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 Clongriffin to City Centre Core Bus Corridor Scheme (hereafter referred to as the Proposed Scheme). The TIA also informs Chapter 6 of the EIAR (Traffic and Transport) 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;
- Enhance the potential for walking by improving the pedestrian infrastructure on the corridor;
- 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, as described in detail in in Chapter 4 (Proposed Scheme Description) of the EIAR, has an overall length of approximately 5.7km, and is routed along the R107 Malahide Road from Mayne River Avenue – R107 Malahide Road Junction to the junction with Marino Mart - Fairview and also routed for cyclists via the junction with Malahide Road-Brian Road along Carleton Road, St Aidan's Park, Haverty Road and Marglann Marino, all in the County of Dublin and within the Dublin City Council (DCC) administrative area. From here the scheme ties into a separate project, Clontarf to City Centre Cycle & Bus Priority Project, currently being developed by DCC. The Clontarf to City Centre Cycle & Bus Priority Project will provide segregated cycling facilities and bus priority infrastructure along a 2.7km route that extends from Clontarf Road at the junction with Alfie Byrne Road, to Amiens Street at the junction with Talbot Street in the City Centre. The start of the scheme ties into a separate project being developed by DCC namely, The Belmayne Main Street and Belmayne Avenue Scheme, which provides bus and cycle linkages to Clongriffin Dart Station.

Assessment Methodology

The assessment of the Proposed Scheme in relation to the baseline transport environment required 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, dependant 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

A detailed review of the existing traffic and transport conditions within the redline boundary of the Proposed Scheme has been undertaken, specifically for pedestrian, cycling, bus services and priority measures, general traffic and parking / loading facilities. 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 baseline cycling infrastructure provision on the corridor consists of 77% cycle priority outbound (4% cycle track, 73% advisory cycle lane), with 65% inbound (4% cycle track, 61% advisory cycle lane).

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

- Section 1 – Mayne River Avenue to Gracefield Road – Malahide Road; and
- Section 2 – Gracefield Road to Marino Mart / Fairview – Malahide Road.

Section 1 of the Proposed Scheme begins on the R107 Malahide Road at the junction with Mayne River Avenue. The route then comprises 3.0km of the R107 Malahide Road, finishing at Artane Roundabout, a four-arm roundabout between the R107 Malahide Road, the R808 Gracefield Road and Ardlea Road.

Section 2 of the Proposed Scheme begins at the roundabout between the R107 Malahide Road / Ardlea Road / R808 Gracefield Road and is approximately 2.7km in length, running in a northeast to southwest direction along Malahide Road.

Potential Impacts

Construction Phase

The impacts during the construction phase are outlined in Table 0.1. During the construction phase, the Proposed Scheme will have temporary **Low Negative** impacts to pedestrian, cycling, bus access and parking and loading.

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 daytime and night-time, which will involve consultation between the appointed contractor and relevant authorities. Access for general traffic to existing residential and commercial units immediately adjacent to the Proposed Scheme is to be accommodated throughout the Construction Phase. Therefore, the impact on general traffic redistribution is anticipated to be a medium, negative and temporary impact due to the short-term nature of any restrictions.

The impact of construction traffic is anticipated to result in a temporary **Low Negative** impact due to the low numbers of vehicles anticipated which are and below the thresholds set out in the Transport Assessments Guidelines.

Table 0.1 Summary of Potential 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	Low 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

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 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.

Although it is recognised that there will be some negative impacts for general traffic and parking / loading availability, 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.

Accordingly, it is concluded that the Proposed Scheme will deliver benefits from a sustainable transport point of view and will not result in a significant deterioration to the existing traffic conditions on the local road network during the operational phase, meeting the aim of the Proposed Scheme to provide enhanced walking, cycling and

bus infrastructure, enabling and delivering efficient, safe, and integrated sustainable transport movement along the corridor.

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. A Level of Service (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 the LoS during the Do Minimum scenario consists predominantly of the low D / E ratings, with the exception of 10 Cs. During the Do Something scenario, i.e. following the development of the Proposed Scheme, the LoS consists predominantly of the highest A / B ratings, with the exception of four Cs. Overall, the improvements to the quality of the pedestrian infrastructure will have a **Medium Positive impact** in Section 1 and 2 of the Proposed Scheme.

- **Cycling Infrastructure:** The Proposed Scheme also consists of measures to enhance the existing cycling infrastructure along the direct study area. A LoS assessment was undertaken using an adapted version of the NTA's National Cycle Manual Quality of Service (QoS) Evaluation criteria. The results of the assessment demonstrate that the LoS during the Do Minimum scenario consists of C ratings. During the Do Something scenario, the LoS consists predominantly of the highest A / A+ ratings, with the exception of one B (along the proposed quietly trafficked cycle route section via Brian Road). Overall, the improvements will have a **Medium Positive impact** in Section 1 and Section 2 of the Proposed Scheme.

- **Bus Infrastructure:** The implementation of the Proposed Scheme will result in improvements in the quality of bus infrastructure provision along 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 improvements to the quality of the bus infrastructure will have a **High Positive impact** in Section 1 and Section 2 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 66 spaces within the redline boundary of the Proposed Scheme (-29 spaces in Section 1 and -37 spaces in Section 2). Given the nature of the loss in parking and the availability of alternative spaces in the indirect study area, a **Low Negative impact** in Section 1 and a **Medium Negative impact** in Section 2 of the Proposed Scheme is expected.

- **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 the sustainable movement of people travelling along the corridor. A quantitative impact assessment has been undertaken using outputs from the NTA's ERM and LAM, 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 of 15% and 16% in the number of people travelling along the Proposed Scheme during the 2028 AM and PM Peak Hours respectively. During the 2043 scenario there will be an increase of 27% in the number of people travelling along the Proposed Scheme during the AM and PM Peak Hours. These increases are all due to the increased sustainable modes people movement facilitated by the Proposed Scheme.

  The analysis also shows that there will be an increase in 9.6% and 10.8% of passengers boarding buses during the 2028 AM and PM Peak hours respectively. During the 2043 scenario there will be an increase in 10.5% and 14.1% of passengers boarding buses during the AM and PM Peak Hours respectively. Overall, it is adjudged that the Proposed Scheme will have a **High Positive impact** on the sustainable movement of people along the corridor.

- **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 between 20% and 23% during the AM and PM Peak hours of the 2028 Opening Year and 2043 Design Year. The Proposed Scheme will reduce total bus journey times along the Proposed Scheme by up to 18% in 2028 and 17% in 2043. Based on the AM and PM peak hours alone, this equates to **6 hours of savings in 2028 and 5.7 hours in 2043.** When compared to the Do Minimum combined across all buses. On an annual basis this equates to approximately 4,500 hours of bus vehicle savings in 2028 and 4,300 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 improvements in journey times and reliability for bus users along the Proposed Scheme will have a **Medium Positive impact**.

- **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 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. The significance of the impact has been described in terms of the loss in traffic flows. An increase in general traffic flows along a road link has been described as a negative impact to the environment. Reference has been given to TII's Traffic and Transport Assessment Guidelines as an indicator for best practice, to determine the key road links that require further traffic analysis due to the increase in traffic. Operational capacities were extracted from the LAM at the associated junctions of the key road links to identify the impact that the Proposed Scheme will have on the Volume / Capacity ratios. The results are presented in terms of the significance of the impact to the V / C ratio for each junction based on its sensitivity and magnitude of impact.

  The results of the assessment demonstrate that the surrounding road network largely 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 V / C 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 a **Medium Positive impact** whilst the impact of the redistributed general traffic along the surrounding road network will have a **Low Negative impact.**

- **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 -5.47% and 3.52% and will therefore have a **Low Negative impact**.

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 Proposed Schemes, along with other GDA Strategy measures, 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) compared to the Do Minimum scenario. 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) compared to the Do Minimum scenario.

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 impact** for People Movement by sustainable modes

Summary and Conclusions

The Proposed Scheme, along the R107 Malahide Road from Mayne River Avenue to the R105 Marino Mart / R105 Clontarf Road, comprises the development of improved bus priority along the entire route. This TIA provides a robust assessment of the scheme through qualitative assessment and quantitative analysis using a suite of multi-modal transport modelling tools.

During the construction phase, the Proposed Scheme will have temporary **Low Negative impacts** to pedestrian cycling, 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 daytime and night-time. Therefore, the impact on general traffic redistribution is anticipated to be a temporary **Medium Negative impact**. The impact of construction traffic is anticipated to result in a temporary **Low Negative impact** due to the low numbers of vehicles anticipated which are and below the thresholds set out in the Transport Assessments Guidelines.

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 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.

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 is routed along the R107 Malahide Road from Mayne River Avenue – R107 Malahide Road junction to the junction with Marino Mart - Fairview and also routed via the junction with Malahide Road-Brian Road along Carleton Road, St Aidans Park, Haverty Road and Marglann Marino, all in the County of Dublin.

The Proposed Scheme includes an upgrade of the existing bus priority and cycle facilities associated with the Malahide Road Quality Bus Corridor (QBC), which has been in place since 1999. The Proposed Scheme includes a substantial increase in the level of bus priority provided along the Malahide QBC, including the provision of additional lengths of bus lane, particularly in the outbound direction.

Throughout the Proposed Scheme 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. Where space for a segregated cycle track is not available on the main corridor an alternative cycle route via quiet roads is proposed. Throughout the Proposed Scheme pedestrian facilities will be upgraded and additional signalised crossings provided.

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	**5.7km**	
Bus Priority	**Existing (km)**	**Proposed Scheme (km)**
Bus Lanes		
Inbound	4.5	5.1
Outbound	3.9	5.0
Bus Priority through Traffic Management		
Inbound	0	0.6
Outbound	0	0.7
Total Bus Priority (both directions)	8.4	11.4 (+36%)
Bus Measures		
Proportion of Route with Bus Priority Measures	74%	100%
Cycle Facilities – Segregated		
Inbound	0.2	4.7
Outbound	0.2	5.3
Cyclist Facilities – Non-segregated		
Inbound	3.5	1.2
Outbound	4.2	0.7
Total Cyclist Facilities (both directions)	8.1	11.9 (+47%)
Proportion Segregated (including Quiet Street Treatment)	5%	100%
Other Features		
Number of Traffic Signal Controlled Junctions	11	14
Number of Signal Crossings	36	52

The Proposed Scheme is supported by a series of drawings which are contained in Volume 3 of the 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-0001_XX_00-DR-CR-9001	General Arrangement
BCIDA-ACM-GEO_CS-0001_XX_00-DR-CR-9001	Typical Cross Sections
BCIDA-ACM-TSM_GA-0001_XX_00-DR-CR-9001	Traffic Signs and Road Markings
BCIDA-ACM-TSM_SJ-0001_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;
- Enhance the potential for walking by improving the pedestrian infrastructure on the corridor;
- 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 optimization 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. 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 3.4 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 4.3.1), 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 4.3.1) was developed to support this iterative design process,

Diagram 1.1 below illustrates this process whereby the emerging design for the Proposed Scheme have 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 displaced traffic 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.

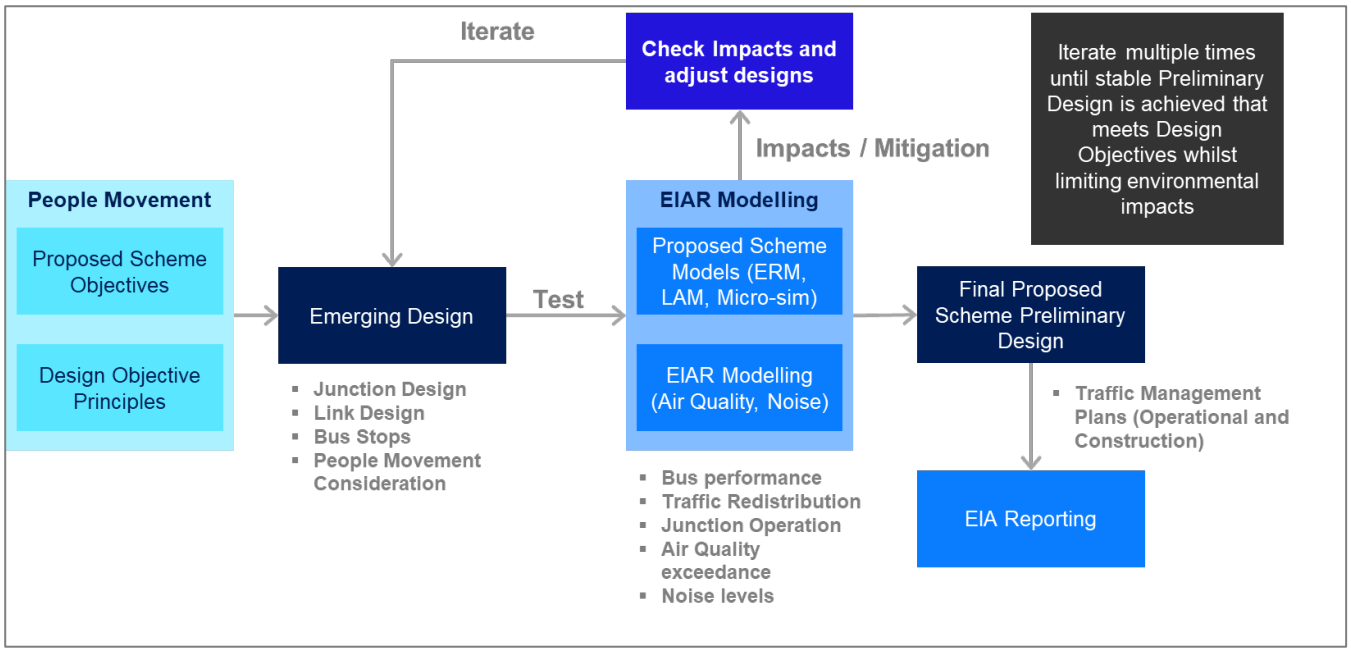

Diagram 1.1: Proposed Scheme Impact Assessment and Design Interaction

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 includes the comprehensive assessment of 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 assesses the impacts and significance of those impacts in relation to the receiving transport environment of the Proposed Scheme.

The traffic and transport impacts assessment have been 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 impacts and benefits of the Proposed Scheme considers the following transport receptors:

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

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

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

The impact assessments have been carried out based on the following scenarios:

- **'Do Nothing'** – The 'Do Nothing' scenario represents the current baseline traffic and transport conditions of the direct and indirect study areas **without** the Proposed Scheme in place, which has been outlined in Section 5 (Baseline Environment). This scenario forms the reference case by which to compare the Proposed Scheme ('Do Something') for the qualitative assessments only.
- **'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. Further detail on the scheme and demand assumptions within this scenario are included further below in section 6.1.3.
- **'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; and
    - **Operational Phase (Opening Year 2028, Design Year 2043) –** This phase represents when the Proposed Scheme is fully operational.

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

- **Chapter 2 – Study Area:** This chapter sets out both the direct and indirect study areas of the TIA;
- **Chapter 3 – Assessment Methodology:** This chapter sets out the proposed method of assessment for the quantitative and qualitative perspectives;
- **Chapter 4 – Baseline Environment**: This chapter will set out the baseline conditions against which the Proposed Scheme has been assessed;
- **Chapter 5 – Scheme Proposals:** This chapter provides an overview of the Proposed Scheme;
- **Chapter 6 – Proposed Scheme Specific Assessment:** This chapter provides the assessment of the Proposed Scheme in both the Construction and the Operational Phase. 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;
- **Chapter 7 – Mitigation and Monitoring:** This chapter provides and overview of the mitigation and monitoring measures and the residual impacts of the Proposed Scheme;
- **Chapter 8 – 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;
- **Chapter 9 – Summary and Conclusions**: This chapter provides a summary of the TIA and the conclusions which can be drawn from it; and
- **Chapter 10** – **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 – the boundary of the physical works of the scheme); and
- **Indirect Study Area** – This is the area of influence 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 6.1.5.4.6 for further details on the threshold applied in relation to traffic volume changes used in the definition of the indirect study area).

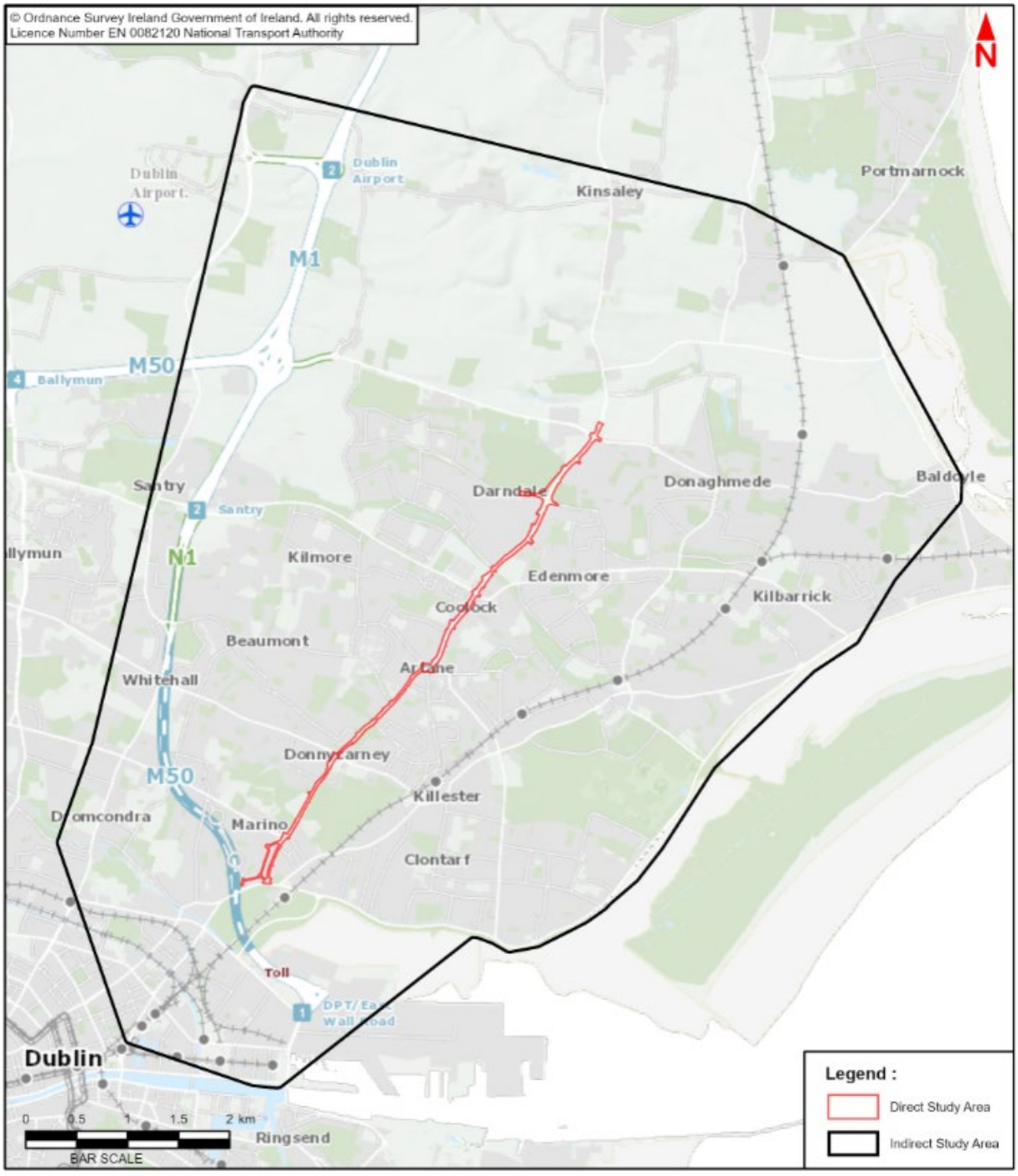

Diagram 2.1: Proposed Scheme Indirect Study Area

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

3.1.2 Design Manual for Urban Roads and Streets

The Design Manual for Urban Roads and Streets (DMURS) (DTTS 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, characterised 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 (DTTS, 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 (DTTS, 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 Section 3.1.

3.2 National Policy

3.2.1 National Planning Framework - Ireland 2040 Our Plan (NPF) (2018)

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.

3.2.2 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.

3.2.3 Draft National Investment Framework for Transport in Ireland (NIFTI) (2021)

The draft National Investment Framework for Transport in Ireland (NIFTI) (Department of Transport, 2021) was recently published by the Department of Transport (DTTS) 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.

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

Smarter Travel: A Sustainable Transport Future (2009 – 2020) (DTTS, 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 BusConnects 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.

3.2.5 National Cycle Policy Framework

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.

3.2.6 Statement of Strategy (2016 – 2019)

The Statement of Strategy (Department of Transport, Tourism and Sport (DTTS), 2019) is the DTTS'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.'*

DTTS'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.

3.2.7 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.

3.2.8 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.

3.2.9 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 industrialisation 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.

3.2.10 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 characterised 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 course of the analysis carried out to identify the preferred core bus corridors for the BusConnects scheme, the provision of these cycle routes was considered at all stages. Therefore, as part of the analysis, 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.

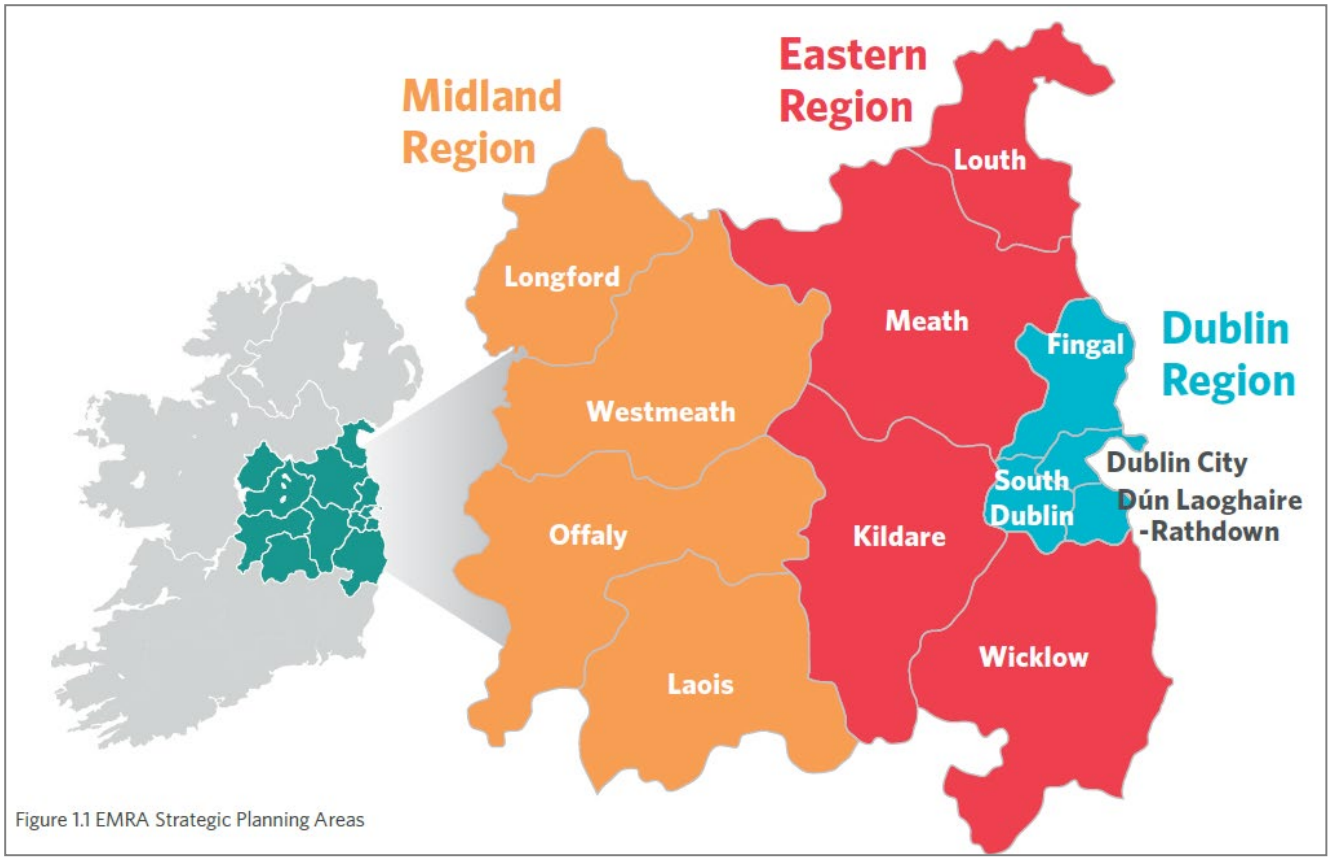

Diagram 3.2: RSES Planning Areas

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 maximises 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

Extract from RSES RPO8.9 (Table 8.3: Bus Projects for the Region)
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, 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 BusConnects scheme incorporates upgrades to pedestrian and cycle infrastructure along the Proposed Scheme and at key junctions.

The Proposed Scheme incorporates upgrades to pedestrian and cycle infrastructure along the Proposed Scheme 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 Clongriffin – Belmayne Local Area Plan

The Local Area Plan (LAP) is a statutory document that acts according to requirements set out in the Planning & Development Act of 2000 and the related Amendment of 2002.

The Planning and Development Act 2000 – 2012 introduced the concept of local area plans within the framework of higher-level plans (such as Regional Planning Guidelines and City and County Development Plans). Local area plans provide more detailed planning policies for areas where significant development and change is anticipated.

The Clongriffin – Belmayne Local Area Plan (CBLAP) (2012 – 2018) (DCC, 2012) was officially extended in 2017 for a further five-year period. It provides a framework for proper planning and sustainable development of Clongriffin – Belmayne (the North Fringe) area in accordance with the policies and objectives of the CDP. Section 1 of the Proposed Scheme begins at the point at which the DCC scheme meets the R107 Malahide Road.

The following key issues are intended to be addressed by the CBLAP:

- To improve connections;
- To create a high-quality family neighbourhood;
- To encouraging integrated neighbourhoods between the developing and established communities adjoining;
- To create a high-quality built environment and public areas; and
- To protect and highlight the assets of the natural environment of the local area, local heritage and opportunities for recreation.

The Proposed Scheme aligns with the design of the transport network for the masterplan site, and the improvements along the R107 Malahide Road as part of the BusConnects scheme are relied upon to achieve the aim of high-frequency, high quality access to public transport and improved connections of the CBLAP and Clongriffin – Belmayne Masterplan.

3.5 Legislation

There is no legislation specifically relevant to this TIA.

4. Assessment Methodology

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

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.

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).

Where relevant 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 assessments which are based upon outputs from the transport 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 4.2 and Section 6.

4.1.1.1 Site Surveys

A walkover of the route of the Proposed Scheme was undertaken to ensure an up-to-date record of the existing environment was used to complete the qualitative assessment. The surveys focussed 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 photography 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 road type indicator, reflecting traffic speed and volume, as well as the importance and connectivity of the road. 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.

This section discusses the data collection undertaken to inform the quantitative assessment metrics set out in Section 6. Further detail can be found in TIA Appendix 1 (Transport Modelling Report).

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 updated 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 Turning 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	23	Thursday 13/2/2020
ATC	IDASO LTD	8	Wednesday 5/2/2020 – Friday 13/2/2020

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. 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 5.1.

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 Custom Area Analysis dataset through the TomTom TrafficStats portal. The NTA has an agreement with TomTom to provide anonymised 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 5 to 95 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 developed for the Proposed Scheme, 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 be 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 LAM and micro-simulation model 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 TIA Appendix 1 (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 Movements:** An assessment has been carried out to determine the potential impact that the Proposed Scheme will have on the projected volume of people moving along the Proposed Scheme 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 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 queuing, 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 sets out 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 is detailed and the use of the tool for each element of the Proposed Scheme is defined.

The modelling tools that have been developed 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 etc. which is 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.

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 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 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 designs and traffic signal control strategies and to provide bus journey time information for the determination of benefits of the Proposed Scheme; 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.

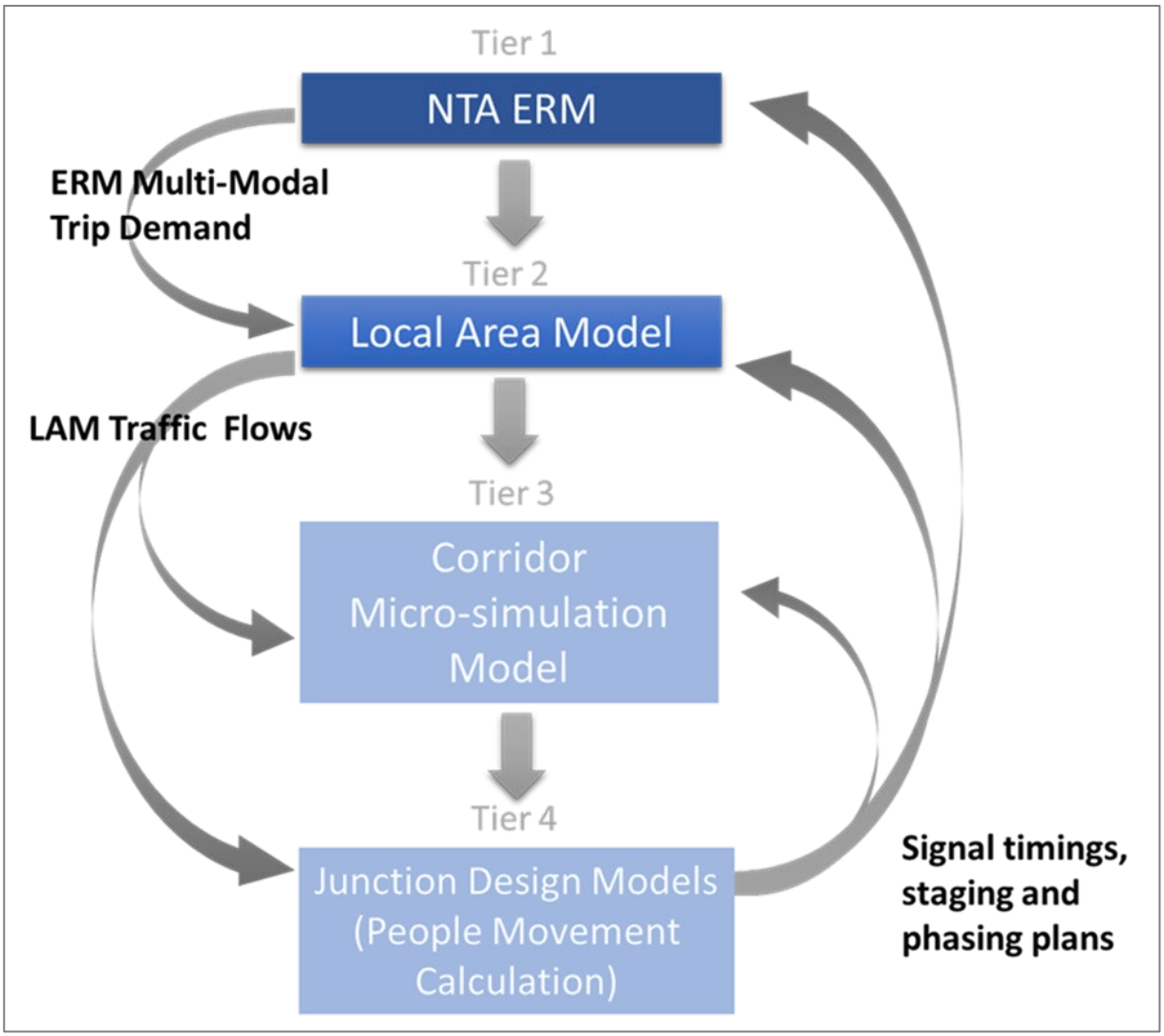

Diagram 4.1: Proposed Scheme Modelling Hierarchy

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	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[1] 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 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 updated traffic counts for a neutral period was completed for the Proposed Scheme. Traffic surveys were undertaken in and 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 (as per timetabled services) and as such were 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 LAM network as shown in Diagram 4.2.

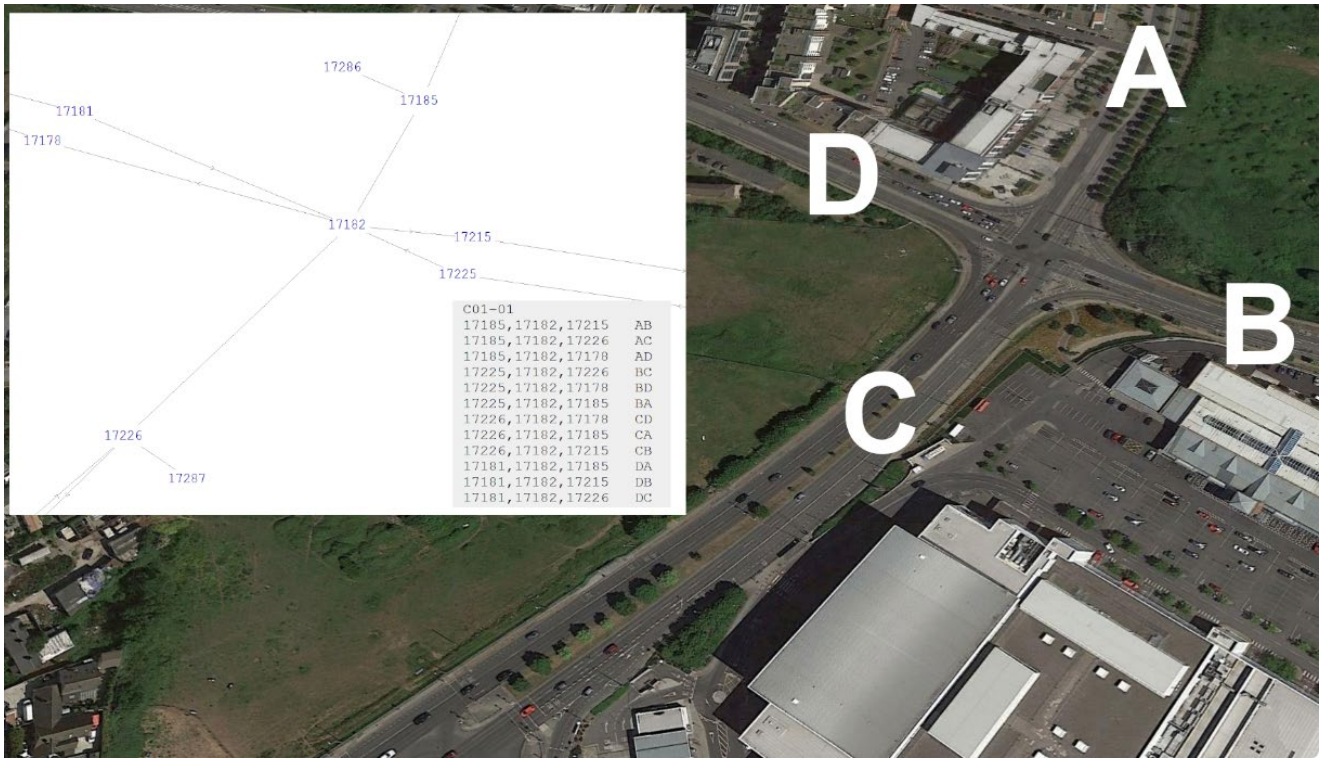

Diagram 4.2: Bus Connects LAM Node Matching (Junction C01-01)

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

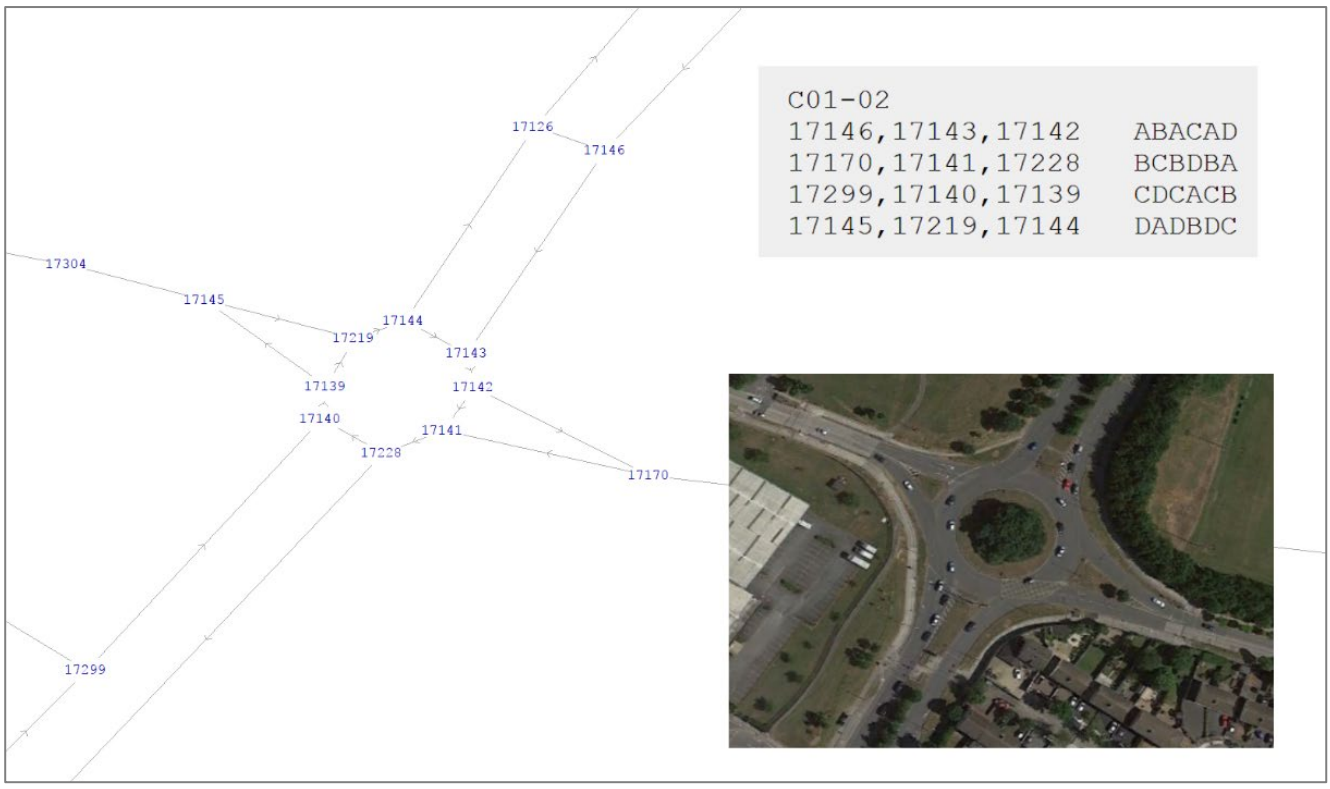

Diagram 4.3: Bus Connects LAM Node Matching (Junction C01-02)

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 77% cycle priority outbound (4% cycle track, 73% advisory cycle lane), with 65% inbound (4% cycle track, 61% advisory cycle lane).

5.1 Bus Journey Times

Bus services along the Proposed Scheme currently operate within a constrained and congested environment, with 68% priority outbound and 79% priority inbound on the corridor. An examination of Automatic Vehicle Location (AVL, collected by the NTA) data indicates that the current standard deviation for journey times of buses on the corridor is 9 minutes (14 mins to the City Centre). With any further increases in traffic levels, these issues are expected to be exacerbated. While impacting upon bus passengers, longer and less reliable bus services also require operators to use additional buses to maintain headways to fill gaps created in the timetable. Aligned to this, the remaining sections of unprioritised bus network can lead to bunching of buses which, in turn, means stops can become overcrowded, creating delays in boarding and alighting and the imbalanced 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. The results demonstrate that the busiest junction (65,028 daily movements) within the direct study area is R107 Malahide Road / R139 Clarehall Road four-arm signalised junction which provides access to the M50 and M1 motorways. The next busiest junctions are:

- R107 Malahide Road / Priorswood Road (54,299 daily movements);
- R107 Malahide Road / Clarehall Shopping Centre (48,850 daily movements);
- R107 Malahide Road / R104 (Oscar Traynor Road) (45,462 daily movements); and
- R107 Malahide Road / R105 Clontarf Road (44,979 daily movements).

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

Junction Identifier	Junction Name	Type	Daily Movements	AM Movements	PM Movements
1-1	R107/R139	Signals	65,028	4,037	4,381
1-2	R107/Priorswood Road	Priority	54,299	3,665	3,835
1-3	R107/Greencastle Road	Priority	33,945	2,153	2,260
1-4	R107/Tonlegee Road	Signals	45,462	3,075	2,982
1-5	R107/Gracefield Road	Priority	43,733	2,934	2,956
1-6	R107/Kilmore Road	Signals	31,080	2,155	2,477
1-7	R107/Collins Avenue	Signals	39,372	2,530	2,695
1-8	R107/Griffith Ave	Priority	37,627	2,811	2,529
1-9	R107/Marino Mart	Signals	44,979	2,838	3,052
1-10	R107/Clarehall Shopping Center	Priority	48,850	2,875	3,669
1-11	R107/Main Street Coolock	Priority	32,102	2,402	2,102
1-12	R107/Killester Avenue	Signals	31,626	2,123	2,232
1-13	R107/Casino Park	Priority	31,224	2,292	2,142

Junction Identifier	Junction Name	Type	Daily Movements	AM Movements	PM Movements
1-14a	R107/St Aiden's Park	Signals	24,628	1,680	1,494
1-14b	R107/Marino Crescent	Signals	27,073	1,870	1,580
1-15	R105/Marino Crescent	Priority	28,405	1,807	2,045
1-16	Main Street/Hole In The Wall Road	Signals	14,824	1,042	1,334
1-17	Main Street/Belmayne Avenue	Priority	7,072	795	554
1-18	Main Street/Bridge Street	Priority	3,316	300	308
1-19	Clongriffin Road/Station Square	Priority	1,056	59	98
1-20	Bridge Street/Station Square	Priority	1,302	74	123
1-21	R105/R807 (Clontarf Road)	Signals	31,965	2023	2,346

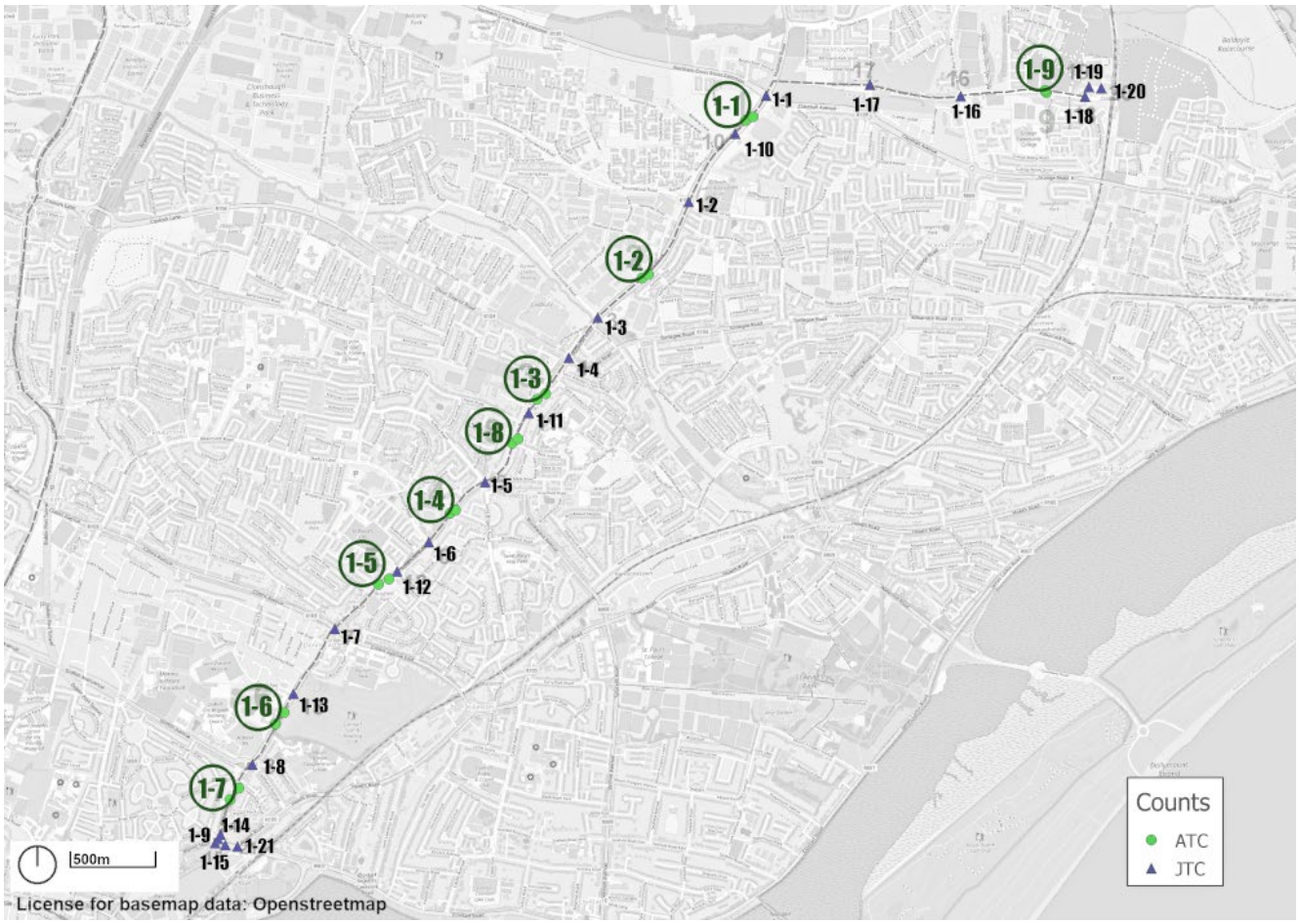

Diagram 5.1: ATC and JTC Traffic Count Locations

5.2.2 Automatic Traffic Counts (ATCs)

Table 5.2 displays the ATCs collected for the Proposed Scheme, the locations of which are shown in Diagram 5.1. The highest ATC daily flows are at Clarehall Shopping Centre. The ATC count at Marino Crescent did not have reliable counts for a full week and was therefore excluded from the dataset.

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

ATC Identifier	ATC Location	Direction	Daily Movements	AM Movements	PM Movements
1.1A	Clarehall Shopping Centre	Northbound	19,614	969	1,552
1.1B		Southbound	18,861	1,583	1,228
1.2A	North of Odeon Coolock	Northbound	13,998	727	1,036
1.2A		Southbound	13,037	906	772
1.3A	South of Odeon Coolock	Northbound	12,425	780	815
1.3B		Southbound	14,102	1,107	859
1.4A	South of Artane Roundabout	Northbound	12,335	679	855
1.4B		Southbound	11,862	690	671
1.5A	Mayfield Park	Northbound	12,134	669	889
1.5B		Southbound	12,543	783	726
1.6A	Clontarf Golf Club	Northbound	13,108	642	1,103
1.6B		Southbound	13,575	1,223	701
1.7A	Marino Crescent	Northbound	Excluded	Excluded	Excluded
1.7B		Southbound	Excluded	Excluded	Excluded
1.8A	North of Artane Roundabout	Northbound	13,754	857	920
1.8B		Southbound	13,889	1,038	828
1.9A	Main Street Clongriffin	Westbound	3,138	309	263
1.9B		Eastbound	3,095	236	278

5.3 Baseline Conditions

5.3.1 Overview

In describing the baseline conditions, the scheme has been divided into two no. sections in accordance with the proposed design. The two sections are outlined as follows:

- Section 1 – Mayne River Avenue to Gracefield Road – Malahide Road; and
- Section 2 – Gracefield Road to Marino Mart / Fairview – Malahide Road.

5.3.2 Section 1 – Mayne River Avenue to Gracefield Road – Malahide Roade

This Section outlines the baseline environment for walking, cycling, bus services, general traffic and parking / loading facilities along Section 1 of the Proposed Scheme, between Mayne River Avenue and the R808 Gracefield Road.

This section commences at the Mayne River Avenue – R107 Malahide Road Junction. The route then comprises 3km of the R107 Malahide Road, finishing at Artane Roundabout, a four-arm roundabout between the R107 Malahide Road North and South, the R808 Gracefield Road and Ardlea Road.

5.3.2.1 Pedestrian Infrastructure

The R107 Malahide Road between Mayne River Avenue and the junction with the R139 Brookfield Crescent provides a footpath and street lighting along both sides of the road. A wide shared space of approximately 10.0m is provided for approximately 55m between Mayne River Avenue and the Hilton Hotel on the western side of the road. In front of the Hilton Hotel, pedestrians are diverted to a footpath approximately 4.0m wide. On the eastern side, the footpath is alongside a cycle track (delineated by white lining) which are segregated from the road by a grass verge a combined width of approximately 3.0m.

South of the R139 Clarehall Avenue, footpaths and street lighting on both sides of the road are adjacent to the carriageway. Continuing south, the footpaths are typically separated from the road by a grass verge. South of Belcamp Lane, there is no footpath on the western side of the road, and pedestrians are diverted onto Buttercup Park which runs parallel to the R107 Malahide Road. Pedestrians re-join the R107 Malahide Road again after crossing Priorswood Road.

South of the R104 Tonlegee Road, the footpaths are mostly provided adjacent to the carriageway for approximately 300m. The footpath is then diverted onto the roads running parallel to the R107 Malahide Road, namely Brookville Park (northbound) and St Brendan's Avenue (southbound). Uncontrolled pedestrian crossings are provided to reach the footpaths along the two parallel roads. Street lighting is provided throughout.

There are several controlled pedestrian crossings along Section 1 of the Proposed Scheme which benefit from tactile paving and dropped kerbs which can be found at the following locations:

- The four-arm R107 Malahide Road / R139 Northern Cross Route Extension / R139 Clarehall Avenue signalised junction has signalised crossings on all its arms. The crossings are staggered to allow pedestrians to cross in four stages with traffic islands providing pedestrian refuge due to slip lanes at each arm and guard rails are provided;
- The three-arm signalised junction adjacent to Clarehall Shopping Centre has signalised crossings and pedestrian refuge islands with guard rails on all its arms;
- The pelican crossing across the R107 Malahide Road south of Belcamp Lane. Pedestrians cross in two stages using the central reservation between the two carriageways as a refuge island which includes guard rails;
- R107 Malahide Road / Priorswood Road / Blunden Road four-arm roundabout provides a dropped kerb on the northern arm and toucan crossings on the southern and western arms;
- The R107 Malahide Road / Greencastle Road signalised junction provides signalised crossings on the northern, western and eastern arms;

- R107 Malahide Road / R104 Tonlegee Road / R014 Brookville Crescent four-arm signalised junction has signalised crossings on its eastern, western and northern arms. The crossings are staggered and do not have guard rails;
- A pelican crossing south of St Brendan's Avenue. The crossing is staggered using the central reservation for pedestrian refuge and there are guard rails;
- A signalised crossing north of the R107 Malahide Road / Brookville Park junction, to allow crossing of the R107 Malahide Road. The crossing is staggered using the central reservation for pedestrian refuge and there are guard rails; and
- R107 Malahide Road / Ardlea Road / R808 Gracefield Road Roundabout provides toucan crossing on each arm. Each crossing provides pedestrian refuge on the traffic islands (but the crossings are not staggered).

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).

5.3.2.2 Cycling Infrastructure

Cycle facilities are provided along the length of Section 1 of the Proposed Scheme, comprising predominantly of on-road advisory cycle lanes of approximately 1.5m wide, except for the section of the R107 Malahide Road between Mayne River Avenue and the junction with the R139 Clarehall Avenue, where a cycle track segregated from vehicles is provided on each side of the road. Shared facilities and toucan crossings are provided at all arms of the Artane Roundabout with Gracefield Road.

St Brendan's Avenue runs parallel to the R107 Malahide Road and provides an alternative link between the junction with St Brendan's Park and the R808 Gracefield Road via a quieter, residential route (although there are no formal cycle facilities).

Cycle parking stands are provided at the following points in the vicinity of the Proposed Scheme, albeit, outside of the redline boundary:

- Four curved steel 'toast rack' cycle stands (able to accommodate eight bicycles) on the footpath at the junction of R107 Malahide Road and Mayne River Avenue;
- 27 curved steel 'toast rack' cycle stands (able to accommodate up to 54 bicycles) outside Clare Hall shopping centre adjacent to the R107 Malahide Road;
- Four Sheffield stands (able to accommodate up to eight bicycles) adjacent to Malahide Road Retail Shopping Centre;
- 20 'Lo-hoop' racks adjacent to the Leisureplex (opposite Greencastle Road);
- 13 Sheffield stands (able to accommodate 26 bicycles) along Main Street; and
- Three Sheffield stands (able to accommodate up to six bicycles) immediately south of Artane Roundabout (adjacent to the R808 Gracefield Road).

There are no designated cycle hire scheme parking racks within Section 1 of the Proposed Scheme.

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

Further details of the baseline cycling facilities (i.e. level of segregation from vehicles, capacity for cycling two abreast and / or overtaking, and junction treatment) along the length of Section 1 of the Proposed Scheme is included in TIA Appendix 4.2 (Cycling Impact Assessment).

5.3.2.3 Bus Infrastructure

5.3.2.3.1 Bus Priority Measures

Bus lanes are provided along Section 1 of the Proposed Scheme at the following locations (aside from intermittent breaks and junctions):

- In both directions between the junction with R139 and the junction with Blunden Drive / Priorswood Road, operating 24 hours a day, Monday to Sunday; and
- In both directions between the junction with Blunden Drive / Priorswood Road and the junction with R808 Gracefield Road / Ardlea Road, operating between 07:00 and 19:00, Monday to Saturday.

5.3.2.3.2 Bus Stop Facilities

There are currently 15 bus stops along Section 1 of the Proposed Scheme. The inbound stops are as follows:

- Stop 4563 on R107 Malahide Road outside Clarehall Shopping Centre;
- Stop 1218 on R107 Malahide Road immediately south of the junction with Belcamp Lane;
- Stop 1270 on R107 Malahide Road south of the R017 Malahide Road / R139 Clarehall Avenue / R139 Northern Cross Route Extension signalised junction;
- Stop 1272 on R107 Malahide Road south of the Newtown Cottages junction;
- Stop 1201 on R107 Malahide Road immediately south of the R107 Malahide Road / Coolock Leisureplex / Greencastle Road signalised junction;
- Stop 1274 on R107 Malahide Road immediately south of the R107 Malahide Road / R104 Tonlegee Road / R104 Brookville Crescent signalised junction;
- Stop 1199 on R017 Malahide Road south of Chanel Road junction; and
- Stop 1276 on R107 Malahide Road to the south of the St Brendan's Avenue / Mask Avenue junction.

The outbound stops are:

- Stop 1205 on R017 Malahide Road outside Clarehall Shopping Centre;
- Stop 6115 on R017 Malahide Road south of the junction with Belcamp Lane;
- Stop 1203 on R107 Malahide Road between Newtown Road and the R017 Malahide Road / R139 Clarehall Avenue / R139 Northern Cross Route Extension signalised junction;
- Stop 1202 on R107 Malahide Road at the access junction to Crown Paints and Decorating Centre;
- Stop 4385 on R107 Malahide Road adjacent to St Brendan's Church Coolock, opposite St Brendan's Avenue;
- Stop 1200 on R107 Malahide Road north of junction with Main Street; and
- Stop 1275 on R107 Malahide Road opposite the St Brendan's Avenue / Mask Avenue junction.

Out of the 15 bus stops, the following six stops are indented from the carriageway:

- Clare Hall, stop 4563;
- Newton Road, stops 1203 and 1270;
- Newton Cottages, stop 1271;
- St Brendan's Church, stop 4385; and
- Chanel College, stop 1200.

All other stops are situated inline within bus lanes. At one bus stop, only a pole and an accessible kerb are provided, while the remaining stops all provide timetable information, shelters, seating and accessible kerbs as a minimum.

Table 5.3 shows the availability of bus stop facilities at the existing 15 bus stops along the R107 Malahide Road.

Table 5.3: Section 1 – Availability of Bus Stop Facilities (of a Total 15no. Bus Stops)

Bus Stop Facility	Number of Bus Stops in Baseline with Facility	Percentage of Bus Stops in Baseline with Facility
RTPI	3	20%
Timetable information	13	86%
Shelter	14	93%
Seating	14	93%
Accessible Kerbs	15	100%
Indented Drop Off Area	6	40%

The existing bus facilities along Section 1 of the Proposed Scheme are illustrated in Figure 6.5a in TIA Appendix 3 (Maps). The bus services which operate along Section 1 are outlined in Table 5.4.

Table 5.4: Section 1 – Bus Service Frequency

Service	Route	Typical Service Frequency	
		Weekday	Weekend
15	Clongriffin (Sq.) - Artane Roundabout - Fairview - IFSC - Aungier St. (Bishop St.) - Rathmines - Terenure - Templeogue Bridge - Ballycullen Rd.	10 minutes	15 minutes
27	Clare Hall - Artane Roundabout - Fairview - Eden Quay - Dolphin's Barn Cross - Walkinstown Cross (The Kestrel) -Tallaght (The Square) - Jobstown	10 minutes	10-15 minutes
27x	Clare Hall - Artane Roundabout Donnycarney - Fairview - Connolly Rail Station - UCD Belfield	Twice per day	No service
42	Talbot St. - Fairview (Footbridge) - Artane Roundabout -Seabury - Malahide - Sand's Hotel (Portmarnock)	30 minutes	30 minutes
43	Talbot St. - Fairview (Footbridge) - Artane Roundabout -Feltrim Rd. - Swords Business Park	15-20 minutes	50 minutes

5.3.2.4 General Traffic

5.3.2.4.1 R107 Malahide Road

The R107 Malahide Road in Section 1 of the Proposed Scheme is a dual carriageway road, with a speed limit of 60km/h, except for a 100m section on the approach to the R107 Malahide Road / Gracefield Road roundabout, where a speed limit of 50km/h is in place. The number of lanes varies as follows:

- Two lanes per direction between Mayne River Avenue and the R139 Clarehall Avenue with a carriageway width of approximately 6.0m;
- Three lanes (two standard and one bus lane) per direction between the R139 Clarehall Avenue and the entrance to the Clarehall Shopping Centre. The width of the carriageway is approximately 9.0m on each side of the central reservation;
- Five lanes northbound (four standard and one bus lane, approximate width 15.0m) and three lanes southbound (two standard, one bus lane, approximate width 10.0m) between the entrance to the Clarehall Shopping Centre and Belcamp Lane;
- Varying between two and four lanes between Belcamp Lane and the R107 Malahide Road / Priorswood Road / Blunden Road roundabout. The carriageway width varies between 9.0m and 13.0m;
- Two lanes per direction between the R107 Malahide Road / Priorswood Road / Blunden Road roundabout and the R104 Brookville Crescent. The approximate width is 7.0m on each side of the central reservation. The carriageway becomes three lanes on the approach to intersections and widens to approximately 10.0m; and

- Two lanes per direction (one standard lane and one bus lane) until the R808 Gracefield Road where the two carriageways merge into one. The carriageway is approximately 7.0m wide on each side of the central reservation.

R107 Malahide Road acts as the alternative route to Dublin Port, when the Port Tunnel is closed, meaning that at times it has to cope with higher flows of HGVs than during 'typical' traffic flow periods. This has had a particular bearing upon the design of the Proposed Scheme, in terms of road widths and junction design.

The existing major junction arrangements along the section are as follows:

- R107 Malahide Road / R139 Northern Cross Route Extension / R139 Clarehall Avenue four-arm signalised junction;
- R107 Malahide Road / Clarehall Shopping Centre three-arm signalised junction;
- R107 Malahide Road / Belcamp Lane three-arm priority junction;
- R107 Malahide Road / Priorswood Road / Blunden Road four-arm roundabout;
- R017 Malahide Road / Newtown Road three-arm priority junction;
- R107 Malahide Road / Greencastle Road four-arm signalised junction;
- R107 Malahide Road / R104 Tonlegee Road / R014 Brookville Crescent four-arm signalised junction;
- R107 Malahide Road / Brookville Park four-arm priority junction; and
- R107 Malahide Road / Ardlea Road / R808 Gracefield Road four-arm roundabout.

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).

R107 Malahide Road / R139 Northern Cross Route Extension / R139 Clarehall Avenue four-arm signalised junction: This junction consists of a three-lane approach on all arms, except the R139 Clarehall Avenue which has a two-lane approach. The leftmost lane of each arm diverts left into a slip lane and yield to allow access to the correspondent left arm and bypass the signals (albeit, there are signalised pedestrian crossings on the slip lanes).

The R107 Malahide Road South arm has three lanes exiting from the junction, with the left lane becoming a 24-hour bus lane approximately 100m south of the junction The R139 Northern Cross Route Extension and R107 Malahide Road North arms have two exit lanes for all traffic, and the R139 Clarehall Avenue arm has two exit lanes, but the left lane is a bus lane from Monday to Saturday between 07:00 and 19:00.

There are cycle advanced stacking locations on each arm. These characteristics are shown in Image 5.1.

Image 5.1: R107 Malahide Road / R139 Four-Arm Signalised Junction

R107 Malahide Road / Clarehall Shopping Centre three-arm signalised junction: This junction is located approximately 275m south of the previous junction and provides access into Clarehall Shopping Centre.

The R107 Malahide Road North arm has three lanes for ahead movements (left lane is intended for buses) controlled by a set of signal heads, and a leftmost lane for left turn movements to Clarehall Shopping Centre which is controlled by a separate signal head. Advisory cycle lanes are also provided for ahead and left turn movements. Exit onto this arm comprises an advisory cycle lane, a bus lane (24 hour) and two general traffic lanes.

The Clarehall Shopping Centre arm has two approach lanes (one for right and left turn movements respectively) and two exit lanes. The signals include a left turn filter phase.

The R107 Malahide Road South arm has five approach lanes and an advisory cycle lane. The left lane is a 24-hour bus lane, two middle lanes are for ahead movements and two right lanes are for right turns to Clarehall Shopping Centre which are controlled by a separate signal phase. The cycle lane continues northwards through the junction. There are three exit lanes onto this arm; the leftmost lane is a bus lane and there is an advisory cycle lane travelling southbound.

U-turns are not permitted and there are advanced stacking locations for cyclists. These characteristics are shown in Image 5.2.

Image 5.2: R107 Malahide Road / Clarehall Shopping Centre Three-Arm Signalised Junction

R107 Malahide Road / Belcamp Lane three-arm priority junction: The R107 Malahide Road is a dual carriageway at this junction with four general traffic lanes and a bus lane travelling northbound, and two general traffic lanes and a bus lane travelling southbound. The northbound and southbound traffic lanes are separated by a central reservation. On-road cycle lanes travelling in both directions are also present.

Belcamp Lane is approximately 7.0m wide and has a one lane entering and existing the junction. The junction operates a 'left-in / left-out' arrangement to and from Belcamp Lane due to the R107 Malahide Road being a dual carriageway with numerous lanes. There is a yellow box in front of the Belcamp Lane arm across the four northbound general traffic lanes of the R107 Malahide Road.

These characteristics are shown in Image 5.3.

Image 5.3: R107 Malahide Road / Belcamp Lane Priority Junction

R107 Malahide Road / Priorswood Road / Blunden Road four-arm roundabout: This roundabout has an inscribed circle diameter of approximately 65.0m. The R107 Malahide Road North arm has two approach lanes and a wide two-lane exit approximately 10.0m wide. The exit link divides into three lanes approximately 50m from the junction, with the left-most lane being a 24-hour bus lane.

The Blunden Drive arm has two approach lanes and a wide single exit lane of approximately 7.0m. There is a yellow box between the Blunden Drive approach and the R107 Malahide Road South exit arms.

The R107 Malahide Road South arm has two approach lanes in addition to a left flare lane of approximately 20.0m long. There are two lanes exiting onto this arm.

The Priorswood Road arm has two lanes approaching the junction and a wide single exit lane of approximately 7.0m. No provision for cyclists is made on-road and instead, toucan crossings are provided.

These characteristics are shown in Image 5.4.

Image 5.4: R107 Malahide Road / Priorswood Road / Blunden Road Four-Arm Roundabout

R017 Malahide Road / Newtown Road three-arm priority junction: The R107 Malahide Road is a dual carriageway at this junction with two general traffic lanes travelling northbound, and two lanes travelling southbound; a bus lane and one general traffic lane. The northbound and southbound traffic lanes are separated by a central reservation. On-road cycle lanes travelling in both directions are also present.

The Newton Road arm is one-way traveling eastbound and has two lanes approaching the R107 Malahide Road, both of which are for left turn movements. No right turn movements are permitted at this junction. There is a former left turn lane which comprises white hatching and is not permitted for use along the northbound carriageway of the R107 Malahide Road, sitting to the left of the cycle lane. There is a yellow box in front of the Newton Road arm across the two northbound general traffic lanes of the R107 Malahide Road.

These characteristics are shown in Image 5.5.

Image 5.5: R017 Malahide Road / Newtown Road Priority Junction

R107 Malahide Road / Greencastle Road four-arm signalised junction: The junction is at the access to the Coolock Leisureplex and Odeon cinema. The R107 Malahide Road North and South arms each have three entry lanes, the right of which is a flare lane of approximately 50.0m long and the signals operate a right turn filter phase. There are two lanes and an advisory cycle lane exiting onto this arm, the left of which is a bus lane operating Monday to Saturday between 07:00 and 19:00. The entry and exit lanes are separated by the central reservation.

The Leisureplex / cinema access arm has one entry and exit lane with no separation. The Greencastle Road arm has two entry lanes and a single exit lane. Advanced stacking locations for cyclists are provided on the northern, southern and western arms of the junction.

These characteristics are shown in Image 5.6.

Image 5.6: R107 Malahide Road / Greencastle Road Four-Arm Signalised Junction

R107 Malahide Road / R104 Tonlegee Road / R104 Brookville Crescent four-arm signalised junction: The R107 Malahide Road North arm has three lanes approaching the junction and a short left slip lane onto the R104 Tonlegee Road. The two middle lanes are therefore for ahead movements (the left of which is a bus lane) and the right lane is for right turn movements only and is separated by a traffic island. The left and right turn movements are controlled by separate signal heads and green phases. There are two exit lanes onto this arm, the left of which is a bus lane operating Monday to Saturday between 07:00 and 19:00. There are advisory cycle lanes both approaching and exiting the junction from this arm.

The R104 Tonlegee Road arm has a two-lane approach, the right lane is for ahead and right turn movements, and the left lane is for ahead and left turn movements. There is a short left slip lane with its own signal head which yields to southbound traffic on the R107 Malahide Road. There is yellow box between the left turn movement from the R104 Tonlegee Road and the R107 Malahide Road South arm.

The R107 Malahide Road South arm has a four lane approach which comprises a left slip lane of approximately 45m in length (and controlled by its own signal head and flashing amber phase) which yields to westbound traffic, two ahead lanes (the left of which is a bus lane during certain hours) and a right turn lane separated by a traffic island and with a separate signal head and green phase.

The R104 Brookville Crescent arm has a two-lane approach; the left lane is for left and ahead movements and the right lane is for ahead and right turn movements. There is a single lane exiting the junction onto this arm.

Advanced stacking locations are provided on the R107 Malahide Road North and South arms. The characteristics are shown in Image 5.7.

Image 5.7: R107 Malahide Road / R104 Four-Arm Signalised Junction

R107 Malahide Road / Brookville Park four-arm priority junction: Vehicles travelling along the R107 Malahide Road have priority over the vehicles entering from the eastern and western arms, as indicated by the stop lines. A yellow box is provided for vehicles entering from the western arm. Vehicles are only permitted to turn left at this junction due to the two carriageways being separated by a central reservation. A signalised pedestrian crossing is provided across the northern arm.

These characterises are shown in Image 5.8.

Image 5.8: R107 Malahide Road / Brookville Park Four-Arm Priority Junction

R107 Malahide Road / Ardlea Road / R808 Gracefield Road four-arm roundabout: This roundabout marks the end of Section 1 of the Proposed Scheme. The roundabout has an inscribed circle diameter of approximately 40.0m.

The R107 Malahide Road North and South arms each have two entry lanes and two exit lanes, the left of which becomes a bus lane in operation Monday to Saturday between 07:00 and 19:00, approximately 50.0m from the junction.

The R808 Gracefield Road arm also has two entry lanes and two exit lanes. The left entry lane is for left turn movements onto the R107 Malahide Road South arm (travelling southbound) and the right lane is for ahead and right turn movements. There is a yellow box on the right-hand lane of the circulatory between this arm and the R107 Malahide Road South arm.

The Ardlea Road arm has a single lane approaching the junction which widens to approximately 6.0m at the entrance to the roundabout to allow two lanes. The exit lane is a similar width and the road markings show a single lane for traffic exiting onto this arm.

There is no on-road provision for cyclists as toucan crossings linked by cycle tracks are provided at each arm of the roundabout. These characterises are shown in Image 5.9.

Image 5.9: R07 Malahide Road / Ardlea Road / R808 Gracefield Road Four-Arm Roundabout

5.3.2.4.2 St Brendan's Avenue

St Brendan's Avenue is a residential road that runs parallel to the east of R107 Malahide Road for the majority of its length between Tonlegee Road and Gracefield Road.

St Brendan's Avenue has a single carriageway in each direction and is within a 30km/h 'slow zone'. In addition, there are speed cushions at regular intervals to slow traffic.

There are no parking restrictions, and unrestricted parking is allowed on both sides of the road, although the majority of residential properties on St Brendan's Avenue have private off-street parking in driveways. A no left-turn restriction from St Brendan's Avenue into Mask Road is in place Monday to Saturday between 07:00 and 10:00.

5.3.2.4.3 Brookville Park

The northern section of Brookville Park is a residential cul-de-sac of approximately 150m in length that runs parallel to the west of R107 Malahide Road, immediately to the north of the R107 Malahide Road / R104 Oscar Traynor Road signalised junction. Vehicular access is only possible from Oscar Traynor Road via Brookville Crescent. Direct access to Brookville Park is not possible from R107 Malahide Road, as a kerbed footway runs between the two roads.

The southern section is a residential road approximately 380m in length which heads south from the R107 Malahide Road / St Brendan's Road junction and runs parallel to R017 Malahide Road on the western side of the road. There is an existing turn ban that restricts northbound traffic on R017 Malahide Road from entering Brookville Park directly (left-out only is permitted). Entry to Brookville Park can however be achieved from the north via Main Street.

There are no parking restrictions on the northern section of Brookville Park, and unrestricted parking is allowed on both sides of the road, although each of the residential properties has driveway parking.

Along the southern section, parking is generally unrestricted with the exception of a section controlled by double yellow lines approximately 115m in length on the eastern side of the road. Residential properties also have driveway parking.

5.3.2.5 Existing Parking / Loading

There is parking directly on the R107 Malahide Road along Section 1 of the Proposed Scheme at the following locations:

- Approximately 23 informal (i.e. no marked bays or operating hours) residential parking spaces adjacent to the northbound carriageway between Greencastle Road and the R104 Tonlegee Road;
- Six parallel car parking spaces along the northbound carriageway of the R107 Malahide Road, immediately south of Mayne River Avenue, associated with the adjacent commercial units (maximum stay of 30 minutes); and
- Approximately eight informal parking spaces along the eastern side of the R107 Malahide Road, adjacent to 43 to 48 St Brendan's Avenue.

Further parking is accommodated on the streets running parallel to the main carriageway which have residential frontage as follows:

- Approximately 22 informal residential parking spaces along the western carriageway south of the R107 Malahide Road / Brookville Park junction; and
- Informal residential on-street parking occurs along St Brendan's Avenue and Brookville Park, albeit, the properties along these roads have private off-street parking.

There are no loading bays along Section 1 of the Proposed Scheme.

5.3.3 Section 2 – Gracefield Road to Marino Mart / Fairview– Malahide Road

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 the R808 Gracefield Road and the R105 Marino Mart / R105 Clontarf Road Junction. Section 2 begins at the roundabout between the R107 Malahide Road / Ardlea Road / R808 Gracefield Road. Section 2 of the Proposed Scheme is approximately 2.7km in length and runs in a northeast to southwest direction along Malahide Road.

5.3.3.1 Pedestrian Infrastructure

South of the R808 Gracefield Road, footpaths and street lighting are provided on both sides of the R107 Malahide Road adjacent to the carriageway for the entirety of Section 2 of the Proposed Scheme.

A proposed alternative quiet route for cyclists as part of the Proposed Scheme utilises the residential streets; Brian Road, Carleton Road, Haverty Road and Marino Mart, to route between the R107 Malahide Road and R105 Marino Mart whilst bypassing a busy section of the R107 Malahide Road. These residential streets provide a footpath on each side of the carriageway.

There are several pedestrian crossings along Section 2 of the Proposed Scheme, the majority of which are signalised. Pedestrian crossing facilities can be found at the following locations:

- The R107 Malahide Road / Kilmore Road signalised junction has a signalised crossing on its northern and western arms;
- The R107 Malahide Road / Killester Avenue / St David's Wood signalised junction has a signalised crossing on the Malahide Road South arm only (uncontrolled crossings of Killester Avenue and St David's Wood arms are also provided);
- The R107 Malahide Road / Elm Mount Road signalised junction has signalised crossings on the R107 Malahide Road South arm only (an uncontrolled crossing of the Elm Mount Road arm is also provided);
- The R107 Malahide Road / R103 Collins Avenue four-arm signalised junction has signalised crossings on all arms except the R107 Malahide Road North arm;
- There is a pelican crossing on the R107 Malahide Road immediately south of Elm Road. A traffic island is provided at the centre of the carriageway providing pedestrian refuge and there are guard rails on either side of the carriageway;
- There is a pelican crossing on the R107 Malahide Road immediately south of Donnycarney Road. The crossing is staggered by a traffic island with pedestrian refuge and guard rails;
- There is a pelican crossing on the R107 Malahide Road immediately south of Casino Park. The crossing is staggered by a traffic island with pedestrian refuge and guard rails;
- There is a pelican crossing on R107 Malahide Road at the junction to the south of Nazareth House. The crossing is staggered with the central reservation acting as a traffic island and guard rails present;
- At the R107 Malahide Road / R102 Griffith Avenue / Copeland Avenue four-arm junction, signalised crossings are provided on all arms except the R107 Malahide Road South arm. The R107 Malahide Road North and R102 Griffith Avenue crossings are staggered by traffic islands with pedestrian refuge and guard rails;
- There is a raised table crossing (uncontrolled) of Brian Road and a pelican crossing on the R107 Malahide Road at the R107 Malahide Road / Brian Road / Marino Avenue staggered priority junction; and
- There are staggered signalised crossings with pedestrian refuge on traffic islands and guard rails across the R107 Malahide Road and R105 Clontarf Road arms at the R107 Malahide Road / R105 Clontarf Road three-arm signalised junction.

Uncontrolled crossings across priority junctions at side roads benefit from dropped kerbs. The location of pedestrian crossings is illustrated in Figure 6.3b 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 2 of the Proposed Scheme is included in TIA Appendix 4.1 (Pedestrian Infrastructure Assessment).

5.3.3.2 Cycling Infrastructure

Existing cycling facilities along Section 2 are intermittent. Between the R808 Gracefield Road and Danieli Road, an advisory cycle lane of approximately 1.5m wide is provided on both sides of the carriageway. From Danieli Road to Kilmore Road, the advisory cycle lane is provided for cyclists travelling northbound only. Between Kilmore Road and Donnycarney Road, cyclists have to make use of a shared bus / cycle lane.

From Donnycarney Road to the R102 Griffith Avenue, advisory cycle lanes are provided in both directions, and for the final section to the R105 Clontarf Road, cyclists travelling southbound are to use a shared bus / cycle lane, with a continuous advisory cycle lane travelling northbound.

Cycle parking stands are provided at the following locations in the vicinity of the Proposed Scheme, albeit, outside of the redline boundary:

- Three Sheffield stands (able to accommodate up to six bicycles) immediately south of Artane Roundabout (adjacent to the R808 Gracefield Road);
- Four Sheffield stands (able to accommodate up to eight bicycles) on the western side of the R107 Malahide Road, adjacent to the junction with Mornington Grove;
- Four Sheffield stands (able to accommodate up to eight bicycles) on the eastern side of the R107 Malahide Road to the south of Danieli Road;
- Three Sheffield stands (able to accommodate up to six bicycles) on the corner between the R103 Collins Avenue East and Clancarthy Road;
- Three Sheffield stands (able to accommodate up to six bicycles) on the eastern side of the R107 Malahide Road across from the junction with Brian Road which are designated public cycle parking racks;
- Six Sheffield stands (able to accommodate up to 12 bicycles) on St Aidan's Park Road at the junction with the 106 Malahide Road which are designated public cycle parking racks; and
- 22 floor mounted racks and two Sheffield stands (able to accommodate up to four bicycles) on the corner between the R107 Malahide Road and R105 Marino Mart.

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

Further details of the baseline cycling facilities (i.e. level of segregation from vehicles, capacity for cycling two abreast and / or overtaking, and junction treatment) along the length of Section 2 of the Proposed Scheme is included in TIA Appendix 4.2 (Cycling Impact Assessment).

5.3.3.3 Bus Infrastructure

5.3.3.3.1 Bus Priority Measures

Bus lanes are provided along the majority of Section 2 of the Proposed Scheme at the following locations (aside from intermittent breaks and junctions):

- In both directions between the R808 Gracefield Road and Danieli Road, operating Monday to Saturday between 07:00 – 10:00 and 12:00 – 19:00;
- Southbound from Danieli Road to Kilmore Road, operating Monday to Saturday between 07:00 – 10:00 and 12:00 – 19:00;
- In both directions between Kilmore Road and Brian Road, operating Monday to Saturday between 07:00 – 10:00 and 12:00 – 19:00 (with the southbound section between Clontarf Golf Club and Copeland Avenue, and the northbound section between Brian Road and Griffith Avenue operating between 07:00-19:00 Monday to Saturday);
- Southbound from Charlemont Road to Crescent Place, operating Monday to Saturday between 07:00 and 10:00, and from 12:30 to 19:00; and

- Southbound from Crescent Place to the R105 Clontarf Road, operating Monday to Saturday between 07:00 and 10:00.

5.3.3.3.2 Bus Stop Facilities

There are currently 17 bus stops along Section 2 of the Proposed Scheme. The inbound stops are as follows:

- Stop 1277 on R017 Malahide Road immediately south of Artane Roundabout;
- Stop 1219 on R107 Malahide Road south of Danieli Road;
- Stop 1220 on R107 Malahide Road north of Killester Avenue;
- Stop 1221 on R107 Malahide Road south of Elm Mount Road, opposite Mayfield Park;
- Stop 664 on R107 Malahide Road adjacent to Donnycarney Church and opposite Elm Road;
- Stop 665 on R107 Malahide Road north of Casino Park and adjacent to Clontarf Golf Club;
- Stop 666 on R017 Malahide Road opposite Nazareth House;
- Stop 667 on R017 Malahide Road between Copeland Avenue and Brian Road; and
- Stop 668 on R017 Malahide Road opposite St Aiden's Park Road and immediately north of the R017 Malahide Road / R015 Clontarf Road / R105 Marino Mart signalised junction.

The outbound stops are:

- Stop 1198 on R107 Malahide Road between Mornington Grove and Artane Roundabout;
- Stop 1197 on R107 Malahide Road between St David's Wood and Kilmore Road;
- Stop 1196 on R107 Malahide Road north of Elm Mount Road and opposite Mayfield Park;
- Stop 4382 on R107 Malahide Road north Elm Road and opposite Donnycarney Church;
- Stop 672 on R107 Malahide Road opposite Clancarthy Road;
- Stop 671 on R107 Malahide Road adjacent to Nazareth House;
- Stop 670 on R107 Malahide Road north of R102 Griffith Avenue; and
- Stop 669 on R107 Malahide Road between Crescent Place and Charlemont Road.

Of the 17 bus stops along Section 2 of the Proposed Scheme, the Mornington Grove, Stop 1198; and Donnycarney Church, Stop 1198; are indented whilst all other bus stops are inline along the carriageway.

The majority of bus stops provide timetables, shelter, seats and accessible kerbs. Those without a shelter or seating comprise a pole only. Real time passenger information is also provided at four stops.

The content of Table 5.5 outlines the availability of bus stop facilities at the existing 17 bus stops along Section 2 of the Proposed Scheme.

Table 5.5: Section 2 – Availability of Bus Stop Facilities (of a Total 17no. Bus Stops)

Bus Stop Facility	Number of Bus Stops in Baseline with Facility	Percentage of Bus Stops in Baseline with Facility
RTPI	4	24%
Timetable information	17	100%
Shelter	15	88%
Seating	15	88%
Accessible Kerbs	17	100%
Indented Drop Off Area	2	12%

The existing bus facilities along Section 2 of the Proposed Scheme are illustrated in Figure 6.5b in TIA Appendix 3 (Maps). The bus services which 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
14	Beaumont (Ardlea Rd.) - Fairview - D'Olier Street / Eden Quay - Rathmines - Braemor Rd. - Ballinteer - Dundrum Luas Station	15 minutes	15-20 minutes
15	Clongriffin (Sq.) - Artane Roundabout - Fairview - IFSC - Aungier St. (Bishop St.) - Rathmines - Terenure - Templeogue Bridge - Ballycullen Rd.	10 minutes	15 minutes
27	Clare Hall - Artane Roundabout - Fairview - Eden Quay - Dolphin's Barn Cross - Walkinstown Cross (The Kestrel) -Tallaght (The Square) - Jobstown	10 minutes	10-15 minutes
27a	Eden Quay - Fairview - Donnycarney - Harmonstown Rd. (Ribh Rd.) - Blunden Drive	35 minutes	30-45 minutes
27b	Eden Quay - Fairview - Donnycarney Church - Artane Roundabout - Beaumont Hospital - Harristown	20 minutes	20 minutes
27x	Clare Hall - Artane Roundabout Donnycarney - Fairview - Connolly Rail Station - UCD Belfield	Twice per day	No service
15	Clongriffin (Sq.) - Artane Roundabout - Fairview - IFSC - Aungier St. (Bishop St.) - Rathmines - Terenure - Templeogue Bridge - Ballycullen Rd.	10 minutes	15 minutes
27	Clare Hall - Artane Roundabout - Fairview - Eden Quay - Dolphin's Barn Cross - Walkinstown Cross (The Kestrel) -Tallaght (The Square) - Jobstown	10 minutes	10-15 minutes
42	Talbot St. - Fairview (Footbridge) - Artane Roundabout - Seabury - Malahide - Sand's Hotel (Portmarnock)	30 minutes	30 minutes
43	Talbot St. - Fairview (Footbridge) - Artane Roundabout -Feltrim Rd. - Swords Business Park	15-20 minutes	50 minutes

5.3.3.4 General traffic

5.3.3.4.1 R107 Malahide Road

South of the R808 Gracefield Road, the R107 Malahide Road is a single carriageway with two lanes in each direction, one standard lane and one bus lane until Donnycarney Road. The carriageway is approximately 7.0m wide and becomes wider in the proximity of junctions. The speed limit on this section is 50km/h.

Between Donnycarney Road and the R102 Griffith Avenue, the road is predominantly a dual carriageway with two lanes travelling in each direction, a bus lane and a general traffic lane, separated by a central reservation of approximately 2.5m wide. The carriageway width in the dual carriageway varies between 7.0m and 9.0m each side of the central reservation. The speed limit on this section is 50km/h.

Along Section 2 of the Proposed Scheme from the R102 Griffith Avenue to R105 Clontarf Road, the R107 Malahide Road is single carriageway with one lane traveling northbound and two lanes travelling southbound (one bus lane and one lane for general traffic). The speed limit on this section is 50km/h.

The existing major junction arrangements along Section 2 of the Proposed Scheme are as follows:

- R107 Malahide Road / Kilmore Road three-arm signalised junction;
- R07 Malahide Road / Killester Road / St David's Wood four-arm signalised junction;
- R107 Malahide Road / Elm Mount Road three-arm Signalised junction;
- R107 Malahide Road / R103 Collins Avenue / Collins Avenue East four-arm signalised junction;
- R107 Malahide Road / Elm Road three-arm priority junction;
- R107 Malahide Road / Donnycarney Church Car Park three-arm priority junction;
- R107 Malahide Road / Clancarthy Road three-arm priority junction;
- R107 Malahide Road / Donnycarney Road three-arm priority junction;
- R107 Malahide Road / Casino Park three-arm signalised junction;

- R107 Malahide Road / Nazareth House / Clontarf Golf Club four-arm priority junction;
- R107 Malahide Road / Fire Brigade Training Centre / Mount Temple School Access four-arm priority junction;
- R107 Malahide Road / Copeland Avenue / R102 Griffith Avenue four-arm signalised junction;
- R107 Malahide Road / Brian Road three-arm priority junction;
- R107 Malahide Road / Charlemont Road three-arm priority junction;
- R107 Malahide Road / The Crescent three-arm priority junction; and
- R107 Malahide Road / R105 Clontarf Road / R105 Marino Mart three-arm signalised junction.

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).

R107 Malahide Road / Kilmore Road three-arm signalised junction: Each arm has a two-lane approach and advanced stacking locations for cyclists. The R107 Malahide North arm has a single exit lane and advisory cycle lane and there is a yellow box between this arm and the Malahide Road South arm. There is a peak-period right-turn ban preventing vehicles from turning right from Malahide Road onto Kilmore Road. This is in place between 07:00 and 10:00.

The R107 Malahide Road South arm has a left slip lane of approximately 40.0m long which is controlled by a separate signal head and flashing amber phase and separated from the ahead lanes by a traffic island. This arm provides an advisory cycle lane travelling northbound. This arm has two exit lanes, the left of which is a bus lane from Monday to Saturday between 07:00 – 10:00 and 12:00 – 19:00.

The Kilmore Road arm has an advisory cycle lane approaching the junction and the left and right traffic lanes are designated for left and right turn movements respectively.

These characteristics are illustrated in Image 5.10.

Image 5.10 R107 Malahide Road / Kilmore Road Signalised Junction

R107 Malahide Road / Killester Road / St David's Wood four-arm signalised junction: The R107 Malahide Road North and South arms each provide two lanes approaching the junction, advanced stacking locations for cyclists and two lanes exiting the junction. The left lane on exit onto each arm is a bus lane during the hours of operation.

The Killester Avenue and St David's Wood arms each provide a single entry and exit lane. Killester Avenue is approximately 5.5m wide and St David's Wood is approximately 6m wide. A yellow box at the centre of the junction is provided. The left turn movement from R107 Malahide Road North to Killester Avenue is not permitted between 07:00-10:30, Monday to Saturday. The junction is illustrated in Image 5.11.

Image 5.11: R107 Malahide Road / Killester Road / St David's Wood Signalised Junction

R107 Malahide Road / Elm Mount Road three-arm Signalised Junction: There are two lanes on approach and exit (left lane is a bus lane) from the R107 Malahide Road North and South arms with advanced stacking locations for cyclists.

There are two narrow lanes (approximately 4.0m combined) on the approach from Elm Mount Road and a single exit lane. A yellow box provided at the centre of the section. These characteristics are shown in Image 5.12.

Image 5.12: R107 Malahide Road / Elm Mount Road Signalised Junction

R107 Malahide Road / R103 Collins Avenue four-arm signalised junction: The R107 Malahide Road North arm has one lane for right and ahead movements and another lane for left and ahead movements and provides advanced stopping lines for cyclists. There are two lanes exiting onto this arm, the left of which is a bus lane during the hours of operation.

The R103 Collins Avenue East arm has a single lane for ahead and right turn movements, and a slip lane for vehicles turning left controlled by a separate signal head and separated by a traffic island. A yellow box is also provided after the slip lane. There is a single lane for exiting onto this arm.

The R107 Malahide Road South arm has a four-lane approach; one right-only which is a filter lane of approximately 50.0m long, one left-only and two ahead lanes. Each movement has its own signal and green time. The leftmost ahead lane is dedicated to buses and there is an advisory cycle lane adjacent to the footpath. Advanced stopping lines for cyclists are provided.

The R103 Collins Avenue (West) arm has a two-lane approach, with a right-only and a left and ahead lane. The stop line of the right only lane is provided approximately 11m behind the stop line of the left lane to enable buses and other larger vehicles to clear the left turn onto this arm from the R107 Malahide Road South. There is a single exit lane onto this arm.

A yellow box is provided at the centre of the junction. These characteristics are illustrated in Image 5.13.

Image 5.13: R107 Malahide Road / R013 Collins Avenue / Collins Avenue East Signalised Junction

R107 Malahide Road / Elm Road three-arm priority junction: The R107 Malahide Road has two lanes travelling northbound, a bus lane and general traffic lane, plus an on-road cycle lane at this junction.

The R107 Malahide Road southbound carriageway has three lanes, two bus lanes and one general traffic lane. The northbound and southbound traffic lanes are separated by a central reservation which breaks to allow the right turn movement onto Elm Road. At the right turn into the Elm Road arm there is a storage lane, additional to the three traffic lanes, of approximately 32.5m long. There is a southbound bus stop (Stop 664) opposite the Elm Road arm.

There is a peak-period left-turn ban preventing vehicles from turning left from Malahide Road onto Elm Road. This is in place between 16:00 and 19:00, Monday to Saturday.

The Elm Road arm is approximately 5.0m wide and has no lane / stop line road markings but is two-way and allows movements left and right onto the R107 Malahide Road. There is a raised table across the assumed stop line. In front of the Elm Road arm there is a yellow box across the northbound general traffic lane of the R107 Malahide Road.

These characteristics are illustrated in Image 5.14.

Image 5.14: R017 Malahide Road / Elm Road Priority Junction

R107 Malahide Road / Donnycarney Church Car Park three-arm priority junction: The R017 Malahide Road has two lanes travelling in each direction; a bus lane and one general traffic lane, at this junction. There is a signalised crossing approximately 13.0m north of the Donnycarney Church Car Park arm which features a traffic island between the northbound and southbound traffic lanes.

The Donnycarney Church Car Park arm is approximately 6.0m wide and has one entry and exit lane respectively. The arm into the car park is approximately 10.5m long before opening up to the wider car park area. There is a yellow box in front of the Donnycarney Church Car Park arm across the two general traffic lanes of the R107 Malahide Road.

These characteristics are illustrated in Image 5.15.

Image 5.15: R107 Malahide Road / Donnycarney Church Car Park Priority Junction

R107 Malahide Road / Clancarthy Road three-arm priority junction: The R017 Malahide Road has two lanes travelling in each direction; a bus lane and one general traffic lane, at this junction. There is a northbound bus stop (Stop 672) and indented parking bays opposite the Clancarthy Road arm.

Clancarthy Road is a single lane of approximately 5.5m wide and is one-way travelling eastbound away from the R107 Malahide Road. There is a raised table approximately 16.5m back from the entry into Clancarthy Road. There is a yellow box in front of the Clancarthy Road arm across the northbound general traffic lane of the R107 Malahide Road.

These characteristics are illustrated in Image 5.16.

Image 5.16: R017 Malahide Road / Clancarthy Road Priority Junction

R107 Malahide Road / Donnycarney Road three-arm priority junction: At this junction the R017 Malahide Road has two lanes travelling in each direction; a bus lane and one general traffic lane. Immediately south of the junction, the northbound and southbound lanes of the R107 Malahide Road are separated by a central reservation. There is no central reservation to the north of the junction. There is a signalised crossing approximately 17.0m south of the Donnycarney Road arm.

The Donnycarney Road arm is approximately 6.0m wide and has one entry and exit lane respectively. There is a raised table approximately 20.0m back from the stop line. There is a yellow box in front of the Donnycarney Road arm across the two general traffic lanes of the R107 Malahide Road, and there is a peak-period left-turn ban preventing vehicles from turning left from Malahide Road onto Donnycarney Road between 16:00 and 19:00, Monday to Friday.

These characteristics are illustrated in Image 5.17.

Image 5.17: R107 Malahide Road / Donnycarney Road Priority Junction

R107 Malahide Road / Casino Park three-arm signalised junction: The R107 Malahide Road North and South arms are separated by a central reservation, and provide two entry and exit lanes with the nearside lanes being bus lanes. The R107 Malahide Road North arm also provides a right turn flare lane of approximately 30m in length and the signal timings include a right turn phase.

The Casino Park has a single entry and exit lane. There is an advisory cycle lane travelling in both directions along the R107 Malahide Road which continue through the junction and there is a yellow box in the centre of the junction. These characteristics are illustrated in Image 5.18.

Image 5.18: R107 Malahide Road / Casino Park Signalised Junction

R107 Malahide Road / Nazareth House / Clontarf Golf Club four-arm priority junction: The R107 Malahide Road has two lanes travelling in each direction; a bus lane and a general traffic lane, plus an on-road advisory cycle lane. In addition, the R107 Malahide Road northbound carriageway has a right turn storage lane of approximately 27.0m long. The northbound and southbound lanes are separated by a central reservation which breaks for approximately 14.0m to facilitate movements to and from the minor arms.

The Nazareth House arm is approximately 6.5m wide and has one entry and exit lane respectively. The Clontarf Golf Club arm is approximately 7.0m wide and has one entry and exit lane respectively. Left and right turn movements out of both arms onto the R107 Malahide Road are permitted. There are two yellow boxes in front of the minor arms across the R107 Malahide Road northbound and southbound general traffic lanes respectively.

These characteristics are illustrated in Image 5.19.

Image 5.19: R107 Malahide Road / Nazareth House / Clontarf Golf Club Priority Junction

R107 Malahide Road / Fire Brigade Training Centre / Mount Temple School Access four-arm priority junction: R107 Malahide Road has two lanes travelling in each direction, comprising a bus lane and a general traffic lane, plus an on-road advisory cycle lane. The R107 Malahide Road northbound approach also has a short right-turn storage lane approximately 40.0m long. The northbound and southbound lanes are separated by a

central reservation which breaks for approximately 8.0m to allow northbound traffic to turn right from the storage lane.

The Mount Temple School Access arm is approximately 10.0m wide and has one entry and one exit lane. Only left turns out of the access are permitted. The Fire Brigade Training Centre arm is approximately 15m wide and has one entry and exit lane. A small yellow box is located at the junction in the general traffic lane of the northbound R107 Malahide Road approach to discourage drivers from the Fire Brigade Training Centre blocking the general traffic lane when using the right turn storage lane on the R107 Malahide Road northbound.

These characteristics are illustrated in Image 5.20.

Image 5.20: R107 Malahide Road / Fire Brigade Training Centre / Mount Temple School Access Priority Junction

R107 Malahide Road / Copeland Avenue / R102 Griffith Avenue four-arm signalised junction: The junction provides a three-lane approach and two-lane exit on the R107 Malahide Road North and South arms respectively which are separated by a central reservation.

The R107 Malahide Road North arm has a lane for right, ahead and left turn movements respectively. From Malahide Road South, no right turn onto Copeland Avenue is permitted, therefore, the leftmost lane is for left turn movements at which a filter green phase is provided, the middle lane is a bus lane for ahead movements and the right lane is for ahead movements by general traffic. This arm also provides an advisory cycle lane travelling northbound, and has a staggered signalised pedestrian crossing covering the entry and exit lanes. No pedestrian crossing is provided over the R107 Malahide Road South arm of the junction.

The Copeland Avenue arm has a single lane entry and exit lane of approximately 4.0m wide each. A signalised pedestrian crossing is also provided.

The R102 Griffith Avenue arm has a two-lane approach and wide single lane exit of approximately 7.0m wide, therefore able to accommodate two vehicles side-by-side. A staggered pedestrian crossing is provided covering the entry and exit lanes.

A yellow box is provided between the northern and the eastern arm and advanced stacking locations for cyclists are provided at all arms except the Copeland Avenue arm. These characteristics are illustrated by Image 5.21.

Image 5.21: R107 Malahide Road / Copeland Avenue / R102 Griffith Avenue Signalised Junction

R107 Malahide Road / Brian Road three-arm priority junction: To the south of Brian Road, the R107 Malahide Road has one lane plus an on-road advisory cycle lane travelling northbound and two lanes travelling southbound; a bus lane and a general traffic lane. To the north of Brian Road, the northbound lanes expand to three lane with the nearside lane designated for left turn movements at the R107 Malahide Road / Copeland Avenue / R102 Griffith Avenue signalised junction and the middle lane for buses.

Right turn movements from the R107 Malahide Road into Brian Road are not permitted. There is a signalised pedestrian crossing approximately 20.0m south of Brian Road.

The Brian Road arm is approximately 7.0m wide and there is one lane entering and existing the junction respectively which are separated by a traffic island. There is a raised speed table approximately 8.0m back from the stop line. There is a yellow box in front of the Brian Road arm across the R107 Malahide Road southbound general traffic lane.

These characteristics are illustrated in Image 5.22.

Image 5.22: R107 Malahide Road / Brian Road Priority Junction

R107 Malahide Road / Charlemont Road three-arm priority junction: The R107 Malahide Road has one lane plus an on-road advisory cycle lane travelling northbound and two lanes travelling southbound; a bus lane and a general traffic lane. There is a signalised pedestrian crossing approximately 20.0m north of the Charlemont Road arm.

Charlemont Road is approximately 7.6m wide and has no lane / stop line road markings but permits two-way traffic. There are on-street parking and loading bays on both side of Charlemont Road staring approximately 5.0m back from the assumed stop line. There is a yellow box in front of the Charlemont Road arm across the northbound and southbound general traffic lanes of the R107 Malahide Road.

These characteristics are illustrated in Image 5.23.

Image 5.23: R107 Malahide Road / Charlemont Road Priority Junction

R107 Malahide Road / The Crescent three-arm priority junction: The R107 Malahide Road has one lane plus an on-road advisory cycle lane travelling northbound and three lanes travelling southbound, a bus lane and two general traffic lanes. There is a bus stop (Stop 668) immediately south of The Crescent arm.

The Crescent arm is approximately 8.5m wide and has no lane / stop line road markings. The Crescent splits left and right approximately 10.0m back from the assumed stop line and provides a route to the eastbound R105 Clontarf Road (the left turn from R107 Malahide Road onto the eastbound R105 Marino Road is banned at the downstream junction). There is a yellow box in front of The Crescent arm across the two southbound general traffic lanes of the R107 Malahide Road. These characteristics are illustrated in Image 5.24.

Image 5.24: R107 Malahide Road / The Crescent Priority Junction

R107 Malahide Road / R105 Clontarf Road / R105 Marino Mart three-arm signalised junction: The R107 Malahide Road arm provides three entry lanes which all turn right onto the R105 Marino Mart, the left of which is a bus lane. There is no left turn from R107 Malahide Road onto the eastbound R105 Marino Road. To make this

movement, vehicles have to turn left on Marino Crescent approximately 50m before approaching the junction. The junction between the Marino Crescent and the R105 Clontarf Road is a priority junction, whereby Marino Crescent yields to the R105 Clontarf Road eastbound traffic. Marino Crescent is a one-way road, hence vehicles travelling along the R105 Clontarf Road cannot turn right at the junction.

The R105 Clontarf Road arm provides a three-lane approach (with an advanced stop line) and two-lane exit, including an advisory cycle lane. The leftmost approach lane is for buses, the middle lane is for ahead movements and the right lane is for ahead and right turn movements. The approach and exit lanes are separated by a white hatching of approximately 1m wide.

The R105 Marino Mart arm has three entry and exit lanes respectively. The leftmost approach lane is for left turn movements and the other two lanes are for ahead movements. There is also an advisory cycle lane between the left turn and ahead lanes. On exit onto this arm, the leftmost lane is for buses (operating Monday to Friday between 07:00 and 19:00, and Saturday between 07:00 and 10:00).

Two yellow boxes are provided at the centre of the junction between the R105 Clontarf Road, R107 Malahide Road approach lanes and R105 Marino Mart exit lanes. These characteristics are illustrated in Image 5.25.

Image 5.25: R107 Malahide Road / R105 Clontarf Road / R105 Marino Mart Signalised Junction

5.3.3.4.2 Brian Road / Carleton Road / Haverty Road

Brian Road, Carleton Road and Haverty Road are residential roads that run parallel to the west of the R107 Malahide Road between the R102 Griffith Avenue and the R105 Marino Mart. Carleton Road and Haverty Road connect to the R107 Malahide Road via St Aidan's Park Road, and Haverty Road connects to the R105 Marino Mart via Marino Mart (residential street).

Brian Road, Carleton Road and Haverty Road are single-carriageway streets in each direction and are within a 30km/h 'slow zone'. In addition, there are speed cushions at regular intervals to slow traffic.

There are no parking restrictions and unrestricted parking is allowed on both sides of these residential streets, although the majority of residential properties on Brian Road, Carleton Road and Haverty Road have private off-street parking in driveways.

5.3.3.5 Existing Parking / Loading

The existing conditions for parking and loading for this Section 2 of the Proposed Scheme are as follows:

- 15 informal parking spaces alongside the southbound carriageway of R107 Malahide Road, between R808 Gracefield Road and Danieli Road;

- Seven informal parking spaces and one disabled space alongside the northbound carriageway of R107 Malahide Road immediately to the south of Mornington Grove, which are associated with the parade of local shops;
- Six informal parking spaces alongside the northbound carriageway of the R107 Malahide Road immediately north of Kilmore Road, which are associated with the shops and business premises located there. It is also noted that approximately eight vehicles tend to park on the footway opposite Kilmore Road, adjacent to the row of private properties.
- 11 informal parking spaces alongside the northbound carriageway of the R107 Malahide Road between Donnycarney Road and Casino Park, associated with the row of commercial premises; and
- 14 pay and display parking spaces alongside the southbound carriageway of the R107 Malahide Road between Crescent Place and Marino Crescent, associated with the row of commercial properties. These spaces are controlled between 10:00 – 19:00, Monday to Saturday.

Informal residential on-street parking occurs along Brian Road, Carleton Road, Haverty Road and Marino Park Avenue.

6. Potential Impacts

6.1.1 Characteristics of the Proposed Scheme

The Proposed Scheme is routed along the R107 Malahide Road from Mayne River Avenue – R107 Malahide Road junction to the junction with Marino Mart - Fairview and also routed for cyclists via the junction with Malahide Road-Brian Road along Carleton Road, St Aidans Park, Haverty Road and Marglann Marino, all in the County of Dublin.

The Proposed Scheme includes an upgrade of the existing bus priority and cycle facilities associated with the Malahide Road Quality Bus Corridor (QBC), which has been in place since 1999. The Proposed Scheme includes a substantial increase in the level of bus priority provided along the Malahide QBC, including the provision of additional lengths of bus lane, particularly in the outbound direction.

Throughout the Proposed Scheme 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. Where space for a segregated cycle track is not available on the main corridor an alternative cycle route via quiet roads is proposed. Throughout the Proposed Scheme pedestrian facilities will be upgraded and additional signalised crossings provided.

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 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.

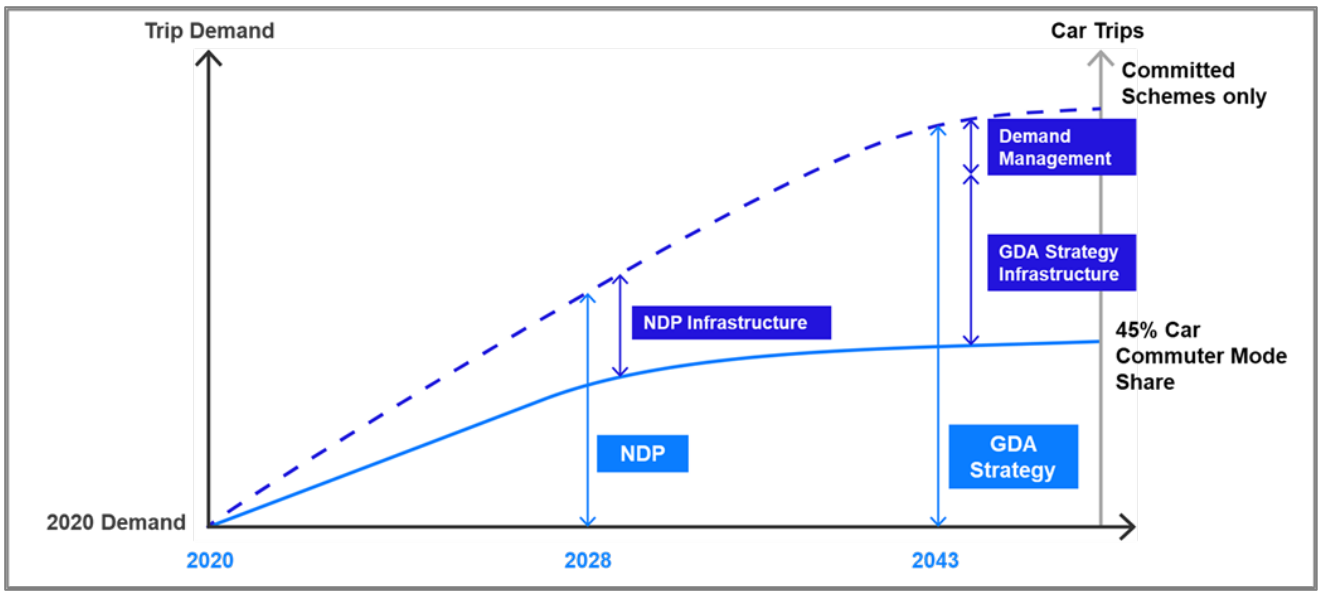

Diagram 6.1: Trip Demand Growth and the GDA Strategy

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.

6.1.5 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) of the EIAR 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 a proposed Construction Compound, 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) of the EIAR.

A Construction Environmental Management Plan (CEMP) has been prepared and is included as Appendix A5.1 in Volume 4 of the EIAR. The CEMP which will be updated and finalised by the appointed contractor prior to construction commencing. The CEMP comprises the construction mitigation measures, which are set out in this EIAR, and will be updated with any additional measures which may be required by the conditions attached to An Bord Pleanála's decision. Implementation of the CEMP will ensure disruption and nuisance are kept to a minimum during the Construction Phase. 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 TIA.

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.

6.1.5.1 Description of Construction Works

The Proposed Scheme has been divided into two principal sections. The division line between sections has been determined by grouping similar carriageway types together. These sections have been further subdivided into 13 sub-sections, according to the types of construction works required. The sections / sub-sections are the following (as shown in Diagram 6.2):

- Section 1: Mayne River Avenue to Gracefield Road – Malahide Road;
  - **Section 1a:** R107 Malahide Road – Mayne River Avenue Junction;
  - **Section 1b:** R107 Malahide Road – R139 Clarehall Avenue / R107 Malahide Road Junction;
  - **Section 1c:** R107 Malahide Road – R139 Clarehall Avenue Junction to Blunden Drive / Priorswood Road;
  - **Section 1d:** Blunden Drive / Priorswood Road / R107 Malahide Road Junction;
  - **Section 1e:** R107 Malahide Road – Blunden Drive / Priorswood Road to Santry River;
  - **Section 1f:** R107 Malahide Road – Santry River to Ardlea Road / R808 Gracefield Road;
  - **Section 1g:** Ardlea Road / R808 Gracefield Road / R107 Malahide Road Junction;
- Section 2: Gracefield Road to Marino Mart / Fairview – Malahide Road;
  - **Section 2a:** R107 Malahide Road – Ardlea Road / R808 Gracefield Road to Killester Avenue;
  - **Section 2b:** R107 Malahide Road – Killester Avenue to Collins Avenue;
  - **Section 2c:** R107 Malahide Road – R103 Collins Avenue Junction;
  - **Section 2d:** R107 Malahide Road – R103 Collins Avenue to Clancarthy Road;
  - **Section 2e:** R107 Malahide Road – Clancarthy Road to Marino Avenue; and
  - **Section 2f:** R107 Malahide Road – Marino Avenue to R105 Marino Mart / Clontarf Road.

Diagram 6.2: Proposed Subsections of Construction Phase

6.1.5.2 Construction Programme

An indicative programme for the Proposed Scheme is provided in Chapter 5 (Construction) 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.

6.1.5.3 Construction Route

The location for a Construction Compound is identified on lands south west of the R107 Malahide Road / R139 junction (as shown in Diagram 6.6). The appointed contractor's CTMP shall include measures for managing traffic in and out of the compound. Access to and egress from the Construction Compound will be permitted via dedicated Construction Access Routes and will utilise a temporary access point directly from Priorswood Road, immediately west of the junction with the R107 Malahide Road. The Contractor may identify other (or additional) Construction Compound locations, subject to gaining all necessary approvals. In addition to the Construction Compound, welfare facilities will be provided along the Proposed Scheme.

The haulage of material on site is anticipated to be minimal. There will however be the removal of excavated material and the delivery of construction materials to site. It is anticipated that the exporting and delivery of materials will be executed as efficiently as possible using dedicated Construction Access Routes. Construction vehicles will be directed to access work sections via the Proposed Scheme and dedicated routes on the National and Regional Road Network where practicable, to minimise use of the local road network. The following National

and Regional roads are envisaged to form dedicated Construction Access Routes for construction vehicles to travel to and from the construction works (as shown in Diagram 6.3):

- M1 / N1 and M50 Motorway;
- R139 Northern Cross Extension / Clarehall Avenue;
- R104 Oscar Traynor Road / Brookville Crescent; and
- R107 Malahide Road.

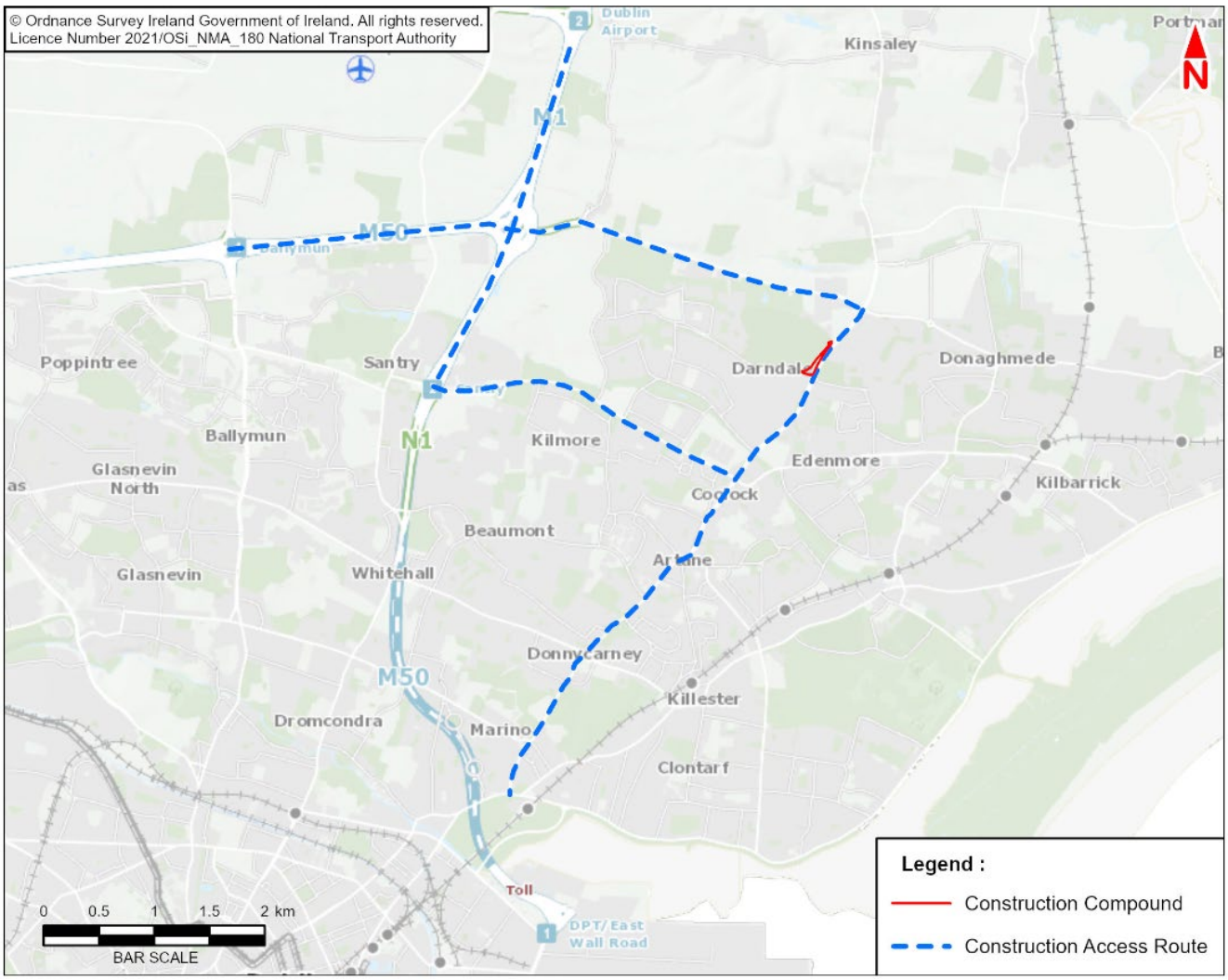

Diagram 6.3: Proposed Construction Routes and Compound Location

6.1.5.4 Potential Construction Impact

6.1.5.4.1 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) of the EIAR and the CEMP (Appendix A5.1 in Volume 4 of the 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 public roads, all works will be undertaken in accordance with DTTS's 'Traffic Signs Manual, Chapter 8 Temporary Traffic Measures and Signs for Roadworks' and associated guidance. Chapter 5 (Construction) of the EIAR 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.

6.1.5.4.2 Pedestrian Provisions

As described in Chapter 5 (Construction) of the EIAR, 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, provisions for matching 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.

6.1.5.4.3 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.

6.1.5.4.4 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 the 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. It is also likely that some existing bus stop locations may need to be temporarily relocated to accommodate the works. In such cases operational bus stops will be safely accessible to all users.

6.1.5.4.5 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.

6.1.5.4.6 General Traffic

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 illustrative temporary traffic management measures to facilitate construction of the Proposed Scheme are included in Chapter 5 (Construction) of the EIAR. 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.

6.1.5.4.6.1 General Traffic Redistribution

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. 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 **Negative, Moderate and Short Term** due to the temporary nature of any restrictions.

For the purpose of Air Quality (Chapter 7), Climate (Chapter 8) and Noise & Vibration (Chapter 9) impacts assessments, a worst-case scenario for construction activities was considered for assessment purposes and has been modelled in the LAM based on a notional stage of construction whereby Sections 1b, 1d, 1g, 2c and 2f were under construction concurrently. Further details on the impacts assessment can be found within these chapters.

6.1.5.4.6.2 Construction Traffic Generation

Site Operatives: It is expected that there will be 70 to 80 staff directly employed across the Proposed Scheme, rising to 100 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 Compound 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; and
- Removal of construction waste material.

Chapter 5 (Construction) 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 17 HGV trips are estimated to access / egress the construction works during the AM and PM Peak Hours.

Overall Peak Hour Impacts: The contents of Table 6.1 outline the anticipated maximum construction traffic generation by site operatives and HGVs during the AM and PM Peak Hours.

Table 6.1: Anticipated Maximum Construction Traffic Generation during Construction Phase

Peak Hour	Arrivals		Departures		Total Two-Way Traffic Flows (Vehicles)	Total Two-Way Traffic Flows (PCUs)
	Car / Van (1 PCU)	HGV (2.3 PCUs)	Car / Van (1 PCU)	HGV (2.3 PCUs)		
AM Peak Hour	10	17	0	17	44	88
PM Peak Hour	0	17	10	17	44	88

Given that the above impacts are minimal and comfortably below the thresholds set out in TII's Guidelines for Transport Assessments, it is considered appropriate to define the general traffic impacts of the Construction Phase to have a **Slight Negative and Short-term impact**. Therefore, no further analysis is required for the purpose of this assessment.

It should be noted that further detail on the restrictions to construction vehicle movements during the peak periods of the day will be contained within the appointed contractor's CTMP prior to construction.

6.1.5.5 Construction Phase Summary

The contents of Table 6.2 present a summary of the potential impacts of the Proposed Scheme during Construction Phase.

Table 6.2: Summary of Construction Phase Potential Impacts

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

6.2 Operational Phase

6.2.1 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.

6.2.2 Qualitative Assessment

6.2.2.1 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 two 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.

6.2.2.1.1 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 6.3 outlines the assessment criteria for each junction.

Table 6.3: 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 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 6.4 displays the LoS rating based on the number of indicators met.

Table 6.4: 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 6.5 have been used to describe the potential impact, based on the changes in the Qualitative Pedestrian LoS rating.

Table 6.5: 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

6.2.2.1.2 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 6.6 outlines the assessment criteria with reference to the corresponding LoS ratings.

Table 6.6: 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) available up to the junction but don't 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 6.7 have been used to describe the potential impact, based on the changes in the Qualitative Cycling LoS rating.

Table 6.7: Description of Impact for Cycling Qualitative Assessment

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

6.2.2.1.3 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; 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 6.8.

Table 6.8: 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.
High negative	Complete removal of provision.

6.2.2.1.4 Parking and Loading

The 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 (baseline environment) and Do Something scenarios. The assessment has taken the parking information and 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 account of adjacent parking on side streets 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.

6.2.2.1.5 Section 1 – Mayne River Avenue to Gracefield Road – Malahide Road

6.2.2.1.5.1 Pedestrian Infrastructure

The key infrastructural changes to the pedestrian link along Section 1 of the Proposed Scheme are the following:

- Footpaths with a minimum running width of 2.0m;
- Proposed speed limit reduction from 60km/h to 50km/h between Clarehall Avenue and the R105 Clontarf Road;
- Provision of a new direct signalised Toucan crossing on the R107 Malahide Road to the south of the access to Malahide Road Retail Centre, and a new pedestrian access to Ayrefield Drive;
- Upgrade of the existing signalised crossings across R107 Malahide Road at St Brendan's Drive and St Brendan's Park from pelican to Toucan crossings; and
- Provision of a new staggered Toucan signalised crossing on the R107 Malahide Road to the south of Mask Avenue.

The assessment of the qualitative impacts on the pedestrian facilities at the junctions along Section 1 of the Proposed Scheme are summarised in Table 6.9. 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 6.9: Section 1 – Significance of Effects for Pedestrian Impact during Operational Phase

Junctions	Chainage	Do Minimum LoS	Do Something LoS	Impact
R107 Malahide Road / R139 Clarehall Avenue / R139 Northern Cross Route Extension signalised junction	A3200	D	B	Medium Positive
R107 Malahide Road / Clarehall Shopping Centre Access signalised junction	A3500	C	B	Low Positive
R107 Malahide Road / Belcamp Lane priority junction	A3625	C	B	Low Positive
R107 Malahide Road / Grove Lane priority junction	A3750	C	B	Low Positive

Junctions	Chainage	Do Minimum LoS	Do Something LoS	Impact
R107 Malahide Road / Blunden Drive / Priorswood Road (roundabout to signalised junction)	A3975	E	B	Medium Positive
R107 Malahide Road / Newtown Road priority junction	A4100	C	B	Low Positive
R107 Malahide Road / Retail Park Access priority junction	A4350	E	B	Medium Positive
R107 Malahide Road / Newtown Cottages priority junction	A4550	C	B	Low Positive
R107 Malahide Road / Crown Paints and Decorating Centre Access / Retail Park Emergency Access priority junction	A4700	D	B	Medium Positive
R107 Malahide Road / Greencastle Road signalised junction	A4875	D	B	Medium Positive
R107 Malahide Road / R104 Brookville Crescent / R104 Tonlegee Road signalised junction	A5150	D	B	Medium Positive
R107 Malahide Road / Main Street priority junction	A5550	E	B	Medium Positive
R107 Malahide Road / St Brendan's Drive priority junction	A5550	E	B	Medium Positive
R107 Malahide Road / R808 Gracefield Road / Ardlea Road roundabout to signalised junction	A6050	D	B	Medium Positive
Section Summary		**D**	**B**	**Medium Positive**

The contents of Table 6.9 demonstrate that the Proposed Scheme will have a positive impact on the quality of the pedestrian infrastructure along the R107 Malahide Road between Mayne River Avenue and the R808 Gracefield Road during the Operational Phase.

The LoS during the Do Minimum scenario ranges between C and E, with nine of the 14 impacted junctions along this section given the low D / E ratings. These ratings have been determined using the previously referenced assessment criteria set out in Table 6.3. The LoS will improve to a B rating at all impacted junctions in the Do Something scenario which will provide a balance between enhanced facilities for pedestrians alongside improvements for cyclists and bus users along this section. This is as a result of the proposed improvements to the existing pedestrian facilities in the form of additional crossing locations, increased pedestrian directness, provision of traffic calming measures to reduce vehicle speeds, improved accessibility and increased footpath and crossing widths. All proposed facilities have been designed in accordance with the principles of DMURS and the National Disability Authority (NDA) 'Building for Everyone: A Universal Design Approach' (NDA 2020) with regards to catering for all users, including those with disabilities.

Overall, it is anticipated that there will be **Medium Positive** impact to the quality of the pedestrian infrastructure along Section 1 of the Proposed Scheme during the Operational Phase which aligns with the overarching aim to provide enhanced walking infrastructure on the corridor.

6.2.2.1.5.2 Cycling Infrastructure

The following section sets out the qualitative impacts on the cycling receptor for Section 1 of the Proposed Scheme. The results are summarised in Table 6.10, along with the accompanying sensitivity for each section and the resultant significance of impact.

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

- Provision of continuous cycle infrastructure in both directions between Mayne River Avenue and the St Brendan's Park in the form of a 2.0m wide cycle tracks in both directions which bypass bus stop islands and continuous cycle lanes through signalised junctions with two stage right-turn movements;
- Upgrade of the existing signalised crossings on R107 Malahide Road, to the east of Belcamp Lane, from pelican to Toucan crossings;
- Upgrade of the existing signalised crossings on R107 Malahide Road at St Brendan's Drive and St Brendan's Park from pelican to Toucan crossings;
- Provision of a new staggered Toucan signalised crossing on the R107 Malahide Road to the south of Mask Avenue;
- Provision of a new, two-way cycle track between R107 Malahide Road and Ayrefield Drive.
- Addition of cycle tracks on the approach to signalised junctions at Clarehall Avenue, Blunden Drive, Priorswood Road, Greencastle Road, Tonlegee Road, Brookville Crescent, Gracefield Road and Ardlea Road;
- To the south of St Brendan's Park, cyclists travelling southbound will be diverted onto an alternative quietly trafficked route along St Brendan's Avenue (permitting vehicles, but with new demand management measures to limit traffic flows and speeds) which meets the R808 Gracefield Road. Cyclists travelling northbound will continue along a 2.0m wide cycle track which bypasses bus stop islands and on-street parking bays; and
- Provision of upgraded cycling facilities at signalised junctions to provide continuous cycle lanes through major signalised junctions with early green light starts for cyclists, with hard island segregation for left-turn movements and right-turn movements made in two stages.

Along Section 1, the Proposed Scheme will provide a 60mm set down kerb segregation between the footpath and the cycle track. This is of particular importance in the context of providing for pedestrians with visual impairments, whereby the use of white line segregation (as is the case in some areas of the baseline environment) is not as effective for establishing a clear understanding of the change of pavement use and potential for cyclist / pedestrian interactions. The cycle tracks will also be raised 120mm from the carriageway to provide segregation from vehicles.

The contents of Table 6.10 outline 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 description of impact. Please refer to TIA Appendix 4.2 (Cycling Infrastructure Assessment) which outlines in further detail the methodology behind each LoS rating given to the Do Minimum and Do Something scenarios.

Table 6.10: Section 1 – Cycling Impact during Operational Phase

Locations	Chainage	Do Minimum LoS	Do Something LoS	Impact
Mayne River Avenue to R139 Clarehall Avenue	A3050 - A3250	C	A	Medium
R139 Clarehall Avenue to St Brendan's Park	A3250 - A5300	C	A	Medium
St Brendan's Park to R808 Gracefield Road	A5300 - A6050	C	A	Medium
Section Summary		**C**	**A**	**Medium Positive**

The contents of Table 6.10 demonstrate that the Proposed Scheme will have a positive impact on the cycling environment along the R107 Malahide Road between Mayne River Avenue and the R808 Gracefield Road.

The LoS rating of the cycling facilities will improve from C in the Do Minimum to A in the Do Something along the entirety of Section 1 of the Proposed Scheme. This is as a result of improved segregation for cyclists and junction

treatment in the form of cycle lanes traversing priority junctions and continuing through signalised junctions with protected treatment as part of the Proposed Scheme.

Overall, it is anticipated that there will be **Medium Positive** impact to the quality of the cycling infrastructure along Section 2 of the Proposed Scheme, during the Operational Phase.

The findings of the cycling assessment fully aligns with the objective of the CBC Infrastructure Works, applicable to the Traffic and Transport assessment of the Proposed Scheme, to 'Enhance the potential for cycling by providing safe infrastructure for cycling, segregated from general traffic wherever practicable'.

6.2.2.1.5.3 Bus Infrastructure

This section provides an assessment of the changes in the quality of bus stop infrastructure provision as a result of the Proposed Scheme along the R107 Malahide Road, between Mayne River Avenue and the R808 Gracefield Road, including upgrades and any relocations. Any relocations of bus stops which need to be carried through to the EIAR for significance assessment are identified.

There are currently 16 bus stops along Section 1 of the Proposed Scheme. Table 6.11 presents a summary of the changes in the number and location of bus stops along Section 1 of the Proposed Scheme.

Table 6.11: Section 1 – Overview of Amendments to Bus Stop Locations

Direction	Stop	Chainage	Do Something	Comment
Inbound	4563	A3375	Retained	Length of the Bus Stop to be reduced to approximately 20m (Standard Stop)
Inbound	1218	A3675	Retained	N/A
Inbound	1270	A4025	Relocated	Existing stop moved approximately 60m north, nearer to the R107 Malahide Road / Priorswood Road / Blunden Drive signalised junction.
Inbound	-	A4450	New	New stop located approximately 105m south of the Malahide Road Retail Centre access. Stop proposed to serve the surrounding residential catchment and located adjacent to a new signalised crossing.
Inbound	1272	A4600	Relocated	Existing stop to be relocated approximately 190m south. Proposed new location is approximately 60m north of Greencastle Road to better serve the Coolock Retail Centre and is located adjacent to signalised crossings at the junction.
Inbound	1201	A4925	Removed	Existing stop proposed to be removed given the proximity of the new stop at Chainage A4800.
Inbound	1274	A5225	Retained	N/A
Inbound	-	A5475	New	New stop located approximately 40m north of St Brendan's Drive and near pedestrian crossing. Stop proposed to serve the surrounding residential catchment.
Inbound	1199	A5675	Removed	Existing stop to be removed due to the proximity of the new St Brendan's Drive stop and also the existing Stop 1276 (which is proposed to be relocated closer to Mask Avenue).
Inbound	1276	A5825	Relocated	Moved approximately 25m closer to Mask Avenue to Chainage A5800.
Outbound	1205	A3425	Relocated	Existing stop to be relocated approximately 125m to the south to Chainage A3550, between the Clarehall Retail Park access and Belcamp Lane.
Outbound	6115	A3650	Removed	Existing stop to be removed as stop is located between nearby the new Blunden Drive stop and Clarehall, Stop 1205. The rationalisation of this bus stop will assist to improve bus journey times at this location.
Outbound	-	A3925	New	Located approximately 30m north of Priorswood Road. Stop proposed to better serve the residential catchment and is located adjacent to signalised crossings at the junction.
Outbound	1203	A4075	Removed	Existing stop to be removed as a new stop is proposed north of the Blunden Road junction. The rationalisation of this stop will assist to improve journey times along the corridor at this location.
Outbound	-	A4375	New	Located approximately 15m south of retail park access to better serve the retail park and located adjacent to a new signalised crossing.

Direction	Stop	Chainage	Do Something	Comment
Outbound	1202	A4725	Relocated	Existing stop to be relocated approximately 90m south to Chainage A4925, to be adjacent to Greencastle Road and nearer to signalised pedestrian crossings.
Outbound	1201	A4975	Relocated	Proposed stop relocated approximately 125m south, to north of Brookville Crescent at Chainage A5100. Aim to better serve the community and adjacent to signalised crossings.
Outbound	4385	A5300	Removed	Removed due to proximity to new stop at Chainage A5100 to the north and existing Stop 1200 to the south.
Outbound	1200	A5525	Retained	Existing stop serving the college and the surrounding catchment is proposed to be retained.
Outbound	1199	A5775	Retained	N/A

Under the proposals, there will be a total of 15 bus stops along Section 1 of the Proposed Scheme – eight inbound and seven outbound, with one fewer outbound stop than at present. The layout of new bus stops is considered to better serve the existing and future catchment, and be closer to existing and new pedestrian crossing facilities for improved convenience.

Table 6.12 provides a summary of the improvements to the bus stop infrastructure along Section 1 of the Proposed Scheme, with reference to the number and percentage of bus stops that provide each facility in the Do Minimum and Do Something scenarios.

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	19%	15	100%	It is proposed that all bus stops provide real-time information.
Timetable information	13	81%	15	100%	It is proposed that all bus stops provide timetable information. This is added to inbound Stop 1218 (and outbound Stop 6115 is removed).
Shelter	15	94%	15	100%	It is proposed that all bus stops along this section is to be provided with shelter. This is added to inbound Stop 1218.
Seating	15	94%	15	100%	It is proposed that all bus stops along this section is to be provided with seating. This is added to inbound Stop 1218.
Accessible Kerbs	16	100%	15	100%	No change from Do Minimum.
Indented Drop Off Area	6	38%	0	0%	All proposed bus stops are within bus lanes and hence does not impact the flow of general traffic.
Total Stops	**16**		**15**		One fewer outbound stop that the Do Minimum.

Table 6.12 indicates that there are significant improvements to the bus stop facilities along Section 1 of the Proposed Scheme.

It is proposed that all bus stops will be provided inline within dedicated bus lanes along the entirely of the corridor, meaning that buses will not incur delay when setting off after picking up passengers. Improvements in the provision of real-time information, shelters, seating and accessible kerbs at the bus stops throughout Section 1 of the Proposed Scheme are assessed as providing an overall positive impact for bus passengers. All proposed facilities have been designed in accordance with BusConnects Preliminary Design Guidance which has been developed with cognisance to the relevant accessibility guidance.

6.2.2.1.5.4 Parking and Loading

The proposals will impact on existing parking along Section 1 of the Proposed Scheme and the main changes are as follows:

- The removal of the 23 informal, general residential parking spaces along the R107 Malahide Road, between Greencastle Road and the R104 Tonlegee Road to provide a 2.0m wide footpath alongside a more formalised cycle lane, bus lane and general traffic lane arrangement. In substitution, nine marked bays will be provided along Brookville Park, accessible from the R107 Malahide Road via the R104 Brookville Crescent. The residential properties adjacent to these lost spaces have off-street parking within driveways as well as informal kerb-side parking along Brookville Park. Furthermore, there are approximately 83 parking spaces along the side streets of Brookville Crescent and Brookville Park within 50m of the lost parking, and further spaces available along Dunree Park on the opposite side of R107 Malahide Road;
- The reduction from 22 to 11 informal general residential parking spaces on the western side of the R107 Malahide Road, between the R104 Tonlegee Road and St Brendan's Drive to widen the footpath, formalise the cycle lanes and therefore provide improvements for pedestrians and cyclists. The five taxi bays currently provided will be retained. There are over 50 other equivalent parking spaces within 100m of this location such as; along Ross Place running parallel to the R107 Malahide Road at this location, along St Brendan's Avenue and St Brendan's Park on the opposite side of the R107 Malahide Road (pelican crossing provided), Main Street;
- The removal of 10, general residential parking spaces along the eastern side of the R107 Malahide Road, between the R104 Tonlegee Road and St Brendan's Avenue which are proposed to be removed to widen the footpath and provide a cycle track which bypasses the bus stop island (Stop 1274). The residential properties adjacent to these lost spaces have off-street parking within driveways as well as informal kerb-side parking along St Brendan's Avenue. Furthermore, there are over 50 other informal parking spaces available within 100m of this location such as; along St Brendan's Avenue, St Brendan's Park; and
- It is proposed that an additional seven informal parking spaces are provided along Brookville Park, near Chanel Road between Main Street and Mask Avenue, to increase the total to 23, by slightly reducing the carriageway width to formalise car parking along Brookville Crescent.

The contents of Table 6.13 present a summary of the proposed changes to parking along Section 1 of the Proposed Scheme.

Table 6.13: Section 1 – Overall Changes in Parking / Loading Spaces

Location	Parking Type	Do Minimum	Do Something	Change
R107 Malahide Road (western side); Between Greencastle Road and R104 Tonlegee Road	Informal Parking: general residential	23	0	-23
Brookville Park; Between Greencastle Road and R104 Tonlegee Road	Informal Parking: general residential (marked bays)	0	9	+9
R107 Malahide Road (western side); between R104 Tonlegee Road and St Brendan's Drive	Informal Parking: general residential	22	11	-11
	Taxi Bays	5	5	0
R107 Malahide Road (eastern side); between R104 Tonlegee Road and St Brendan's Avenue	Informal Parking: general residential	10	0	-10
Brookville Park (at Chanel Road); Between Main Street and Mask Avenue	Informal Parking: general residential	17	23	6
Total		**77**	**48**	**-29**

As shown in Table 6.13, there are approximately 77 current parking spaces affected within the area of the Section 1 of the Proposed Scheme. Under the proposals, 29 parking spaces will be lost, all of which are informal general residential parking spaces. This change is considered to have a Negligible impact due to the low numbers of

spaces lost and the presence of a large number of similar types of spaces within proximity to the affected locations and that no disabled bays will be lost.

6.2.2.1.6 Section 2 – Gracefield Road to Marino Mart / Fairview – Malahide Road

6.2.2.1.6.1 Pedestrian Infrastructure

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

- Footpaths with a minimum running width of 2.0m, with the exception of a short section between Brian Road and the R105 Clontarf Road where the width varies between 1.8m – 2.0m;
- Provision of a new direct signalised Toucan crossing along R107 Malahide Road between Mornington Grove and Danieli Road;
- Provision of raised table crossings at entrance and exit to a small collection of retail units south of Danieli Road;
- Provision of an upgraded signalised crossing along R107 Malahide Road immediately south of Elm Road from a staggered two stage crossing to a direct crossing;
- Provision of an upgraded signalised crossing along R107 Malahide Road immediately south of Donnycarney Road from a staggered two-stage crossing to a direct crossing;
- Upgrade of the existing staggered signalised crossing across R107 Malahide Road at Mount Temple House / Nazareth School to a direct Toucan crossing; and
- Relocating the signalised crossing at Brian Road from the current position immediately south of the junction to immediately north of the junction to better serve the local community.

The assessment of the qualitative impacts on the pedestrian facilities at the junctions along Section 2 of the Proposed Scheme are summarised in Table 6.14. 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 6.14: Section 2 – Significance of Effects for Pedestrian Impact during Operational Phase

Junctions	Chainage	Do Minimum LoS	Do Something LoS	Impact
R107 Malahide Road / Mornington Grove Priority Junction	A6200	D	B	Medium Positive
R107 Malahide Road / Danieli Road Priority Junction	A6300	D	B	Medium Positive
R107 Malahide Road / Local Shops Car Park Access Priority Junction	A6375	D	C	Low Positive
R107 Malahide Road / Local Shops Car Park Egress Priority Junction	A6375	D	C	Low Positive
R107 Malahide Road / Mornington Business Park Car Park Access Priority Junction	A6475	D	C	Low Positive
R107 Malahide Road / Kilmore Road Signalised Junction	A6525	C	B	Low Positive
R107 Malahide Road / St David's Wood / Killester Avenue Signalised Junction	A6775	C	A	Medium Positive
R107 Malahide Road / Elm Mount Road Signalised Junction	A6975	D	A	Medium Positive
R107 Malahide Road / R103 Collins Avenue / R103 Collins Avenue East Signalised Junction	A7275	D	B	Medium Positive

Junctions	Chainage	Do Minimum LoS	Do Something LoS	Impact
R107 Malahide Road / St John's Court Priority Junction	A7475	D	B	Medium Positive
R107 Malahide Road / Clancarthy Road Priority Junction	A7550	D	B	Medium Positive
R107 Malahide Road / Donnycarney Road Priority Junction	A7600	D	B	Medium Positive
R107 Malahide Road / Casino Park Signalised Junction	A7750	D	A	Medium Positive
R107 Malahide Road / Golf Club Access / Nazareth House Access Priority Junction	A7825	D	B	Medium Positive
R107 Malahide Road / Mount Temple Comprehensive School / Dublin Fire Brigade Access Signalised Junction	A8025	C	A	Medium Positive
R107 Malahide Road / R102 Griffith Avenue / Copeland Avenue Signalised Junction	A8225	D	C	Low Positive
R107 Malahide Road / Marino Avenue Priority Junction	A8325	D	B	Medium Positive
R107 Malahide Road / Charlemont Road Priority Junction	A8375	D	B	Medium Positive
R107 Malahide Road / Marino Crescent Priority Junction	A8675	C	B	Low Positive
R107 Malahide Road / St Aidan's Park Road Priority Junction	A8700	D	A	Medium Positive
R107 Malahide Road / R105 Clontarf Road Signalised Junction	A8725	C	B	Low Positive
Section Summary		D	B	**Medium Positive**

Table 6.14 demonstrates that the Proposed Scheme will have a positive impact on the quality of the pedestrian infrastructure along the R107 Malahide Road between the R808 Gracefield Road and R105 Clontarf Road.

The LoS during the Do Minimum scenario ranges from C to D, with 16 of the 21 impacted junctions along this section given the low D rating. These ratings have been determined using the previously referenced assessment criteria set out in Table 6.3. The LoS will improve to an A rating at 5 of the impacted junctions and a B at 12 junctions and a C at 4 junctions in the Do Something scenario. This is as a result of the proposed improvements to the existing pedestrian facilities in the form of additional crossing locations, increased pedestrian directness, provision of traffic calming measures to reduce vehicle speeds, improved accessibility and increased footpath and crossing widths. All proposed facilities have been designed in accordance with the principles of DMURS and the Building for Everyone: A Universal Design Approach (NDA 2020) with regards to catering for all users, including those with disabilities.

Overall, it is anticipated that there will be **Medium Positive** impact to the quality of the pedestrian infrastructure 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.

6.2.2.1.6.2 Cycling Infrastructure

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

- Provision of 2.0m wide cycle tracks in both directions between the R808 Gracefield Road and Kilmore Road;

- Addition of cycle tracks on the approach to signalised junctions at Kilmore Road, Collins Avenue, Casino Park, Copeland Avenue and Griffith Avenue;
- Provision of a new Toucan crossing across R10 Malahide Road between Mornington Grove and Danieli Road;
- Cycle lanes continue through R107 Malahide Road / Kilmore Road junction with hard island segregation for left-run movements and right-turn movements will be made in two stages;
- Provision of a 2.0m cycle tracks southbound between Kilmore Road and St David's Wood. Advanced stop lines on all arms and continuous cycle lanes through the junction;
- Provision of 2.0m wide cycle tracks in both directions between St David's Wood and the R102 Griffith Avenue which bypass bus stop islands and on-street parking bays;
- Continuous cycle lanes through R107 Malahide Road / R103 Collins Avenue East / R103 Collins Avenue junction with hard island segregation for left-turn movements and right-turn movements will be made in two stages (referred to as 'Box Turns' within the National Cycle Manual) allowing cyclists to stay within the cycle lanes at all times when navigating this large junction;
- Provision of a new Toucan crossing across R107 Malahide Road at Mount Temple School / Nazareth House;
- Southbound cycle lanes cross the R107 Malahide Road / Copeland Avenue / R102 Griffith Avenue signalised junction diagonally to join a bidirectional cycle track on the northbound side of the carriageway;
- It is proposed that cycle facilities turn off the R107 Malahide Road onto at Brian Road followed by Carleton Road to continue as an alternative quiet route along lightly trafficked roads. This alternative route follows Brian Road onto Carleton Road and St Aiden's Park to re-join the R107 Malahide Road. Vehicles will still be permitted to use these roads; and
- Provision of a further link from St Aiden's Park onto Haverty Road and Marino Park Avenue to meet the R105 Marino Mart will be an alternative, quieter route for cyclists that using the R107 Malahide Road. The northern end of Haverty Road will be closed to vehicles (removing through traffic), meaning that Haverty Road and Marino Park Avenue will have less traffic than at present, and therefore be more attractive to cyclists.

Along Section 2, the Proposed Scheme will provide a 60mm set down kerb segregation between the footpath and the cycle track. This is of particular importance in the context of providing for pedestrians with visual impairments, whereby the use of white line segregation is not as effective for establishing a clear understanding of the change of pavement use and potential for cyclist / pedestrian interactions. The cycle tracks will also be raised 120mm from the carriageway to provide segregation from vehicles.

The contents of Table 6.15 outline the cycling qualitative assessment along Section 2 of the Proposed Scheme, with reference to the accompanying sensitivity for each section and the resultant Significance of Impact. A detailed breakdown of the assessment along each section can be found in TIA Appendix 4.2 (Cycling Infrastructure Assessment).

Table 6.15: Section 2 – Cycling Impact during Operational Phase

Locations	Chainage	Do Minimum LoS	Do Something LoS	Impact
R808 Gracefield Road to Kilmore Road	A6050 - A6550	C	A	Medium Positive
Kilmore Road to St David's Wood	A6550 - A6800	C	A	Medium Positive
St David's Wood to R102 Griffith Avenue	A6800 - A8250	C	A	Medium Positive
R102 Griffith Avenue to Brian Road	A8250 - A8350	C	A+	High Positive
Brian Road to R105 Clontarf Road	A8350 - A8750	C	B	Low Positive
Section Summary		**C**	**A**	**Medium Positive**

The contents of Table 6.15 demonstrate that the scheme will have a positive impact on the cycling environment between the R808 Gracefield Road and R105 Clontarf Road. The Do Minimum LoS is C which has been determined using the previously referenced assessment criteria set out in Table 6.6.

In the Do Something scenario, the LoS improves to A between the R808 Gracefield Road and Kilmore Road, and to A between Kilmore Road and the R102 Griffith Avenue, as a result of the provision of well-separated cycle lanes in both directions which traverse priority junctions and continue through signalised junction with protected treatment as part of the Proposed Scheme. There is a small section in the Do Something scenario with an LoS of A+ where a bidirectional segregated cycle track is provided as part of the Proposed Scheme.

Between Brian Road and the R105 Clontarf Road, a quiet cycle route in terms of traffic flows is proposed via the residential streets of Brian Road, Carleton Road, Haverty Road and Marino Park Avenue, with a connection to the R107 Malahide Road from St Aidan's Park Road. No formal cycle infrastructure will be put into place. However, traffic management arrangements will limit access to general traffic thereby resulting in a more cycle friendly environment.

There is currently a northbound on-road cycle lane along the R107 Malahide Road that runs between St Aidan's Park Road and Brian Road. Under the Proposed Scheme, this would be removed to accommodate a shared bus / cycle lane. However, cyclists will have the option of either using the shared bus / cycle lane or diverting onto the quiet route via Brian Road and Carleton Road.

Overall, it is anticipated that there will be **Medium Positive** impact to the quality of the cycling infrastructure along Section 2 of the Proposed Scheme during the Operational Phase. The findings of the cycling assessment fully aligns with the objective of the CBC Infrastructure Works, applicable to the Traffic and Transport assessment of the Proposed Scheme, to 'Enhance the potential for cycling by providing safe infrastructure for cycling, segregated from general traffic wherever practicable'.

6.2.2.1.6.3 Bus Infrastructure

There is currently a total of 17 bus stops along Section 2, nine inbound and eight outbound. Under the Proposed Scheme, there will be a total of 15 bus stops along Section 2 with one fewer inbound, and one fewer outbound stops, than in the Do Minimum. The layout of new bus stops is considered to better serve the existing and future catchment and be closer to existing and new pedestrian crossing facilities for improved convenience.

Table 6.16 presents a summary of the changes in the number and location of bus stops along Section 1 of the Proposed Scheme.

Table 6.16 Section 2 – Overview of Amendments to Bus Stop Locations

Direction	Stop	Chainage	Do Something	Comment
Inbound	1277	A6125	Retained	N/A
Inbound	1219	A6350	Removed	Existing stop removed due to the proximity of the Mornington Grove and the new Kilmore Road stop.
Inbound	-	A6575	New	New stop approximately 30m to the south of Kilmore Road at Chainage 6575 proposed to serve the surrounding catchment.
Inbound	1220	A6725	Removed	Existing stop removed due to the proximity of the Kilmore Road and Elm Mount Road junctions.
Inbound	1221	A7025	Retained	N/A
Inbound	664	A7375	Retained	N/A
Inbound	665	A7675	Retained	N/A

Direction	Stop	Chainage	Do Something	Comment
Inbound	666	A7975	Retained	N/A
Inbound	667	A8275	Retained	N/A
Inbound	668	A8700	Retained	N/A
Outbound	1198	A6175	Retained	N/A
Outbound	-	A6500	New	New stop approximately 30m north of Kilmore Road to serve the surrounding residential catchment. Stop is proposed adjacent to signalised pedestrian crossings at the Kilmore Road junction.
Outbound	1197	A6650	Removed	Existing stop to be removed due to the distance to a controlled pedestrian crossing. A new stop is proposed at the Kilmore Road junction to cater for the surrounding residential catchment.
Outbound	1196	A6950	Retained	N/A
Outbound	4382	A7375	Retained	N/A
Outbound	672	A7575	Removed	Existing stop to be removed due to the proximity of the (new) Casino Park stop and also the existing Stop 4382.
Outbound	-	A7800	New	New stop approximately 50m south of Casino Park to cater for the surrounding residential catchment. Stop is located adjacent to a controlled pedestrian crossing at the Casino Park Junction.
Outbound	671	A8000	Relocated	Existing stop to be relocated approximately 80m south to Chainage A8000 to be nearer to Mount Temple School, and due to the proximity to the new Casino Park stop.
Outbound	670	A8175	Removed	Existing stop to be removed. New stop immediately north of Brian junction, which will serve the secondary school and also cater for the surrounding residential catchment.
Outbound	-	A8300	New	New stop to serve the surrounding catchment. Stop will be 'tailed' with the inbound stop.
Outbound	669	A8500	Removed	Stop to be removed given the proximity of stops along Marino Mart and also the Brian Road stop (Chainage A8300).

The layout of new bus stops is considered to better serve the existing and future catchment, and be closer to existing and new pedestrian crossing facilities for improved convenience.

Table 6.17 provides a summary of the improvements to the bus stop infrastructure along Section 2 of the Proposed Scheme, with reference to the number and percentage of bus stops that provide each facility in the 'Do Minimum' and 'Do Something' scenarios.

Table 6.17 Section 2 – Overview of Amendments to Bus Stop Locations

Bus Stop Facility	Do Minimum		Do Something		Comment
	No. of Stops	Percentage of Stops	No. of Stops	Percentage of Stops	
RTPI	4	24%	15	100%	It is proposed that all bus stops provide real-time information.
Timetable information	17	100%	15	100%	It is proposed that all bus stops provide timetable information, this is consistent with Do Minimum.
Shelter	15	88%	15	100%	It is proposed that all bus stops along this section is to be provided with shelter. This is two more stops compared to the Do Minimum.

Bus Stop Facility	Do Minimum		Do Something		Comment
	No. of Stops	Percentage of Stops	No. of Stops	Percentage of Stops	
Seating	15	88%	15	100%	It is proposed that all bus stops along this section is to be provided with seating. This is two more stops compared to the Do Minimum.
Accessible Kerbs	17	100%	15	100%	It is proposed that all bus stops provide timetable information, this is consistent with Do Minimum.
Indented Drop Off Area	2	12%	0	0%	All stops inline.
Total Stops	**17**		**15**		No change from Do Minimum.

Table 6.17 indicates that there are improvements to the bus stop facilities along Section 2 of the Proposed Scheme. The retained Marino Crescent, Stop 668, will be indented from the carriageway while all other stops along this section will be inline, within dedicated bus lanes along the entirety of the corridor. Improvements in the provision of real-time information, shelters, seating and accessible kerbs at the bus stops throughout Section 2 of the Proposed Scheme are assessed as providing an overall positive impact for bus passengers. All proposed facilities have been designed in accordance with BusConnects Preliminary Design Guidance which has been developed with cognisance to the relevant accessibility guidance.

6.2.2.1.7 Parking and Loading

The proposals will impact on existing parking along Section 2 of the Proposed Scheme and the main changes are as follows:

- The removal of the 10 informal general residential parking spaces along the eastern side R107 Malahide Road between the R808 Gracefield Road and Danieli Road to gain the road space to accommodate cycle lanes on both sides of the road. The adjacent residential properties have dropped kerb driveways and off-street parking capacity for approximately two vehicles. Additionally, there are approximately 80 further informal residential parking spaces along side streets within 200m of this location, such as Danieli Road and Danieli Drive;
- A revised parking arrangement outside the shops on the west side of R107 Malahide Road, to the south of. Morning Grove. The existing parking arrangement comprises a parallel style parking however motorists currently park perpendicular to the carriageway. This parking arrangement causes a safety issue with cars blocking the cycle lane, which is illegal, whilst also reversing onto main carriageway and on-road cycle lane. Instead, it is proposed that a small off-street car parking area is provided next to this location, comprising five general parking spaces and one disabled bay. This car park will be accessible via the R107 Malahide Road and will operate a one-way system to exit onto Mornington Grove. This will result in the loss of two car parking spaces at this location;
- The removal of the six informal general / commercial parking spaces along the R107 Malahide Road on the footpath at the frontage of the commercial units, immediately north of Kilmore Road. This is to allow for widening of the footpath and provision of a cycle track which bypasses the bus stop island, and therefore provide wider improvements for pedestrians and cyclists. There are a further approximately 16 pay & display parking bays along Kilmore Road, less than 50.0m from this location, and over 100 informal parking spaces available along side streets within 200m, such as Pinebrook Road and Pinebrook Grove;
- The removal of five of the 11 informal general / commercial parking spaces along the R107 Malahide Road between Donnycarney Road and Casino Park to provide improvements for pedestrians and cyclists in the form of widening the footpath and provision of a continuous, uninterrupted cycle lane along this stretch. There are approximately 140 informal parking spaces along side streets within 200m of this location, such as Casino Park, Cherrymount Crescent and Donnycarney Road; and
- The removal of the 14 pay & display general / commercial parking spaces within the southbound bus lane along the R107 Malahide Road between Crescent Place and Marino Crescent to provide a dedicated bus lane. There are approximately 91 other pay & display parking spaces within 200m of this location along side streets, including Crescent Place and Marino Crescent.

The contents of Table 6.18 present a summary of the proposed changes to parking along Section 2 of the Proposed Scheme between the Do Minimum and Do Something scenarios.

Table 6.18: Section 2 – Overall Changes in Parking / Loading Spaces

Location	Parking Type	Do Minimum	Do Something	Change
R107 Malahide Road (eastern side); Between R808 Gracefield Road and Danieli Road	Informal Parking: general residential	10	0	-10
R107 Malahide Road (western side); Immediately south of Mornington Grove	Informal Parking: general residential and commercial	7	5	-2
	Disabled Bay	1	1	0
R107 Malahide Road (eastern side) – Between Clancarthy and Donnycarney Road	Informal Parking: general residential and commercial	4	4	0
R107 Malahide Road (western side); Immediately north of Kilmore Road	Informal Parking: general residential and commercial	6	0	-6
R107 Malahide Road (western side); Between Donnycarney Road and Casino Park	Informal Parking: general residential and commercial	11	6	-5
R107 Malahide Road (eastern side); Between Crescent Place and Marino Crescent	Pay & Display: general / commercial	14	0	-14
Total		**53**	**16**	**-37**

As shown in Table 6.18, there is currently approximately 53 parking spaces affected along Section 2 of the Proposed Scheme and is it proposed that 37 of these spaces are removed. The Proposed Scheme will formalise the parking arrangements at these locations to improve the environment, particularly for pedestrians and cyclists. Given the availability of equivalent types of parking along adjacent streets within 200m of these locations (and typically within under 100m), the overall impact of this loss of parking is considered to have a **Medium Negative** impact, which is considered appropriate in the context of the aim of the Proposed Scheme, to provide enhanced walking, cycling and bus infrastructure on this key access corridor.

6.2.2.1.8 Summary of Corridor-Wide Infrastructure Works

6.2.2.1.8.1 Pedestrian Infrastructure

Overall, the Proposed Scheme will provide an average increase in footway area for pedestrians of 26% inbound and 14% outbound across the corridor compared to the Do Minimum scenario. The Proposed Scheme will increase the number of controlled pedestrian crossings from 36 in the Do Minimum to 52 in the Do Something scenario, equating to a 70% increase. Additionally, there will be an increase in the number of raised table crossings on side roads from 9 in the Do Minimum to 31 in the Do Something scenario, equating to a 244% increase.

6.2.2.1.8.2 Cycling Infrastructure

The Proposed Scheme will provide 4.7km inbound and 5.3km outbound of segregated cycle facilities which is an increase from only 0.2km 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) will be increased by 47% as part of the Proposed Scheme. The proportion of the corridor with segregated facilities (including quiet street treatment) will increase from 5% in the Do Minimum to 100% in the Do Something scenario.

With regards to cycle parking, 226 spaces are provided in the Do Minimum scenario. The Proposed Scheme will increase provision by 87% to a total of 422 spaces across the entire corridor in the Do Something scenario.

6.2.2.1.8.3 Bus Priority Infrastructure

The Proposed Scheme will provide 5.1km inbound and 5.0km outbound of bus lanes across the corridor. This is an increased from 4.5km inbound and 3.9km outbound in the Do Minimum scenario. This contributes to an increase of 36% 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 the entirety of the corridor.

6.2.2.1.8.4 Parking & Loading

Whilst total parking provision will be reduced by 66 spaces as part of the Proposed Scheme, the majority of these spaces (39) are informal spaces (general residential) and the overall number of disabled parking spaces will increase by one spaces in the Do Something scenario compared to the Do Minimum.

6.2.3 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 Movement by Bus; and
  - Bus Boarding.
- Bus Network Performance Indicators:
  - Bus Journey Times; and
  - Bus Journey Time Reliability.
- General Traffic Network Performance Indicators:
  - Flow changes on the Direct Study Area; and
  - Redistributed flows and Junction Capacity Outputs on the Indirect Study Area.
- Overall Road Network-Wide Performance Indicators
  - Queuing;
  - Total Travel Times;
  - Total Travel Distance; and
  - Average Network Speed.

6.2.3.1 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).

6.2.3.1.1 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.

6.2.3.1.1.1 2028 AM Peak Hour People Movement

Diagram 6.4 illustrates the People Movement by mode travelling along the Proposed Scheme inbound towards the city centre during the AM Peak Hour in 2028.

Diagram 6.4: People Movement by Mode travelling along the Proposed Scheme during 2028 AM Peak Hour

As indicated in Diagram 6.4, there is a reduction of 30% in the number of people travelling via car, an increase of 24% in the number of people travelling via bus and an increase of 93% in people walking or cycling along the Proposed Scheme during the AM Peak Hour. It must 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 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 undertaken, is therefore conservative in terms of the predicted cycling mode share. The Proposed Scheme has 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 Scheme.

The contents of Table 6.19 outline 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 15% increase in people moved as a result of the Proposed Scheme and 32% increase in people moved by sustainable modes (Public Transport, Walk, Cycle).

Table 6.19: 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	960	28%	670	17%	-290	-30%
		Public Transport	2,110	63%	2,610	68%	500	24%
		Walking	150	4%	150	4%	0	0%
		Cycling	150	4%	430	11%	280	187%
		Combined Walking/Cycling	300	9%	580	15%	280	93%
		Sustainable Modes Total	**2,410**	**72%**	**3,190**	**83%**	**780**	**32%**
		Total (All modes)	**3,370**	**100%**	**3,860**	**100%**	**490**	**15%**

6.2.3.1.1.2 2028 PM Peak Hour People Movement

Diagram 6.5 illustrates the People Movement by mode travelling along the Proposed Scheme outbound from the city centre during the PM Peak Hour.

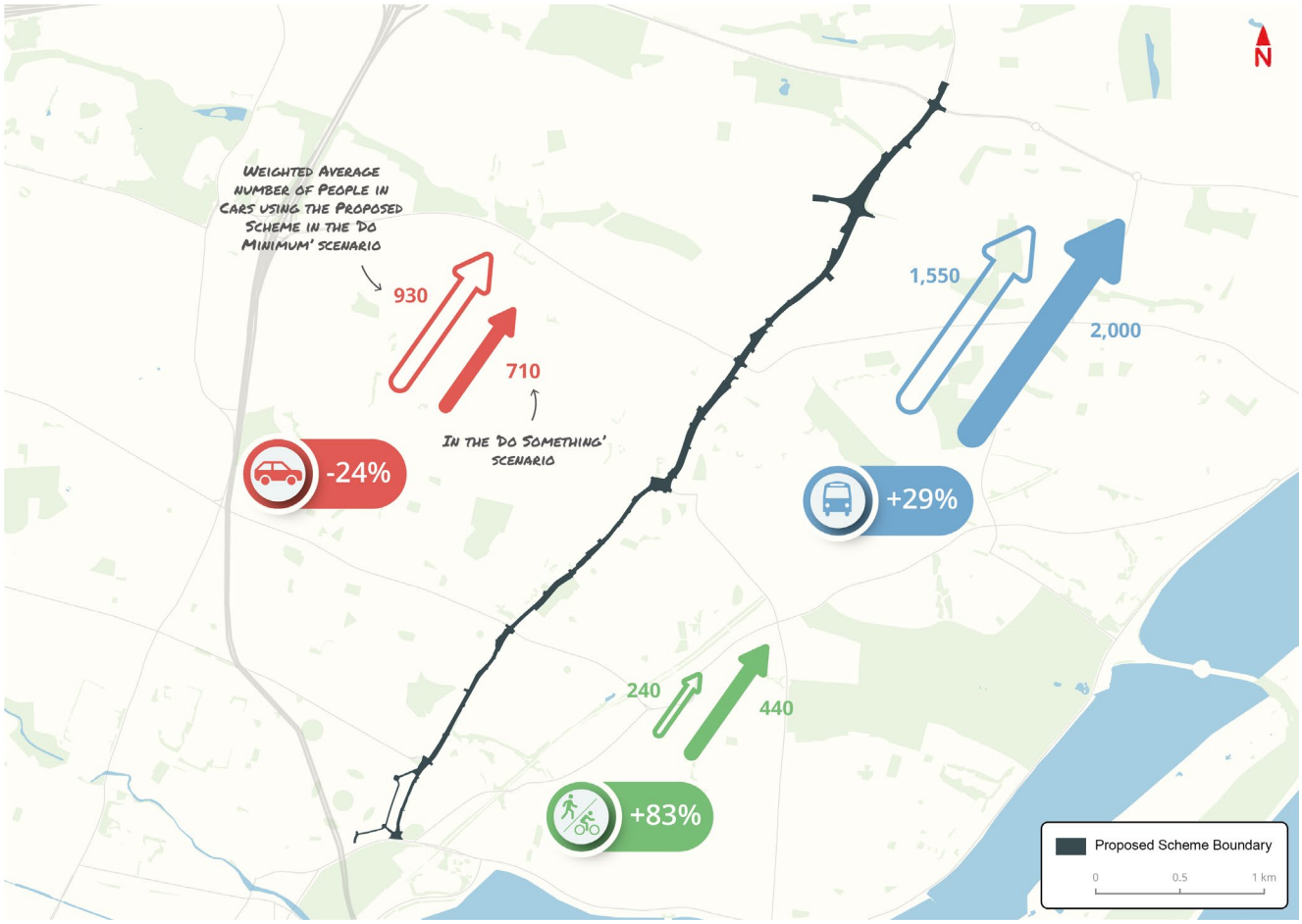

Diagram 6.5: People Movement by Mode travelling along the Proposed Scheme during 2028 PM Peak Hour

As indicated in Diagram 6.5, there is a reduction of 24% in the number of people travelling via car, an increase of 29% in the number of people travelling via bus and an increase in 83% in the number of people walking or cycling along the Proposed Scheme during the PM Peak Hour.

Table 6.20 outlines the difference in modal split between the Do Minimum and Do Something scenarios for each mode of transport in an outbound direction from the City Centre during the PM Peak Hour. The results indicate 16% increase in people moved as a result of the Proposed Scheme and 36% increase in people moved by sustainable modes (Public Transport, Walk, Cycle).

Table 6.20: 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	930	34%	710	23%	-220	-24%
		Public Transport	1,550	57%	2,000	63%	450	29%
		Walking	110	4%	120	4%	10	9%
		Cycling	130	5%	320	10%	190	146%
		Combined Walking/Cycling	240	9%	440	14%	200	83%
		Sustainable Modes Total	**1,790**	**66%**	**2,440**	**77%**	**650**	**36%**

Direction	Time Period	Mode of Transport	Do Minimum		Do Something		Difference	
			Hourly Trips	Modal Split (%)	Hourly Trips	Modal Split (%)	Hourly Trips	Difference (%)
		Total (All modes)	**2,720**	**100%**	**3,150**	**100%**	**430**	**16%**

6.2.3.1.1.3 2043 AM Peak Hour People Movement

Diagram 6.6 illustrates the People Movement by mode travelling along the Proposed Scheme inbound towards the city centre during the AM Peak Hour in 2043.

Diagram 6.6: People Movement by Mode travelling along the Proposed Scheme during 2043 AM Peak Hour

As indicated in Diagram 6.6, there is a decrease of 33% in the number of people travelling via car, an increase of 35% in the number of people travelling via bus and an increase of 124% in the number of people walking and cycling along the Proposed Scheme during the AM Peak Hour.

The contents of Table 6.21 outline 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 27% increase in people moved as a result of the Proposed Scheme and 48% increase in people moved by sustainable modes (Public Transport, Walk, Cycle).

Table 6.21: 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	880	27%	590	14%	-290	-33%
		Public Transport	2,050	62%	2,760	66%	710	35%
		Walking	180	5%	170	4%	-10	-6%
		Cycling	190	6%	660	16%	470	247%
		Combined Walking/Cycling	370	11%	830	20%	460	124%
		Sustainable Modes Total	**2,420**	**73%**	**3,590**	**86%**	**1,170**	**48%**
		Total (All modes)	**3,300**	**100%**	**4,180**	**100%**	**880**	**27%**

6.2.3.1.1.4 2043 PM Peak Hour People Movement

Diagram 6.7 illustrates the People Movement by mode travelling along the Proposed Scheme outbound from the city centre during the PM Peak Hour in 2043.

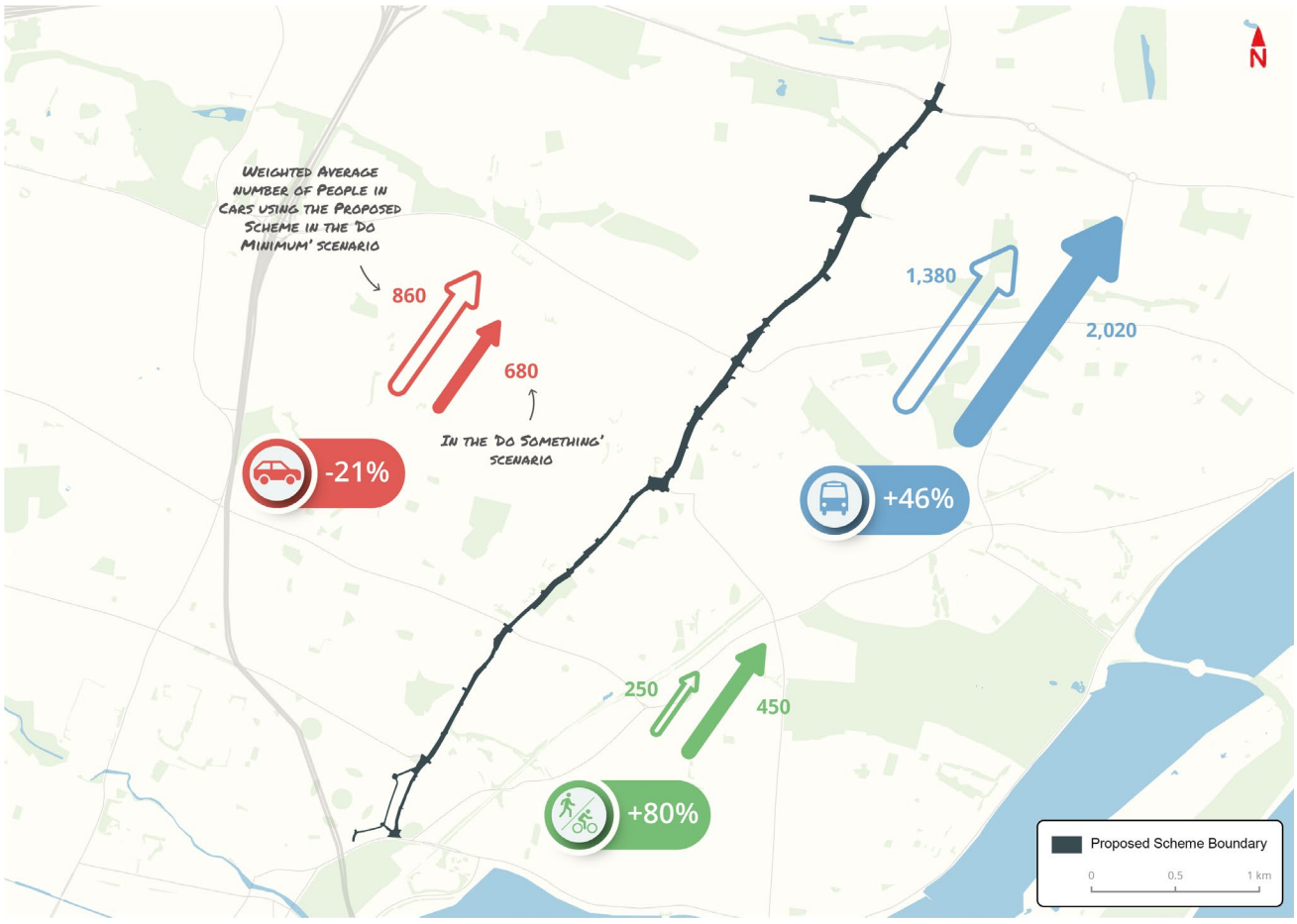

Diagram 6.7: People Movement by Mode travelling along the Proposed Scheme during 2043 PM Peak Hour

As indicated in Diagram 6.7, there is a decrease of 21% in the number of people travelling via car, an increase of 46% in the number of people travelling via bus and an increase of 80% in the number of people walking and cycling along the Proposed Scheme during the PM Peak Hour.

The contents of Table 6.22 outline the difference in modal split between the Do Minimum and Do Something scenarios for each mode of transport in an outbound direction from the City Centre during the PM Peak Hour. The results indicate 27% increase in people moved as a result of the Proposed Scheme and 52% increase in people moved by sustainable modes (Public Transport, Walk, Cycle).

Table 6.22: 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	860	35%	680	22%	-180	-21%
		Public Transport	1,380	55%	2,020	64%	640	46%
		Walking	130	5%	140	4%	10	8%
		Cycling	120	5%	310	10%	190	158%
		Combined Walking/Cycling	250	10%	450	14%	200	80%
		Sustainable Modes Total	**1,630**	**65%**	**2,470**	**78%**	**840**	**52%**
		Total (All modes)	**2,490**	**100%**	**3,150**	**100%**	**660**	**27%**

6.2.3.1.2 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 compared to the Do Minimum scenario.

6.2.3.1.2.1 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.

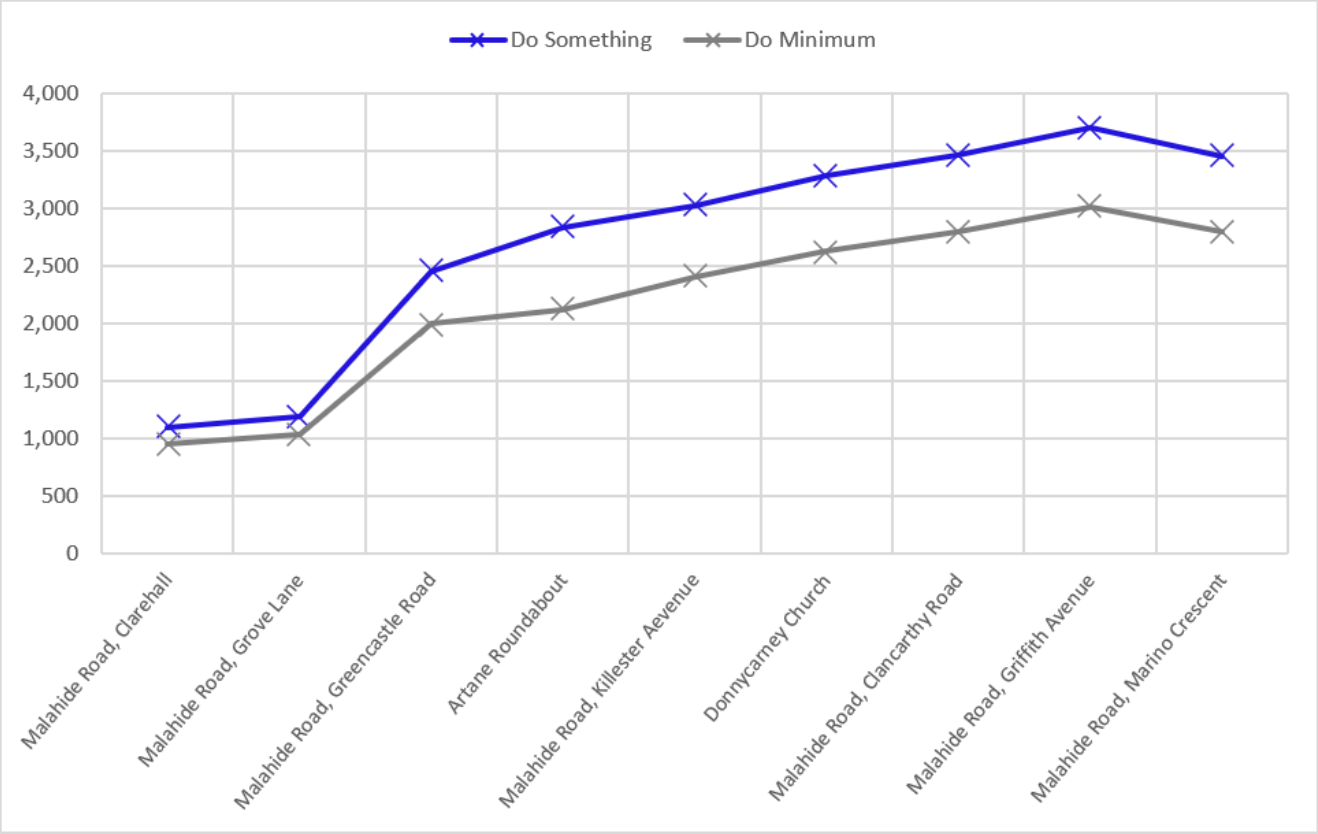

Diagram 6.8: 2028 AM Peak Hour Passenger Volume along Proposed Scheme (inbound direction)

Diagram 6.8 shows higher levels of bus passenger loadings along the Proposed Scheme with a notable increase at the intersection between Malahide Road and Greencastle Road. The volume of passengers increases consistently and reaches its peak at the intersection with Griffith Avenue with a volume of 3,700 passengers in the AM Peak hour, compared to approximately 3,000 in the Do Minimum scenario.

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

6.2.3.1.2.2 2043 AM Peak Hour Bus Passengers

Diagram 6.9 presents the passenger loading profile comparing the Do Minimum and Do Something scenarios in the AM Peak Hour in the inbound direction in 2043.

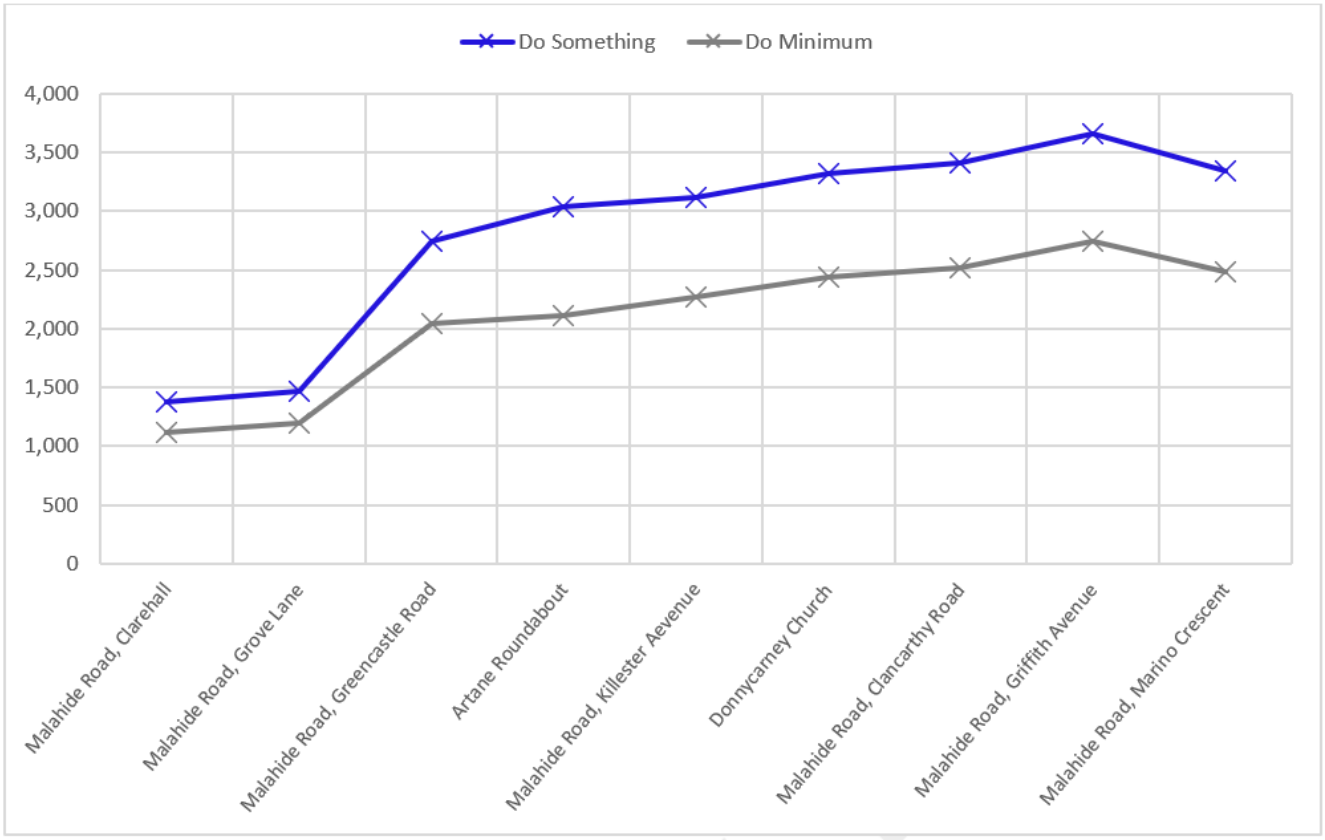

Diagram 6.9: 2043 AM Peak Hour Passenger Volume along Proposed Scheme (inbound direction)

Diagram 6.9 shows higher levels of bus passenger loadings along the Proposed Scheme with a notable increase at the intersection between the R107 Malahide Road and Greencastle Road. The volume of passengers increases consistently and reaches its peak at the intersection with Griffith Avenue with a volume of 3,700 passengers in the AM Peak hour, compared to approximately 2,700 in the Do Minimum scenario.

The increase in bus passengers remains at a high level along the Proposed Scheme with approximately 1,000 additional users on most of the corridor, compared to the Do Minimum scenario.

6.2.3.1.2.3 2028 PM Peak Hour Bus Passengers

Diagram 6.10 presents the passenger loading profile comparing the Do Minimum and Do Something scenarios in the PM Peak Hour in the inbound direction in 2028.

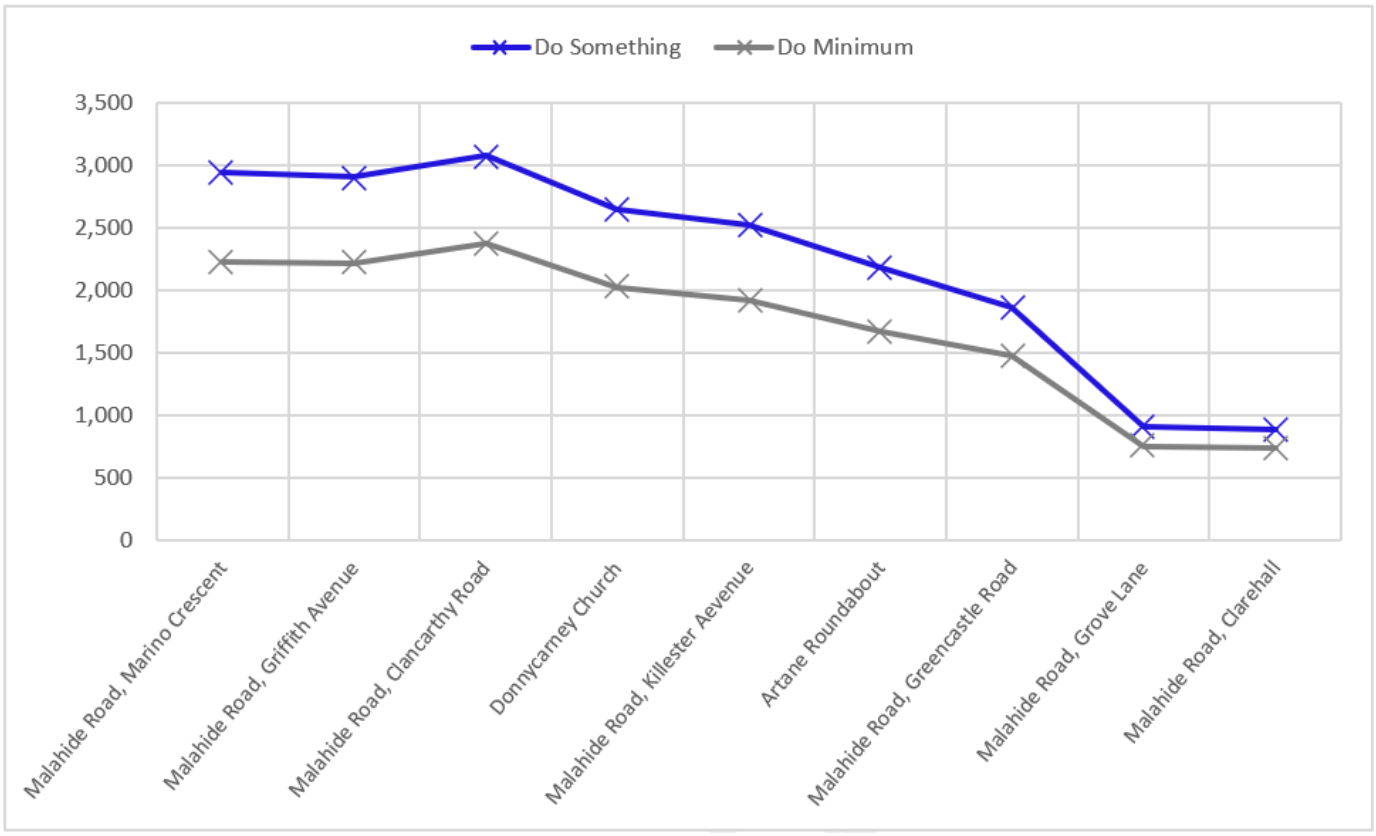

Diagram 6.10: 2028 PM Peak Hour Passenger Volume along Proposed Scheme (outbound direction)

Diagram 6.10 shows a higher level of bus passenger on the southern part of the scheme, where the loadings reach a peak at approximately 3,000 passengers in the Do Something scenario, compared to 2,300 passengers in the Do Minimum.

The increase in bus patronage is high all along the Proposed Scheme, specifically on the southern part of the corridor where the additional passengers loading is approximately 700, compared to the Do Minimum scenario.

6.2.3.1.2.4 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.

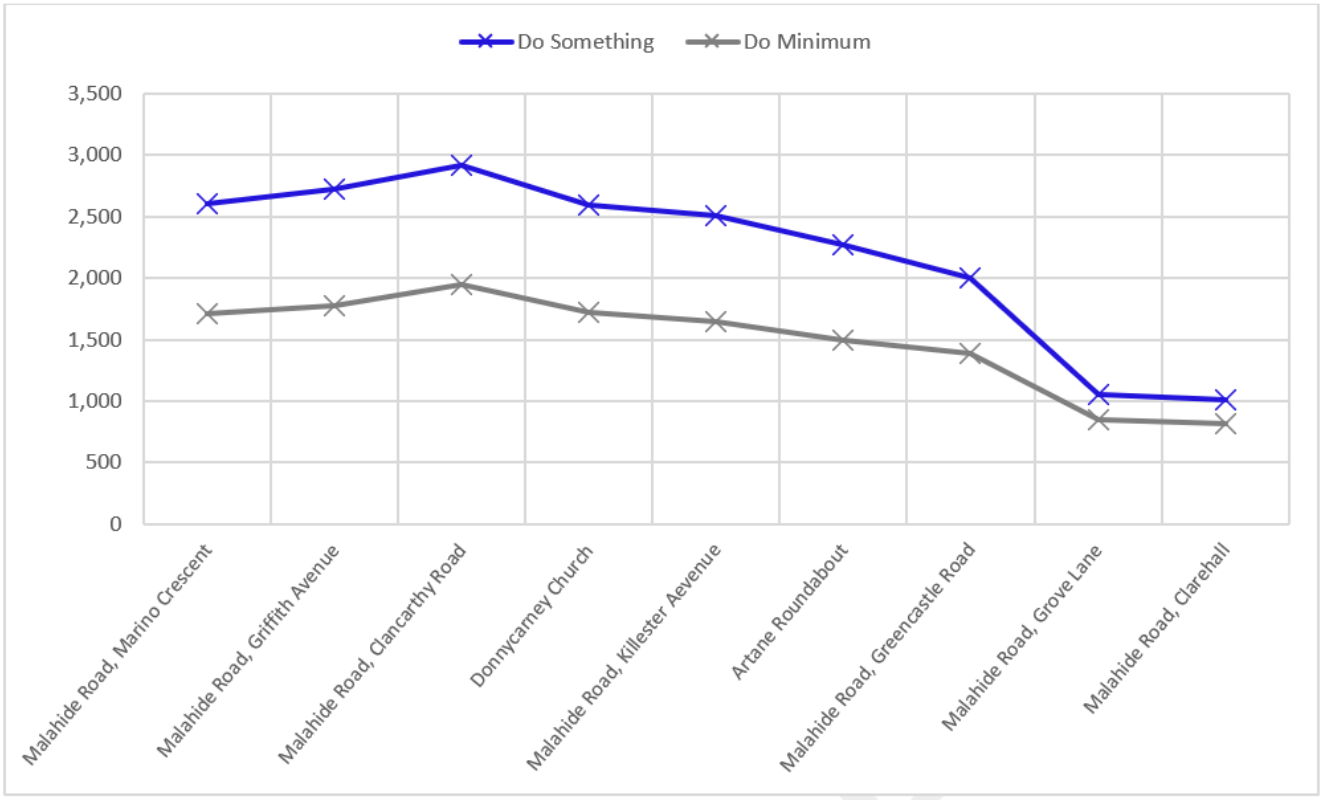

Diagram 6.11: 2043 PM Peak Hour Passenger Volume along Proposed Scheme (outbound direction)

Diagram 6.11 shows a higher level of bus passenger on the southern part of the scheme, where the loadings reach a peak loading at approximately 2,900 passengers in the Do Something scenario, compared to 1,900 passengers in the Do Minimum.

The increase in bus patronage is high all along the Proposed Scheme, specifically on the southern part of the corridor where the additional passenger load is approximately 1,000, compared to the Do Minimum scenario.

6.2.3.1.2.5 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 6.23.

Table 6.23: 2028 Peak Hour Bus Boardings on Routes using the Proposed Scheme (inc. boarding at stops outside Proposed Scheme)

Time Period	Do Minimum (no. of boardings)	Do Something (no. of boardings)	Difference in No. of Boardings	Difference (%)
AM Peak Hour	8,830	9,680	850	9.6%
PM Peak Hour	7,670	8,500	830	10.8%

The contents of Table 6.23 show that there will be a 9.6% 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 10.8% increase in people boarding bus routes which use the Proposed Scheme, representing an additional 830 passengers.

The comparison results for the 2043 Design Year scenario are indicated in Table 6.24.

Table 6.24: 2043 Peak Hour Bus Boardings on Routes using the Proposed Scheme (inc. boarding at stops outside Proposed Scheme)

Time Period	Do Minimum (no. of boardings)	Do Something (no. of boardings)	Difference in No. of Boardings	Difference (%)
AM Peak Hour	9,070	10,020	950	10.5%
PM Peak Hour	7,750	8,840	1,090	14.1%

The contents of Table 6.24 show that there will be a 10.5% increase in people boarding bus routes which use the Proposed Scheme during the AM Peak Hour. This represents an addition of 950 passengers in the AM Peak hour.

In the PM Peak hour, there will be a 14.1% increase in people boarding bus routes which use the Proposed Scheme, representing an additional 1,090 passengers.

6.2.3.1.3 People Movement – Significance of Impact

The significance of impact for the movement of People Movement 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 Proposed Scheme has been adjudged to deliver a **Positive, Very Significant and Long-term**, 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, which will enable and deliver efficient, safe, and integrated sustainable transport movement along the corridor'.

6.2.3.1.4 Operational Impacts for Bus Users

6.2.3.1.4.1 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.

6.2.3.1.4.2 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 D1 service, which traverses the entire length of the Proposed Scheme, have been extracted from the model. As outlined in Section 6.1.2 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 D-Spine services.

Inbound Direction

Average journey times for the inbound D1 service in 2028 Opening Year and in 2043 Design Year can be seen in Table 6.25. 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 6.25: D1 Service Bus Average Journey Times (Inbound Direction)

Peak Hour	Do Minimum (minutes)	Do Something (minutes)	Difference (minutes)	% Difference
2028 AM	22.7	18.2	-4.5	-20%
2028 PM	22.7	18.0	-4.7	-21%
2043 AM	22.9	18.2	-4.7	-20%
2043 PM	22.6	17.4	-5.2	-23%

Additional information regarding the range of journey times (minimum, maximum, average and standard deviation) for inbound D1 buses in the Do Minimum (red) and Do Something (blue) can be seen in Table 6.26 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 6.26: D1 Service – Range of Journey Times (Inbound Direction)

Peak Hour	Do Minimum				Do Something			
	MIN	MAX	AVG	STDEV	MIN	MAX	AVG	STDEV
2028 AM	20.0	24.1	22.7	1.1	16.5	20.6	18.2	1.1
2028 PM	20.3	25.0	22.7	1.4	16.3	20.0	18.0	1.0
2043 AM	20.1	28.1	22.9	1.7	17.0	22.3	18.2	1.1
2043 PM	20.3	25.3	22.6	1.4	15.9	18.7	17.4	0.7

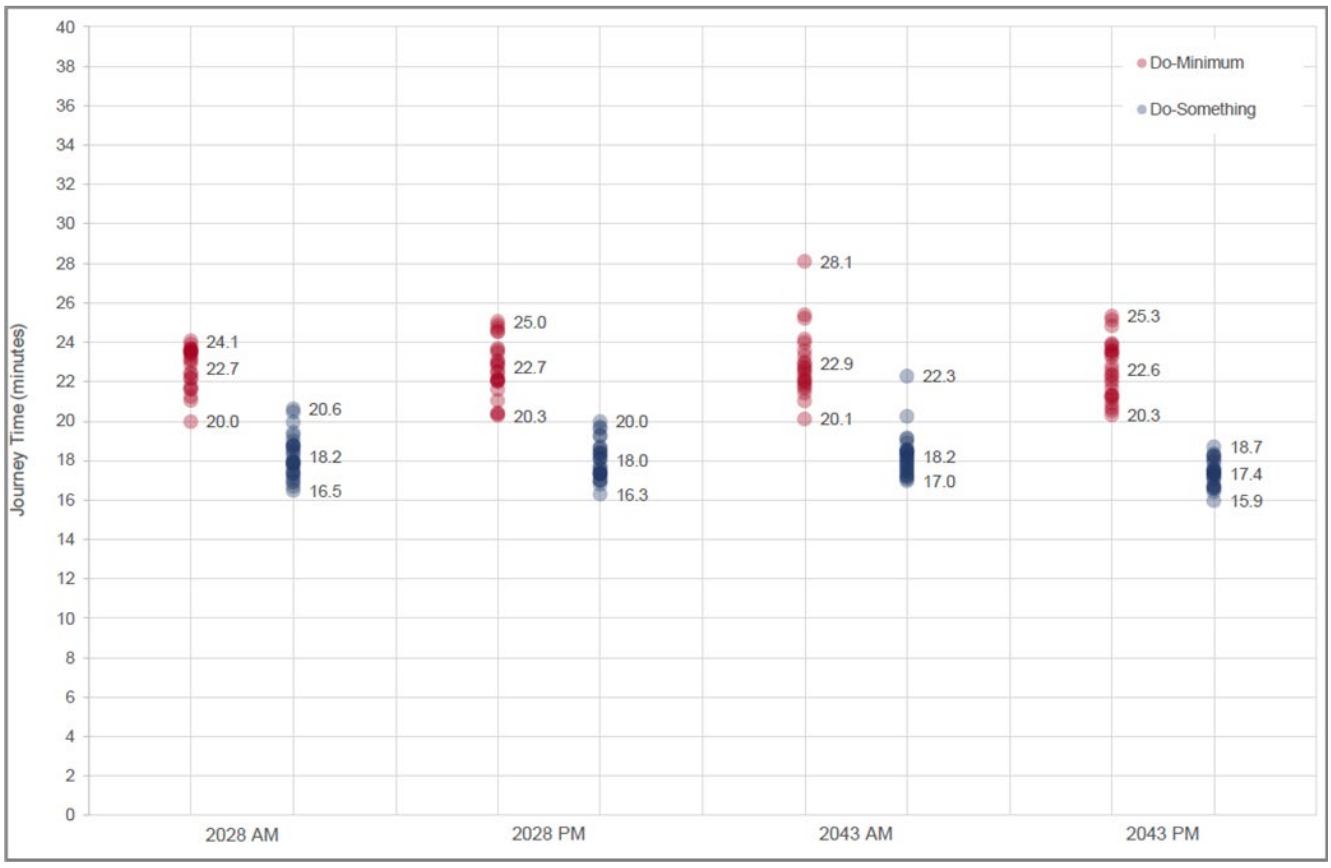

Diagram 6.12: D1 Bus Journey Times (Inbound Direction)

Based on the results presented in Diagram 6.12, the Proposed Scheme will deliver average inbound journey time savings for D1 service bus passengers of up to 4.7 minutes (21%) in 2028 (PM) and 5.2 minutes (23%) in 2043 (PM). Furthermore, results presented in Diagram 6.15 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 (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 D1 service are also illustrated in the cumulative time-distance graphs shown in Diagram 6.13 to Diagram 6.16.

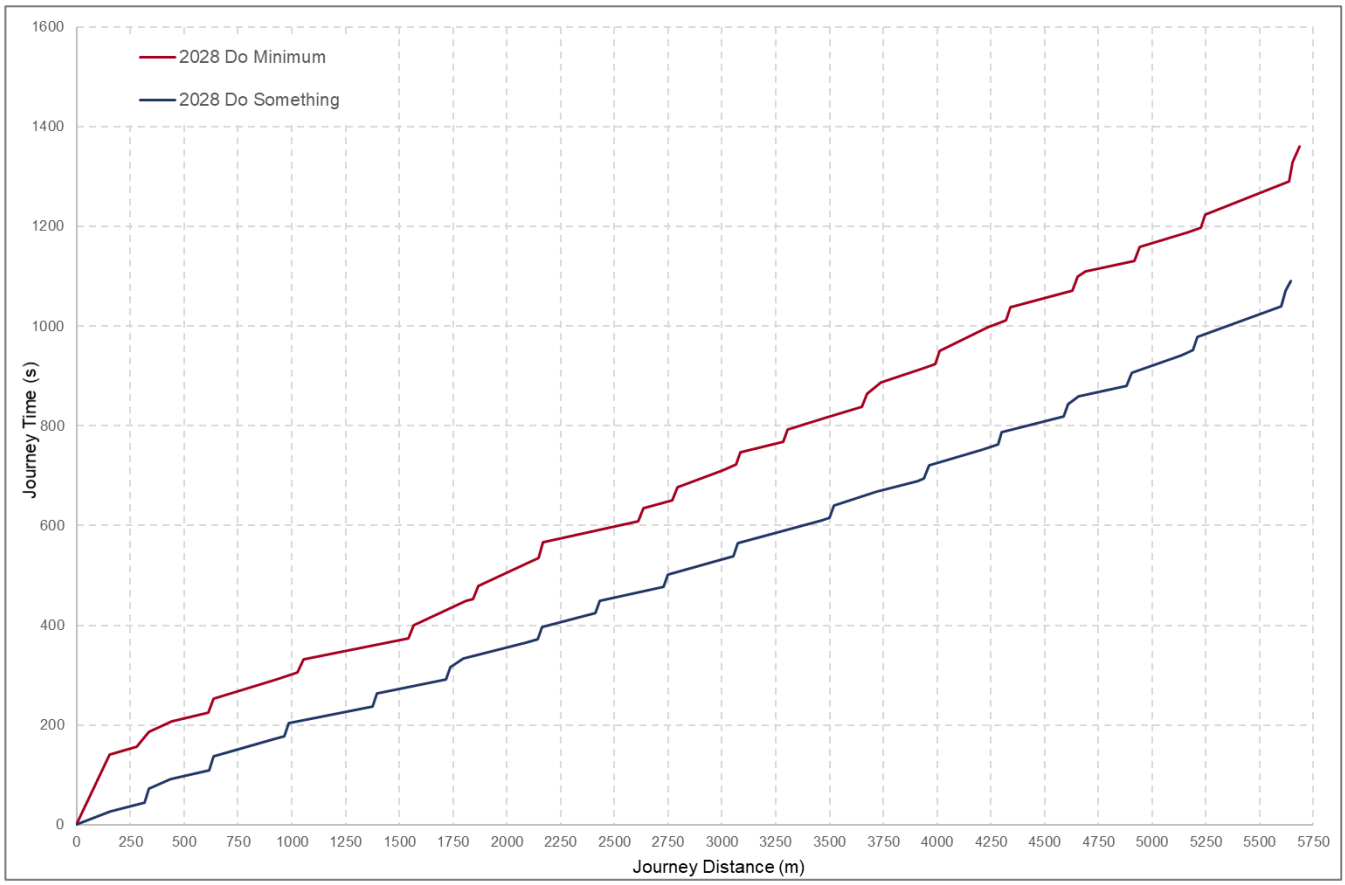

Diagram 6.13: D1 Bus Journey Time (2028 AM, Inbound)

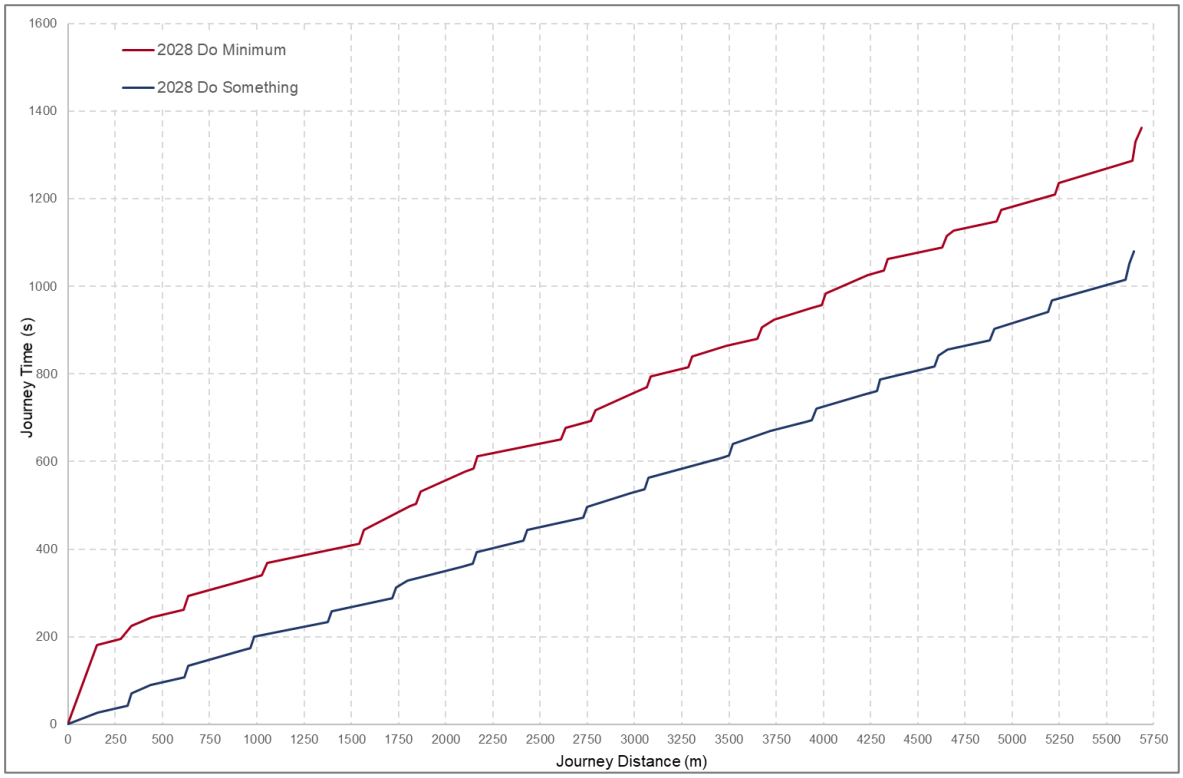

Diagram 6.14: D1 Bus Journey Time (2028 PM, Inbound)

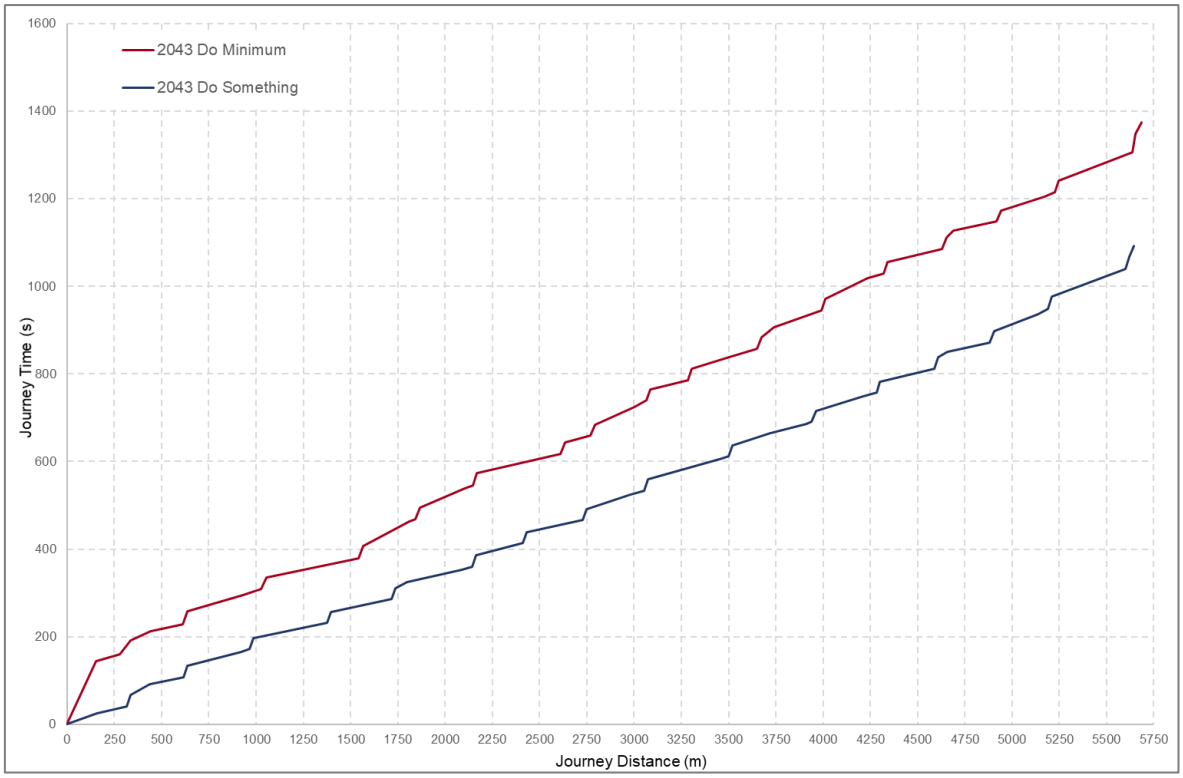

Diagram 6.15: D1 Bus Journey Time (2043 AM, Inbound)

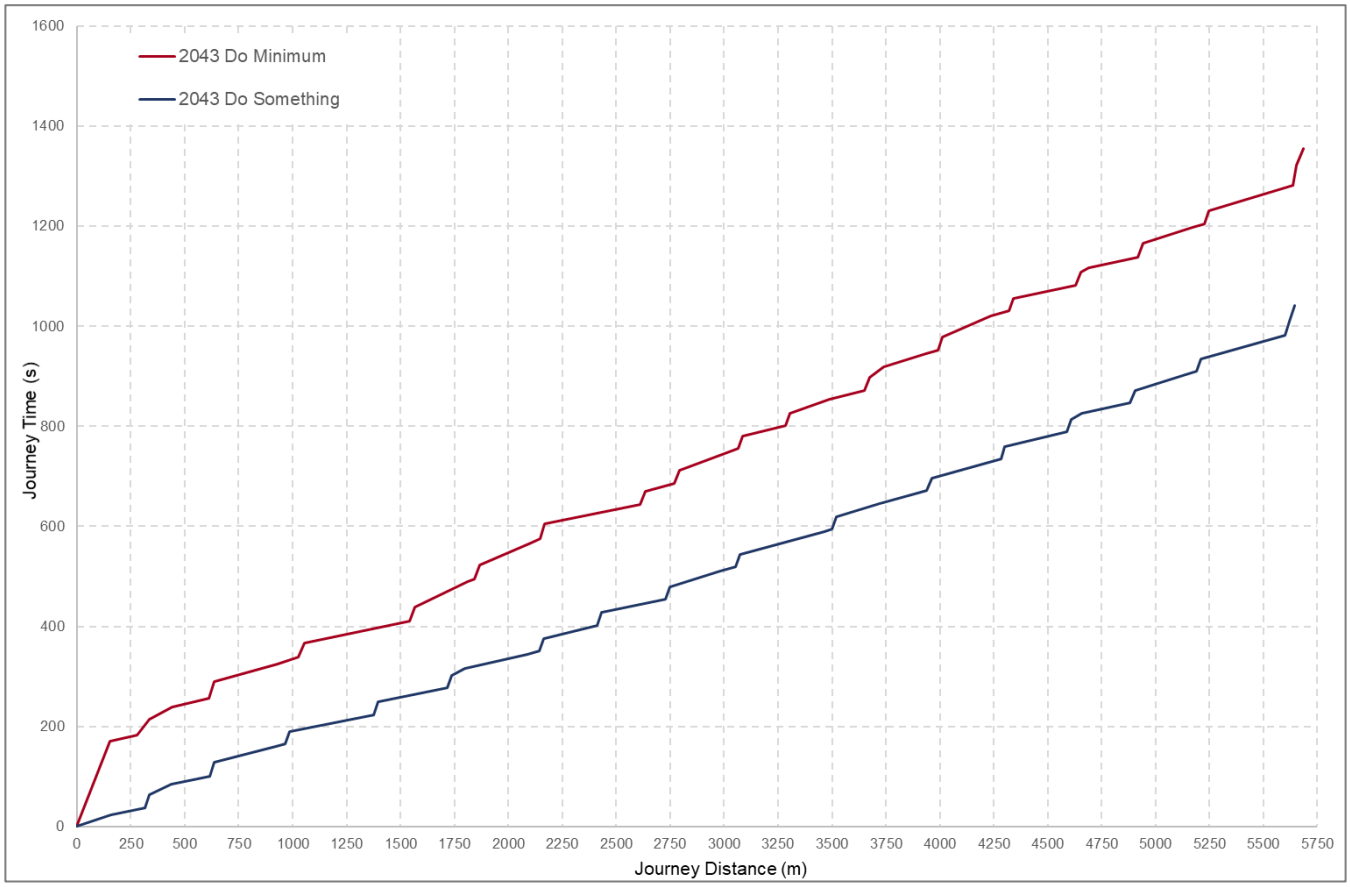

Diagram 6.16: D1 Bus Journey Time (2043 PM, Inbound)

Based on the results presented in Diagram 6.13 to Diagram 6.16, the Proposed Scheme will deliver notable bus journey time savings on the southbound R107 Malahide Road approach to the R139 Northern Cross junction in all scenarios. This is due to the introduction of a short but effective section of bus lane on the northern arm of the junction and the bus priority 'hurry calls' (use of traffic signal plans to give buses priority ahead of general traffic) offered to mainline buses as part of the Proposed Scheme. In all scenarios, the junction is shown to operate over capacity for general traffic, with a considerable amount of 'gated' traffic on the two R107 and western R139 approaches.

Beyond Greencastle Road, the junction improvements and bus priority 'hurry calls' included as part of the Proposed Scheme can be shown to create cumulative bus journey time savings over the Do Minimum, most notably at the currently un-signalised Artane Roundabout.

Outbound Direction

Average journey times for the outbound D1 service in 2028 Opening Year and in 2043 Design Year can be seen in Table 6.27. 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 6.27: D1 Service Bus Journey Times (Outbound Direction)

Peak Hour	Do Minimum (minutes)	Do Something (minutes)	Difference (minutes)	% Difference
2028 AM	20.1	16.4	-3.7	-18%
2028 PM	20.6	16.5	-4.1	-20%
2043 AM	19.5	16.3	-3.2	-17%
2043 PM	19.6	17.0	-2.6	-13%

Additional information regarding the range of journey times (minimum, maximum, average and standard deviation) for outbound D1 buses in the Do Minimum (red) and Do Something (blue) can be seen in Table 6.28 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 6.28: D1 Service – Range of Journey Times (Outbound Direction)

Peak Hour	Do Minimum				Do Something			
	MIN	MAX	AVG	STDEV	MIN	MAX	AVG	STDEV
2028 AM	17.5	23.1	20.1	1.4	15.1	17.9	16.4	0.8
2028 PM	18.7	24.2	20.6	1.2	15.0	18.7	16.5	0.8
2043 AM	17.4	23.1	19.5	1.3	14.8	17.7	16.3	0.8
2043 PM	17.9	22.3	19.6	1.2	15.3	18.4	17.0	0.8

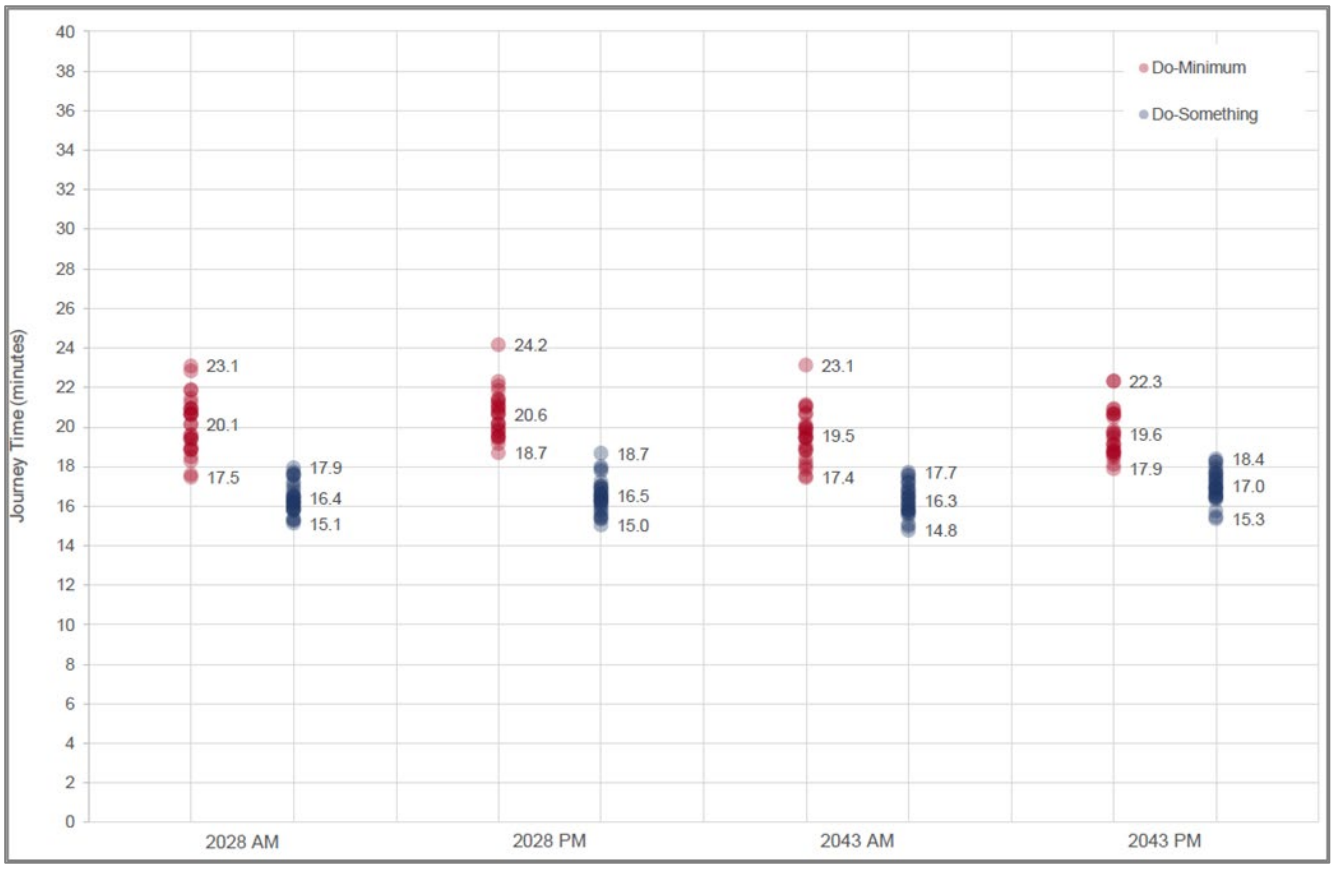

Diagram 6.17: D1 Bus Journey Times (Outbound Direction)

Based on the results presented in Diagram 6.17, the Proposed Scheme will deliver average outbound journey time savings for D1 service bus passengers of up to 4.1 minutes (20%) in 2028 (AM) and 3.2 minutes (17%) in 2043 (AM). Furthermore, results presented in Diagram 6.25 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 D1 service for the outbound direction of travel illustrated in the cumulative time-distance graphs shown in Diagram 6.18 to Diagram 6.21.

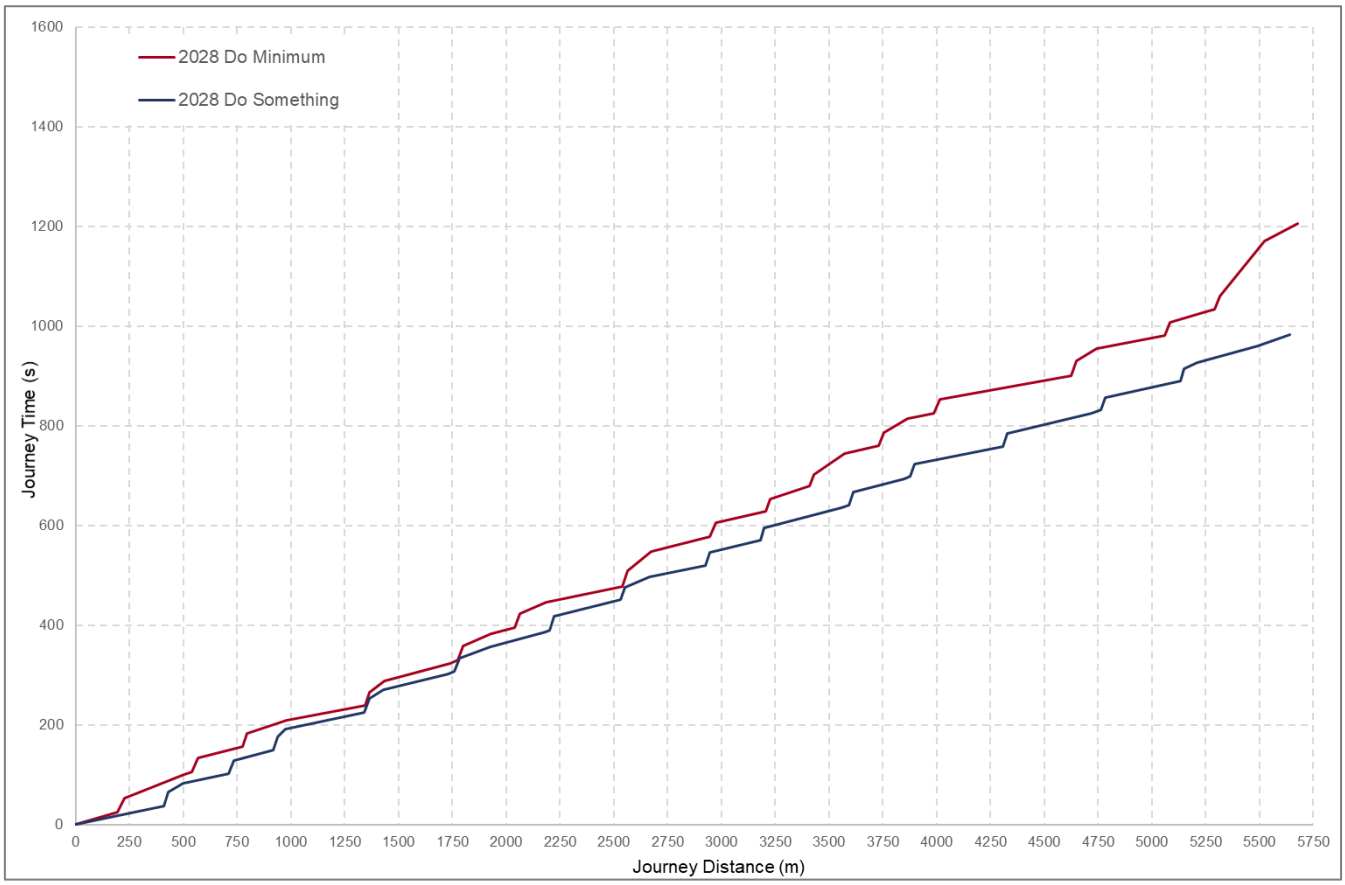

Diagram 6.18: D1 Bus Journey Time (2028 AM, Outbound)

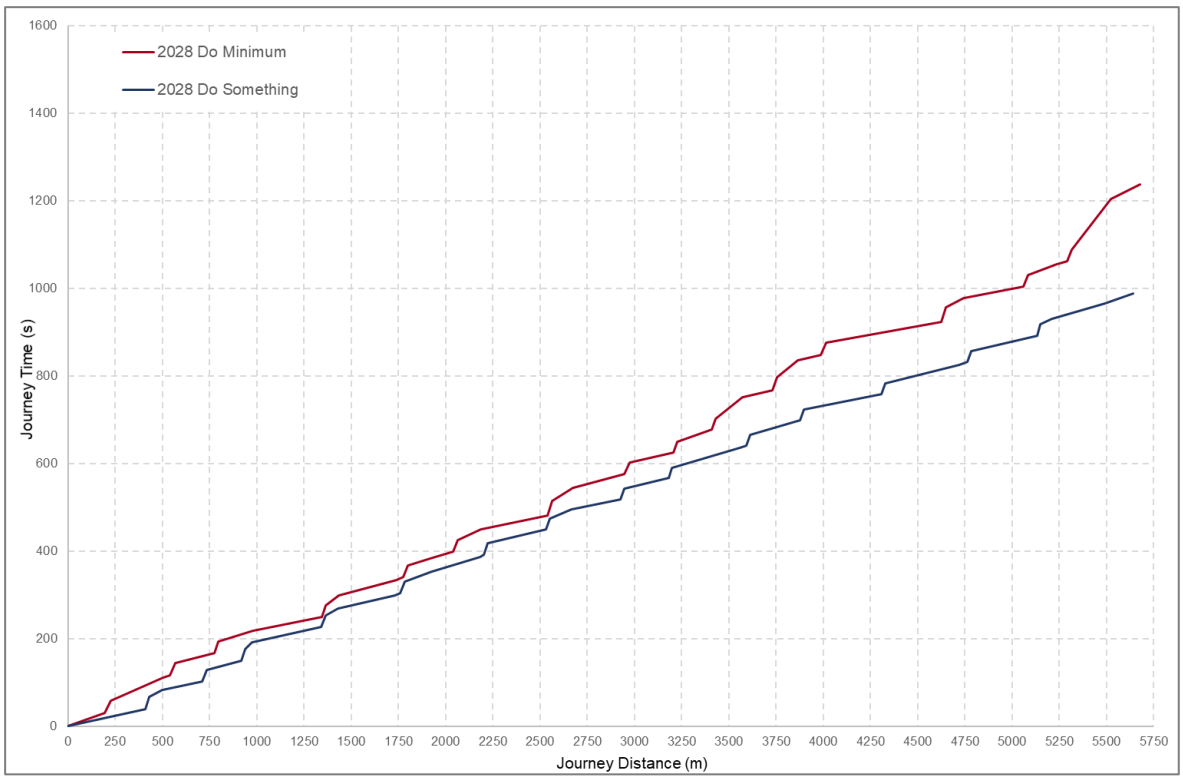

Diagram 6.19: D1 Bus Journey Time (2028 PM, Outbound)

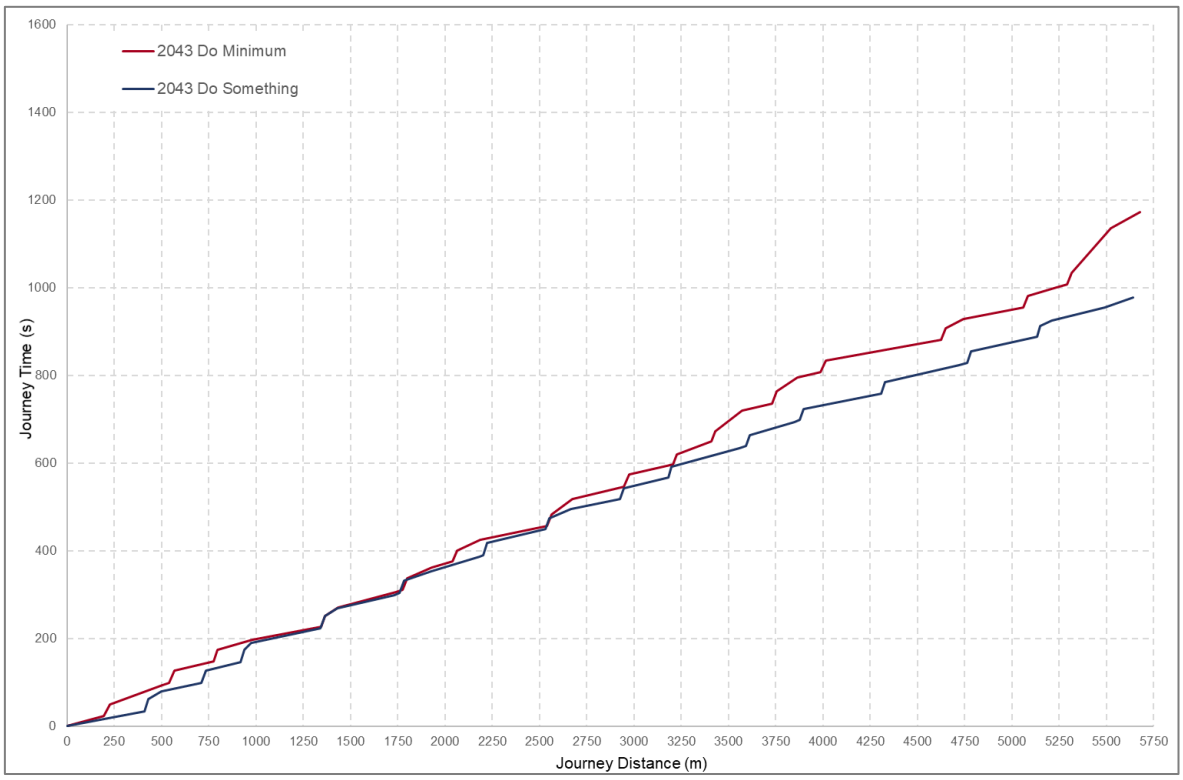

Diagram 6.20: D1 Bus Journey Time (2043 AM, Outbound)

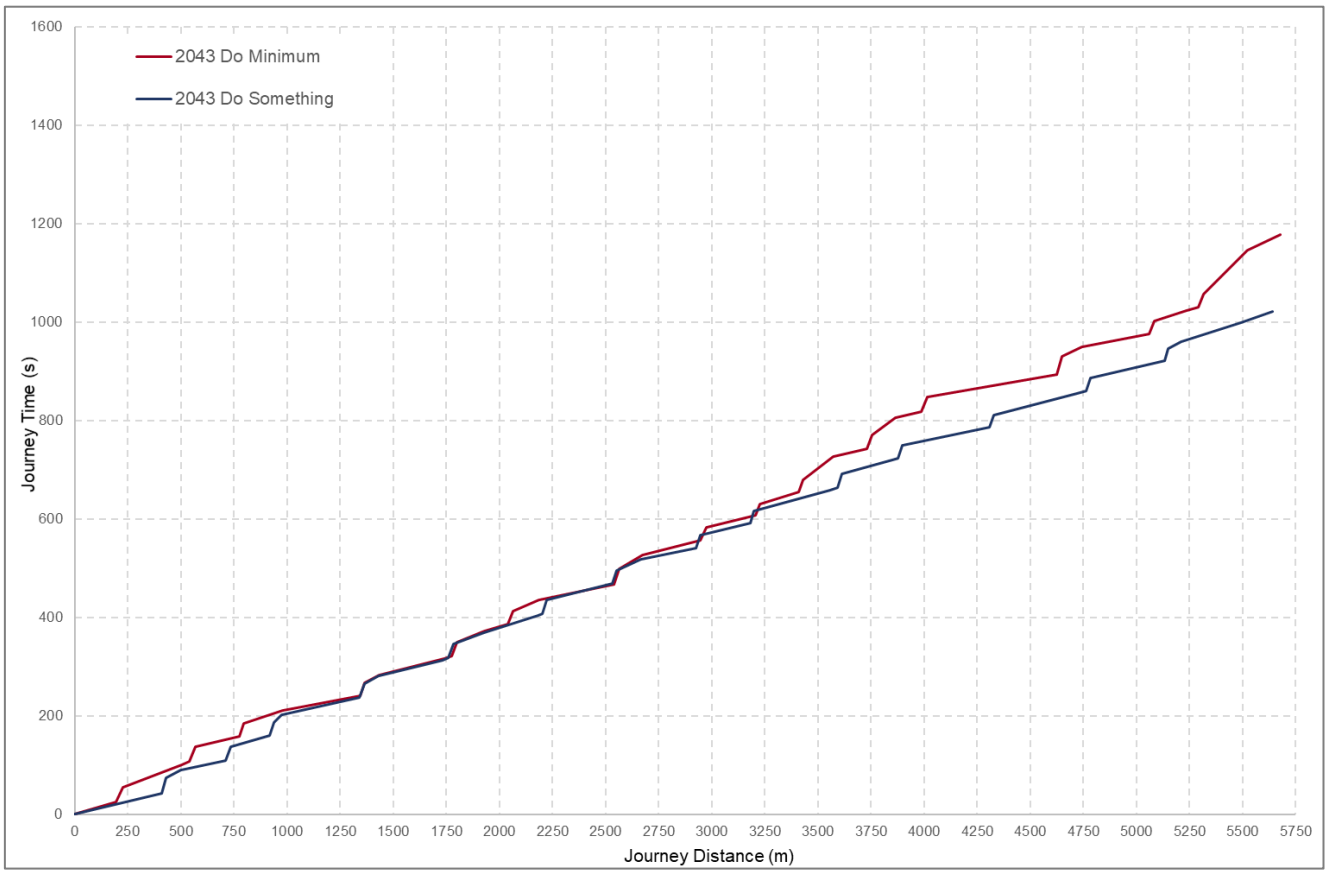

Diagram 6.21: D1 Bus Journey Time (2043 PM, Outbound)

Based on the results presented in Diagram 6.18 to Diagram 6.21 the Proposed Scheme will deliver bus journey time savings between the R105 Clontarf Road and the R102 Griffith Avenue four arm junction following the introduction of the northbound bus lane in the Proposed Scheme.

As expected, Do Something benefits along this section are most notable in the PM peak where blocking back from the R013 Collins Avenue four arm junction extends beyond the R102 Griffith Avenue in the Do Minimum scenario.

Lower changes in journey time can be seen on the section of the R107 Malahide Road between the R102 Griffith Avenue and the Kilmore Road three-arm signalised junction. This is due to the 'gating' of traffic at the R102 Collins Avenue and the upgrade of pedestrian crossing and cycle facilities (including the introduction of advanced green, pre signals for cycles) at a number of junctions in between, with the corresponding improvements for pedestrians and cyclists balanced against the provision for buses along this section.

Beyond Kilmore Road, the junction improvements and bus priority 'hurry calls' included as part of the Proposed Scheme can be shown to create cumulative bus journey time savings over the Do Minimum, most notably at the Artane and Priorswood roundabout junctions.

Significant journey time savings can also be seen in the Do Something on the northbound R107 Malahide Road approach to the R139 Northern Cross junction as a result of the extension of the existing bus lane up to the stop line. As expected, these benefits are most notable in the PM peak.

6.2.3.1.4.3 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 6.29in vehicle minutes.

Table 6.29: Total Bus Journey Time

Peak Hour	Do Minimum (vehicle minutes)	Do Something (vehicle minutes)	Difference (vehicle minutes)	%Difference
2028 AM	1034	858	-176	-17%
2028 PM	1047	860	-187	-18%
2043 AM	1029	862	-167	-16%
2043 PM	1035	860	-175	-17%

Based on the results presented in Table 6.29, modelling would suggest that the Proposed Scheme will reduce total bus journey times along the Proposed Scheme by up to 18% in 2028 and 17% in 2043. Based on the AM and PM peak hours alone, this equates to **6.0 hours of savings in 2028 and 5.7 hours in 2043** combined across all buses when compared to the Do Minimum. On an annual basis this equates to approximately 4,500 hours of bus vehicle savings in 2028 and 4,300 hours in 2043, when considering weekday peak periods only.

6.2.3.1.5 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.

6.2.3.1.6 Increased Bus Frequency – Resilience Sensitivity Analysis

6.2.3.1.6.1 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.

6.2.3.1.6.2 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 6.30 below.

Table 6.30: Resilience Testing Bus Service Frequency Scenario Testing

Scenario	Inbound (Buses per Hour)	Outbound (Buses per Hour)
Do Minimum	25	25
Do Something	25	25
Do Minimum - Additional Services Resilience Test	35	35
Do Something - Additional Services Resilience Test	35	35

Table 6.31 outlines the average journey times for the inbound Clongriffin to City Centre D1 service in the 2028 Opening Year.

Table 6.31: D1 Service – Average Bus Journey Times

Peak Hour	Do Minimum (minutes)	Do Minimum (Additional Services) (minutes)	% Difference	Do Something (minutes)	Do Something - Additional Services (minutes)	% Difference
2028 AM	22.7	22.4	-1%	18.2	18.0	-1%
2028 PM	20.4	21.9	+7%	16.5	16.5	0%

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.

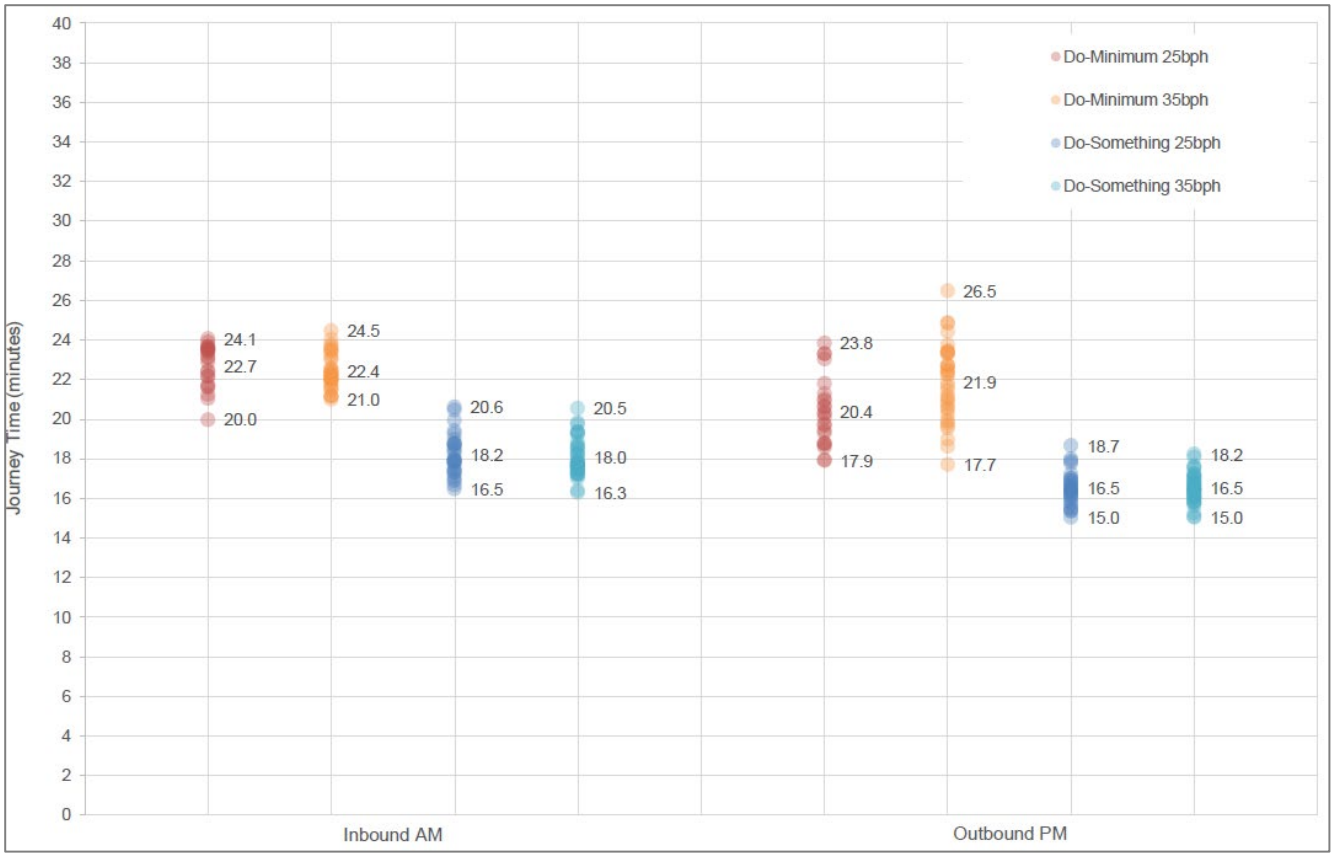

Diagram 6.22: Resilience Testing Bus Journey Time Reliability Indicators - Scenario Testing– Opening Year (2028)

As can be seen from Table 6.31 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 25 buses per direction per hour results. The results indicate negligible change in journey times in the Do Something Resilience sensitivity test per bus. 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 of up to c1.5 minutes on average per bus is experienced. ***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.

Further details on the potential additional greenhouse gas (GHG) emissions savings that could occur from this resilience is outlined in Chapter 8 (Climate).

6.2.3.1.7 General Traffic Assessment

6.2.3.1.7.1 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

likely worst-case scenario. It is possible that societal trends in the medium to long term may reduce car demand further due to the ongoing changes to travel behaviours and further shifts towards sustainable travel, flexibility in working arrangements brought on following COVID-19, 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[2] 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.

[2] 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.

6.2.3.1.8 General Traffic Flow Difference - AM Peak Hour

Diagram 6.24 illustrates the difference in traffic flows on the road links in the AM Peak Hour for the 2028 Opening Year. Please see TIA Appendix 4.7 (General Traffic Assessment) for the full LAM outputs.

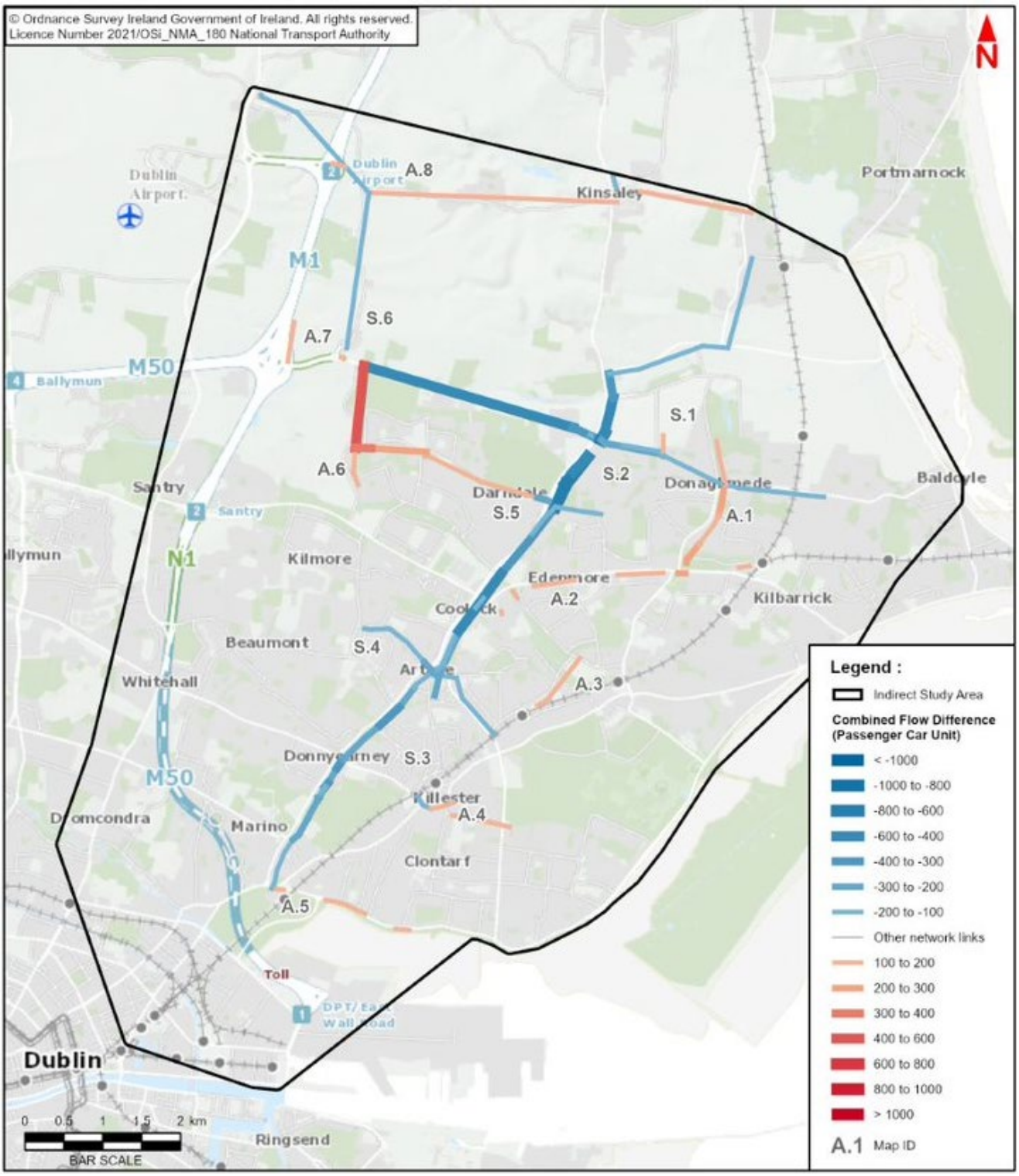

Diagram 6.24: Flow Difference on Road Links (Do Minimum vs. Do Something), AM Peak Hour, 2028 Opening Year

6.2.3.1.8.1 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 occur.

The key reductions in traffic flows during the AM Peak Hour are outlined in Table 6.32.

Table 6.32: Road Links that Experience a Reduction of ≥ 100 Combined Flows during AM Peak Hour (Direct Study Area)

Location	Map I.D.	Road Name	DoMinimum Flows (PCUs)	DoSomething Flows (PCUs)	Flow Difference (PCUs)
Section 1 – Mayne River Avenue to R808 Gracefield Road – R107 Malahide Road	S.1	R107 Malahide Road between Mayne River Avenue and Blunden Drive	2,741	1,633	-1,108
	S.2	R107 Malahide Road between Blunden Drive and Greencastle Road	1,111	712	-399
		R107 Malahide Road between Greencastle Road and Oscar Traynor Road	1,746	1,226	-520
		R107 Malahide Road between Brooklea Crescent and Gracefield Road	1,603	1,368	-235
Section 2 – R808 Gracefield Road to R105 Clontarf Road – R107 Malahide Road	S.3	R107 Malahide Road between Gracefield Road and Kilmore Road	1,263	1,027	-235
		R107 Malahide Road between Kilmore Road and Collins Avenue	1,505	1,283	-221
		R107 Malahide Road between Casino Park and Griffith Avenue	1,020	759	-261
		R107 Malahide Road between Griffith Avenue and Marino Mart	1,402	1,236	-166

The contents of Table 6.32 demonstrate that there is a slight to very significant reduction of between -166 and -1,108 general traffic flows along the direct study area during the AM Peak Hour, which is attributed to the Proposed Scheme and the associated modal shift as a result of its implementation. The largest impact occurs along the R107 Malahide Road between Mayne River Avenue and Blunden Drive.

This reduction in general traffic flow has been determined as an overall **Medium Positive** impact on the direct study area.

There are no increases to general traffic flows along the direct study area.

6.2.3.1.8.2 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 6.33.

Table 6.33: Road Links that Experience a Reduction of ≥100 Combined Flows during AM Peak Hour (Indirect Study Area)

Location	Map I.D.	Road Name	DoMinimum Flow (PCUs)	DoSomething Flow (PCUs)	Flow Difference (PCUs)
Eastern Side of Proposed Scheme	S.1	R124 Drumnigh Road	857	703	-154
		R123 Balgriffin Road	801	676	-125
		R107 Malahide Road (between Belmayne and R123)	1,795	1,239	-557
		R139 Grange Road	774	650	-124
		Marrsfield Avenue	330	159	-171
		R139 Clarehall Avenue	1,029	752	-277
	S.2	Blunden Drive	908	780	-128
	S.3	R808 Gracefield Road	912	730	-182
		Brockwood Avenue	522	337	-185
Western Side of Proposed Scheme	S.4	Ardlea Road	652	467	-184
	S.5	Priorswood Road	635	381	-254
	S.6	R139 Northern Cross Extension	3,175	2,621	-554
		Stockhole Lane	1,151	969	-182
		Clonshaugh Road	969	849	-120

The contents of Table 6.33 outlines that the traffic reductions within the indirect study area that exceed 100 flows varies between -120 and -557 combined flows along the surrounding road links. This reduction in general traffic flow has been determined as an overall **Medium Positive** impact on the direct study area.

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 6.34.

Table 6.34: Road Links where the 100 Flow Additional Traffic Threshold is Exceeded (AM Peak Hour)

Location	Map I.D.	Road Name	DoMinimum Flows (PCUs)	DoSomething Flows (PCUs)	Flow Difference (PCUs)
Eastern Side of Proposed Scheme	A.1	Grange Road	1609	1897	289
		Belmayne Avenue	753	856	103
	A.2	Tonlegee Road	1079	1280	202
	A.3	Harmonstown Road	187	289	102
	A.4	Howth Road	1079	1194	115
		Vernon Avenue	207	333	125
	A.5	Clontarf Road	1327	1494	168
	A.8	Chapel Road	655	765	109
Western Side of Proposed Scheme	A.6	Clonshaugh Road	818	1288	470
		Clonshaugh Avenue	243	564	321
		Priorswood Road	245	427	181
	A.7	M1 Southbound (Junction 3)	3138	3302	163
	A.8	Baskin Lane	1083	1232	149
		M1 Junction 2 Circulatory	1429	1549	120

The contents of Table 6.34 outlines that the additional traffic on the key road links within the indirect study area varies between 102 and 470 combined flows during the AM Peak Hour. Further junction capacity assessment has been undertaken along these road links to determine whether the above road links have the capacity to cater for the additional traffic volumes as a result of the Proposed Scheme.

Operational capacity outputs have been extracted from the LAM at the associated junctions along the subject road links to determine whether there is reserve capacity to facilitate the uplift in traffic. The results are presented in terms of the significance of the impact to the V / C ratio for each junction based on its sensitivity and magnitude of impact.

It should be noted that the worst performing arm of the junction has been used for the purpose of the assessment to ensure a conservative impact assessment is undertaken.

6.2.3.1.8.3 National Roads – 5% Threshold Impact Assessment (AM Peak Hour)

On the basis of the assessment methodology specifically for national roads, whereby 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, the junctions and associated flow difference between the Do Minimum and Do Something scenarios during the AM Peak Hour are outlined in Table 6.35.

Table 6.35: National Road Links where the 5% Additional Traffic Threshold is Exceeded (AM Peak Hour)

Junction	Total Do Minimum Turning Flows (PCUs)	Total Do Something Turning Flows (PCUs)	Turning Flow Difference (PCUs)	Percentage Difference
M1 Junction 2	4,589	4,614	37	1%
M50 Junction 1	1,875	1,881	6	0%
M50 Junction 2	3,467	3,411	-56	-2%
M50 Junction 3	3,719	3,688	-31	-1%

The contents of Table 6.35 demonstrate that redistributed traffic from the Proposed Scheme will have a less than 5% impact on turning flows at junctions with national roads, therefore, no further assessment of the AM Peak Hour has been undertaken, aside from instances where the 100 combined flow of additional traffic threshold is exceeded, as shown in Table 6.34.

6.2.3.1.9 General Traffic Flow Difference - PM Peak Hour

Diagram 6.25 illustrates the difference in traffic flows on road links in the PM Peak Hour for the 2028 Opening Year. TIA Appendix 4.7 (General Traffic Assessment) provides further details of the LAM outputs.

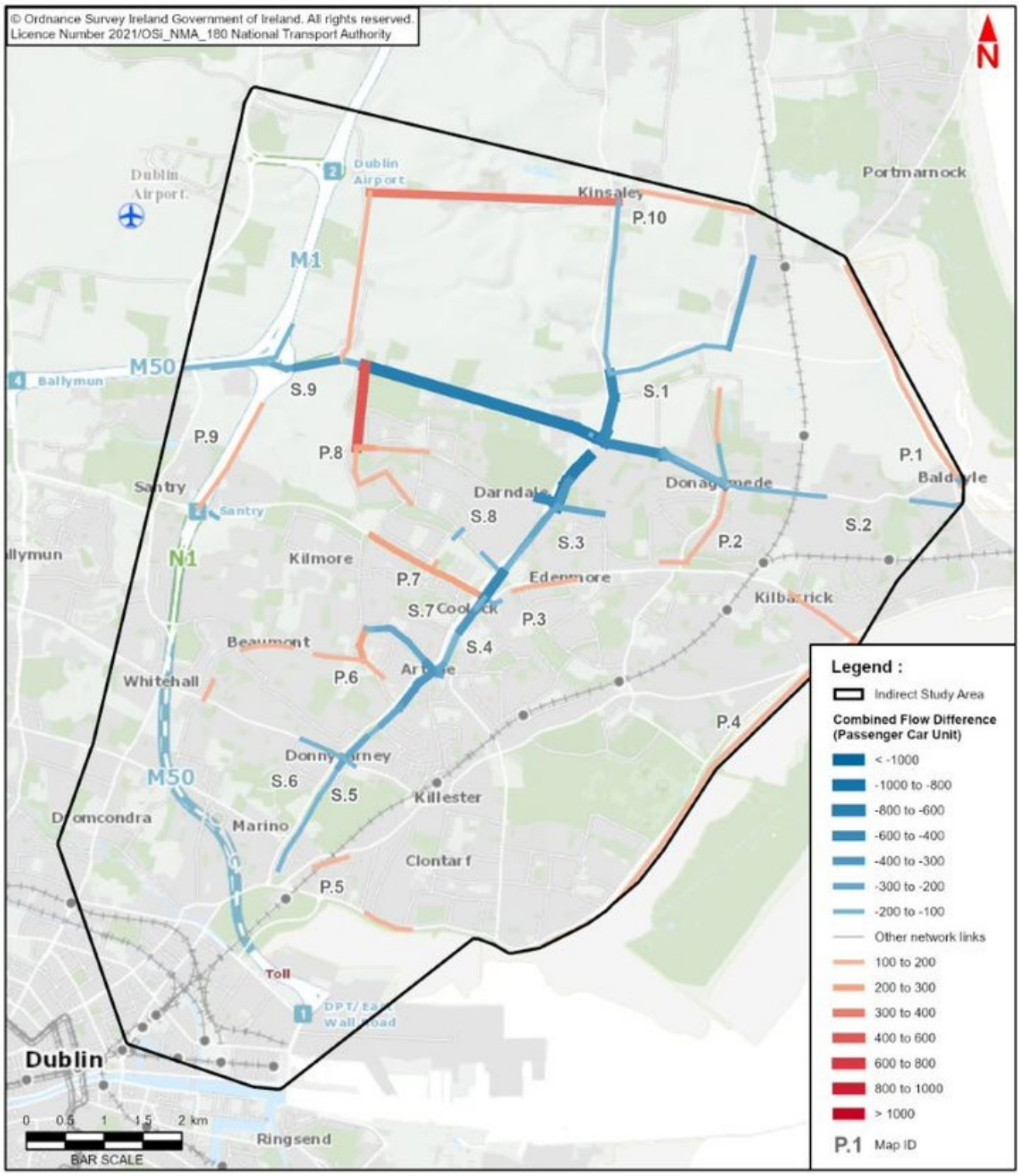

Diagram 6.25: Flow Difference on Road Links (Do Minimum vs. Do Something), PM Peak, 2028 Opening Year

6.2.3.1.9.1 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 occur.

The key reductions in traffic flows during the PM Peak Hour are outlined in Table 6.36.

Table 6.36: Road Links that Experience a Reduction of ≥100 Combined Flows during PM Peak Hour (Direct Study Area)

Location	Map I.D.	Road Name	DoMinimum Flows (PCUs)	DoSomething Flows (PCUs)	Flow Difference (PCUs)
Section 1 – Mayne River Avenue to R808 Gracefield Road	S.1	R107 Malahide Road between R139 and Blunden Drive	2,774	1,755	-1,108
	S.3	R107 Malahide Road between Greencastle Road and Oscar Traynor Road	1,808	1,330	-520
	S.4	R107 Malahide Road between Brooklea Crescent and Gracefield Road	1,665	1,266	-235
Section 2 – R808 Gracefield Road to R105 Clontarf Road	S.5	R107 Malahide Road between Kilmore Road and Collins Avenue	1,501	1,281	-221
	S.6	R107 Malahide Road between Casino Park and Griffith Avenue	568	496	-261
	S.7	R107 Malahide Road between Griffith Avenue and Marino Mart	1,219	1,080	-166

The contents of Table 6.36 demonstrate that there is a slight to very significant reduction of between -166 and -1,108 general traffic flows along the direct study area during the PM Peak Hour, which is attributed to the Proposed Scheme and the associated modal shift as a result of its implementation. This reduction in general traffic flow has been determined as an overall **Medium Positive** on the direct study area. The largest impact occurs along the R107 Malahide Road which is the main corridor of the Proposed Scheme.

This reduction in general traffic flow has been determined as an overall medium positive impact on the direct study area.

There are no increases to general traffic flows along the direct study area.

6.2.3.1.9.2 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 PM Peak Hour. The key reductions in traffic flows along the indirect study area during the PM Peak Hour are outlined in Table 6.37.

Table 6.37: Road Links that Experience a Reduction of ≥100 Combined Flows during PM Peak Hour (Indirect Study Area)

Location	Map I.D.	Road Name	DoMinimum Flow (PCUs)	DoSomething Flow (PCUs)	Maximum Flow Difference (PCUs)
Eastern Side of Proposed Scheme	S.1	The Hole In The Wall Road	789	602	-187
		R139 Clarehall Avenue	976	500	-476
		R123 Balgriffin Road	836	718	-119
		R124 Drumnigh Road	844	629	-216
	S.2	Brookstone Road	566	444	-122
		R139 Grange Road	1,122	953	-169
		Dublin Street	518	415	-103
	S.3	Blunden Drive	932	720	-212
	S.4	R808 Gracefield Road	1189	958	-231
		R104 Tonlegee Road	898	783	-115

	S.5	R103 Collins Avenue East	583	403	-180
Western Side of Proposed Scheme	S.6	R103 Collins Avenue	696	509	-187
	S.7	Ardlea Road	878	617	-261
	S.8	Greencastle Road	550	427	-123
	S.8	Priorswood Road	916	455	-460
	S.8	Coolock Drive	359	225	-133
	S.9	Coolock Lane	1,256	1,131	-125
	S.9	M1 SB onto M50	361	253	-108
	S.9	M50	5,544	5,435	-108
	S.9	R139 Northern Cross Extension	3,513	2,769	-743

The LAM, as demonstrated by the contents of Table 6.37, indicates that during the 2028 Opening Year, there is a reduction in general traffic travelling in the indirect study area PM Peak Hour, as illustrated by blue links in Diagram 6.25. The traffic flow reduction varies between -103 and -743 combined flows, with peak reductions occurring along the R139 Northern Cross Extension Northern Cross Extension to the west of the R107 Malahide Road. This reduction in general traffic flow has been determined as an overall **Medium Positive** impact on the indirect study area.

Increases in General Traffic Flows: The road links which experience additional traffic volumes of over 100 combined flows are illustrated by the red lines in Diagram 6.25. The road links and associated flow difference between the Do Minimum and Do Something scenarios during the PM Peak Hour are outlined in Table 6.38.

Table 6.38: Road Links Where Link Threshold of 100 Combined Flows is Exceeded (PM Peak Hour)

Location	Map I.D.	Road Name	DoMinimum Flows (PCUs)	DoSomething Flows (PCUs)	Flow Difference (PCUs)
Eastern Side of Proposed Scheme	P.1	R106 Coast Road	899	1007	108
		R106 Main Street	1186	1323	137
	P.2	The Hole In The Wall Road	319	428	109
		R809 Grange Road	1807	1988	181
		Millbrook Avenue	303	411	108
	P.3	R104 Tonlegee Road	610	723	112
	P.4	Kilbarrack Road	269	372	103
		R807 James Larkin Road	1378	1539	161
		R105 Dublin Road	1567	1727	160
	P.5	R807 Clontarf Road	1378	1539	161
		R105 Howth Road	1120	1253	134
	P.10	Chapel Road	641	771	130
Western Side of Proposed Scheme	P.6	Beaumont Road	846	979	134
		Skelly's Lane	665	827	162
		Kilmore Road	717	992	274
	P.7	Oscar Traynor Road	349	626	277
	P.7	Coolock Drive	190	296	106
	P.8	Clonshaugh Road	765	1173	407
		Riverside Park	426	559	133
	P.9	M50	3585	3709	124
	P.10	Baskin Lane	882	1239	357

The contents of Table 6.38 outline that the additional traffic on the key road links varies between 103 and 407 combined flows during the PM Peak Hour which have been identified as experiencing additional traffic volumes over the threshold for further assessment.

6.2.3.1.9.3 National Roads – 5% Threshold Impact Assessment (PM Peak Hour)

On the basis of the assessment methodology specifically for national roads, the junctions and associated flow difference between the Do Minimum and Do Something scenarios during the AM Peak Hour are outlined in Table 6.39.

Table 6.39: National Road Links where the 5% Additional Traffic Threshold is Exceeded (PM Peak Hour)

Junction	Total Do Minimum Turning Flows (PCUs)	Total Do Something Turning Flows (PCUs)	Turning Flow Difference (PCUs)	Percentage Difference
M1 Junction 2	4,794	4,819	51	1%
M50 Junction 1	1,402	1,405	3	0%
M50 Junction 2	2,360	2,365	-72	-3%
M50 Junction 3	3,622	3,175	-447	-12%

The contents of Table 6.39 demonstrate that the highest impact of increased traffic predicted for total turning flows between the Do Minimum and Do Something scenarios in the PM Peak Hour is 1% at the M1 Junction 2, which is considered to have a negligible impact.

At the other three junctions, either no increase or a decrease in turning flows is predicted as a result of the Proposed Scheme. Therefore, no further assessment into the junctions with national roads during the AM Peak Hour has been undertaken, aside from instances where the 100 combined flow of additional traffic threshold is exceeded, as shown in Table 6.38.

6.2.3.1.10 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 of the EIAR which considers the junction sensitivities and the significant of effects.

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 6.40.

Table 6.40: Junction Volume / Capacity Ranges

V / C Ratio	Traffic Condition
≤85%	Traffic is operating well within theoretical capacity.
85% - 100%	Traffic is approaching theoretical capacity and may experience occasional queues and delays.
≥100%	Traffic 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 6.41 have been used to describe the impact.

Table 6.41: 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 6.41, 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.

6.2.3.1.10.1 General Traffic Impact Assessment (2028 Opening Year) – Indirect Study Area - AM Peak Hour

The contents of Table 6.42 outline the V / C ratios at the key local / regional road junctions in the AM Peak Hour for the 2028 Opening Year. 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 6.42: 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%	
Grange Road	Grange Road / St Donagh's Road	✓			✓			Negligible
	Grange Road / Millbrook Avenue	✓			✓			Negligible
	Grange Road / Ardara Avenue / Howth View Park	✓				✓		Low Negative
	Grange Road / Donaghmede Shopping Centre	✓			✓			Negligible
	Grangemore Road / Grange Road	✓			✓			Negligible
	Grange Road / Newbrook Road		✓			✓		Negligible
	Grange Road / Clarehall Avenue	✓			✓			Negligible
	Grange Road / Belmayne Avenue	✓			✓			Negligible
Belmayne Avenue	Belmayne Avenue / Priory Hall		✓			✓		Negligible
The Hole In the Wall Road	The Hole In The Wall Road / Grange Abbey Road	✓			✓			Negligible
	The Hole In The Wall Road / Grattan Wood	✓			✓			Negligible
	The Hole in the Wall Road / Grange Road	✓			✓			Negligible
	The Hole in the Wall Road / Main Street / Priory Hall			✓			✓	Negligible
Tonlegee Road	Tonlegee Road / Grange Road / Kilbarrack Road		✓			✓		Negligible
	Tonlegee Road / Raheny Road	✓			✓			Negligible
	Tonlegee Road / Millbrook Drive	✓			✓			Negligible
	Tonlegee Road / Millwood Villas	✓			✓			Negligible
	Tonlegee Road / Millbrook Road	✓			✓			Negligible
	Tonlegee Road / Tonlegee Avenue	✓			✓			Negligible
	Tonlegee Road / Rathvale Drive	✓			✓			Negligible
	Glenfarne Road / Tonlegee 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%	
	Tonlegee Road / Moatfield Road	✓			✓			Negligible
Harmonstown Road	Lein Park / Harmonstown Road	✓			✓			Negligible
	Springdale Road / Harmonstown Road	✓			✓			Negligible
	Ribh Road / Harmonstown Road	✓			✓			Negligible
Howth Road	Howth Road / Collins Avenue East	✓			✓			Negligible
	Dunseverick Road / Howth Road	✓			✓			Negligible
	Howth Road / The Demesne	✓			✓			Negligible
	Howth Road / Dunluce Road	✓			✓			Negligible
	Howth Road / Furry Park Road (South)	✓			✓			Negligible
	Howth Road / The Demesne / Furry Park Road	✓			✓			Negligible
	Howth Road / Furry Park Road (North)	✓			✓			Negligible
	Howth Road / Brookwood Avenue / Sybil Hill Road		✓			✓		Negligible
Vernon Avenue	Vernon Avenue / Sybil Hill Road	✓			✓			Negligible
	Castle Avenue / Vernon Avenue	✓			✓			Negligible
	Dunluce Road / Vernon Avenue / Vervill Court	✓			✓			Negligible
	Vernon Avenue / Grosvenor Court	✓			✓			Negligible
Clontarf Road	Marino Crescent / Clontarf Road	✓			✓			Negligible
	St Lawrence Road / Clontarf Road /	✓			✓			Negligible
	Clontarf Road / Alfie Byrne Road			✓			✓	Negligible
	Clontarf Road / Malahide Road	✓				✓		Low Negative
	Castle Avenue / Clontarf Road		✓			✓		Negligible
	Haddon Road / Clontarf Road / Clontarf Road	✓				✓		Low Negative
	Clontarf Road / Howth Road		✓		✓			Low Positive
	Clontarf Road / Hollybrook Road			✓		✓		Low Positive
Clonshaugh Road	Clonshaugh Road / R139			✓		✓		Low Positive
	Clonshaugh Avenue / Clonshaugh Heights	✓			✓			Negligible
	Riverside Park / Clonshaugh Road	✓			✓			Negligible
	Clonshaugh Road / R139	✓			✓			Negligible
Clonshaugh Avenue	Clonshaugh Avenue / Glin Road	✓			✓			Negligible
	Clonshaugh Road / Clonsaugh Avenue	✓			✓			Negligible
Priorswood Road	Priorswood Road / Marigold Avenue	✓			✓			Negligible
	Priorswood Road / Glin Road	✓			✓			Negligible
	Priorswood Road / Marigold Road	✓			✓			Negligible
M1 Southbound (Junction 3)	M1 Southbound / R139	✓			✓			Negligible
	M1 Southbound / M1 Junction 3 Off-slip	✓			✓			Negligible
Baskin Lane	Baskin Lane / Clonshaugh Road / Stockhole Lane			✓			✓	Negligible
	Malahide Road / Baskin Lane		✓			✓		Negligible
M1 Southbound (Junction 3)	M1 Junction 2 / Airport Motorway	✓			✓			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%	
Chapel Road	R124 / Chapel Road	✓			✓			Negligible
	Chapel Road / Kinsealy Lane	✓			✓			Negligible

The results of the junction analysis illustrated in Table 6.42 demonstrate that the majority of junctions are operating with a maximum V / C ratio of below 85% during the AM Peak Hour in the 2028 Opening Year.

Capacity issues are noted at the following junctions:

- **R807 Clontarf Road / Alfie Byrne Road three-arm signalised junction (13175[3]) –** operates above 100% during both the Do Minimum and Do Something scenarios;
- **The Hole in the Wall Road / Main Street / Priory Hall four-arm signalised junction (17204)** – operates above 100% during both the Do Minimum and Do Something scenarios; and
- **Baskin Lane / Clonshaugh Road / Stockhole Lane three-arm priority junction (35656)** – operates above 100% during both the Do Minimum and Do Something scenarios.

Each of the three junctions operate with a maximum V / C ratio of above 100% in both the Do Minimum and Do Something scenarios, therefore, the impact is considered to be **Negligible**.

The above demonstrates that the Proposed Scheme will have a **Negligible** impact on the majority of assessed local / regional road links within the indirect study area. **Low Negative** impacts are experienced at three junctions and **Low Positive** impacts are predicted at three junctions.

6.2.3.1.10.2 General Traffic Impact Assessment (2028 Opening Year) – Indirect Study Area - PM Peak Hour

The contents of Table 6.43 outline the V / C ratios at the key local / regional road junctions in the PM Peak Hour for the 2028 Opening Year. The location of these junctions and the V / C ratio comparison between the Do Minimum and Do Something scenarios in the 2028 PM Peak Hour are illustrated in Figure 6.10 in TIA Appendix 3 (Maps).

Table 6.43: 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%	
Coast Road	Main Street / Willie Nolan Road / Coast Road		✓			✓		Negligible
	Red Arches Road / Coast Road	✓			✓			Negligible
	Coast Road / Red Arches Road	✓			✓			Negligible
Main Street	Main Street / Main Street	✓			✓			Low Negative
	R124 New Street / Main Street / Church Road / The Mall		✓			✓		Negligible
	R106 Main Street / Old Street	✓			✓			Negligible
Moyne Road	Coast Road / Strand Road / Station Road	✓			✓			Negligible

[3] Unique junction number which corresponds with Figure 6.9 to Figure 6.12 in Volume 3 of this EIAR and to the full set of analysis tables in Appendix 6.4.4 (General Traffic Assessment) in Volume 4 of this EIAR.

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%	
	Coast Road / Moyne Road	✓			✓			Negligible
Grange Road	Grange Road / St Donagh's Road	✓			✓			Negligible
	Grange Road / Donaghmede Shopping Centre	✓			✓			Negligible
	Grangemore Road / Grange Road			✓			✓	Negligible
	Grange Road / Clarehall Avenue		✓			✓		Negligible
	Grange Road / R139 / The Hole In The Wall	✓			✓			Negligible
	Grange Road / Newbrook Road	✓			✓			Negligible
	Grange Road / The Hole In The Wall Road	✓			✓			Negligible
	Grange Road / Ardara Avenue		✓			✓		Negligible
Millbrook Avenue	Millbrook Drive / Millbrook Avenue	✓			✓			Negligible
	Grange Road / Millbrook Avenue	✓			✓			Negligible
The Hole In The Wall Road	The Hole In The Wall Road / Priory Hall / Main Street		✓			✓		Negligible
	The Hole In The Wall Road / St Michael's Cottages	✓			✓			Negligible
	The Hole In The Wall Road / Marrsfield Avenue	✓			✓			Negligible
Tonlegee Road	Tonlegee Road / Springdale Road	✓			✓			Negligible
	Glenfarne Road / Tonlegee Road	✓			✓			Negligible
	Tonlegee Road / Tonlegee Avenue	✓			✓			Negligible
	Tonlegee Road / Rathvale Drive	✓			✓			Negligible
	Moatfield Road / Tonlegee Road	✓			✓			Negligible
Clontarf Road	Dollymount Park / Clontarf Road	✓			✓			Negligible
	Clontarf Road / Seaview Avenue North / Clontarf Road			✓			✓	Negligible
	Clontarf Road / Kincora Road / Clontarf Road	✓			✓			Negligible
	Clontarf Road / Clontarf Road / Seafield Road East	✓			✓			Negligible
	Conquer Hill Road / Clontarf Road / Clontarf Road	✓			✓			Negligible
	Danes Court / Clontarf Road / Clontarf Road	✓			✓			Negligible
	St Lawrence Road / Clontarf Road / Clontarf Road /			✓			✓	Negligible
	Dollymount Avenue / Clontarf Road	✓			✓			Negligible
	Clontarf Road / The Oaks	✓			✓			Negligible
	Castle Avenue / Clontarf Road	✓			✓			Negligible
	Haddon Road / Clontarf Road	✓			✓			Negligible
Dublin Road	Dublin Road / Yellow Walls Road	✓			✓			Negligible
	Dublin Road / Ard Na Mara	✓			✓			Negligible
	Dublin Road / O'Hanlon's Lane	✓			✓			Negligible
Howth Road	Copeland Avenue / Howth Road		✓			✓		Negligible
	Howth Road / Hollybrook Park		✓			✓		Negligible
James Larkin Road	Watermill Road / James Larkin Road / Causeway Road		✓			✓		Negligible
	Howth Road / James Larkin 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%	
	Clontarf Road / James Larkin Road / Mount Prospect Avenue	✓			✓			Negligible
Kilbarrack Road	Kilbarrack Avenue / Kilbarrack Road / Kilbarrack Road	✓			✓			Negligible
	St Margarets Avenue / Kilbarrack Road	✓			✓			Negligible
	Kilbarrack Road / Howth Road / Dublin Road		✓			✓		Negligible
	Kilbarrack Road / Verbena Avenue	✓			✓			Negligible
	Alden Road / Kilbarrack Road	✓			✓			Negligible
	Thornville Road / Kilbarrack Road	✓			✓			Negligible
Chapel Road	Drumnigh Road / Chapel Road	✓			✓			Negligible
	Chapel Road / Gandon Lane / Kinsealy Lane	✓			✓			Negligible
Beaumont Road	Beaumont Road / Beaumont Road / The Thatch Road	✓			✓			Negligible
	Grace Park Road / Beaumont Road / Collins Avenue			✓			✓	Negligible
	Dromawling Road / Shantalla Road / Beaumont Road		✓			✓		Negligible
	Coolatree Road (West) / Beaumont Road	✓			✓			Negligible
	Beaumont Road / Beaumont Woods	✓			✓			Negligible
	Coolatree Road (East) / Beaumont Road	✓			✓			Negligible
	Beaumont Road / Coolgreena Road	✓			✓			Negligible
	Beaumont Road / Beaumont Crescent / Skellys Lane	✓			✓			Negligible
	Beaumont Road / Yellow Road	✓			✓			Negligible
	Beaumont Road / The Park	✓			✓			Negligible
Kilmore Road	Maryfield Drive / Kilmore Road	✓			✓			Negligible
	Kilmore Road / Maryfield Crescent	✓			✓			Negligible
Skellys Lane	Elm Mount Park / Skellys Lane	✓			✓			Negligible
	Whitethorn Rise / Skellys Lane	✓			✓			Negligible
	Montrose Grove / Skellys Lane	✓			✓			Negligible
	Kilmore Road / Newlands Court Apartments	✓			✓			Negligible
Coolock Drive	Coolock Drive / Bunratty Road	✓			✓			Negligible
	Coolock Drive / Oscar Traynor Road	✓			✓			Negligible
Oscar Traynor Road	Oscar Traynor Road / Armstrong Walk	✓			✓			Negligible
	Barryscourt Road / Oscar Traynor Road	✓			✓			Negligible
	R104 / Oscar Traynor Road / Malahide Road	✓			✓			Negligible
	Oscar Traynor Road / Beechlawn Avenue	✓			✓			Negligible
	Oscar Traynor Road / Brookville Crescent / Coolock Village	✓			✓			Negligible
	Beechpark Avenue / Oscar Traynor Road	✓			✓			Negligible
	Oscar Traynor Road / Kilmore Road		✓				✓	Medium Negative
Clonshaugh Road	Clonshaugh Road / R139 Northern Cross Extension			✓			✓	Negligible
	R139 / Clonshaugh Road (North)			✓			✓	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%	
	Clonshaugh Road / R139	✓			✓			Negligible
	Clonshaugh Avenue / Glin Road	✓			✓			Negligible
	Clonshaugh Road / Clonshaugh Avenue	✓				✓		Low Negative
	Riverside Park / Clonshaugh Road	✓			✓			Negligible
	Clonshaugh Road / Newbury Wood	✓			✓			Negligible
	Clonshaugh Avenue / Clonshaugh Heights	✓			✓			Negligible
	Baskin Lane / Clonshaugh Road / Stockhole Lane	✓				✓		Low Negative
	Clonshaugh Road / Dublin Airport Hotel / Clonshaugh Service Station	✓			✓			Negligible
Riverside Park	Riverside Park / Riverside Drive	✓			✓			Negligible
	Greencastle Road / Barryscourt Road	✓			✓			Negligible
M50	M50 Northbound / Junction 2 On-slip	✓				✓		Low Negative
	M50 Northbound / Junction 3 Off-slip	✓			✓			Negligible

The results of the junction analysis illustrated in Table 6.43 demonstrate that the majority of junctions are operating with a maximum V / C ratio of below 85% during the PM Peak Hour in the 2028 Opening Year and the Proposed Scheme. A negligible impact is predicted at 88 of the 93 junctions assessed.

Capacity issues are noted at the following seven junctions:

- **Grangemore Road / Grange Road three-arm priority junction (17131)** – operates above 100% during both the Do Minimum and Do Something scenarios;
- **Clontarf Road / Seaview Avenue North three-arm signalised junction (13112)** – operates above 100% during both the Do Minimum and Do Something scenarios;
- **St Lawrence Road / Clontarf Road three-arm priority junction (13173)** – operates above 100% during both the Do Minimum and Do Something scenarios;
- **Grace Park Road / Beaumont Road / Collins Avenue four-arm signalised junction (13196)** – operates above 100% during both the Do Minimum and Do Something scenarios;
- **Oscar Traynor Road / Kilmore Road three-arm signalised junction (13463) –** operates just below 100% in the Do Minimum scenario, and just over 100% in the Do Something scenario (i.e. a marginal increase);
- **Clonshaugh Road / R139 Northern Cross Extension three-arm signalised junction (17115)** – operates above 100% during both the Do Minimum and Do Something scenario; and
- **R139 / Clonshaugh Road (North) three-arm roundabout (17118) –** operates above 100% during both the Do Minimum and Do Something scenario.

At six of the junctions above, performance is similar with or without the Proposed Scheme in place and the impact remains **Low Negative or Negligible** at all junctions, with the exception of the Oscar Traynor Road / Kilmore Road three-arm signalised junction where a **Medium Negative** impact is predicted. Therefore, no further assessment into these junctions has been undertaken.

6.2.3.1.10.3 General Traffic Impact Assessment (2043 Design Year) – Indirect Study Area – AM Peak Hour

The contents of Table 6.44 outline the V / C ratios at the key local / regional road junctions in the AM Peak Hour for the 2043 Design Year. The location of these junctions and the V / C ratio comparison between the Do Minimum and Do Something scenarios in the 2043 AM Peak Hour are illustrated in Figure 6.11 in TIA Appendix 3 (Maps).

Table 6.44: Volume over Capacity Ratios at Key Junctions (Do Minimum vs. Do Something), AM Peak, 2043 Design 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%	
Grange Road	Grange Road / St Donagh's Road	✓			✓			Negligible
	Grange Road / Millbrook Avenue	✓			✓			Negligible
	Grange Road / Ardara Avenue / Howth View Park	✓				✓		Low Negative
	Grange Road / Donaghmede Shopping Centre	✓			✓			Negligible
	Grangemore Road / Grange Road	✓			✓			Negligible
	Grange Road / Newbrook Road		✓			✓		Negligible
	Grange Road / Clarehall Avenue	✓			✓			Negligible
	Grange Road / Belmayne Avenue	✓			✓			Negligible
Belmayne Avenue	Belmayne Avenue / Priory Hall		✓			✓		Negligible
The Hole In the Wall Road	The Hole In The Wall Road / Grange Abbey Road	✓			✓			Negligible
	The Hole In The Wall Road / Grattan Wood	✓			✓			Negligible
	The Hole in the Wall Road / Grange Road	✓			✓			Negligible
	The Hole in the Wall Road / Main Street / Priory Hall			✓			✓	Negligible
Tonlegee Road	Tonlegee Road / Grange Road / Kilbarrack Road		✓			✓		Negligible
	Tonlegee Road / Raheny Road	✓			✓			Negligible
	Tonlegee Road / Millbrook Drive	✓			✓			Negligible
	Tonlegee Road / Millwood Villas	✓			✓			Negligible
	Tonlegee Road / Millbrook Road	✓			✓			Negligible
	Tonlegee Road / Tonlegee Avenue	✓			✓			Negligible
	Tonlegee Road / Rathvale Drive	✓			✓			Negligible
	Glenfarne Road / Tonlegee Road	✓			✓			Negligible
	Tonlegee Road / Moatfield Road	✓			✓			Negligible
Harmonstown Road	/ Lein Park / Harmonstown Road	✓			✓			Negligible
	Springdale Road / Harmonstown Road	✓			✓			Negligible
	Ribh Road / Harmonstown Road	✓			✓			Negligible
Howth Road	Howth Road / Collins Avenue East	✓			✓			Negligible
	Dunseverick Road / Howth Road	✓			✓			Negligible
	Howth Road / The Demesne	✓			✓			Negligible
	Howth Road / Dunluce Road	✓			✓			Negligible
	Howth Road / Furry Park Road (South)	✓			✓			Negligible
	Howth Road / The Demesne / Furry Park Road	✓			✓			Negligible
	Howth Road / Furry Park Road (North)	✓			✓			Negligible
	Howth Road / Brookwood Avenue / Sybil Hill Road		✓			✓		Negligible
Vernon Avenue	Vernon Avenue / Vernon Avenue / Vernon Avenue	✓			✓			Negligible
	Castle Avenue / Vernon Avenue	✓			✓			Negligible
	Dunluce Road / Vernon Avenue / Vervill Court	✓			✓			Negligible
	Vernon Avenue / Grosvenor Court	✓			✓			Negligible
Clontarf Road	Marino Crescent / Clontarf Road	✓			✓			Negligible
	St Lawrence Road / Clontarf Road / Clontarf Road /	✓			✓			Negligible
	Alfie Byrne Road / Clontarf 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%	
	Clontarf Road / Malahide Road	✓			✓			Negligible
	Castle Avenue / Clontarf Road		✓			✓		Negligible
	Haddon Road / Clontarf Road	✓			✓			Negligible
	Clontarf Road / Howth Road		✓		✓			Negligible
	Clontarf Road / Holybrook Road			✓		✓		Low Positive
Clonshaugh Road	Clonshaugh Road / R139			✓			✓	Negligible
	Clonshaugh Avenue / Clonshaugh Heights	✓			✓			Negligible
	Riverside Park / Clonshaugh Road	✓			✓			Negligible
	Clonshaugh Road / R139	✓			✓			Negligible
Clonshaugh Avenue	Clonshaugh Avenue / Glin Road	✓			✓			Negligible
	Clonshaugh Road / Clonsaugh Avenue	✓			✓			Negligible
Priorswood Road	Priorswood Road / Marigold Avenue	✓			✓			Negligible
	Priorswood Road / Glin Road	✓			✓			Negligible
	Priorswood Road / Marigold Road	✓			✓			Negligible
M1 Southbound (Junction 3)	M1 Southbound / R139	✓			✓			Negligible
	M1 Southbound / M1 Junction 3 Off-slip	✓			✓			Negligible
Baskin Lane	Baskin Lane / Clonshaugh Road / Stockhole Lane			✓			✓	Negligible
	Malahide Road / Baskin Lane		✓			✓		Negligible
M1 Southbound (Junction 3)	M1 Junction 2 / Airport Motorway		✓			✓		Negligible
Chapel Road	R124 / R124 / Chapel Road		✓			✓		Negligible
	Chapel Road / Kinsealy Lane	✓			✓			Negligible

The results of the junction analysis illustrated in Table 6.44 demonstrate that the majority of junctions continue to operate with a maximum V / C ratio of below 85% during the AM Peak Hour in the 2043 Design Year.

In the 2043 Design Year, capacity issues arise at the following three junctions during the AM Peak Hour:

- **Clonshaugh Road / R139 three-arm signalised junction (17115)** – operates above 100% during both the Do Minimum and Do Something scenarios;
- **The Hole in the Wall Road / Main Street / Priory Hall for-arm signalised junction (17204)** – operates above 100% during both the Do Minimum and Do Something scenarios; and
- **Baskin Lane / Clonshaugh Road / Stockhole Lane three-arm priority junction (35656)** – operates above 100% during both the Dominium and Do Something scenarios.

As each of these junctions operate with a maximum V / C ratio of above 100% in both the Do Minimum and Do Something, the impact is considered to be **Negligible.**

A **Negligible Impact** is predicted at all junction junctions assessed, with the exception of one **Low Negative** impact at the Grange Road / Ardara Avenue four-arm signalised junction, and one **Low Positive** impact at the Clontarf Road / Holybrook Road junction. Further assessment into mitigation measures is therefore not necessary for any junctions in the AM Peak Hour of the 2043 Design Year.

6.2.3.1.10.4 General Traffic Impact Assessment (2043 Design Year) – Indirect Study Area - PM Peak Hour

The contents of Table 6.45 outline the V / C ratios at the key local / regional road junctions in the PM Peak Hour for the 2043 Design Year. The location of these junctions and the V / C ratio comparison between the Do Minimum and Do Something scenarios in the 2043 PM Peak Hour are illustrated in Figure 6.12 in TIA Appendix 3 (Maps).

Table 6.45: Volume over Capacity Ratios at Key Junctions (Do Minimum vs. Do Something), PM Peak, 2043 Design 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%	
Coast Road	Main Street / Willie Nolan Road / Coast Road		✓			✓		Negligible
	Red Arches Road / Coast Road	✓			✓			Negligible
	Coast Road / Red Arches Road	✓			✓			Negligible
Main Street	Main Street / Main Street	✓				✓		Low Negative
	R124 New Street / Main Street / Church Road / The Mall		✓			✓		Negligible
	R106 Main Street / Old Street	✓			✓			Negligible
Moyne Road	Coast Road / Strand Road / Station Road	✓			✓			Negligible
	Coast Road / Moyne Road	✓			✓			Negligible
Grange Road	Grange Road / St Donagh's Road	✓			✓			Negligible
	Grange Road / Donaghmede Shopping Centre	✓			✓			Negligible
	Grangemore Road / Grange Road			✓		✓		Low Positive
	Grange Road / Clarehall Avenue		✓			✓		Negligible
	Grange Road / R139 / The Hole In The Wall	✓			✓			Negligible
	Grange Road / Newbrook Road	✓				✓		Low Negative
	Grange Road / The Hole In The Wall Road	✓			✓			Negligible
	Grange Road / Ardara Avenue		✓			✓		Negligible
Millbrook Avenue	Millbrook Drive / Millbrook Avenue	✓			✓			Negligible
	Grange Road / Millbrook Avenue	✓			✓			Negligible
The Hole In The Wall Road	The Hole In The Wall Road / Priory Hall		✓			✓		Negligible
	The Hole In The Wall Road / St Michael's Cottages	✓			✓			Negligible
	The Hole In The Wall Road / Marrsfield Avenue	✓			✓			Negligible
Tonlegee Road	Tonlegee Road / Springdale Road	✓			✓			Negligible
	Glenfarne Road / Tonlegee Road	✓			✓			Negligible
	Tonlegee Road / Tonlegee Avenue	✓			✓			Negligible
	Tonlegee Road / Rathvale Drive	✓			✓			Negligible
	Moatfield Road / Tonlegee Road	✓			✓			Negligible
Clontarf Road	Dollymount Park / Clontarf Road	✓			✓			Negligible
	Clontarf Road / Seaview Avenue North			✓			✓	Negligible
	Clontarf Road / Kincora Road	✓			✓			Negligible
	Clontarf Road / Seafield Road East	✓			✓			Negligible
	Conquer Hill Road / Clontarf Road	✓			✓			Negligible
	Danes Court / Clontarf Road	✓			✓			Negligible
	St Lawrence Road / Clontarf Road			✓			✓	Negligible
	Dollymount Avenue / Clontarf Road	✓			✓			Negligible
	Clontarf Road / The Oaks	✓			✓			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%	
	Castle Avenue / Clontarf Road	✓			✓			Negligible
	Haddon Road / Clontarf Road	✓			✓			Negligible
Dublin Road	Dublin Road / Yellow Walls Road	✓			✓			Negligible
	Dublin Road / Ard Na Mara	✓			✓			Negligible
	Dublin Road / O'Hanlon's Lane	✓			✓			Negligible
Howth Road	Copeland Avenue / Howth Road		✓			✓		Negligible
	Howth Road / Hollybrook Park		✓			✓		Negligible
James Larkin Road	Watermill Road / James Larkin Road / Causeway Road		✓			✓		Negligible
	Howth Road / James Larkin Road	✓			✓			Negligible
	Clontarf Road / James Larkin Road / Mount Prospect Avenue	✓			✓			Negligible
Kilbarrack Road	Kilbarrack Avenue / Kilbarrack Road	✓			✓			Negligible
	St Margarets Avenue / Kilbarrack Road	✓			✓			Negligible
	Kilbarrack Road / Howth Road / Dublin Road		✓			✓		Negligible
	Kilbarrack Road / Verbena Avenue	✓			✓			Negligible
	Alden Road / Kilbarrack Road	✓			✓			Negligible
	Thornville Road / Kilbarrack Road	✓			✓			Negligible
Chapel Road	Drumnigh Road / Chapel Road	✓			✓			Negligible
	Chapel Road / Gandon Lane / Kinsealy Lane	✓			✓			Negligible
Beaumont Road	Beaumont Road / The Thatch Road	✓			✓			Negligible
	Grace Park Road / Beaumont Road / Collins Avenue / Collins Avenue			✓			✓	Negligible
	Dromawling Road / Shantalla Road / Beaumont Road		✓			✓		Negligible
	Coolatree Road (West) / Beaumont Road	✓			✓			Negligible
	Beaumont Road / Beaumont Woods	✓			✓			Negligible
	Coolatree Road (East) / Beaumont Road	✓			✓			Negligible
	Beaumont Road / Coolgreena Road	✓			✓			Negligible
	Beaumont Road / Beaumont Crescent / Skellys Lane	✓			✓			Negligible
	Beaumont Road / Yellow Road	✓			✓			Negligible
	Beaumont Road / The Park	✓			✓			Negligible
Kilmore Road	Maryfield Drive / Kilmore Road	✓			✓			Negligible
	Kilmore Road / Maryfield Crescent	✓			✓			Negligible
Skellys Lane	Elm Mount Park / Skellys Lane	✓			✓			Negligible
	Whitethorn Rise / Skellys Lane	✓			✓			Negligible
	Montrose Grove / Skellys Lane	✓			✓			Negligible
	Kilmore Road / Newlands Court Apartments	✓			✓			Negligible
Coolock Drive	Coolock Drive / Bunratty Road	✓			✓			Negligible
	Coolock Drive / Oscar Traynor Road	✓			✓			Negligible
Oscar Traynor Road	Oscar Traynor Road / Armstrong Walk	✓			✓			Negligible
	Barryscourt Road / Oscar Traynor Road	✓			✓			Negligible
	R104 / Oscar Traynor Road / Malahide 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%	
	Oscar Traynor Road / Beechlawn Avenue	✓			✓			Negligible
	Oscar Traynor Road / Brookville Crescent / Coolock Village	✓			✓			Negligible
	Beechpark Avenue / Oscar Traynor Road	✓			✓			Negligible
	Oscar Traynor Road / Kilmore Road		✓				✓	Medium Negative
Clonshaugh Road	Clonshaugh Road / R139 Northern Cross Extension			✓			✓	Negligible
	R139 / Clonshaugh Road (North)			✓			✓	Negligible
	Clonshaugh Road / R139	✓			✓			Negligible
	Clonshaugh Avenue / Glin Road	✓			✓			Negligible
	Clonshaugh Road / Clonshaugh Avenue	✓				✓		Low Negative
	Riverside Park / Clonshaugh Road	✓			✓			Negligible
	Clonshaugh Road / Newbury Wood	✓			✓			Negligible
	Clonshaugh Avenue / Clonshaugh Heights	✓			✓			Negligible
	Baskin Lane / Clonshaugh Road / Stockhole Lane		✓				✓	Medium Negative
	Clonshaugh Road / Dublin Airport Hotel / Clonshaugh Service Station	✓			✓			Negligible
Riverside Park	Riverside Park / Riverside Drive	✓			✓			Negligible
	Greencastle Road / Greencastle Road / Barryscourt Road /	✓			✓			Negligible
M50	M50 Northbound / Junction 2 On-slip	✓				✓		Low Negative
	M50 Northbound / Junction 3 Off-slip	✓			✓			Negligible

The results of the junction analysis illustrated in Table 6.45 demonstrate that the majority of junctions continue to operate with a maximum V / C ratio of below 85% during the PM Peak Hour in the 2043 Design Year and the Proposed Scheme.

It is noted that capacity issues arise at the following seven junctions:

- **Clontarf Road / Seaview Avenue North three-arm signalised junction (13112)** – operates above 100% during both the Do Minimum and Do Something scenarios;
- **St Lawrence Road / Clontarf Road three-arm priority junction (13173)** – operates above 100% during both the Do Minimum and Do Something scenarios;
- **Grace Park Road / Beaumont Road / Collins Avenue four-arm signalised junction (13196)** – operates above 100% during both the Do Minimum and Do Something scenarios;
- **Oscar Traynor Road / Kilmore Road three-arm signalised junction (13463) –** operates between 85% – 100% during the Do Minimum and above 100% during the Do Something scenario;
- **Clonshaugh Road / R139 Northern Cross Extension three-arm signalised junction (17115)** – operates above 100% during both the Do Minimum and Do Something scenario;
- **R139 / Clonshaugh Road (North) three-arm roundabout (17118) –** operates above 100% during both the Do Minimum and Do Something scenario; and
- **Baskin Lane / Clonshaugh Road / Stockhole Lane three-arm priority junction (35656)** – operates between 85% – 100% during the Do Minimum and above 100% during the Do Something scenario.

At five out of seven of the above junctions, the magnitude of impact is predicted to be **Negligible** as performance is similar in the Do Minimum and Do Something scenarios (above 100% V / C).

Overall, at 86 of the 93 junctions assessed, the impact is predicted to be **Negligible**. A **Low Positive** impact is predicted at the Grangemore Road / Grange Road three-arm priority junction, where the V / C ratio is expected to improve as a result of redistributed traffic associated with the Proposed Scheme.

A **Low Negative** impact is predicted at four junctions, and a **Medium Negative** impact at only two junctions (Oscar Traynor Road / Kilmore Road three-arm signalised junction and Baskin Lane / Clonshaugh Road / Stockhole Lane three-arm priority junction). Therefore, no further assessment into mitigation measures is required.

6.2.3.1.11 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[4]. 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.

6.2.3.1.12 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 redistribution of general traffic away from the main corridor onto the surrounding road network.

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 an 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 require further traffic analysis:

- **AM Peak Hour:** Grange Road, R104 Tonlegee Road, Harmonstown Road, R105 Howth Road, Vernon Avenue, R105 Clontarf Road, Clonshaugh Road, Clonshaugh Avenue, M1 Southbound (at Junction 3), Baskin Lane, and M1 Junction 2 Circulatory; and
- **PM Peak Hour:** R106 Main Street, R106 Coast Road, R123 Moyne Road, R809 Grange Road, Millbrook Avenue, R104 Tonlegee Road, Kilbarrack Road, R807 James Larkin Road, R807 Clontarf Road, R807 Dublin Road, R105 Howth Road, Chapel Road, Beaumont Road, Skellys Lane, Kilmore Road, R104 Oscar Traynor Road, Coolock Drive, Clonshaugh Road, Riverside Park, M50, and Baskin Lane.

In terms of the national roads 5% threshold impact assessment, the highest impact predicted for total turning flows between the Do Minimum and Do Something scenarios in both the AM and PM Peak Hours is a 1% increase at the M1 Junction 2. At the other three junctions, either no increase or a decrease in turning flows is predicted as a result of the Proposed Scheme.

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 /

[4] Less pedestrian, cycling and bus demand requirements leading to higher level of general traffic green time allocation per typical signal cycle

C ratio. Mitigation measures have been considered at junctions where the significance of effect is predicted to be significant or higher.

The overall results of this assessment can be summarised as follows:

- The majority of assessed junctions have V / C 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 to be **Negligible.**
- At the small number of junctions indicating capacity constraints, the majority of these junctions operate with a maximum V / C ratio of above 100% in both the Do Minimum and Do Something, therefore, the impact is considered to be **Negligible**. This level of congestion is acceptable according to national guidance. Section 3.4.2 of DMURS (2019) recognises that a certain level of traffic congestion is an inevitable feature within urban networks and that junctions may have to operate at saturation levels for short periods of time during the Peak Hours of the day. Chapter 1 of the Smarter Travel Policy Document also acknowledges that it is not feasible or sustainable to accommodate continued demand for car use. It should therefore be considered that the traffic congestion that is 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. Therefore, the proposed impacts are considered acceptable when considered against the Scheme Objectives.

Overall, it is determined that there will be a **Low Negative** 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**.

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.

6.2.3.1.13 Network-Wide Performance Indicators

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 6.46 outline the impact that the Proposed Scheme will have on the wider transport network, beyond the defined study areas.

Table 6.46: 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.hrs)	18,690	18,730	0.21%	Negligible
	Over Capacity Queues (pcu.hrs)	5,335	5,232	-1.93%	
	Total Travel Times (pcu.hrs)	62,250	62,030	-0.35%	
	Total Travel Distance (pcu.kms)	2,020,000	2,013,000	-0.35%	
	Average Network Speed (km / h)	32.46	32.46	0.00%	
2028 Opening Year PM Peak Hour	Transient Queues (pcu.hrs)	17,990	18,080	0.50%	Low Negative
	Over Capacity Queues (pcu.hrs)	4,718	4,884	3.52%	
	Total Travel Times (pcu.hrs)	59,030	59,100	0.12%	
	Total Travel Distance (pcu.kms)	1,942,000	1,932,000	-0.51%	
	Average Network Speed (km / h)	32.9	32.7	-0.61%	
2043 Opening Year AM Peak Hour	Transient Queues (pcu.hrs)	18200	18070	-0.71%	Low Negative
	Over Capacity Queues (pcu.hrs)	5037	5024	-0.26%	
	Total Travel Times (pcu.hrs)	61,370	61,360	-0.02%	
	Total Travel Distance (pcu.kms)	2,052,000	2,059,000	0.34%	
	Average Network Speed (km / h)	33.44	33.55	0.33%	
2043 Opening Year PM Peak Hour	Transient Queues (pcu.hrs)	18,080	18,170	0.50%	Low Negative
	Over Capacity Queues (pcu.hrs)	17,490	17,470	-0.11%	
	Total Travel Times (pcu.hrs)	4647	4393	-5.47%	
	Total Travel Distance (pcu.kms)	58,080	5,7970	-0.19%	
	Average Network Speed (km / h)	1,933,000	1,943,000	0.52%	

The results of the assessment demonstrate that the impacts to the network performance indicators range between -5.47% and 3.52%, therefore a low negative impact is anticipated.

6.2.4 Operational Phase Summary

The contents of Table 6.47 present a summary of the potential impacts of the Proposed Scheme during the Operational Phase.

Table 6.47:Summary of Potential Operational Phase Impacts

Assessment Topic	Effect	Potential Impact
Pedestrian Infrastructure	Improvements to the quality of the pedestrian infrastructure along the Proposed Scheme.	Medium Positive
Cycling Infrastructure	Improvements to the quality of the cycling infrastructure along the Proposed Scheme.	Medium Positive
Bus Infrastructure	Improvements to the quality of the bus infrastructure along the Proposed Scheme.	High Positive
Parking and Loading	A total loss of 78 parking / loading spaces along the Proposed Scheme.	Medium Negative
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.	Medium 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.	Low Negative
Network Wide Performance Indicators	Deterioration to the network-wide queuing capacity, travel times, travel distances and average network speeds beyond the direct and indirect study areas.	Low Negative

As outlined within Section 6.2 (Operational Phase) and summarised in Table 6.47 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 7.

7. Cumulative Assessment

7.1 Construction Phase 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 Phase Cumulative Impacts

7.2.1 Introduction

This chapter also reports the assessment of cumulative effects associated with the Operational Phase of the Proposed Scheme. 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 of the EIAR.

7.2.2 Transport Schemes

As detailed in Section 6.1.1, 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. 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 growth 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 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.

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 Scheme, and which could reasonably be exposed to cumulative effects in combination with other developments. Diagram 7.1 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.

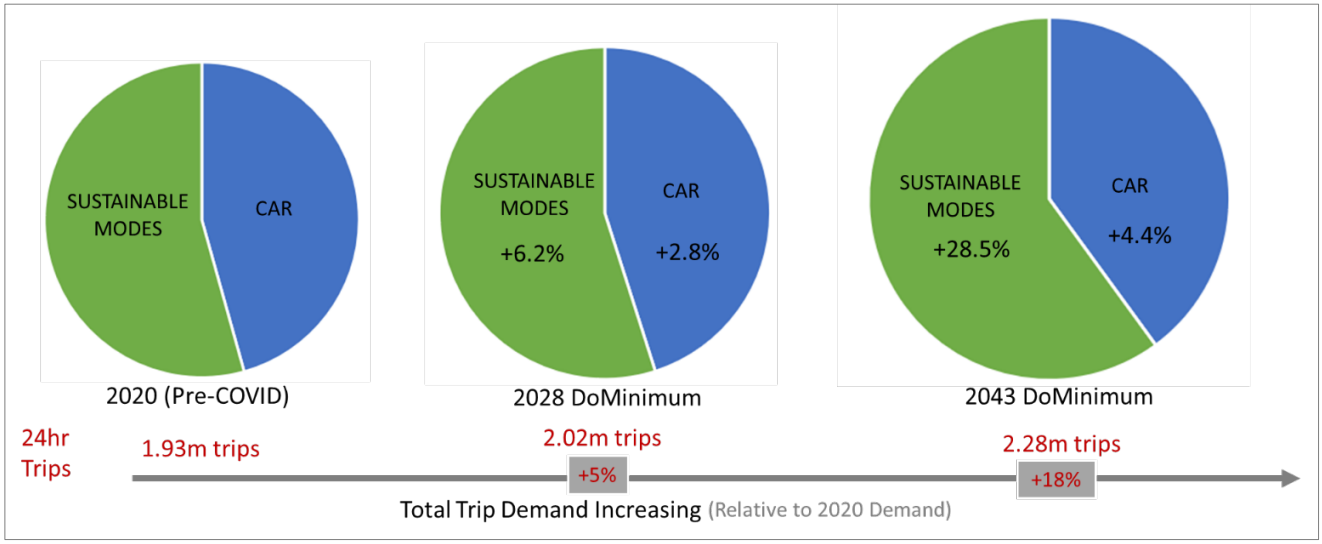

Diagram 7.1: Trip Demand Changes without the Proposed Schemes (in Relation to 2020 Demand)

As shown above, there are 1.93m trips[5] 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.

[5] Trips to/from ERM zones within a 500m distance from the Proposed Scheme to/from any destination

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 7.2 below).

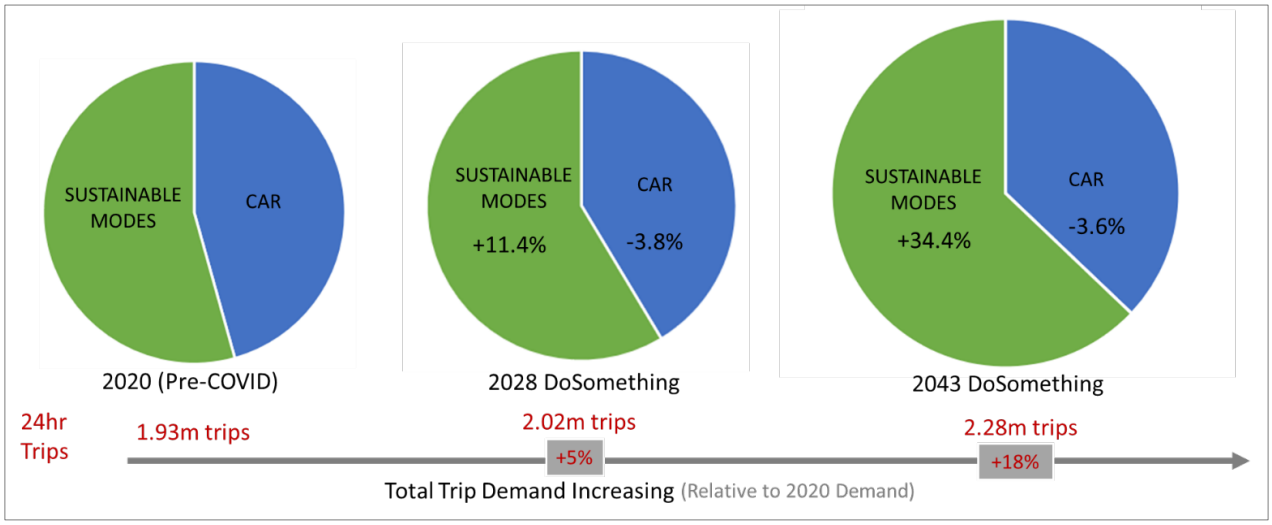

Diagram 7.2: Trip Demand Changes with the Proposed Schemes (in Relation to 2020 Demand)

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 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.

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[6] 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 7.3 and Diagram 7.4 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[7] 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.

[6] 500m recommended maximum walking distance to Core Bus Corridors - “Buses In Urban Development”, CIHT 2018

[7] The analysis includes only trips from the defined catchment i.e., it does not include trips from external areas outside of the catchment that travel to the city centre

7.2.4.2.1 2028 Demand Changes by Mode

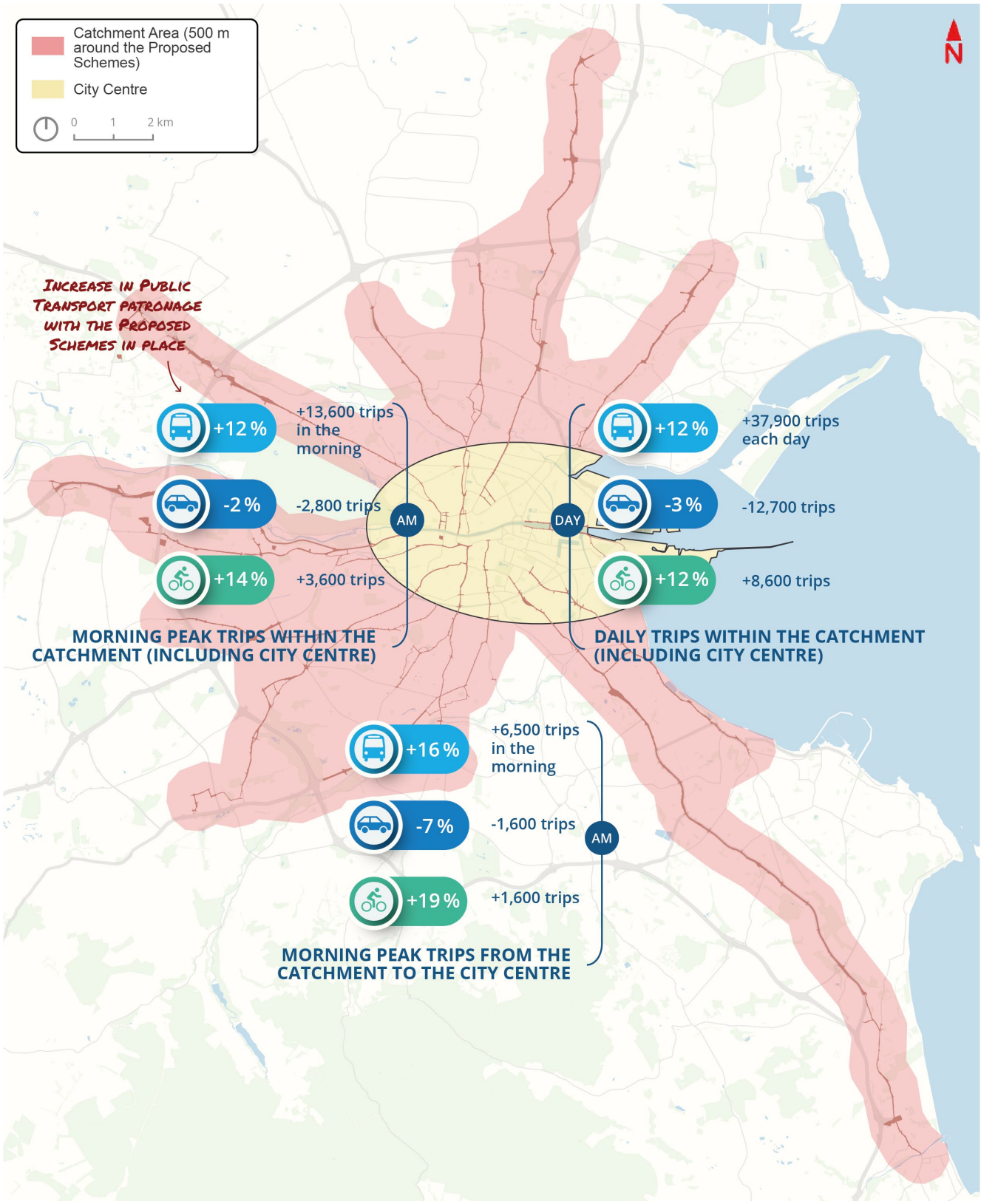

Diagram 7.3: Change in Trips by Mode within a 500m Catchment Area of the Proposed Schemes and the City Centre and Trips Originating from the Catchment Inbound to the City Centre in 2028

As indicated in Diagram 7.3, 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 and a 12% increase in public transport, 3% decrease in general traffic and a 12% increase in cycling trips each day (07:00-19:00).

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 Area and City Centre	AM (07:00-10:00)	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%
		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 Proposed Schemes in operation.

7.2.4.2.2 2043 Demand Changes by Mode

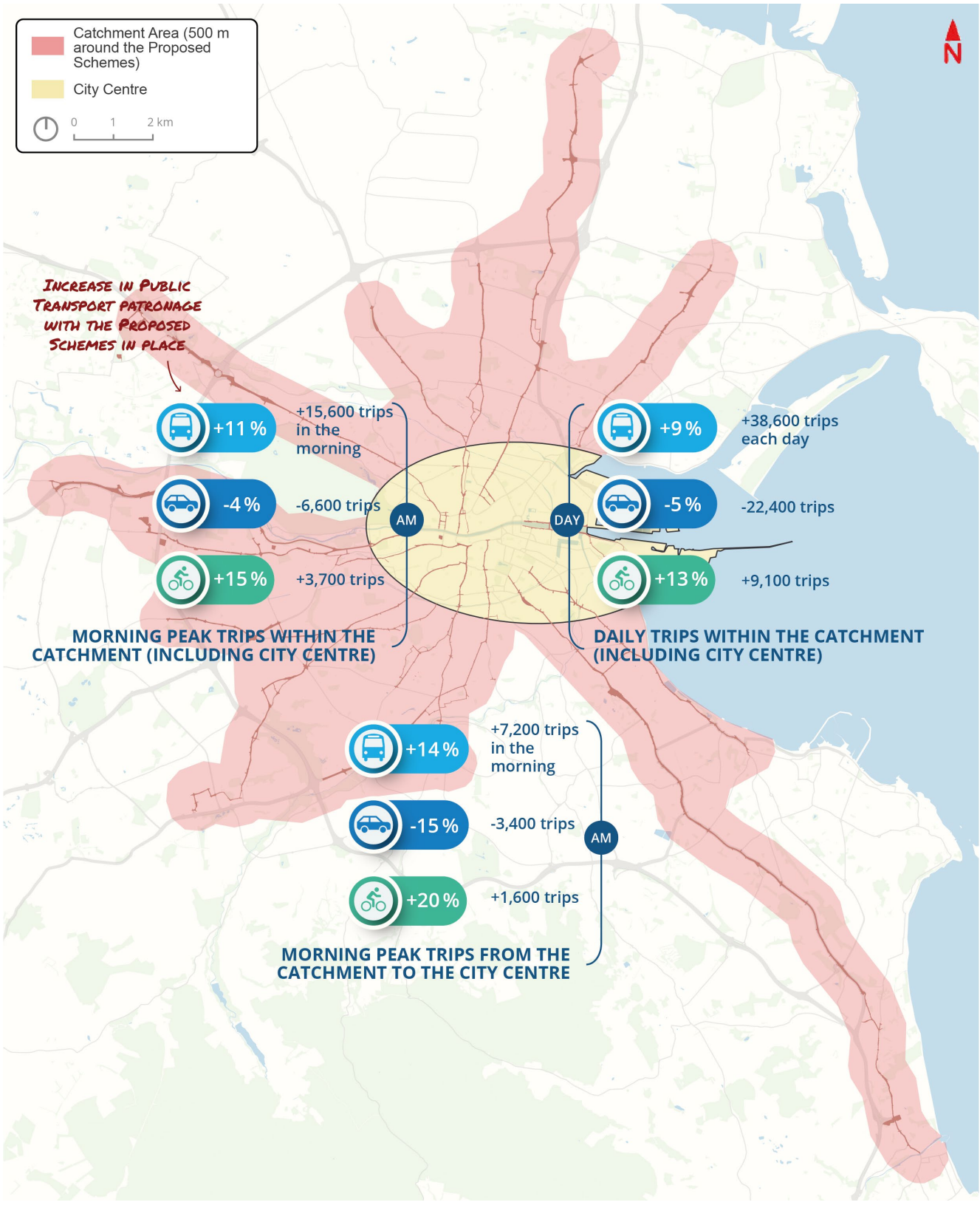

Diagram 7.4: Change in trips by mode within a 500m Catchment Area of the Proposed Schemes and the City Centre and Trips originating from the Catchment inbound to the City Centre in 2043

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 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 and a 9% increase in public transport, 5% decrease in general traffic and a 13% increase in cycling trips each day (07:00-19:00).

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 7.5 illustrates the average People Movement by mode, across all Proposed Schemes, inbound towards the City Centre during the AM Peak Hour in 2028.

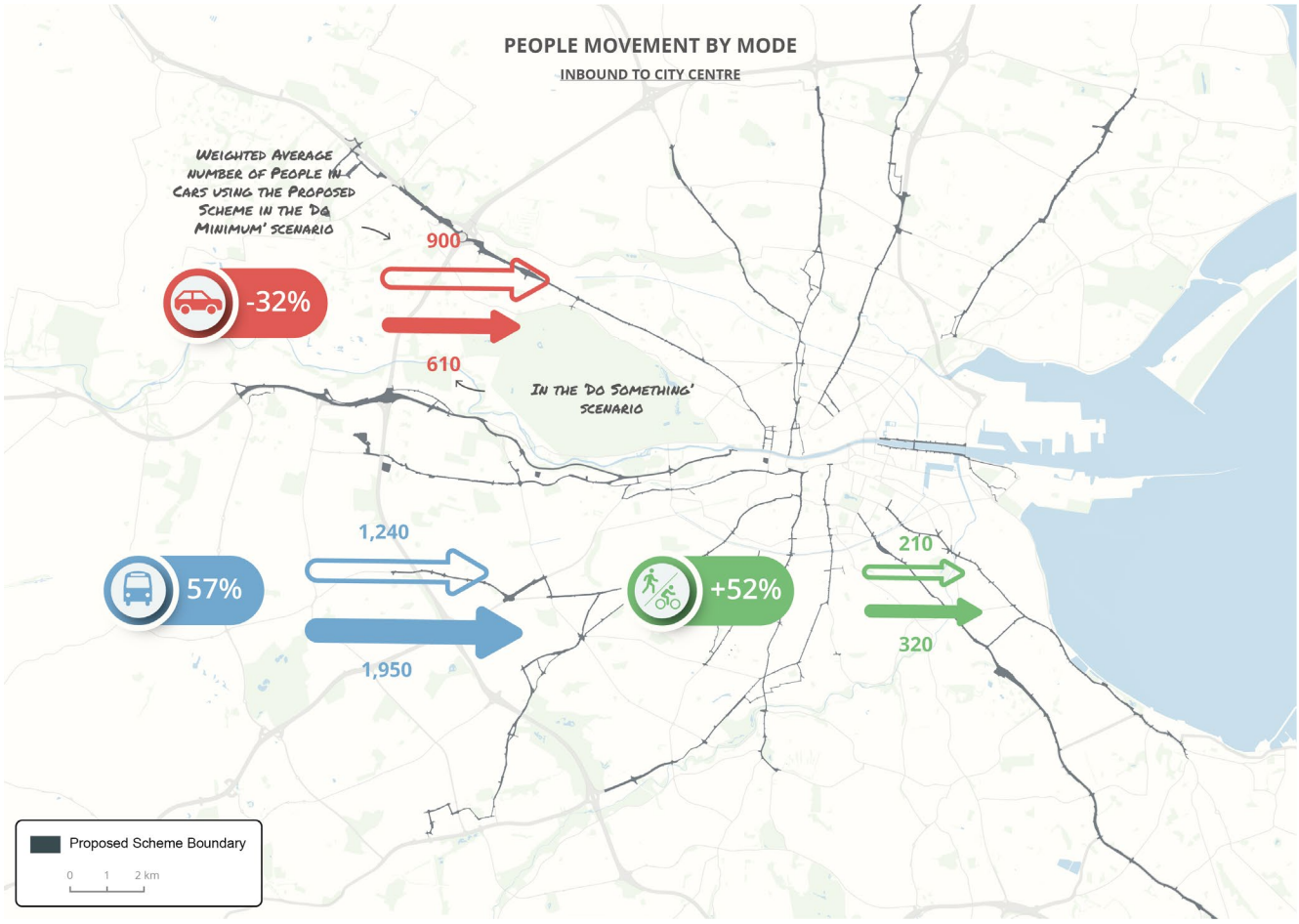

Diagram 7.5: People Movement by Mode during 2028 AM Peak Hour

As indicated in Diagram 7.5, 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 7.6 illustrates the average People Movement by mode, across all Proposed Schemes, travelling outbound from the city centre during the PM Peak Hour.

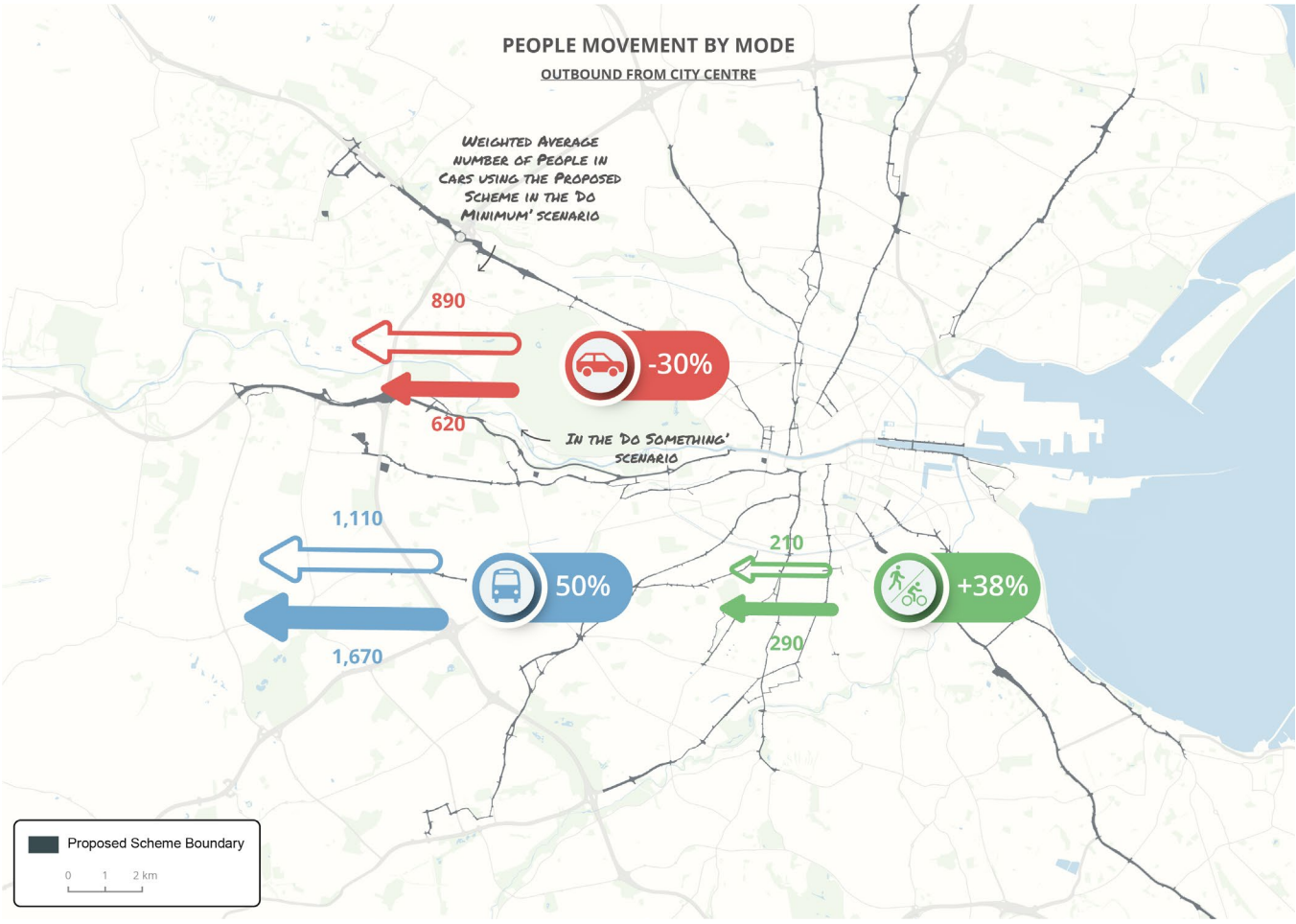

Diagram 7.6: People Movement by Mode during 2028 PM Peak Hour

As indicated in Diagram 7.6, 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**	**100%**	**2,580**	**100%**	**370**	**17%**

7.2.4.3.3 2043 AM Peak Hour People Movement

Diagram 7.7 illustrates the average People Movement by mode, across all Proposed Schemes, inbound towards the City Centre during the AM Peak Hour in 2043.

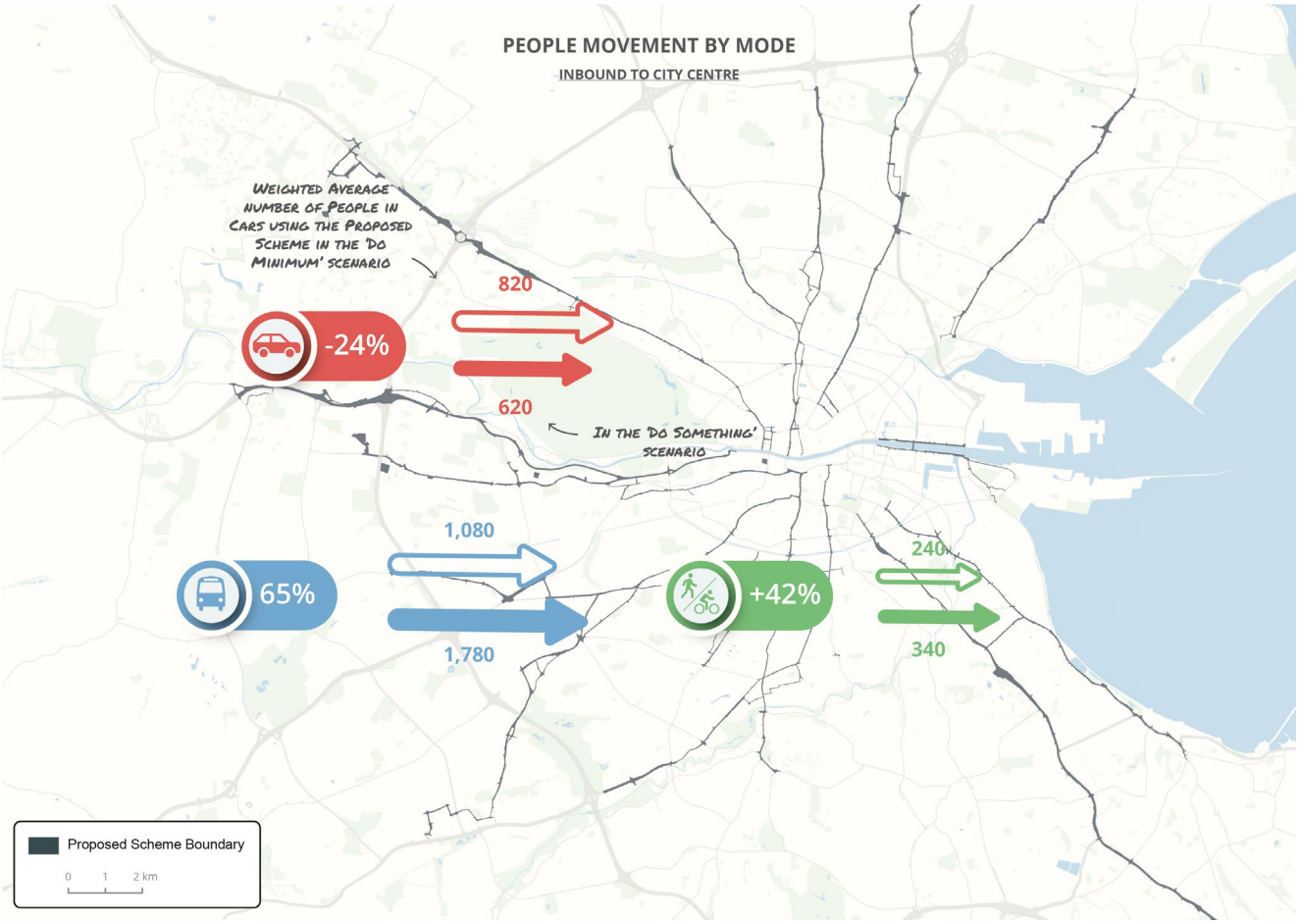

Diagram 7.7: People Movement by Mode during 2043 AM Peak Hour

As indicated in Diagram 7.7, 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 7.8 illustrates the average People Movement by mode, across all Proposed Schemes, travelling outbound from the City Centre during the PM Peak Hour in 2043.

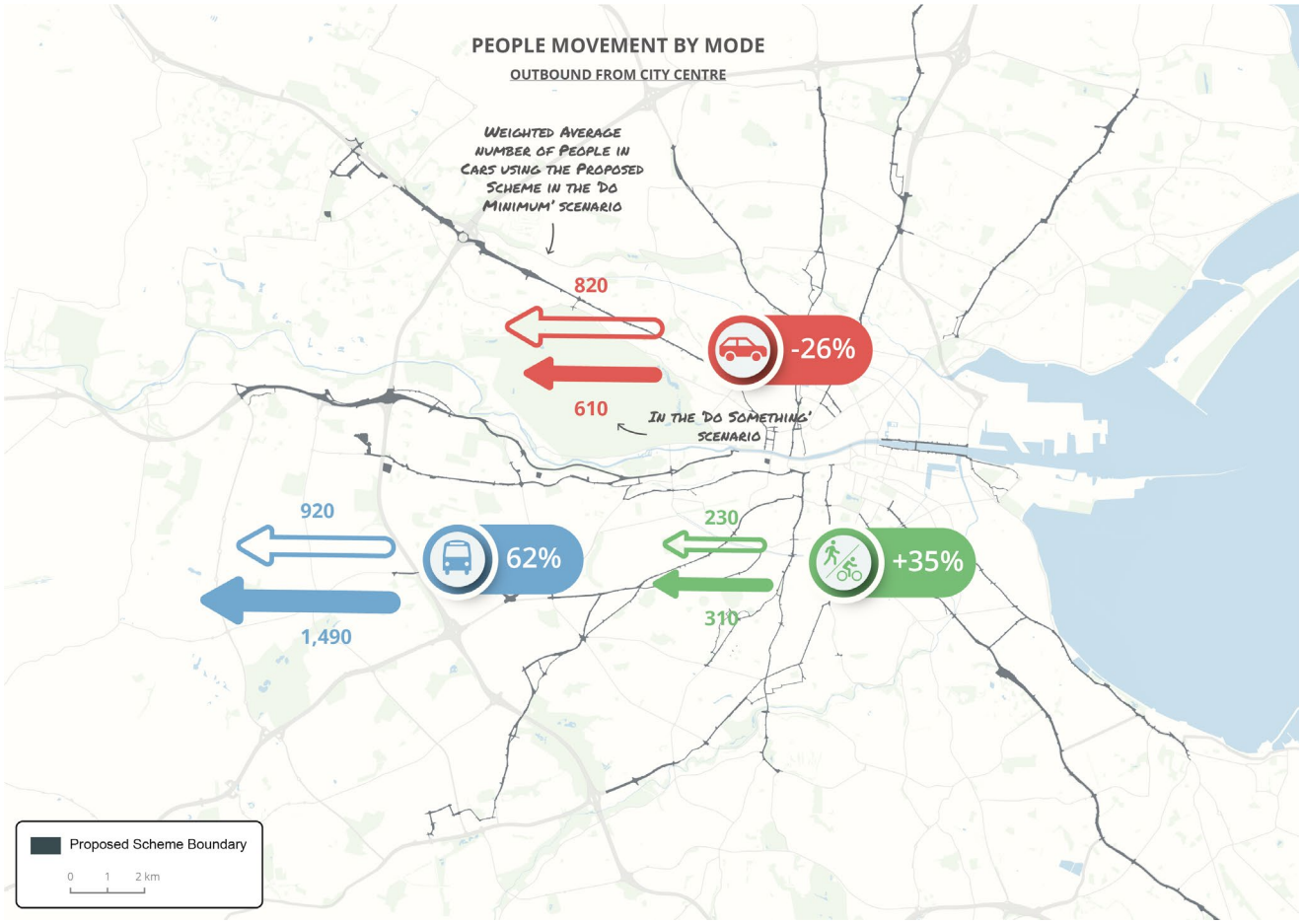

Diagram 7.8: People Movement by Mode during 2043 PM Peak Hour

As indicated in Diagram 7.8, 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**	**100%**	**2,410**	**100%**	**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 7.9 to Diagram 7.12 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

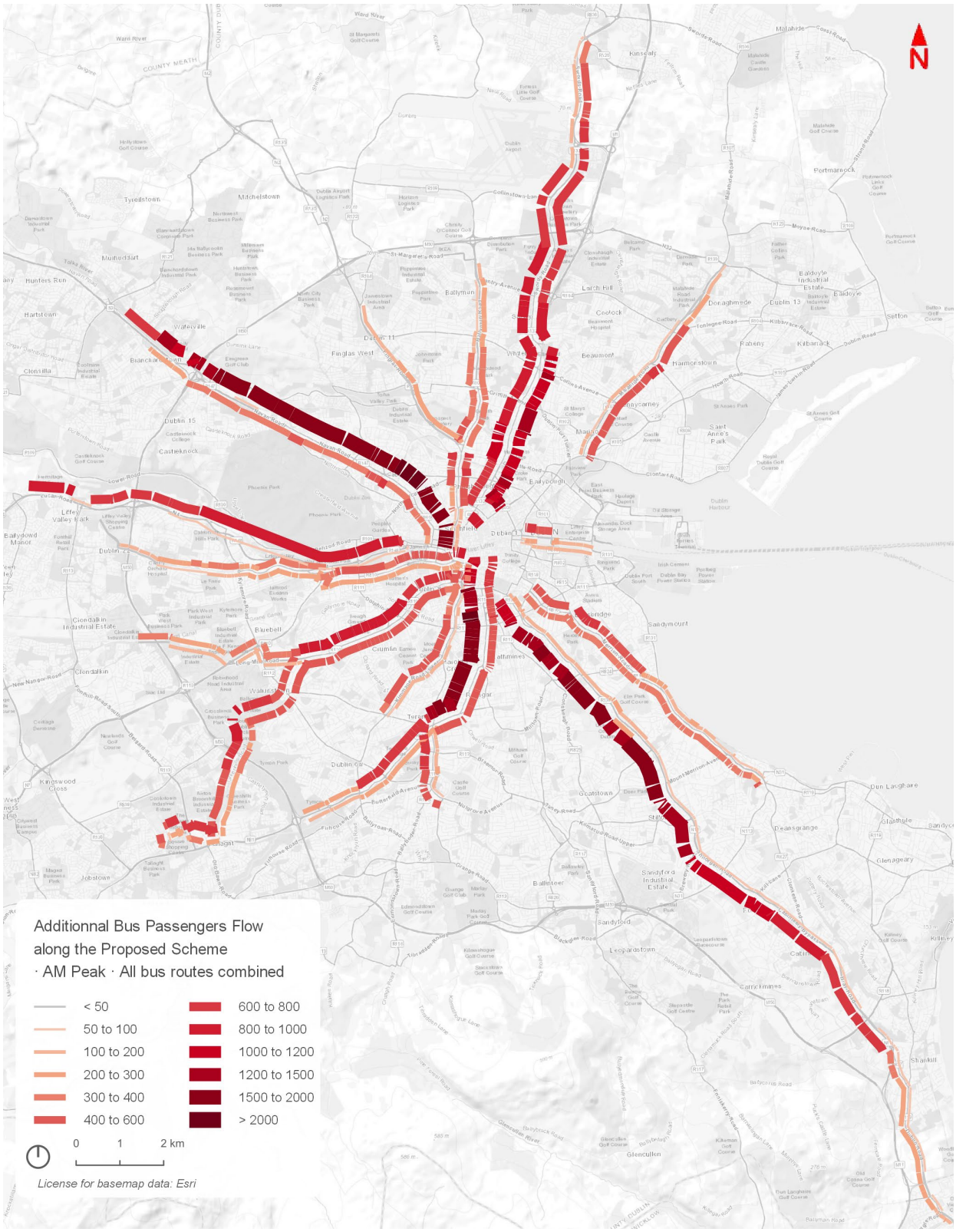

Diagram 7.9: AM Peak Hour Total Bus Passenger Flows Along the Proposed Schemes (All Bus Routes Combined)

As indicated in Diagram 7.9, 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 Clongriffin to City Centre Core Bus

Corridor Scheme shows an increase of approximately 700 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 Clongriffin to City Core Bus Corridor 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 (%)
Clongriffin to City Centre Core Bus Corridor Scheme	8,830	11,270	2,440	27.6%
All Schemes	85,990	101,760	15,770	18.3%

As shown above there will be a 28% increase in people boarding bus routes which form any part of the Clongriffin to City Centre Core Bus Corridor Scheme during the AM Peak Hour. This represents an addition of 2,440 passengers.

There will be a 18% 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

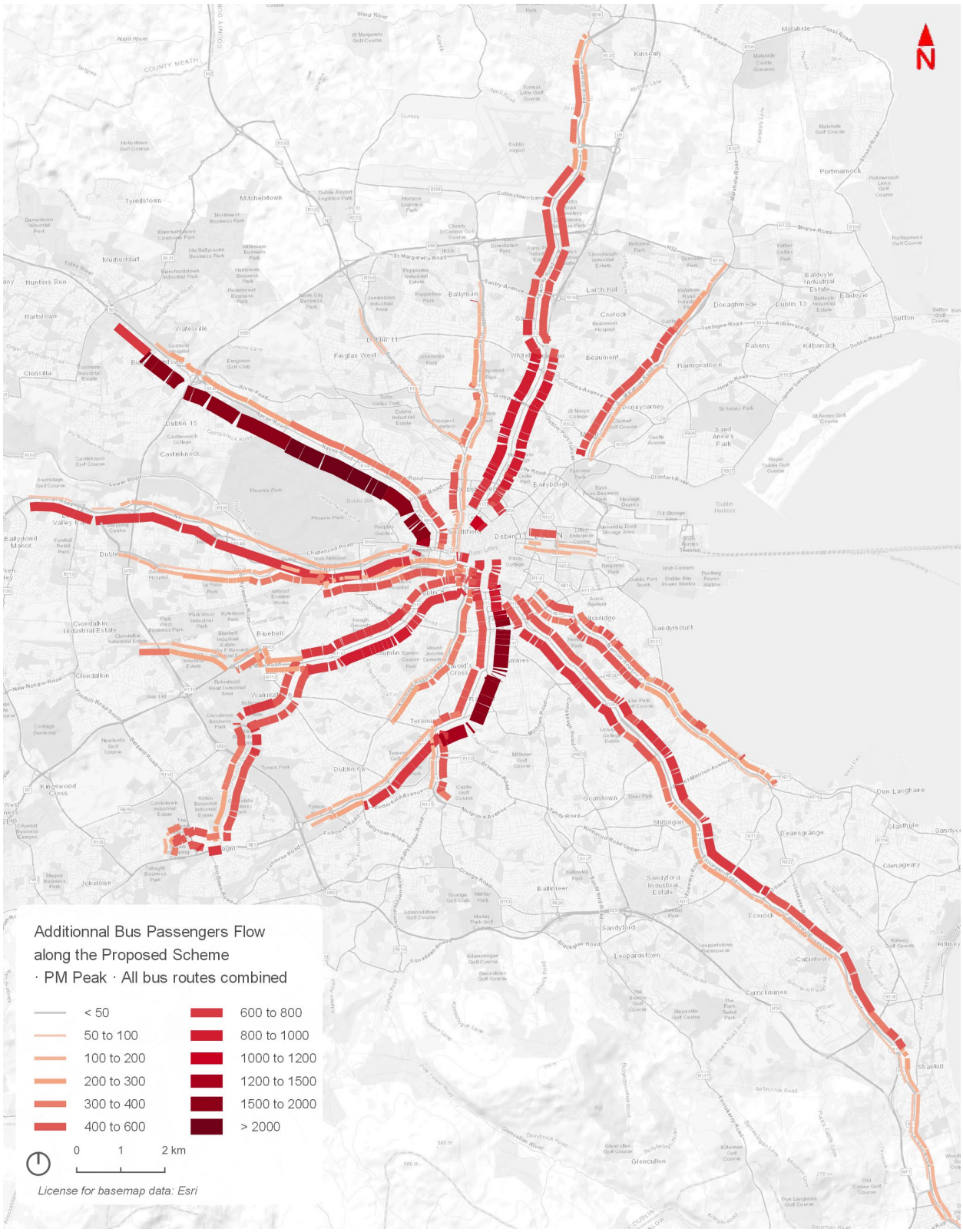

Diagram 7.10: PM Peak Hour Total Bus Passenger Flows Along the Proposed Schemes (All Bus Routes Combined)

As indicated in Diagram 7.10, there is a high growth in bus patronage along all the Proposed Schemes in the 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 Clongriffin to City Centre Core Bus Corridor Scheme shows an increase of approximately 600 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 Clongriffin to City Centre Core Bus Corridor 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 (%)
Clongriffin to City Centre Core Bus Corridor Scheme	7,670	10,300	2,630	34.3%
All Schemes	71,280	85,170	13,890	19.5%

As shown in Table 7.10, there will be a 34% increase in people boarding bus routes which use any part of the Clongriffin to City Centre Core Bus Corridor Scheme during the PM Peak Hour. This represents an addition of 2,630 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

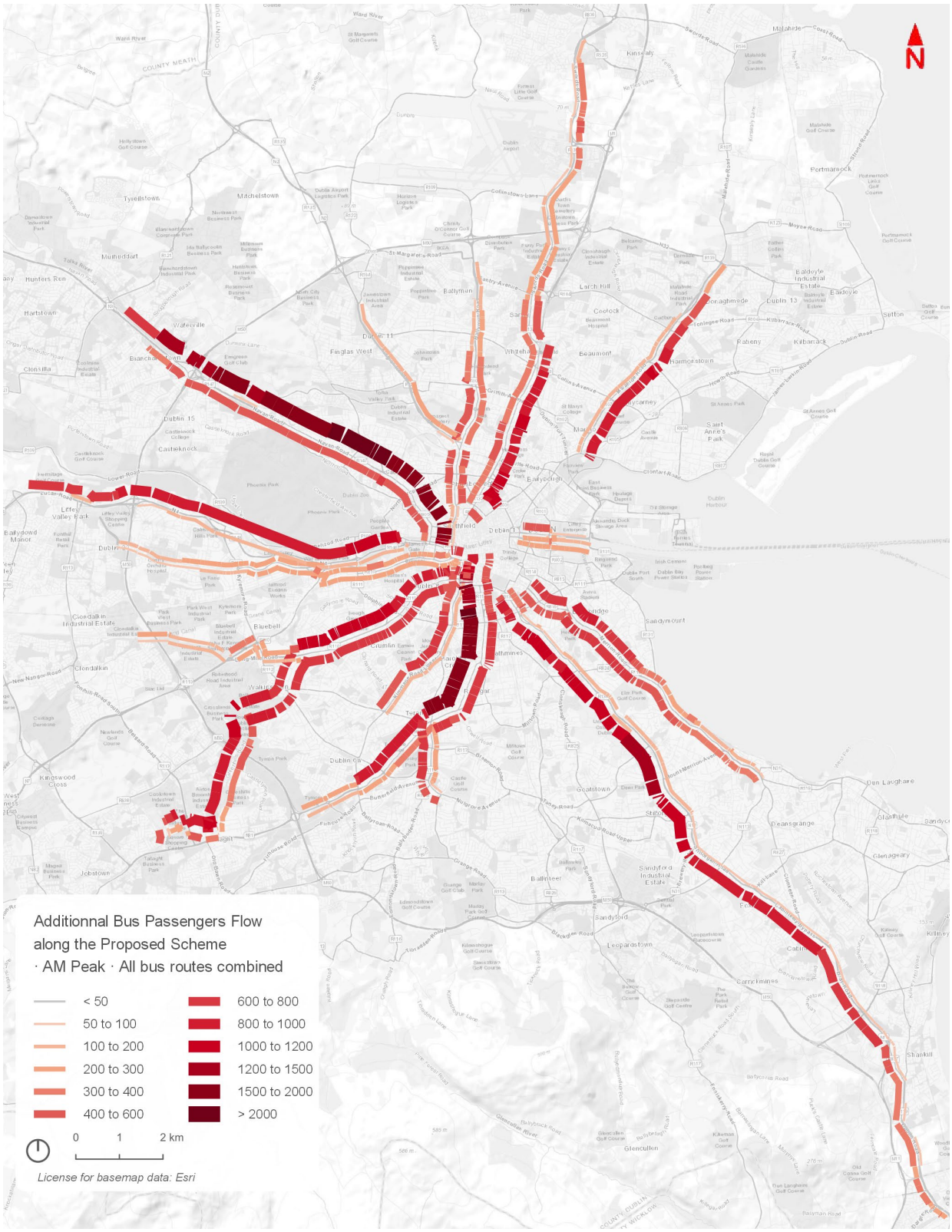

Diagram 7.11: AM Peak Hour Total Bus Passenger Flows Along the Proposed Schemes (All Bus Routes Combined)

As indicated in Diagram 7.11, there is a high growth in bus patronage along all the Proposed Schemes in the 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 Clongriffin to City Centre Core Bus Corridor 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 Clongriffin to City Centre Core Bus Corridor 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 (%)
Clongriffin to City Centre Core Bus Corridor Scheme	9,070	12,600	3,530	38.9%
All Schemes	86,380	106,040	19,660	22.8%

As shown in Table 7.11, there will be a 39% increase in people boarding bus routes which use any part of the Clongriffin to City Centre Core Bus Corridor Scheme during the AM Peak Hour. This represents an addition of 3,530 passengers in the AM Peak Hour.

There will be a 23% 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

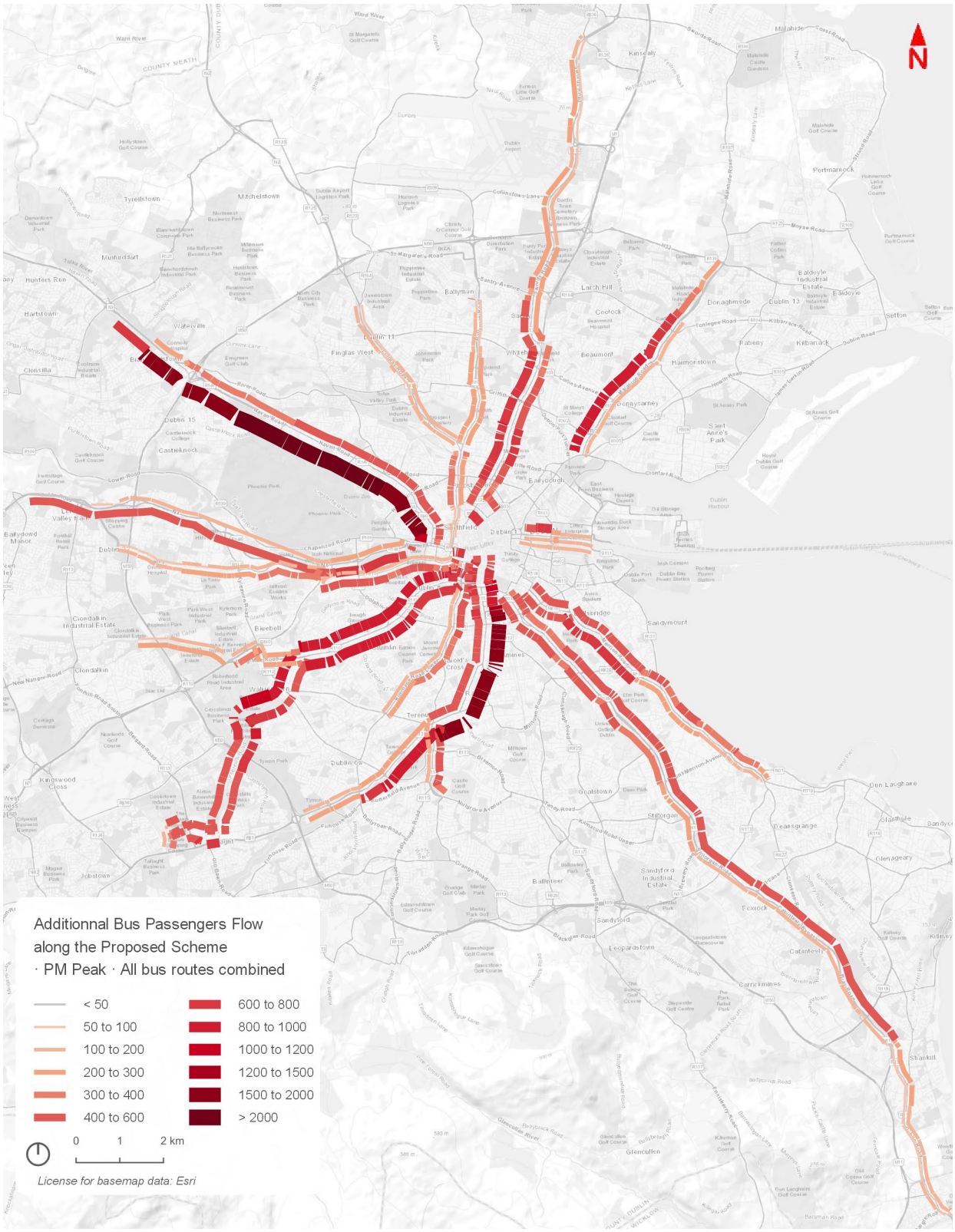

Diagram 7.12: PM Peak Hour Total Bus Passenger Flows Along the Proposed Schemes (All Bus Routes Combined)

As indicated in Diagram 7.12, there is a high growth in bus patronage along all the Proposed Schemes in the 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 Clongriffin to City Centre Core Bus Corridor Scheme shows an increase of approximately 900 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 Clongriffin to City Centre Core Bus Corridor 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 (%)
Clongriffin to City Centre Core Bus Corridor Scheme	7,750	11,340	3,590	46.3%
All Schemes	72,910	89,280	16,370	22.5%

As shown in Table 7.12, there will be a 46% increase in people boarding bus routes which use any part of the Clongriffin to City Centre Core Bus Corridor Scheme during the PM Peak Hour. This represents an addition of 3,590 passengers in the AM Peak Hour.

There will be a 23% 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.

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.

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.

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 period 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.

The Clongriffin to City Centre Core Bus Corridor Scheme does not have any direct interchange points with Luas, Rail or MetroLink stations.

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[8]. The metric considers the average speed across all public transport modes for the entire Study Area which covers all Proposed Schemes.

[8] 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.

Table 7.19: 2028 AM Peak Hour Average Journey Speed per PT Passenger (km/h)

Scenario	Do Minimum	Do Something	Speed Difference (%)
Clongriffin to City Centre Core Bus Corridor Scheme	21.13	21.28	+0.7%
All Schemes Scenario	21.13	23.08	+9.2%

As presented in Table 7.19, the average networkwide speed per PT passenger is expected to grow by 0.7%, with the Clongriffin to City Centre Core Bus Corridor Scheme only in operation in the AM Peak Hour in 2028. With all Proposed Schemes operational, the average speed per PT passenger is expected to grow by 9%, 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 (%)
Clongriffin to City Centre Core Bus Corridor Scheme	21.18	21.34	+0.8%
All Schemes Scenario	21.18	23.14	+9.3%

As presented in Table 7.20, the average networkwide speed per PT passenger is expected to grow by 0.8%, with the Clongriffin to City Centre Core Bus Corridor Scheme only in operation in the AM Peak Hour in 2043. 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 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 Schemes as well as bus usage and integration with other public transport modes, as presented above. The Proposed Schemes 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, along the R107 Malahide Road from Mayne River Avenue to the R105 Marino Mart / R105 Clontarf Road, comprises the development of improved bus priority along the entire route. This TIA provides a robust assessment of the 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 cycling, 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 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 Potential 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	Low 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 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.

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. A Level of Service (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 the LoS during the Do Minimum scenario consists predominantly of the low D / E ratings, with the exception of 10 Cs. During the Do Something scenario, i.e. following the development of the Proposed Scheme, the LoS consists predominantly of the highest A / B ratings, with the exception of four Cs. Overall, the improvements to the quality of the pedestrian infrastructure will have a **Medium Positive impact** in Section 1 and 2 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 Quality of Service (QoS) Evaluation criteria. The results of the assessment demonstrate that the LoS during the Do Minimum scenario consists of C ratings. During the Do Something scenario, the LoS consists predominantly of the highest A / A+ ratings, with the exception of one B (along the proposed quietly trafficked cycle route section via Brian Road). Overall, the improvements will have a **Medium Positive Impact** in Section 1 and Section 2 of the Proposed Scheme.

- **Bus Infrastructure:** The implementation of the Proposed Scheme will result in improvements in the quality of bus infrastructure provision along 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 improvements to the quality of the bus infrastructure will have a **High Positive impact** in Section 1 and Section 2 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 66 spaces within the redline boundary of the Proposed Scheme (-29 spaces in Section 1 and -37 spaces in Section 2). Given the nature of the loss in parking and the availability of alternative spaces in the indirect study area, a **Low Negative impact** in Section 1 and a **Medium Negative impact** in Section 2 of the Proposed Scheme is expected.

- **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 the sustainable movement of people travelling along the corridor. A quantitative impact assessment has been undertaken using outputs from the NTA's ERM and LAM, 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 of 15% and 16% in the number of people travelling along the Proposed Scheme during the 2028 AM and PM Peak Hours respectively. During the 2043 scenario there will be an increase of 27% in the number of people travelling along the Proposed Scheme during the AM and PM Peak Hours. The increases all due to the increased sustainable modes people movement facilitated by the Proposed Scheme.

  The analysis also shows that there will be an increase in 9.6% and 10.8% of passengers boarding buses during the 2028 AM and PM Peak Hours respectively. During the 2043 scenario there will be an increase in 10.5% and 14.1% of passengers boarding buses during the AM and PM Peak Hours respectively. Overall, it is adjudged that the Proposed Scheme will have a **High Positive impact** on the sustainable movement of people along the corridor.

- **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 between 20% and 23% during the AM and PM Peak hours of the 2028 Opening Year and 2043 Design Year. The Proposed Scheme will reduce total bus journey times along the Proposed Scheme by up to 18% in 2028 and 17% in 2043. Based on the AM and PM peak hours alone, this equates to **6 hours of savings in 2028 and 5.7 hours in 2043.** When compared to the Do Minimum combined across all buses. On an annual basis this equates to approximately 4,500 hours of bus vehicle savings in 2028 and 4,300 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 improvements in journey times and reliability for bus users along the Proposed Scheme will have a **Medium Positive impact**.

- **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 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. The significance of the impact has been described in terms of the loss in traffic flows. An increase in general traffic flows along a road link has been described as a negative impact to the environment. Reference has been given to TII's Traffic and Transport Assessment Guidelines as an indicator for best practice, to determine the key road links that require further traffic analysis due to the increase in traffic. Operational capacities were extracted from the LAM at the associated junctions of the key road links to identify the impact that the Proposed Scheme will have on the Volume / Capacity ratios. The results are presented in terms of the significance of the impact to the V / C ratio for each junction based on its sensitivity and magnitude of impact.

  The results of the assessment demonstrate that the surrounding road network largely 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 V / C 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 a **Medium Positive impact** whilst the impact of the redistributed general traffic along the surrounding road network will have a **Low Negative impact.**

- **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 -5.47% and 3.52% and will therefore have a **Low Negative impact**.

- **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 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	Potential Impact
Pedestrian Infrastructure	Improvements to the quality of the pedestrian infrastructure along the Proposed Scheme.	Medium Positive
Cycling Infrastructure	Improvements to the quality of the cycling infrastructure along the Proposed Scheme.	Medium Positive
Bus Infrastructure	Improvements to the quality of the bus infrastructure along the Proposed Scheme.	High Positive
Parking and Loading	A total loss of 78 parking / loading spaces along the Proposed Scheme.	Medium Negative
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.	Medium 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.	Low Negative
Network Wide Performance Indicators	Deterioration to the network-wide queuing capacity, travel times, travel distances and average network speeds beyond the direct and indirect study areas.	Low Negative
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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