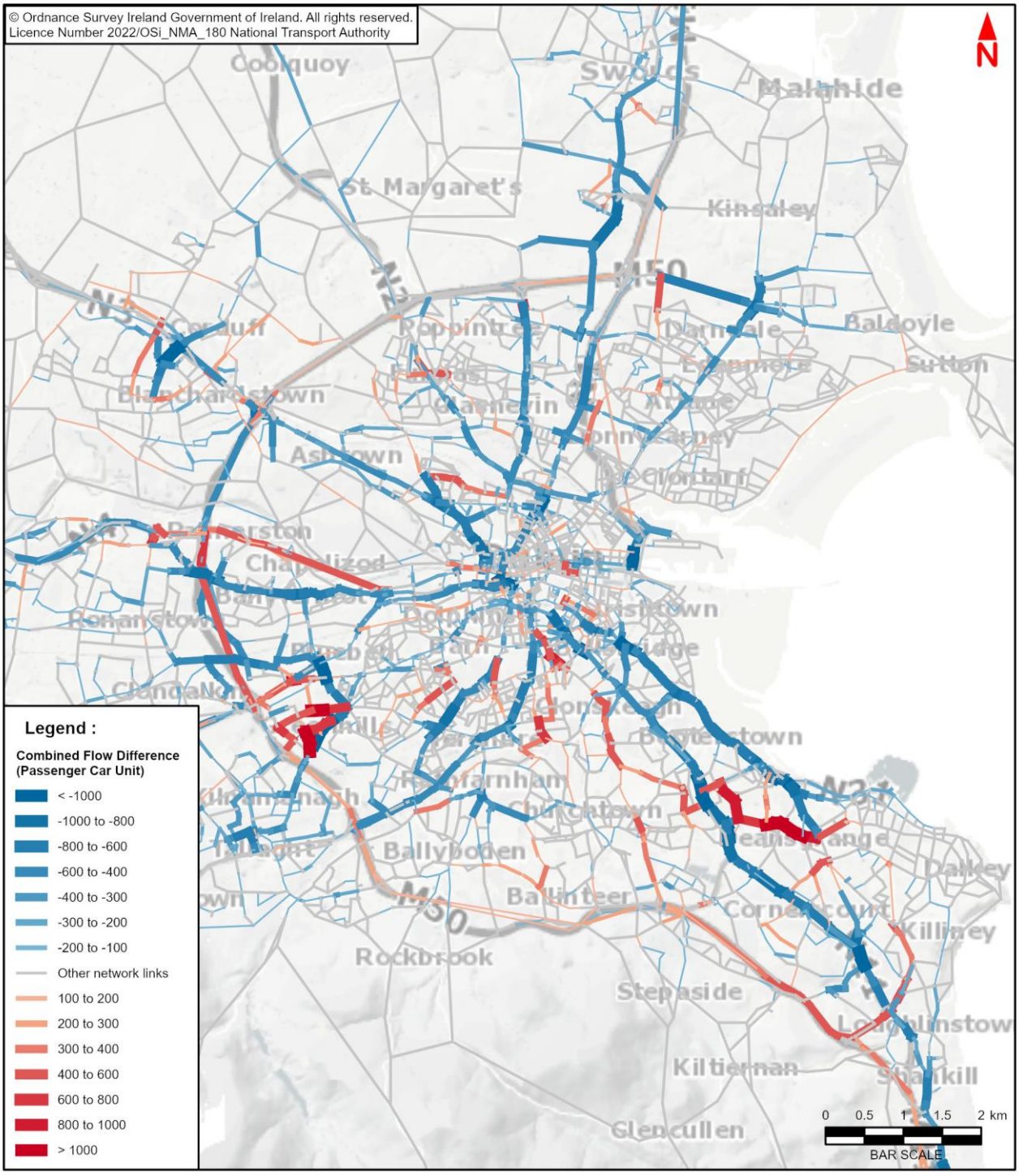

Diagram 7.17: Flow Difference on Road Links (Do Minimum vs. Do Something), PM Peak Hour, 2043 Design Year – Cumulative Scenario

7.2.6.4 Cumulative Traffic Flow Summary

As can be seen in the diagrams above, the level of traffic redistribution is shown to reduce between the Opening and Design years as further modal shift from car to sustainable modes occurs during the period, facilitated by the further roll out of the GDA Transport Strategy measures and, importantly, the sustainable mode capacity provided Core Bus Corridor schemes. As mentioned previously the implementation of all Core Bus Corridor schemes will facilitate the ability of the network to accommodate significant levels of additional travel growth by sustainable modes. It should be noted that higher levels of modal shift from car to sustainable modes are likely to occur either

during or before this period due to the requirement to achieve, for example, 2021 Climate Action Plan (CAP) (DCCAE 2021) targets with further policy measures, likely to be implemented. As the specifics of these policy measures have yet to be determined they are, therefore, not included in the transport modelling to ensure a conservative and reasonable worst-case assessment of effects.

7.2.7 People Movement – Cumulative Impact Summary

The cumulative impact for the movement of People Movement by sustainable modes with the Proposed Schemes in place has been appraised as a qualitative assessment, taking into account the changes in mode share, demand changes by mode along the Proposed Scheme (and the other Core Bus Corridors) as well as bus usage and integration with other public transport modes, as presented above. It is acknowledged that a certain level of residual traffic redistribution is likely, however, these increases are largely constrained to new road infrastructure (as part of the Proposed Schemes) and regional and distributor roads that are designed to cater for high volumes of traffic. The Proposed Schemes in combination have been adjudged to deliver a high positive overall impact on People Movement by sustainable modes. The Proposed Schemes can be shown to deliver significant improvements in People Movement by sustainable modes along the direct Proposed Scheme alignments, particularly by bus and cycling, with reductions in car mode share due to the enhanced sustainable mode provision. The Proposed Schemes provide for enhanced integration and efficiencies for all public transport modes by facilitating substantial increases in public transport average network wide travel speeds.

8. Summary and Conclusions

The aim of the Proposed Scheme is to provide enhanced walking, cycling and bus infrastructure on this key access corridor in the Dublin region, which will enable and deliver efficient, safe, and integrated sustainable transport movement along the corridor. The objectives of the CBC Infrastructure Works, applicable to the Traffic and Transport assessment of the Proposed Scheme, are to:

- Enhance the capacity and potential of the public transport system by improving bus speeds, reliability and punctuality through the provision of bus lanes and other measures to provide priority to bus movement over general traffic movements;
- Enhance the potential for cycling by providing safe infrastructure for cycling, segregated from general traffic wherever practicable;
- Support the delivery of an efficient, low carbon and climate resilient public transport service, which supports the achievement of Ireland's emission reduction targets;
- Enable compact growth, regeneration opportunities and more effective use of land in Dublin, for present and future generations, through the provision of safe and efficient sustainable transport networks;
- Improve accessibility to jobs, education and other social and economic opportunities through the provision of improved sustainable connectivity and integration with other public transport services; and
- Ensure that the public realm is carefully considered in the design and development of the transport infrastructure and seek to enhance key urban focal points where appropriate and feasible.

The Proposed Scheme, between Lucan and the City Centre, comprises the development of improved sustainable modes infrastructure and priority along the entire route. This TIA has provided a robust assessment of the Proposed Scheme through qualitative assessment and quantitative analysis using a suite of multi-modal transport modelling tools.

The impacts during the construction phase are outlined in Table 8.1. During the construction phase, the Proposed Scheme will have **Low Negative** and temporary impacts to pedestrian, bus access and parking and loading and **Medium Negative** and temporary impacts to cycling. General traffic redistribution is not anticipated to be a significant issue during the construction phase, however there will be a requirement for some localised temporary road closures for short durations of the daytime and / or night-time. Therefore, the impact on general traffic redistribution is anticipated to be a **Medium Negative** and temporary impact. The impact of construction traffic is anticipated to result in a **Low Negative** and temporary impact due to the low numbers of vehicles anticipated which are and below the thresholds set out in the Transport Assessments Guidelines.

Table 8.1: Summary of Predicted Construction Phase Impacts

Assessment Topic	Effect	Potential Impact
Pedestrian Access	Restrictions to pedestrians along Proposed Scheme.	Low Negative
Cycling Access	Restrictions to cyclists along Proposed Scheme	Medium Negative
Bus Access	Restrictions to public transport along Proposed Scheme.	Low Negative
Parking and Loading	Restrictions to parking / loading along Proposed Scheme.	Low Negative
General Traffic	Restrictions to general traffic along Proposed Scheme	Medium Negative
	Additional construction traffic flows upon surrounding road network	Low Negative

During the Operational Phase, the Proposed Scheme will deliver positive impacts in terms of People Movement, pedestrian, cycling and bus infrastructure. These improvements will help to provide an attractive alternative to the private car and promote a modal shift to walking, cycling and public transport, with greater capacity along the corridor to facilitate the movement of people. Some negative impacts for general traffic and parking / loading availability may be anticipated, however, the Proposed Scheme has been designed and outlined within this assessment to take cognisance of relevant traffic and transport guidelines. The assessment demonstrates that the Proposed Scheme can be readily utilised by sustainable modes and that the surrounding road network has the capacity to accommodate the associated traffic and transport impacts.

This TIA demonstrates that the Proposed Scheme results in the following impacts:

- **Pedestrian Infrastructure:** The Proposed Scheme consists of measures to enhance the existing pedestrian infrastructure along the direct study area. All proposed facilities have been designed in accordance with PDGB which has been developed with cognisance to the relevant accessibility guidance. A LoS junction assessment was undertaken using a set of five criteria to determine the impact that the Proposed Scheme has for pedestrians. The results of the impacted junctions demonstrate that in the Do Minimum scenario, 73% of the junctions assessed has LoS ratings of C or D, with the exception of two B, three E and one F ratings. In the Do Something scenario, i.e. following the development of the Proposed Scheme, 82% of the assessed junctions had the highest A / B LoS ratings. The impacts of the improvements to the quality of the pedestrian infrastructure will be **Medium Positive** in all sections of the Proposed Scheme.

- **Cycling Infrastructure:** The Proposed Scheme also consists of measures to enhance the potential for cycling by providing safe infrastructure for cycling, segregated from general traffic (and pedestrians) wherever practicable along the direct study area. A LoS assessment was undertaken using an adapted version of the NTA's National Cycle Manual QoS Evaluation criteria. The results of the assessment demonstrate that the LoS in the Do Minimum scenario consists predominantly of C ratings, with the exception of one B rating. In the Do Something scenario, eight of the nine LoS ratings are the highest A+, A and B ratings, with the remainder being C rating. The impact of the improvements will be **Medium Positive** in sections 1 and 2 and **Low Positive** in Section 3 of the Proposed Scheme.

- **Bus Infrastructure:** The implementation of the Proposed Scheme will result in improvements in the quality of bus infrastructure provision in the direct study area. A qualitative impact assessment has been undertaken based on the provision of bus priority, pedestrian accessibility and changes to the bus stop facilities. The results of the assessment demonstrate that the impacts of the improvements to the quality of the bus infrastructure will be **Medium Positive** in Section 1 and 2, and **High Positive** in Section 3 of the Proposed Scheme.

- **Parking and Loading:** A qualitative impact assessment has been undertaken of the Proposed Scheme impacts on the existing parking and loading. The results of the assessment demonstrate that the changes to the parking and loading provision will result in an overall loss of 265 spaces (-108 spaces in Section 1, -124 spaces in Section 2 and -33 spaces in Section 3). Given the nature of the loss in parking (i.e.

predominately low use informal parking on sections of road where properties and businesses have off road parking) and the availability of alternative spaces in the indirect study area, the impacts are expected to be **Medium Negative** in Section 1 and **Low Negative** in Section 2 and Section 3.

- **People Movement:** Given the proposed amendments to the pedestrian, cycling, bus and parking / loading infrastructure outlined above, the Proposed Scheme will have greater capacity to facilitate movement of people travelling through the corridor. A quantitative impact assessment has been undertaken using outputs from the NTA's modelling suite, comparing the Do Minimum and Do Something peak hour scenarios for each forecast year (2028, 2043). The results of the assessment demonstrate that there will be an increase in 13% and 9% of people travelling through the Proposed Scheme during the 2028 AM and PM Peak Hours respectively. During the 2043 scenario there will be an increase in 18% and 9% of people travelling through the Proposed Scheme during the AM and PM Peak Hours. The analysis also shows that there will be an increase in 4.6% and 5.3% of passengers boarding buses during the 2028 AM and PM Peak Hours respectively. During the 2043 scenario there will be an increase of 6.3% and 4.8% of passengers boarding buses during the AM and PM Peak Hours respectively. Overall, it is anticipated that the effects of the increases to the total number of people travelling through the Proposed Scheme will be **High Positive**.

- **Bus Network Performance Indicators:** A micro-simulation modelling assessment has been developed and network performance indicators of the bus operations along the 'end to end' corridor. The results of the assessment demonstrate that the total bus journey times on all modelled bus services will improve by up to 19% during the AM and PM Peak hours of the 2028 Opening Year and 2043 Design Year. Based on the AM and PM peak hours alone, this equates to **c7.2 hours of savings in 2028 and c7.5 hours in 2043,** when compared to the Do Minimum combined across all buses. On an annual basis this equates to approximately 5,400 hours of bus vehicle savings in 2028 and 5,600 hours in 2043, when considering weekday peak periods only. Journey time variation and reliability are shown to improve in all Do Something scenarios compared to the Do Minimum. Overall it is anticipated that the effects of the improvements to the network performance indicators for bus users along the Proposed Scheme will be **Medium Positive**.

- **General Traffic Network Performance Indicators:** There will be an overall reduction in operational capacity for general traffic along the direct study area, given the proposed infrastructural changes to the existing road layout outlined above. This reduction in operational capacity for general traffic will create some level of traffic redistribution from the Proposed Scheme onto the surrounding road network.

  The LAM Opening Year 2028 model results were used to identify the impact in traffic flows between the Do Minimum and Do Something scenarios. A reduction in general traffic flows along a road link has been described as a positive impact to the environment, and vice versa.

  The results of the assessment demonstrate that the surrounding road network has the capacity to accommodate the redistributed general traffic as a result of the Proposed Scheme. The majority of assessed junctions that required further traffic analysis have VoC ratios that are broadly similar before and after the Proposed Scheme.

  Overall, it has been determined that the impact of the reduction in general traffic flows along the Proposed Scheme will be **Low Positive** whilst the impact of the redistributed general traffic along the surrounding road network will be **Negligible.**

- **Network Wide Performance Indicators:** Given the impacts to the traffic conditions outlined above, there will be a knock-on effect to the operational efficiency of the road network beyond the direct and indirect study areas. A quantitative impact assessment has been undertaken using outputs from the NTA's ERM and LAM to determine the conditions to queuing, travel times, travel distances and network speeds during the Do Minimum and Do Something scenarios. The results of the assessment demonstrate that the impacts to the network performance indicators range between -1.5% and +1%. A **Low Positive** impact is anticipated in the 2028 Peak Hour scenarios and a **Negligible** impact is predicted in the 2043 Peak Hour scenarios.

- **Cumulative Assessment**: In general, total trip demand (combining all transport modes) will increase into the future in line with population and employment growth. A greater share of the demand will be by

sustainable modes (Public transport, Walking, Cycling) as facilitated by the GDA Strategy implementation.

The analysis indicates that with the 12 BusConnects Proposed Schemes in place, there will be a high positive impact on sustainable mode share. The schemes will prevent any increase in private car traffic within the study area and will instead result in a reduction in car trips below 2020 levels.

In the 2028 Opening Year scenario, it is estimated that for people travelling within the 500m catchment area (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 and a 12% increase in public transport, 3% decrease in general traffic and a 12% increase in cycling trips each day (7am-7pm). 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 11% increase in public transport trips, 4% decrease in general traffic trips (i.e. motorists) and a 15% increase in cycling trips in the morning peak hour and a 9% increase in public transport, 5% decrease in general traffic and a 13% increase in cycling trips each day (7am-7pm).

General traffic levels reduce more in 2043 than 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 GDA 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 Proposed Schemes in the AM Peak Hour. The bigger increases occur in the inbound direction on the Blanchardstown to City Centre, the Rathfarnham to City Centre 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 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 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 9% respectively, and the increase in passengers boarding bus services will increase by 23% and 22% respectively.

Overall the Proposed Schemes are expected to deliver a **High Positive** cumulative impact on People Movement by sustainable modes.

The impacts during the Operational Phase are summarised in Table 8.2.

Table 8.2: Summary of Potential Operational Phase Impacts

Assessment Topic	Effect	Predicted Impact
Pedestrian Infrastructure	Improvements to the quality of the pedestrian infrastructure along the Proposed Scheme.	Medium Positive in Sections 1, 2 and 3
Cycling Infrastructure	Improvements to the quality of the cycling infrastructure along the Proposed Scheme.	Medium Positive in Sections 1 and 2 and Low Positive in Section 3
Bus Infrastructure	Improvements to the quality of the bus infrastructure along the Proposed Scheme.	Medium Positive in Section 1 and 2 and High Positive in Section 3
Parking and Loading	A total loss of 265 parking / loading spaces along the Proposed Scheme.	Medium Negative in Section 1 and Low Negative in Section 2 and Section 3
People Movement	Increases to the total number of people travelling through the Proposed Scheme.	High Positive
Bus Network Performance Indicators	Improvements to journey time and reliability indicators for bus users along the Proposed Scheme.	Medium Positive
General Traffic Network Performance Indicators	Reduction in general traffic flows along the Proposed Scheme.	Low Positive

Assessment Topic	Effect	Predicted Impact
	Redistributed general traffic along the surrounding road network in the indirect study area as a result of the reduction of reserve capacity along the Proposed Scheme.	Negligible
Network Wide Performance Indicators	Changes in network-wide queuing capacity, travel times, travel distances and average network speeds beyond the direct and indirect study areas.	Negligible
Cumulative Assessment	The Proposed Scheme in tandem with other Core Bus Corridors and GDA Strategy schemes will facilitate substantial mode shift from car to sustainable modes.	High Positive

The Proposed Scheme will address sustainable mode transport infrastructure deficits while contributing to an overall integrated sustainable transport system as proposed in the GDA Transport 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, more reliable journey times which the Proposed Scheme provides. This in turn will support the future increase to the capacity of the bus network and 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. All of these changes combined will therefore cater for higher levels of future sustainable population and employment growth.

In the absence of the Proposed Scheme bus services will be operating in a more congested environment, leading to higher journey times for and lower reliability for bus journeys. This limits their attractiveness to users which will lead to reduced levels of public transport use, making the bus system less resilient to higher levels of growth and leading to increased levels of car use and congestion. The absence of walking and cycling measures that the Proposed Scheme provides will also significantly limit the potential to grow those modes into the future.

On the whole, the Proposed Scheme will make a significant contribution to the overall aims of BusConnects, the GDA Transport Strategy and allow the city to grow sustainably into the future, which would not be possible in the absence of the Proposed Scheme.

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