Údarás Náisiúnta Iompair
National Transport Authority

Draft Transport Strategy for the Greater Dublin Area

Navan Corridor Study

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1 Introduction

1.1 Background

The National Transport Authority (NTA) is preparing a new transport strategy for the Greater Dublin Area (GDA) which will consider the future of the transport system in the GDA for the period up to year 2035. As a means towards informing the direction of the new strategy the NTA has defined eight Study Areas to be assessed for this review in order to understand more fully the 2035 travel demand coming from the Study Areas, and the public transport services that will be required to effectively meet that demand.

Jacobs Engineering Ireland (Jacobs) and SYSTRA provide consultancy services to the NTA through a Modelling Services Framework. By this means Jacobs and SYSTRA were commissioned by the NTA to undertake a desktop transport assessment of six of the eight identified corridors within the GDA.

This report focuses on the **Navan Study Area**. There are also Study Areas being examined by Jacobs / SYSTRA covering the South East, South West, West, North West and Inner Orbital. Reports considering the role that Park and Ride and Demand Management can play in increasing public transport usage will also be informing the transport strategy for the Greater Dublin Area.

1.2 Study Objectives and Principles

This study examines the future transport needs of the Navan Study Area. Consideration is given to the role and function of the strategic road network as well as the performance of existing public transport provision.

A particularly aim of the study is to explore and identify public transport options that could effectively meet the growth in travel demand to the year 2035, between the Navan Study Area and Dublin City Centre (within the Canal boundary). Additional demand for internal travel within the corridor has also been considered when reviewing both travel demand and potential public transport schemes. The review also takes cognisance of through trips that can increase demand on current and future public transport services.

The study objectives for the Navan Study Area were outlined by the NTA and have guided the study and assessment process. These objectives include developing public transport measures that will:

- cater for existing public transport usage;
- cater for 100 per cent of future demand growth to Dublin City Centre; and
- cater for more of the existing car-based demand, if feasible.

The focus is placed on meeting the demand of those trips that are greater than 3km in distance, as it has been assumed that the majority of trips less than 3km may be taken via active modes such as walking or cycling.

Based on the level of demand that is identified, and considering functionality and cost, a set of appropriate public transport solutions are presented. Packages may include bus, bus rapid transit (BRT), light rail, metro and heavy rail. Interchange between public transport modes has been considered. The public transport options identified are considered to offer the most effective, efficient and sustainable solution to serve growth in transport demand and provide the best means of contributing to an integrated public transport strategy for the GDA.

This study has considered the existing road network in the Study Area and has included the various significant road proposals that are under consideration. Discussions have been held by the NTA with the National Roads Authority and local authorities to establish the likely road network changes that will be required during the period of the transport strategy. While many of these road proposals have not yet been developed in detail, and designs are not available, the impacts of these proposals have accounted for in the analysis of the public transport requirements. Accordingly, while the analysis of the public transport necessary for the future is the focus of this study, it has involved a composite consideration of the road network.

1.3 Study Methodology

The study has been undertaken in four stages;

- Stage 1 established travel demand within the 2011 base year and 2035 forecast year using the demand from the Greater Dublin Area Regional Model (GDARM);
- Stage 2 identified public transport options that have the potential to meet the demand identified in Stage 1 based solely on capacity thresholds by public transport mode (e.g. rail, light rail, BRT and bus);
- Within Stage 3 the most appropriate public transport options that meet the demand requirements were scored and sifted based on functionality (journey time and ability to meet demand) and cost (capital cost as related to service level); and
- Stage 4 tested the preferred option in the GDARM to confirm its viability.

These stages are discussed in the following sections.

1.3.1 Stage 1 - Establish Demand

To forecast the strategic public transport needs for each of the Study Areas in 2035, demand was established using the GDARM which has a base year of 2011. To produce the 2035 forecast, planning data was provided by the NTA based on the 2035 population and employment projections.

The 2011 demand outputs were generated for the GDA for the AM peak hour (08:00–09:00) for trip ends for all trips greater than 3km within these time periods. The same process was applied for the 2035 demand. The AM peak hour was chosen for the demand analysis because this is when the travel demand is at its highest over the day. The PM peak was not used for this stage of review, as demand tends to be spread over a longer time and it also does not typically cater for both work and school trips.

Screenlines were used to develop an understanding of travel demand passing through the Study Area. This analysis is primarily used to inform the capacity requirements for future public transport options for the Study Area.

The study aims to cater for growth in public transport demand to 2035. This target was identified for each Screenline. For the Navan Study Area, the public transport demand target is defined to cater for existing public transport flows plus an appropriate percentage of the demand growth using a suitable mode share factor. The target is an upper bound of the growth in demand that has potential to use public transport in the future if suitable services were to be provided.

1.3.2 Stage 2 - Public Transport Option Development

The second stage of the study focuses on developing public transport options to meet the target public transport demand growth from 2011 to 2035, during the AM peak hour (08:00-09:00).

Catchment bands for existing public transport services were defined and applied to identify growth within the catchment of existing service areas and to identify areas where the level of service provided by public transport is low or where no service is provided

Service capacities for possible public transport modes were then defined. This includes the definition of the seating capacity and crush capacity for DART, Commuter Rail, Light Rail, Bus Rapid Transit, Urban Bus, Intercity Bus and Shuttle Bus. For the purpose of option development for the 2035 transport strategy, public transport options are considered based on design capacity which is equivalent to an operating level of service that is at or below 85 per cent of crush capacity. This ensures that at no time will the entirety of the target demand be accommodated by a service that is underutilised, or is so busy as to make the service less desirable. Crush capacity is an industry standard expression relating to the loading upper limit of public transport services that allow standing as a means of catering for higher levels of patronage. Design capacity is assumed at 85 per cent of this to allow for a more comfortable and attractive level of service to be provided.

Development of public transport options for Stage 2 of the study focused on utilising the capacity and frequency definitions to determine the appropriate public transport mode to meet AM peak hour demand.

1.3.3 Stage 3 - Public Transport Option Scoring

Stage 3 takes the output of the high level public transport options developed in Stage 2 and scores them based on categories relating to demand, functionality and cost.

The functionality scoring category analysed the capacity of the public transport option to meet the 2035 travel demand from the Study Area into Dublin City Centre during the AM peak hour. It also considered the average duration of the journey for trips within and out with the catchment bands of the public transport services proposed.

The cost scoring category is based on the capital costs per option. It also considers the extent to which existing infrastructure is utilised and maximised for efficiency. Typical capital costs have been assumed, generally based on a cost per km. Typical costs may include a level of risk. A more detailed review would be required to confirm the likely cost, for example to account for land acquisition and all major risks. Operational costs are not considered. Despite this, the outline costs are considered to provide a reasonable estimation of costs at a suitable level for comparative purposes for this stage of review.

The public transport options with the best score were recommended to be considered further as part of the larger 2035 Greater Dublin Area Transport Strategy.

1.3.4 Stage 4 – Transport Modelling Assessment

This stage tested the preferred option in the Greater Dublin Area Regional Model (GDARM). The modelling exercise was undertaken to determine the likely viability, usage and operation of the proposed services for implementation by 2035.

1.4 Report Structure

The report is structured as follows:

Section 2 describes the Navan Study Area and outlines the Do Minimum scenario;

- Section 3 details the results of the demand analysis for the Study Area and identifies the 2035 public transport target demand;
- Section 4 develops and sifts the public transport options to meet the demand established in Section 3;

- Section 5 outlines the modelling assessment of the proposed public transport services; and
- Section 6 describes the Preferred Emerging Scheme.

2 Study Area

2.1 Corridor Description

The Navan Study Area, shown below in Figure 2.1, covers the area along the M3/N3 Corridor. This includes the towns of Navan, Dunshaughlin, and Ratoath and is bounded to the north by the N51. The rest of the corridor is rural in nature, predominantly made up of small settlements and amenity and agricultural land.

The boundaries of the Study Area were developed by NTA using the electoral division boundaries (small area boundaries) from the Central Statistics Office.

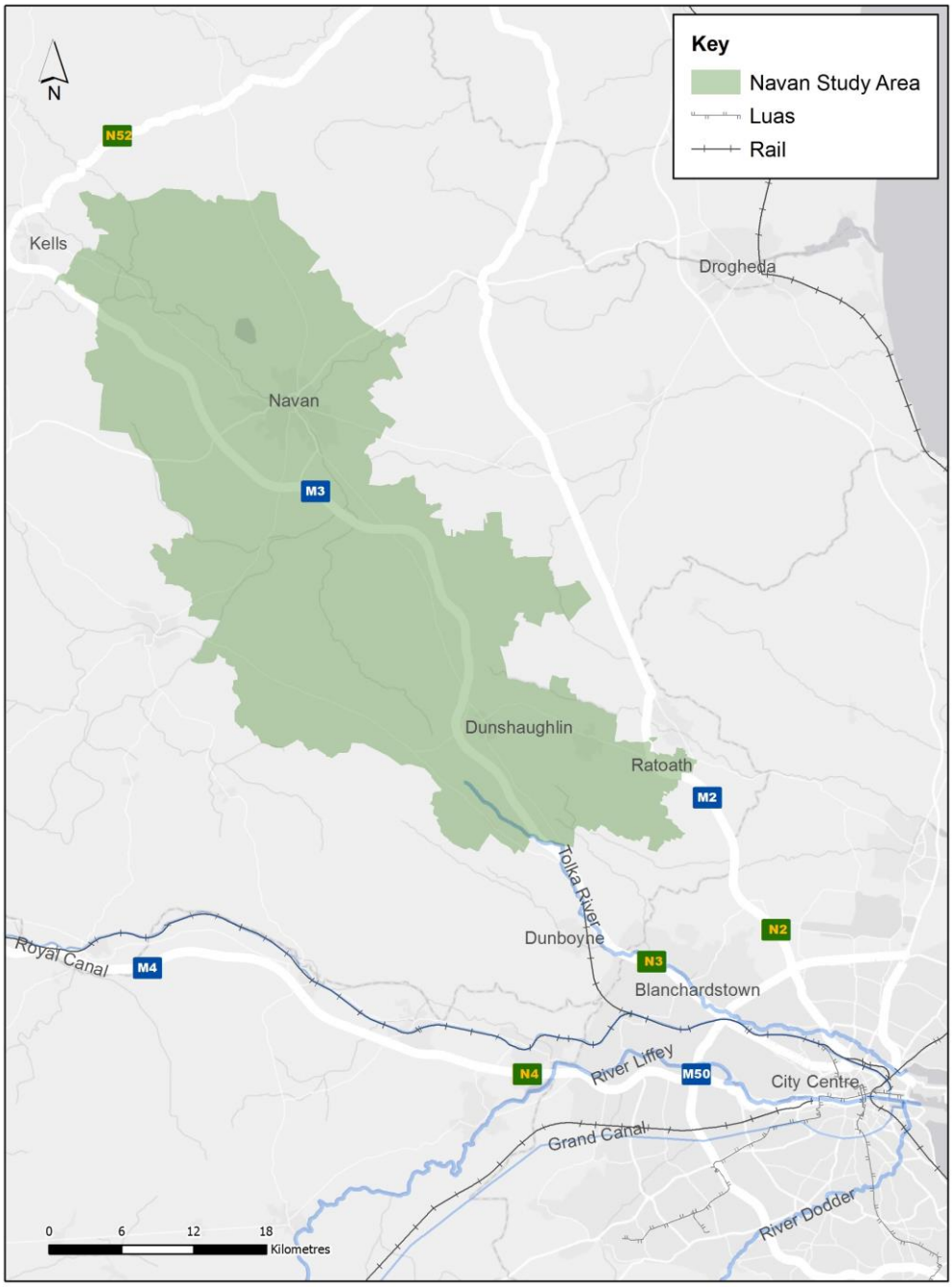


Figure 2-1: Navan – Study Area

2.2 Existing and Planned Strategic Road Network

The corridor contains the M/N3 national inter urban route which caters for significant traffic volumes between Dublin and Cavan via Kells, Navan and Dunshaughlin.

The capacity of the N3 must be protected for strategic traffic movements, including the distribution of goods. Congestion on the N3 is increasing at peak times within the vicinity of the M50.

There is limited opportunity for significant road capacity enhancements in the Dublin Navan Study Area from the perspective of both physical constraints and environmental considerations. Therefore, providing for increasing transport demand through alternative modes, such as public transport, will be necessary to protect the function and operation of the N3 as a strategic corridor.

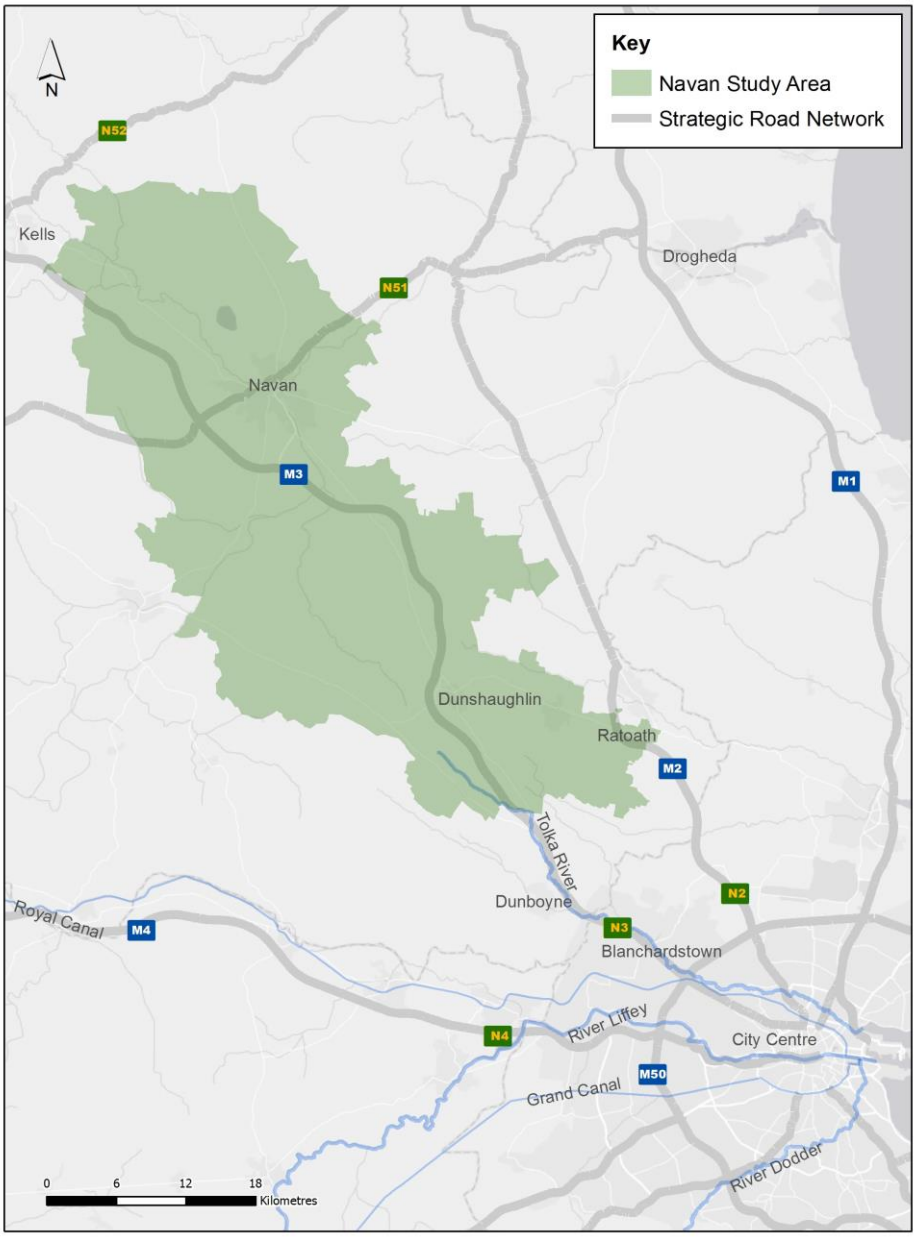


Figure 2-2: Existing Strategic Road Network

2.3 Existing Public Transport Provision

The existing Public Transport provision in the Navan Study Area consists of the bus routes outlined in Figure 2-3. Bus Éireann currently operates both Expressway Coach Services and Local Bus Services. Routes 109 and 109A link the corridor to the City Centre most directly.

The M3 Parkway Station is located to the immediate south of the Study Area. This rail line connects with the Maynooth Line and is easily accessed from the M3. There is a Park and Ride facility at the station that is underutilised. There is a toll plaza situated on the M3 north of the station which increases the cost of both public transport and private vehicle usage.

The rail service terminates at the M3 Parkway Station, however, the station was future proofed for expansion north through the construction of tunnels under the motorway to Navan. This future extension, proposed by Irish Rail, was to consist of 34km of railway serving stations at Dunshaughlin, Kilmessan and Navan.

There is an existing freight rail right-of-way north to Navan which runs west of the M3 through rural lands. Although it may serve Navan, it is situated too far west to adequately serve demand from Dunshaughlin and other towns within the Study Area. In addition there is an existing freight rail line that runs west from Navan to Drogheda.

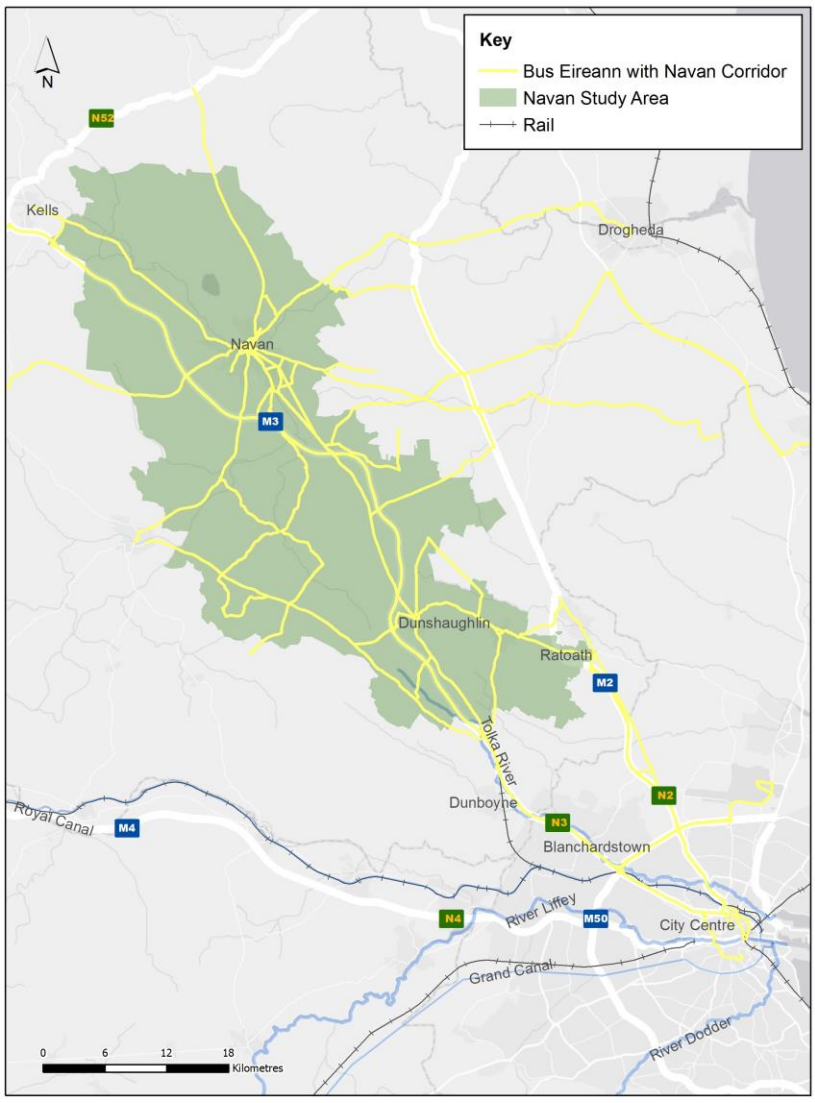


Figure 2-3: Navan Study Area – Existing Rail/Bus Services

2.4 Do Minimum – Proposed Transport Provision

The Do Minimum scenario includes public transport improvements within Dublin City Centre that have a high degree of certainty for completion before the forecast year. The Do Minimum public transport improvements include the following:

- Phoenix Park Tunnel;
- Dublin City Centre Rail Re-Signalling Project; and
- Luas Cross City.

2.4.1 Phoenix Park Tunnel

The re-opening of the Phoenix Park Tunnel will allow for rail connectivity from the South West Line to the South East Line serving Drumcondra, Connolly, Tara Street, Pearse and Grand Canal Dock Stations. The trains using the Phoenix Park Tunnel will not stop at Heuston Station.

The proposed improvements can accommodate four trains per hour (4tph) in one direction and 3tph in the other direction. It is likely that the 4tph would travel eastbound from the South West line using the tunnel in the AM peak and westbound in the PM peak to cater for the peak tidal demand into and out of the city centre.

2.4.2 Dublin City Centre Rail Re-Signalling Project

The Dublin City Centre Rail Re-Signalling project will enable increased train path capacity across the City on the Loopline Bridge over the Liffey. The current capacity constraint of 12tph will be raised to 17tph. It is considered possible to operate with 20tph but operational resilience may be compromised at this level. A new turn-back platform at Grand Canal Dock is proposed, providing turn-back facility for 9tph, leaving at least 8tph to carry on southbound.

2.4.3 Luas Cross City

The Luas Cross City is an extension of the existing Luas Green Line beginning at its current terminus at St. Stephen's Green, interchanging with the Luas Red Line at O'Connell Street / Abbey Street and continuing northbound to the DIT Grangegorman Campus, Phibsborough and terminating at the Broombridge Rail Station on the Maynooth line. A loop is included at O'Connell Street and Marlborough Street to enable northbound services to return south.

Luas Cross City is currently under construction and the planned operation is for 10 trains per hour extended from the increased 20 trains per hour Green Line service using lengthened 53m long trains. This will provide a design capacity of approximately 3,000 in the peak hour. As demand increases, frequency of service can be increased to 20 trains per hour, with a maximum design capacity of approximately 6,000.

2.4.4 Additional Schemes

The Do Minimum represents the future network supply based on current commitments. However, for the purpose of this study the additional schemes of the DART Underground, Metro North and the M50 multi-point tolling are assumed to be part of the future network. Although these schemes are not fully committed, they have been considered as these could influence the potential schemes that could evolve from the study. All of these schemes will increase the attractiveness of public transport within the GDA and therefore are included in the decision making criteria for public transport optioneering for the study. The specifics of these schemes are still yet to be finalised but for the purposes of this study it is assumed that Metro North would connect the City Centre to the Airport and Swords and would connect with the Luas Green Line. DART Underground is assumed to be a tunnel linking Heuston Station to St. Stephen's Green and Pearse Stations. The

M50 multi-point tolling scheme is assumed to be as per the proposals contained with the M50 Demand Management Report, published by the NRA in April 2014.

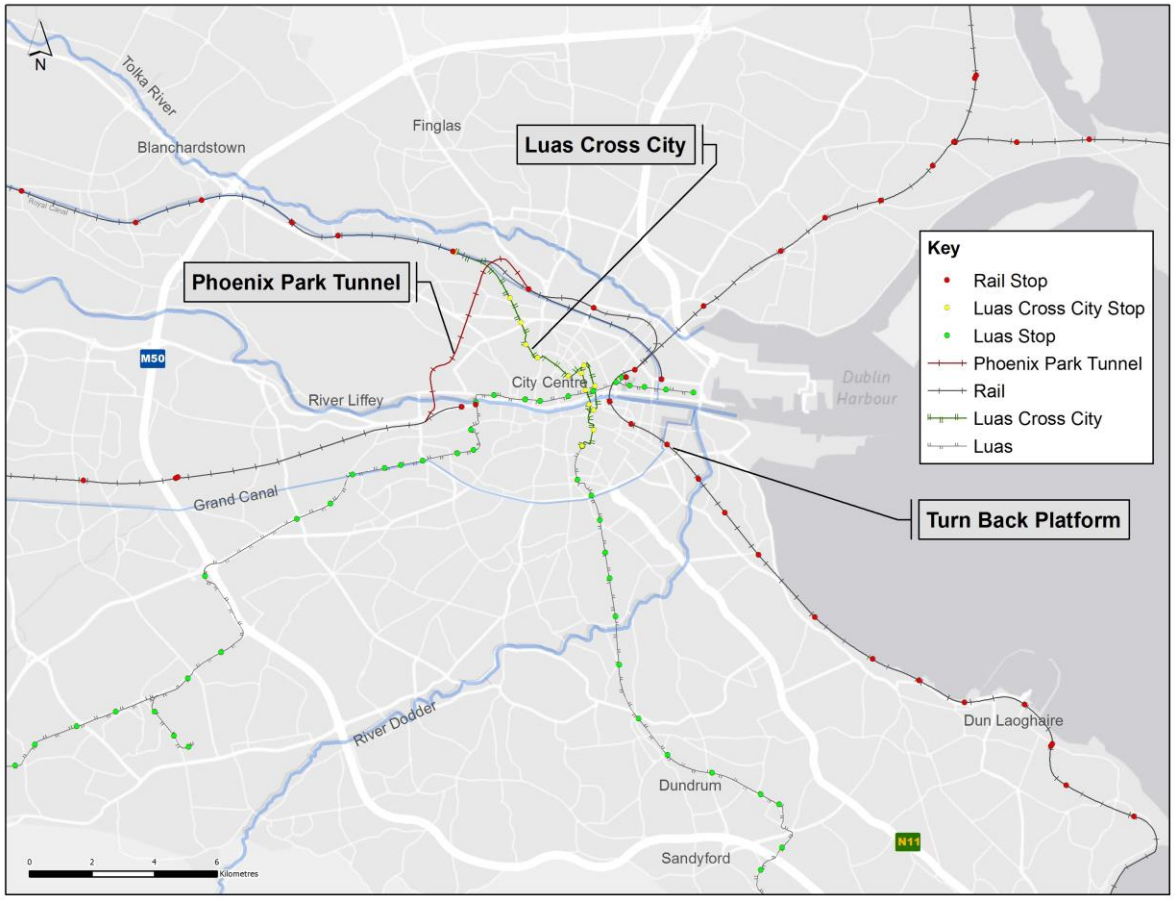


Figure 2-4 Do Minimum Proposed Public Transport

3 Demand Analysis

3.1 Establishing Demand

3.1.1 Establishing Base Year and 2035 Forecast Demand

The demand data utilised for this study considers assessment of a typical AM (08:00 – 09:00) peak hour. Demands for a 3 hour AM period and an average midday Inter Peak hour were also derived, however these were not utilised as part of the assessment. The assessment considers the 2011 base year and a 2035 forecast year.

The trip end data for the GDA was derived from planning data for both the Base Year and 2035 forecast scenarios. The base year data is based on Small Area Population Statistics available from the Central Statistics Office as well as a combination of NACE building data, and POWSCAR variables and has been used in the calibration of the base year trip end model and demand model. The forecast data has been prepared by the NTA based on their most up to date forecasted land use assumptions which cover the entire country.

Having derived trip ends the GDA demand model applies destination choice algorithms to derive travel matrices which have been calibrated in the base year to replicate observed mode shares and trip length distributions. For this analysis, only trips with a distance of longer than 3km were considered as it is assumed that trips with a distance of less than 3km will be provided for through walking and cycling and local public transport. As such these trips were not considered in the assessment of the strategic public transport requirements for the study area.

3.1.2 Establishing Radial Movements

The focus of the demand analysis was to identify radial trips headed south in the AM peak hour. This accounts for the following movements:

- trips generated internally, destined for the City Centre;
- trips generated internally and destined internally; and
- trips originating outside of the corridor, travelling to and through the Study Area and to the City Centre.

Identifying demand for these movements provides a suitable estimate of demand within and through the Study Area. However to establish the critical levels of demand at key points in the Study Area, a screenline analysis was conducted which provides an estimate of demand across screenlines. The results of this process will be discussed in Section 3.2.

3.1.3 Target Demand Level

As part of the demand analysis, a target demand level has been identified to inform the development of public transport options. For the Navan Study Area, the target demand level represents a relevant per cent of growth between year 2011 and 2035 by using an appropriate mode share factor obtained through existing public transport patterns from the Central Statistics Office database. This target will be used for the development of public transport options. It is therefore assumed that there will be no growth in car use to the City Centre. The current public transport provision may cater for an element of growth, however for the purpose of this review it is assumed that current public transport services are effectively at capacity. To determine the growth in public transport demand and capacity within the corridor in 2011 and 2035, an assessment was undertaken of the total demand to the City Centre and other destinations.

3.2 Demand Assessment

3.2.1 Navan Corridor Screenlines

In order to determine the level of demand to be accommodated by potential public transport options, six screenlines were applied to the Study Area. The screenlines were developed to address the radial demand moving southbound to the City Centre. These trips may have destinations within the Study Area, within the City Centre, or to external areas. The screenline demand only takes into account radial trips moving southbound during the AM peak hour. Orbital trips within the Study Area were not included.

3.2.2 Screenline Demand

The Figures below illustrate the level of demand crossing the six screenlines for the 2011 base year, 2035 forecast year, and the demand growth from 2011 to 2035. Screenline demand has also been included for target public transport growth, in order to provide a level of demand that could be anticipated to use public transport.

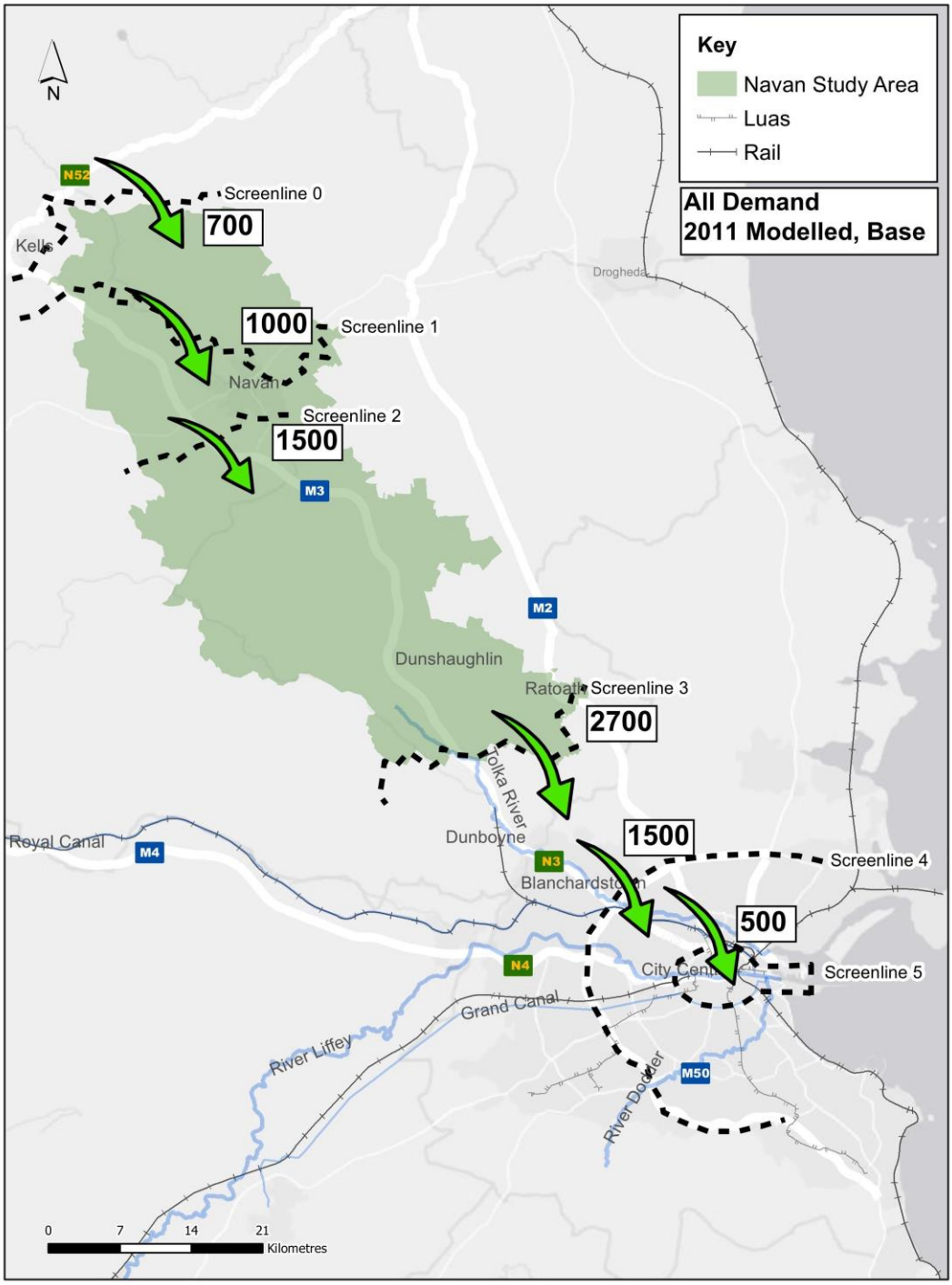


Figure 3-1: 2011 AM Peak Hour Screenline Demand

The base year demand within Figure 3-1 indicates that at the northern end of the corridor, there are approximately 700 trips entering the corridor within a single hour of the AM peak period. This level continues to rise through the corridor to a level of 2,700 trips at the screenline entering the outer metropolitan area. The level entering the inner orbital (inside the M50) is 1,500 trips during the AM peak hour, meaning that over 1,200 remain outside of the M50. The demand continues to reduce by 70 per cent going through Screenline 5 into the City Centre with only 500 trips crossing the canal cordon.

As per the study assumptions, the levels include journeys that are greater than 3km in length, and include journeys through the corridor to the City Centre, internal to the Study Area and also those that originate or terminate within the area.

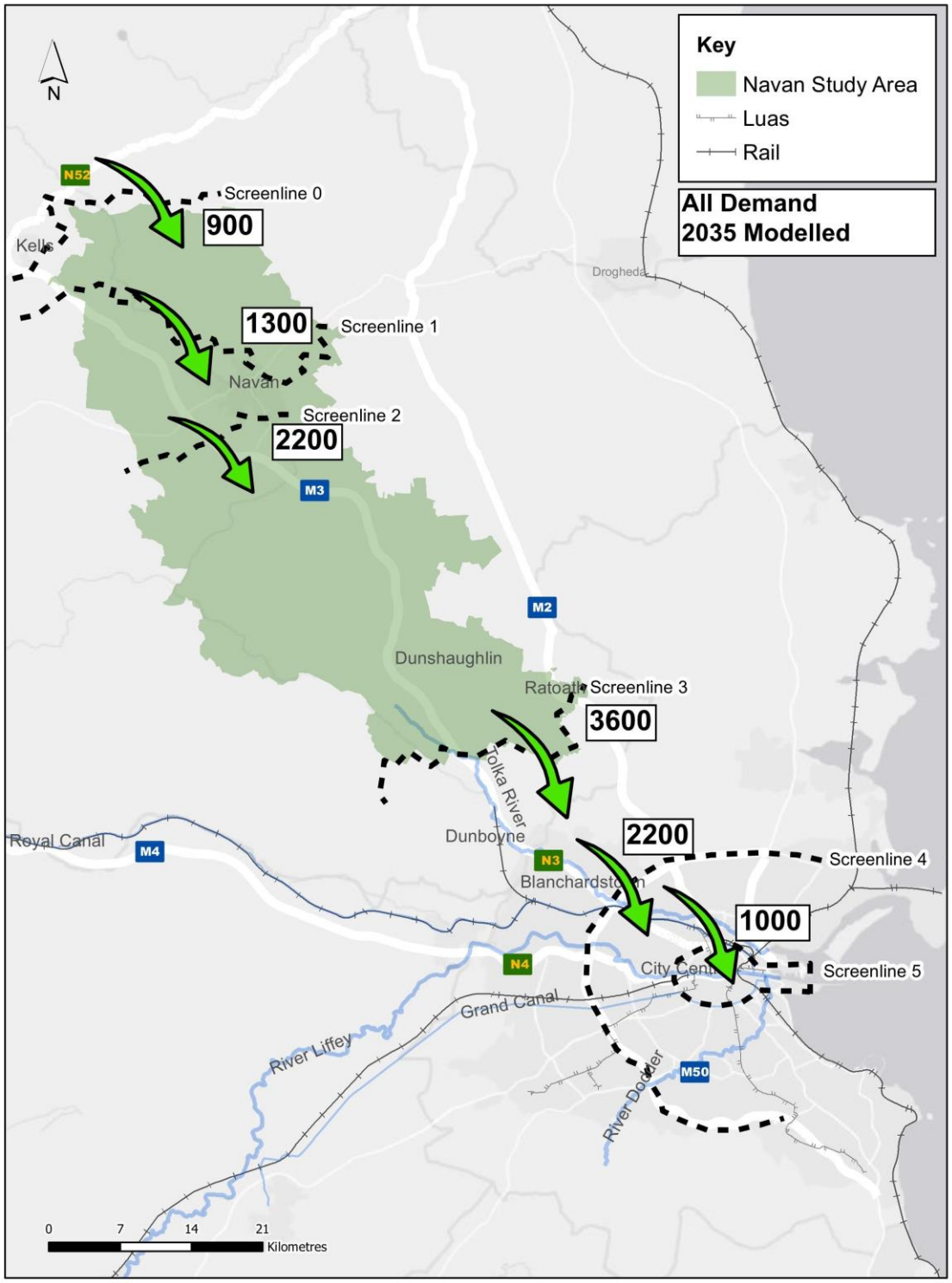


Figure 3-2: 2035 AM Peak Hour Screenline Demand

The forecast year demand shown in Figure 3.2 indicates that at the northern end of the corridor there are approximately 900 trips entering within a single hour of the AM peak period. Similar to the patterns in the base year, the demand increases up to screenline 3 then decreases toward the City Centre, where the total demand is 1000 trips.

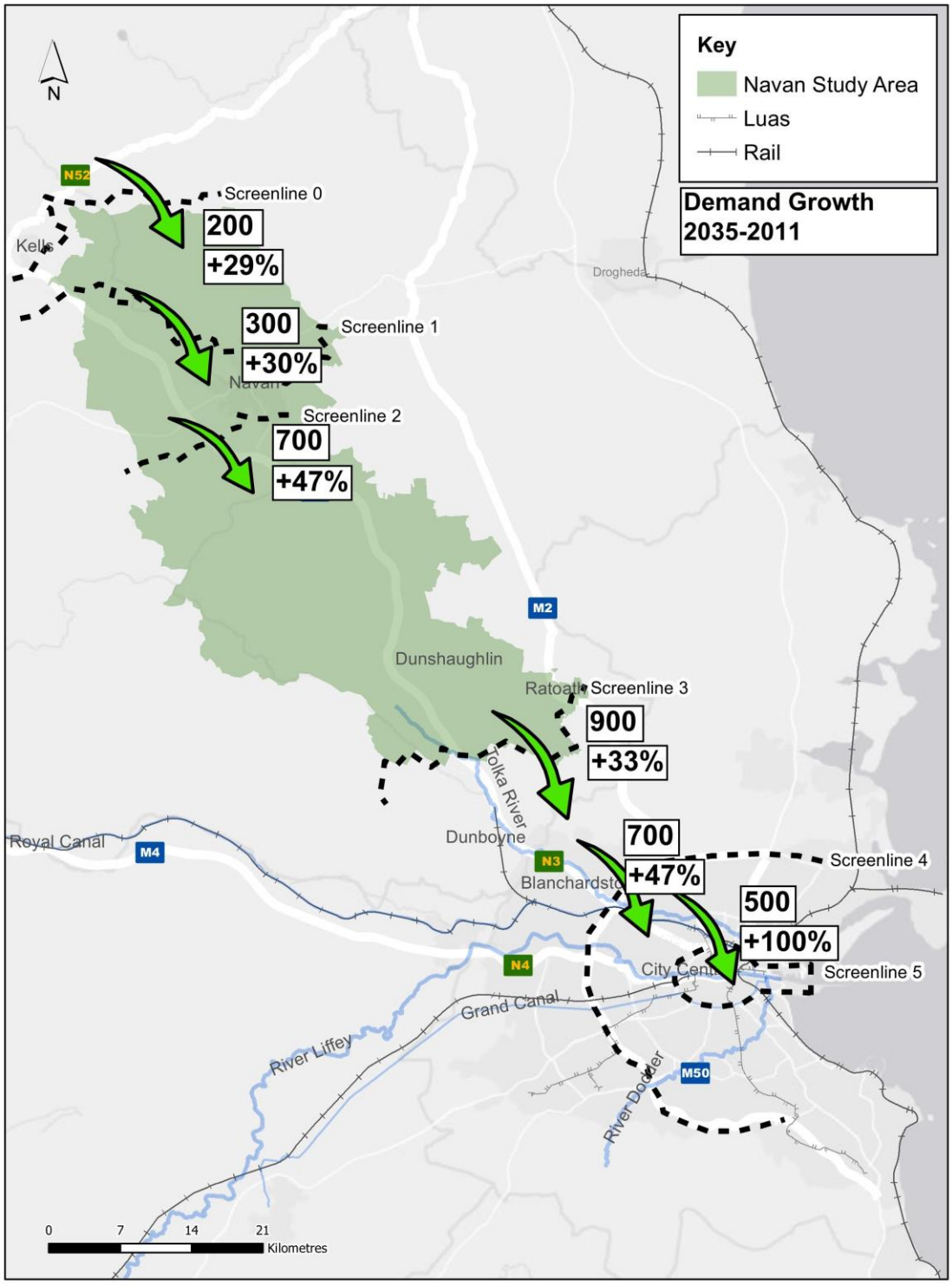


Figure 3-3: Growth (2035-2011) AM Peak Hour Screenline Demand

Figure 3.3 illustrates the potential growth in travel within the corridor. At the northern screenline growth is between 29 per cent through to year 2035, this equates to an additional 200 journeys per single hour during the AM peak. There is a notable increase in the level and proportion of growth south of Navan towards the City Centre, where demand for travel is forecasted to increase by 47 per cent to 700 trips. Of the 900 new trips crossing screenline 3, 400 of them remain outside of screenline 5 with destinations outside the City Centre. The remaining 500 journeys have destinations inside the City Centre. This is a 100 per cent growth from 2011.

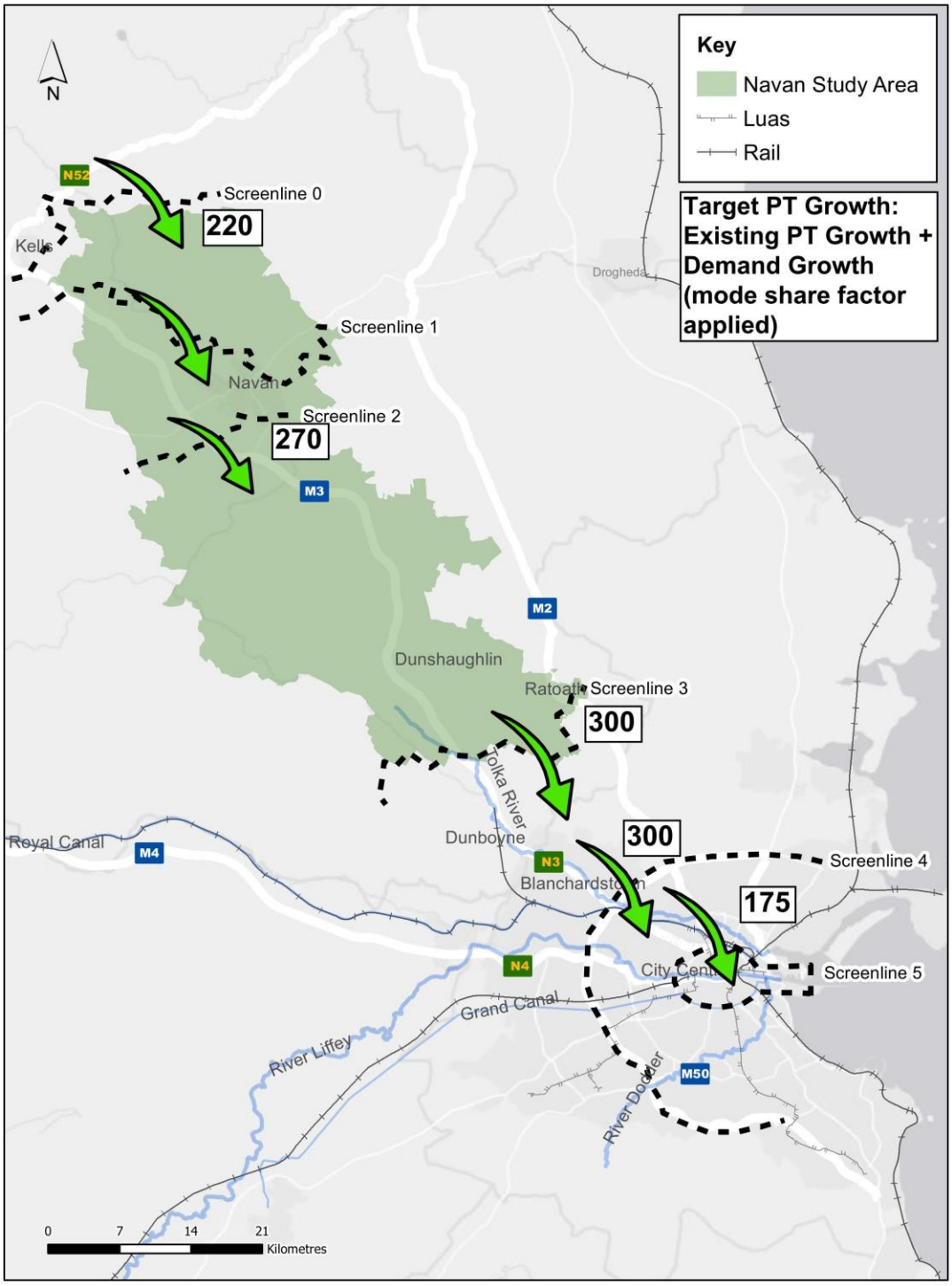


Figure 3-4: Target PT Growth: Existing PT Flows + Demand Growth %

Figure 3-4 illustrates the potential growth in travel within the corridor. The public transport target is derived by combining the existing public transport patronage and applying a mode share factor to the growth in trips across the screenlines. The mode share factor applied was 10 per cent and 15 per cent. Screenlines at the north of the study area used the lower public transport mode share whilst the higher mode share target was applied to screenlines to the south of the study area closer to the M50 / City Centre. These factors were obtained from Census Statistics Office database.

At the northern end of the corridor, there are approximately 220 trips entering the corridor within a single hour of the AM peak period. This level continues to rise through the corridor to a level of 300 trips at screenline 3 entering the outer metropolitan area. The level entering the inner orbital (inside the M50) is 300 trips during the AM peak hour. The demand continues to reduce going through Screenline 5 into the City Centre with only 175 trips crossing the canal cordon.

It can be seen from Figure 3-5 that the demand reaches its highest at screenline 3, before the M50. After the M50 the demand reduces through screenline 5 and into the City Centre. Figure 3-5 also provides a summary of the screenline demand figures.

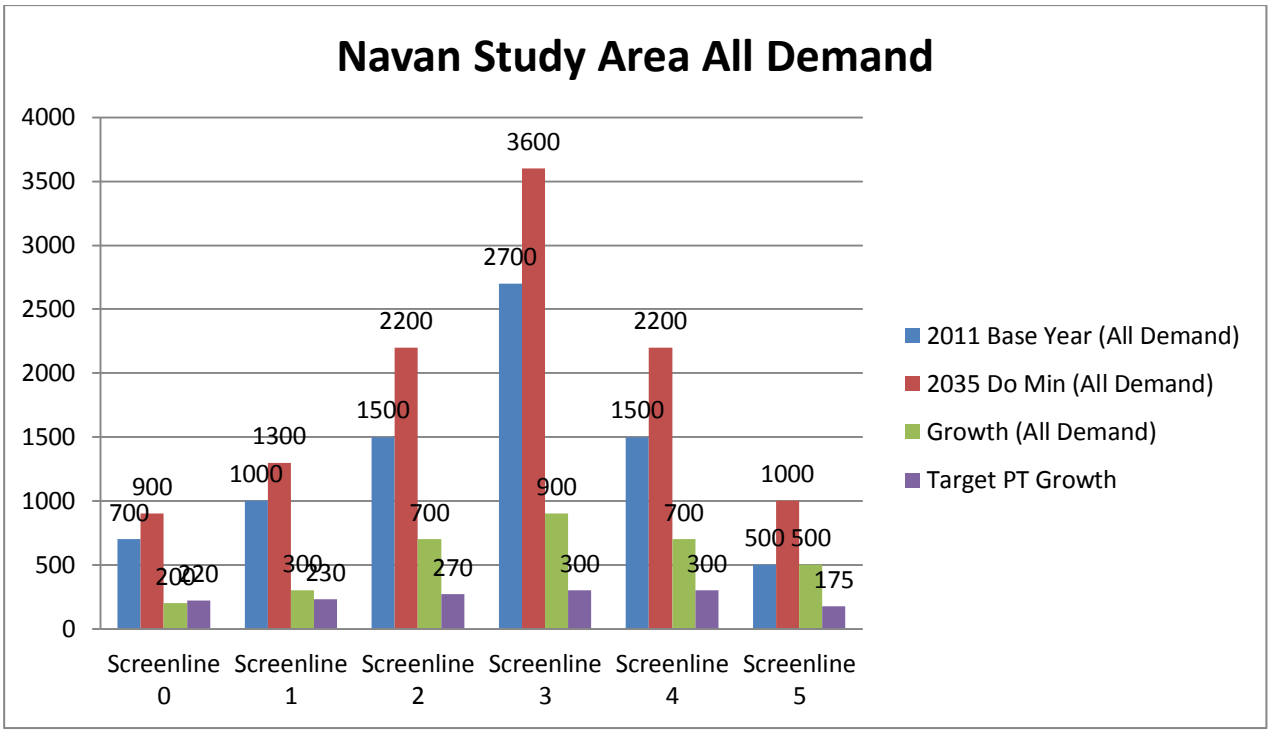


Figure 3-5: Screenline Demand and Growth

4 Public Transport Option Development

4.1 Introduction

This section outlines the development of public transport options at a high level in order to meet the target demand crossing the screenlines. From Section 3, the maximum level of demand growth to be accommodated by public transport in 2035 is 300 trips at screenlines 3 and 4.. For the purposes of the assessment it is assumed that during the AM peak hour the current public transport services are generally close to or at capacity and therefore can accommodate little or no increase in demand. The level of demand growth to the city centre in Figure 3-3 is shown to be 500 trips. It is therefore assumed for the purpose of this study, that the additional demand to be served by public transport for the Navan Study Area is between 300 and 500 trips at a minimum.

It is necessary therefore, to generate likely public transport options that can provide a level of service to accommodate this target demand level. The options, in the first instance, were generated by focussing solely on the proposed public transport services/modes ability to accommodate the screenline demand. This method was adopted so that the option generation process was not restricted by current network constraints that could be removed in the future.

4.2 Design Capacity of Public Transport Modes

The following lists the potential alternative public transport modes that could be considered to meet the target demand:

- DART;
- Commuter Rail;
- Light Rail Transit (LRT);
- Bus Rapid Transit (BRT);
- Urban Bus Service;
- Intercity Bus Service; and
- Shuttle Bus.

Each service type has a pre-defined seated capacity and crush capacity (peak standing capacity). In order to ensure that a quality level of service is provided by the proposed options, design capacities for each of the above service types were developed. Design capacity is assumed to be 85% of crush capacity or 100% of seated capacity, whichever figure is greater. This ensures that at no time will the entirety of the target demand be accommodated by a service that is underutilised or is so busy as to make the service less desirable.

Crush capacity is an industry standard expression relating to the loading upper limit of public transport services that allow standing as a means of catering for higher levels of patronage. Design capacity is assumed at 85% of this to allow for a more comfortable and attractive level of service to be provided.

Table 4-1 details the design capacity for each of the services and outlines the AM peak hour design capacity for each service based on the frequency of the service. Based on a comparison of the various capacity levels and the target demand range between 300-500 trips the highlighted areas show the frequencies for each individual mode that would be necessary to meet this demand. For example Intercity Bus services at a frequency of one every 12 minutes would provide a capacity of 500 which would provide for the target demand of 500 trips to the City Centre in the AM peak hour.

Table 4-1: Design Capacity and Peak Hour Service Frequency

Frequency	Design Capacity (per service vehicle/train)							
	DART	Commuter	Light Rail	LRT Segregated	Bus Rapid Transit	Urban Bus	Intercity Bus	Shuttle Bus
60 min	1,190	410	260	300	100	70	50	30
40 min	1,780	610	390	450	150	110	70	40
30 min	2,380	820	520	600	200	150	100	60
20 min	3,570	1,230	780	900	310	220	150	90
15 min	4,760	1,630	1,040	1,200	410	300	200	120
12 min	5,950	2,040	1,300	1,500	510	370	250	150
10 min	7,140	2,450	1,560	1,800	610	450	300	180
8 min	8,920	3,070	1,940	2,300	760	560	370	225
6 min	11,900	4,090	2,590	3,050	1,020	740	500	300
5 min	14,280	4,910	3,110	3,650	1,220	900	600	360
4 min	17,850	6,130	3,890	4,550	1,530	1,120	750	450
3 min	23,800	8,180	5,180	6,050	2,040	1,500	1,000	600
2 min	35,700	12,270	7,780	9,100	3,060	2,240	1,500	900

Note: The highlighted text above indicates where the target demand of 500 trips could be provided by a single public transport mode operating at the specified service frequency

4.3 High Level Public Transport Options

Table 4-2 illustrates the high level capacity of the proposed service for each possible option that could meet the targeted demand range between 300 - 500 trips in the AM peak hour to the City Centre. Each option is described in more detail below. The high level options developed do not consider network constraints and existing public transport services. The sole focus at this high level options development stage is to outline public transport services than can accommodate the demand to the City Centre within the Navan Study Area.

Table 4-2: Public Transport Options to Meet Target Demand

Public Transport Target Growth: 300 - 500 trips

			Option 1	Option 2	Option 3
Public Transport Option	**Capacity**	**Service to Meet Capacity**	**Rail - Navan to City Centre**	**Rail - Navan to Drogheda**	**Express Bus**
New Rail Line	10,000	1 Rail Line	X	X	
BRT	1,500	1 BRT Route			
QBC	750	1 QBC Routes			
Bus	200	1 Routes			X

The following lists the three public transport options that are able to meet the target demand range between 300 - 500 AM peak hour trips.

- ***Option 1: Extension of the rail line north from M3 Parkway to Navan.***
    - This option would extend the rail line from its current northern terminus at M3 Parkway to Navan, servicing stations at Dunshaughlin, Kilmessan, Navan Town and just north of Navan.
- ***Option 2: Passenger rail service between Navan and Drogheda, connecting to existing commuter services.***
    - This option would provide passenger rail service along an existing freight corridor between Navan and Drogheda. The service would connect to existing commuter rail services in Drogheda.
- ***Option 3: Introduce Express Bus Service.***
    - This option would introduce a new express bus service between the study area and the City Centre with the level of service in line with the demand growth.
    - The availability and frequency of bus services from the study area to the city centre has improved from the Base scenario to the Do Minimum and Do Strategy which further supports the provision of the Navan to Dublin City Centre express bus service.

4.4 Capacity Assessment and Sifting of Proposed Public Transport Options

A capacity assessment of the proposed public transport options was from the Study Area to the City Centre. The capacity assessment highlights, that for most of the options, the proposed public transport provision can accommodate all of the target demand to the City Centre. For this Study Area, there is significant demand that remains within the outer orbital and inner orbital.

For this exercise a number of assumptions were made in recognition of the high level nature of this study. Firstly, demand for the base year public transport was assumed to be catered for by existing public transport services. Secondly, it was assumed that there is no excess capacity for existing services during the AM peak hour. The table outlines the following for each of the three options considered:

- brief description of the option;
- a determination of whether the option would be taken forward for further review;
- rationale for the above decision;
- proposed service type and frequency at each screenline;
- comparison of proposed service design capacity and maximum screenline demand; and
- a conceptual map/schematic of the option.

Option 1: Extension of the Rail line North from M3 Parkway

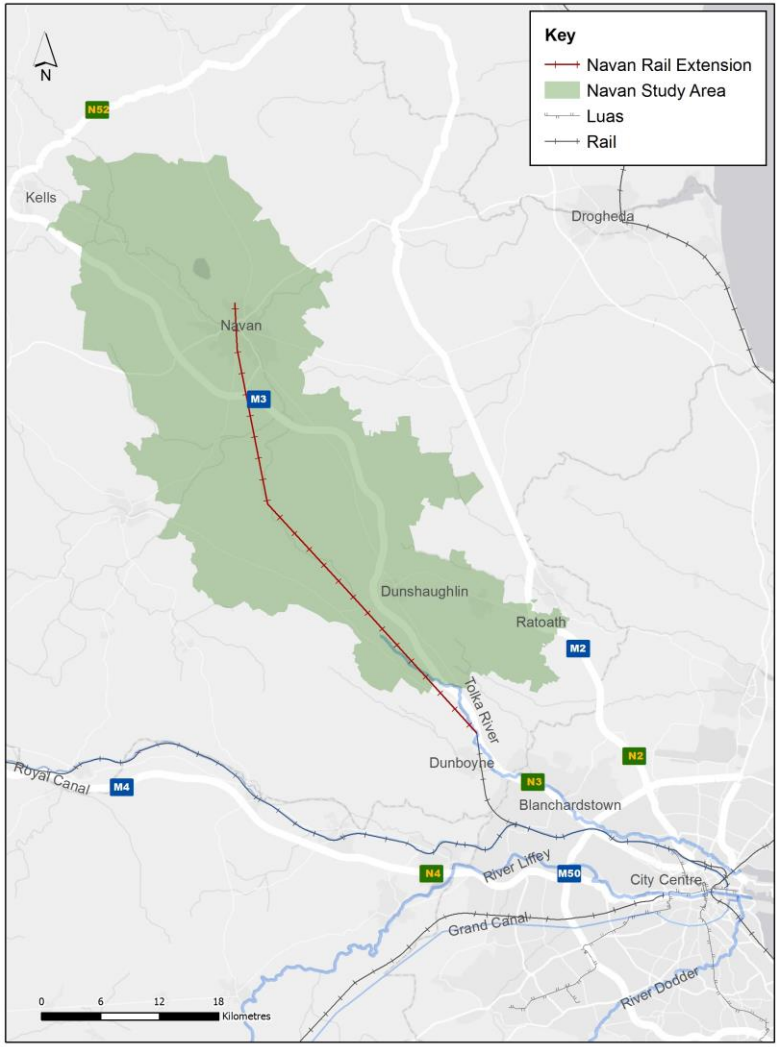
Decision: Not Taken Forward for Detailed Review

Decision Rationale:

Option 1 would extend the rail line north from the M3 Parkway Station beyond Navan town as previously proposed by Irish Rail. The map opposite outlines the proposed route of the extension of the rail line serving stations at Dunshaughlin, Kilmessan, Navan town and just north of Navan.

For 2035 the total growth in demand travelling south of Navan at Screenline 2 is 700 trips. This increases to 900 trips through Screenline 3, then decreases to the city centre with 500 trips crossing the canal cordon (This level of demand would not justify a rail line within the 2035 timeframe.

Although the aim of this report is to cater for growth, for the purpose of reviewing this option thoroughly, a review using a higher demand level of the existing public transport trips plus the growth in trips with an appropriate mode share factor applied as per Figure 3-4. The level of demand does not justify rail within the 2035 time frame. This demand could be served by 1-3 trains per hour. However, the provision of rail in this instance was estimated to cost in the order of 300 million Euro, (source: Irish Rail's 2030 Rail Network Strategy). Higher demand for this rail line would need to be shown to rationalise this magnitude of expenditure.



Design Capacity and Service Frequency:

Table 4-3 and Table 4-4 show the design capacity and service frequency that would be required to meet the maximum screenline demand with the extension of the rail line north from the M3 Parkway station; a 40 minute frequency would be required to meet demand entering screenline 5 at the City Centre.

Table 4-3: PT Option Design Capacity for 100% of Growth in 2035

Option Sifting for Growth				
Design Capacity				

Option 1 Screenlines	Maximum Demand	Commuter		Surplus
screenline 0	200	409		-209
screenline1	300	409		-109
screenline 2	700	818		-118
screenline 3	900	818		82
screenline 4	700	818		-118
screenline 5	500	613		-113

Proposed Service Frequency		
Option 1 Screenlines	Commuter	
screenline 0	60 min	
screenline1	60 min	
screenline 2	30 min	
screenline 3	30 min	
screenline 4	30 min	
screenline 5	40 min	

Table 4-4: PT Option Design Capacity for Target PT Growth

Option Sifting for Target PT Growth				
Design Capacity				

Option 1 Screenlines	Maximum Demand	Commuter		Surplus
screenline 0	220	409		-189
screenline1	230	613		-383
screenline 2	270	1227		-957
screenline 3	300	2044		-1744
screenline 4	300	1227		-927
screenline 5	175	613		-438

Proposed Service Frequency		
Option 1 Screenlines	Commuter	
screenline 0	60 min	
screenline1	40 min	
screenline 2	20 min	
screenline 3	12 min	
screenline 4	20 min	
screenline 5	40 min	

Option 2: Passenger Rail Service between Navan and Drogheda	
Decision: Not Taken Forward	
Decision Rationale: Option 2 would provide passenger rail service along an existing freight corridor between Navan and Drogheda. The service would connect to existing commuter rail services in Drogheda. Similar to the justifications for Option 1, the journey time would not be competitive with driving and the demand does not justify the provision of rail services	*Conceptual alignment was not produced for this option*

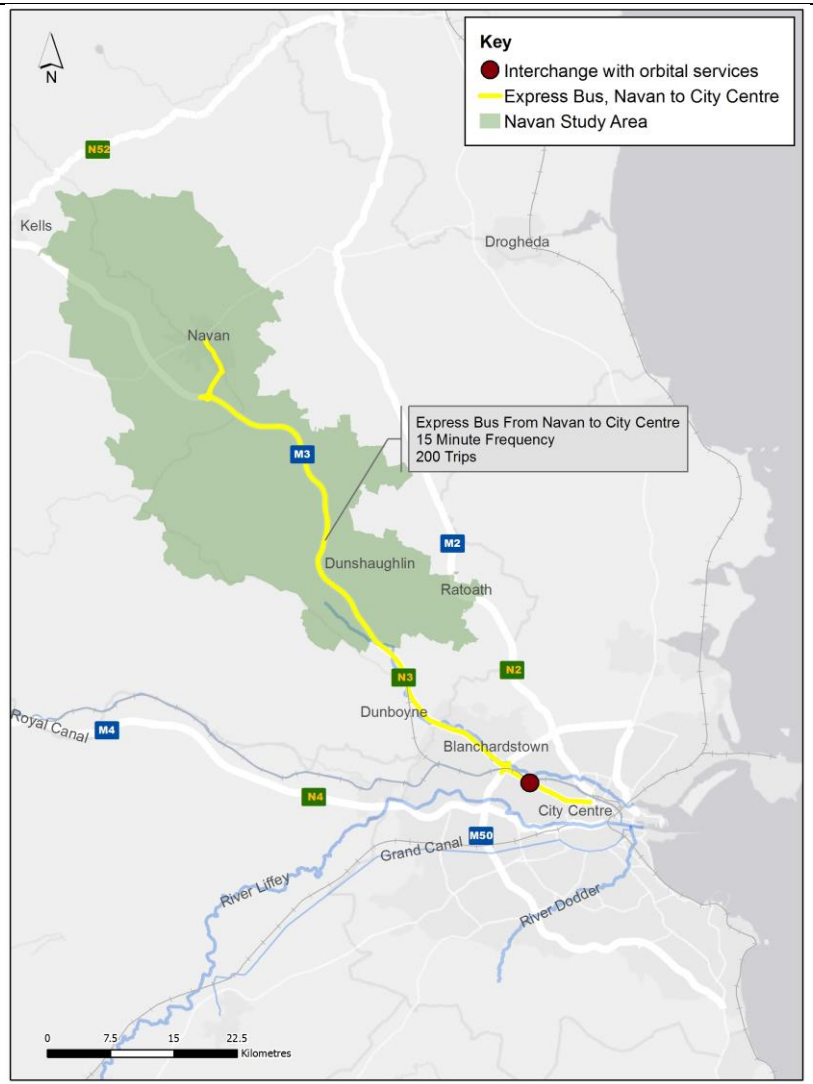
Option 3: Introduce an Express Bus Service between Navan and Dublin City Centre

Decision: Taken Forward

Decision Rationale:

Option 3 would allow for the provision of a new express bus services in line with demand from Navan to the City Centre. The express service would operate at 15 minute frequencies and could cater for approximately 200 trips in the AM peak. It can be seen that there is also a comparably high demand from the Study Area to the orbital area outside the M50 and the orbital area inside the M50. To cater for this demand, the express bus service will stop at Dunshaughlin and Finglas. Option 1 Schematic shown opposite.

A benefit of a bus service is that it can operate at a higher frequency than train would in this location. Additional destinations could be flexible based on demand. Some may focus on the city centre while others focus on the orbital and interconnection with orbital services. This is a significant benefit as the majority of trips have destinations outside the city centre and canal boundary. Bus can also expand in pace with demand growth.



Design Capacity and Service Frequency:

Table 4-5 and Table 4-6 show the design capacity and service frequency that would be required to meet the maximum screenline demand with increased bus service. This would be an express bus service; one every 15 minutes. Table 4-6 shows that the express bus service caters for the majority of public transport target growth for 2035 from Navan to the city centre. Although the main objective of the report is to identify public transport that can meet 100 per cent of the growth in demand to 2035, it is expected that the Do Minimum bus services will support the public transport level of service from the study area to the city centre.

Table 4-5: PT Option Design Capacity for 100% of Growth in 2035

Option Sifting for Growth
Design Capacity

Option 3 Screenlines	Maximum Demand	ICB	Surplus
screenline 0	200		200
screenline1	300		300
screenline 2	700	200	500
screenline 3	900	200	700
screenline 4	700	200	500
screenline 5	500	200	300
Total Surplus			300

Proposed Service Frequency

Option 1 Screenlines	ICB
screenline 0	
screenline1	
screenline 2	15 min
screenline 3	15 min
screenline 4	15 min
screenline 5	15 min
Total Surplus	

Table 4-6: PT Option Design Capacity for Target PT Growth

Option Sifting for Target PT Growth
Design Capacity

Option 3 Screenlines	Maximum Demand	ICB	Surplus
screenline 0	220		220
screenline1	230		230
screenline 2	270	200	70
screenline 3	300	200	100
screenline 4	300	200	100
screenline 5	175	200	-25
Total Surplus			230

Proposed Service Frequency

Option 1 Screenlines	ICB
screenline 0	
screenline1	
screenline 2	15 min
screenline 3	15 min
screenline 4	15 min
screenline 5	15 min
Total Surplus	

4.5

Results Summary

The capacity assessment and option sifting process resulted in advancing Option 3 for the preferred emerging public transport scheme to bring forward. A summary of rationale for this decision is described in the list below.

- Option 1: Extension of the rail line North from M3 Parkway to Navan was ruled out because the level of target public transport growth of 300 trips to the City Centre during the AM peak hour would not justify such a scheme. The option was also considered against the upper range of demand catering for 500 trips, and still this scale did not justify a rail extension. A large proportion of demand remains outside the M50, where land use is dispersed and congestion is low making a rail less attractive as an option.
- Option 2: Extension of the rail line from Navan eastward to Drogheda was ruled out for the same reasons. Additionally the journey time for this trip would not be competitive with a journey time by car.
- Option 3: Introduction of an express bus service was taken forward as the preferred option because it most effectively catered for the scale of demand. It is also flexible enough to adapt to growth as it occurs and to the appropriate destination.

No further scoring was conducted for this corridor.

5 Transport Modelling Assessment

5.1 Background

Following identification of the potential measures that may be taken forward for this corridor, a modelling exercise has been undertaken to determine the likely usage and operation of the proposed new services that may be in place by year 2035.

The modelling testing exercise was undertaken and is reported within this section. The emerging measures were tested Greater Dublin Area Regional Model (GDARM).

This testing stage includes the majority of initiatives that form the Strategy and therefore takes cognisance of the impacts of both the corridor initiatives and interaction with those services being proposed within the overall strategy.

Within this modelling exercise, the model testing does not include the full impact of Demand Management Measures that may be utilised to further enhance the level of journeys made by public transport. In addition, Park and Ride facilities and shuttle bus services to rail and light rail stations have not been modelled and therefore the model output is likely to under represent the actual level of use on public transport. The outcome of the current model testing, therefore, provides a conservative view of demand levels that may use the measures included within the Strategy.

Further information on the transport modelling and strategy measures tested is provided within an overarching Transport Modelling Report.

Figure 5-1 illustrates the proposed GDA public transport proposals in the context of the Navan Study Area corridor.

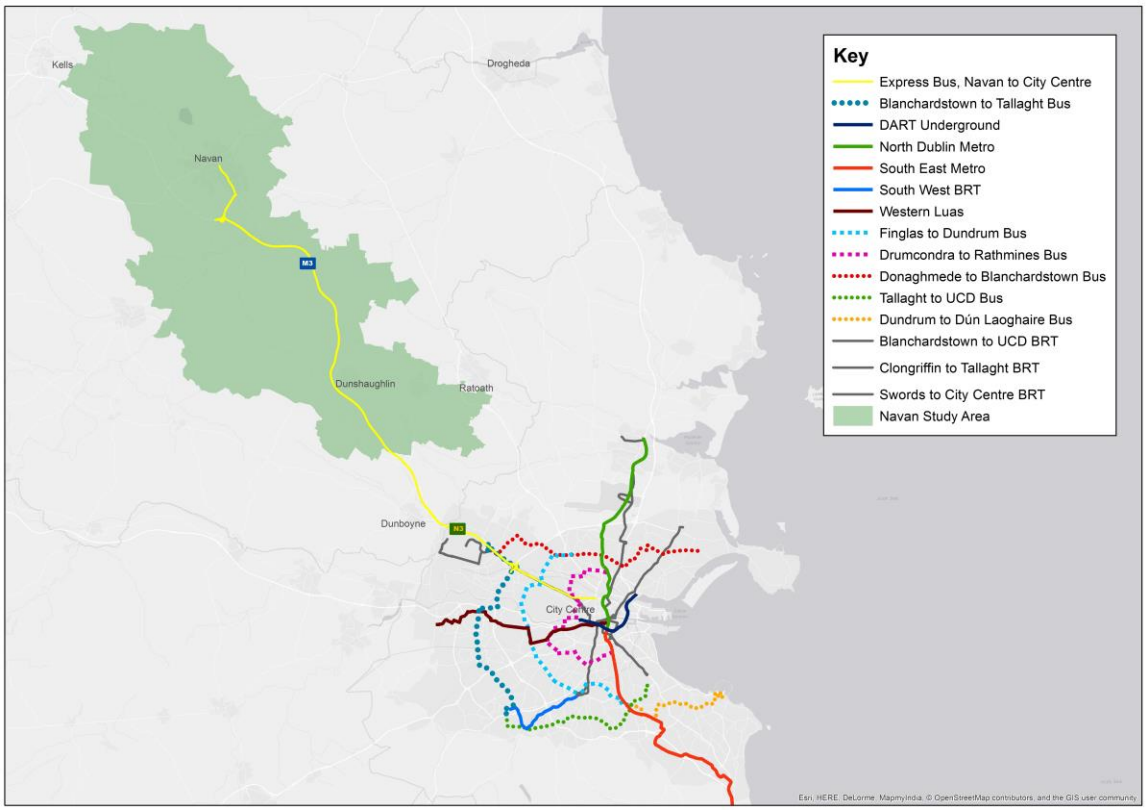


Figure 5-1: Proposed GDA Strategy Public Transport Proposals

5.2 Modelled Public Transport Proposal

The preferred public transport provision for the North West Study Area is to introduce an express bus service between Navan and Dublin City Centre in line with increased demand. The preferred option would also modify routes to interchange with new inner and outer orbital bus services, and to interchange with new light rail and existing rail services.

Table 5-1 describes the proposed express bus service between Navan and Dublin City Centre. The new express service from Navan to the City Centre will also stop in Dunshaughlin and Finglas on route to the City Centre.

Table 5-1: Proposed Public Transport Service Plan

Service	Vehicle	AM headway
Express Service: Navan to City Centre	Bus (capacity of 52 Passengers)	15

5.3 Modelling Assessment

5.3.1 Screenline Assessment

Figure 5-2 illustrates the 2035 forecast for the AM peak hour total public transport at each of the screenlines. These figures may be compared to the public transport target growth in Figure 3-3, which is shown in the graph in Figure 5-3.

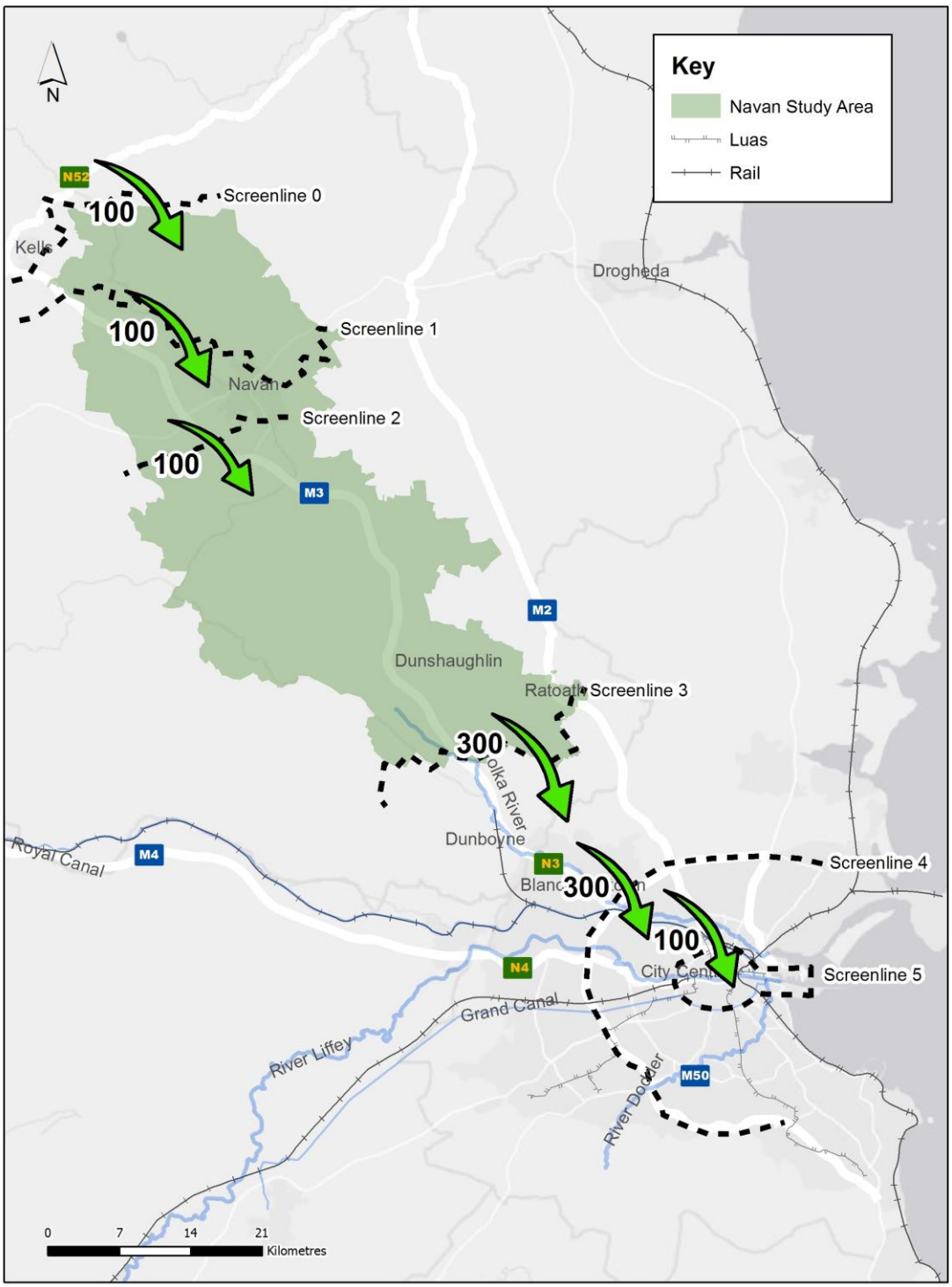


Figure 5-2: 2035 AM Peak Screenline Public Transport Patronage

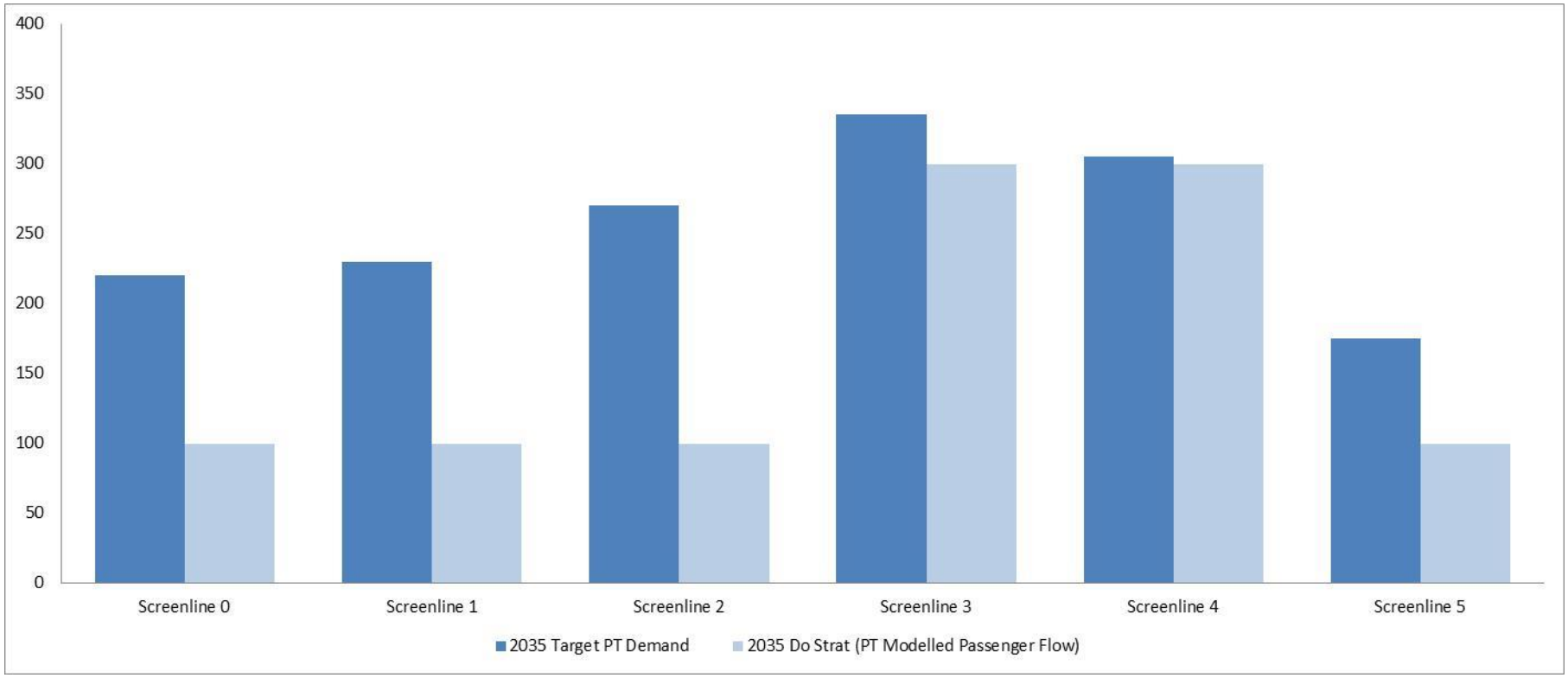


Figure 5-3: 2035 PT Patronage vs. Target Demand

Figure 5-3 concludes that the public transport proposal modelled in the 2035 Strategy scenario can attract a high amount of screenline growth at screenlines 3, 4 and 5.

Flows at screenline 4 and 5 represent trips that originate from the study area and continue onwards towards the M50 and crossing the canal cordon. The peak demand and public transport passenger modelled flows occur at screenline 3 after which there is a decrease at screenline 4 and 5. It can be concluded that the public transport patronage modelled in the 2035 strategy can attract a high percentage of screenline growth with 90 per cent, 98 per cent and 60 per cent of the target public transport demand captured along screenlines 3, 4 and 5. However the level of growth captured along Screenline 0 to 2 is closer to 40 per cent levels. In summary the overall percentage of target growth trips captured by the 2035 Do Strategy proposal is 65 per cent. The benefit of this proposal is that the level of service is flexible and can respond to increased demand.

5.3.2 Corridor Study Area Mode Share

Figure 5-4 outlines the overall mode share of the Navan corridor Study Area during the AM peak for the 2035 Strategy scenario. This shows a public transport mode share of 11per cent.

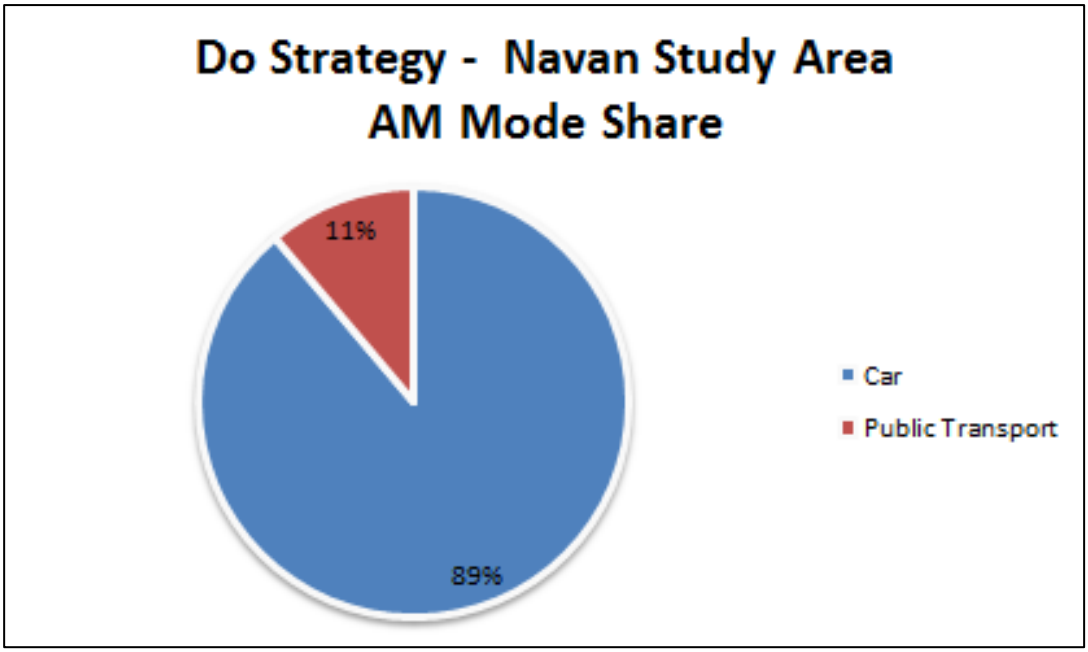


Figure 5-4: 2035 AM Peak Corridor Study Area Mode Share

These figures for public transport mode share (all productions) are expected to increase with additional services from M3 Parkway Station. It is also anticipated that this rail line will be more competitive with demand management measures. Both demand management and Park and Ride are not reflected in the mode share results and it is anticipated that these will attract a portion of trips with destinations in the City Centre. As a high proportion of trips have destinations outside the M50, it is unlikely that public transport will be able to compete with car journey times to these destinations.

5.3.3 Public Transport Boarding and Alighting Profile

Although the M3 Parkway rail line connecting to the Maynooth Line isn't in the study area, boarding and alighting profiles for the forecast year of 2035 have been included in Figure 5-5. This spur from the Maynooth line serves commuters from the study area via the M3 motorway. The journey time from the M3 Parkway Station to Clonsilla Station is 8 minutes. At Clonsilla station,

passengers transfer to a DART on the Maynooth line, which offers a connecting service to Dublin City Centre terminating at the Grand Canal Dock.

The passenger profile in Figure 5-5 shows that more than 1000 passengers are forecasted to board at M3 Parkway Station, and an additional 100 trips board at the Dunboyne Station and Hansfield Station. Approximately 1300 trips are forecasted to alight at Clonsilla and board DART services toward the City Centre. At 15 minute frequency in the 2035 AM peak hour, this service is forecasted to operate well under design and seated capacity.

While the boarding profile shows clear demand during the AM peak hour coming from M3 Parkway, there is capacity to accommodate further demand. Measure to attract further patronage from this Study Area could include enhancing bus transfer opportunities, and reducing the cost of travel imposed by the tolling facility on the M3 motorway north of the M3 Parkway Station.

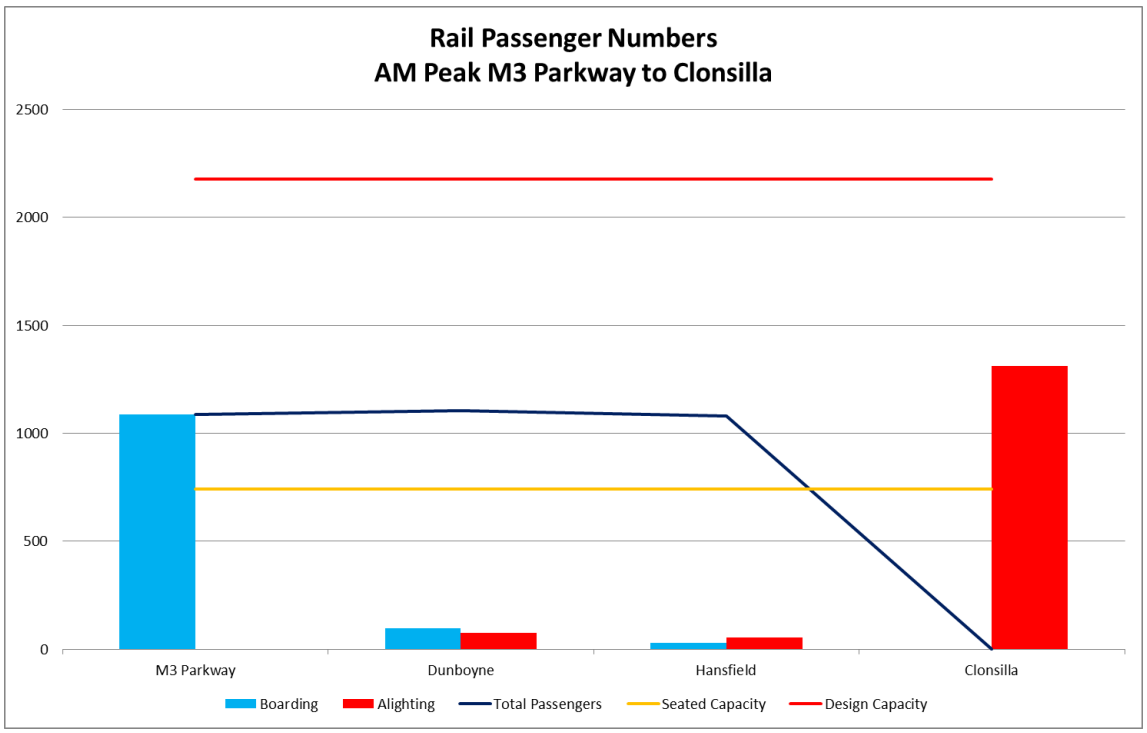


Figure 5-5: M3 Parkway Boarding and Alighting Profile

Figure 5-6 illustrates the Navan express bus service boarding and alighting profiles for the forecast year of 2035.

The passenger profile in Figure 5-6 shows 50 passengers are forecasted to board at Navan, an additional 90 trips board at the Dunshaughlin. Approximately 110 trips are forecasted to alight at Finglas enabling passenger to interchange with other public transport services with a remaining 20 passengers alighting at Bus Aras. At 15 minute frequency in the 2035 AM peak hour, this service is forecasted to operate within the design and seated capacity.

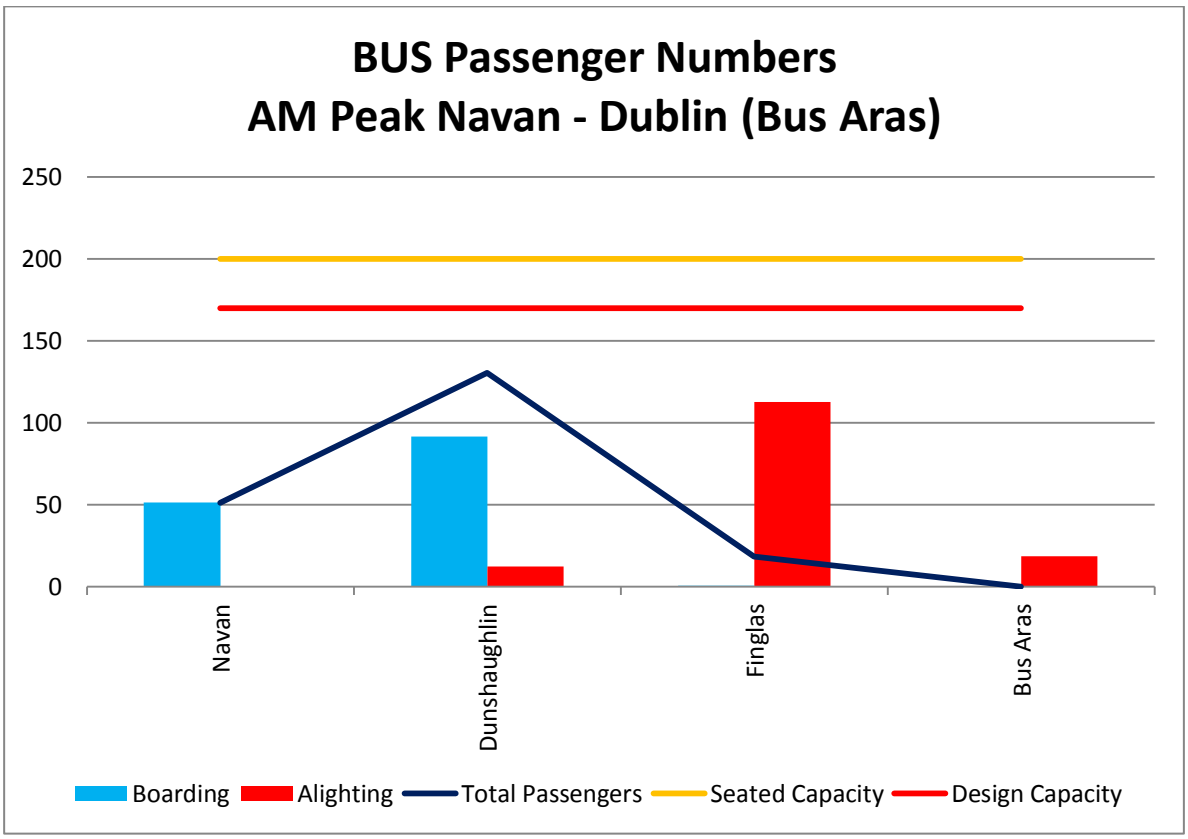


Figure 5-6: Express Service: Navan to City Centre Boarding and Alighting Profile

5.3.4 Journey Times and Service Speeds

The Navan express bus service to Dublin City Centre in the AM peak hour is forecasted to travel at an average speed of 42 KPH. From Navan to Dublin City Centre, the journey time would be 1 hour and 20 minutes. The forecasted 2035 journey time by car is 47 minutes to Cabra Road inside the inner orbital. This results in a journey time to the inner and outer orbital that is very attractive to make with a private vehicle. To the City Centre, the bus and rail may come closer to a competitive journey time. The Clonsilla to Grand Canal Dock rail service has an average rail speed of 27KPH. The M3 Parkway to Clonsilla has an average rail speed of 52KPH. The journey time from the M3 Parkway to Grand Canal Dock is approximately 50 minutes (8 minutes from M3 Parkway to Clonsilla, assumed 6 minutes interchange waiting time and 36 minutes to Grand Canal Dock).

5.4 Modelling Summary and Conclusions

The modelling assessment has shown that the patronage and passenger numbers using the express bus service is a suitable alternative to the car demonstrating that this proposal is a viable service. Figure 5-3 identifies how the public transport offering responds to the target public transport demand in Figure 3-4, in summary the proposal meets the target demand on two of the screenlines and makes a good contribution to the target demand on the remaining screenlines. Because of the flexibility of bus services, service can be increased and revised to meet demand and adapt to priority destinations. The modelling also showed that there is capacity to attract additional Study Area demand on the rail services modelled in the 2035 GDRDM. This can be done through Park and Ride facilities, efficient bus transfer services, and demand management strategies that improve the financial cost competitiveness of rail. For this corridor, financial cost competitiveness is important, as the journey time costs for private car is so low.

6 Emerging Navan Study Area Public Transport Scheme

6.1 Recommendation

The following outlines the recommended Navan Study Area proposal for Public Transport for the 2035 GDA Strategy. The recommended public transport proposal for the Navan Study Area is to introduce an express bus service between Navan and Dublin City Centre. This service would operate at 15 minute frequency during the AM peak hour, and could cater for approximately 200 trips. The service will also connect with orbital services in Dunshaughlin and Finglas.

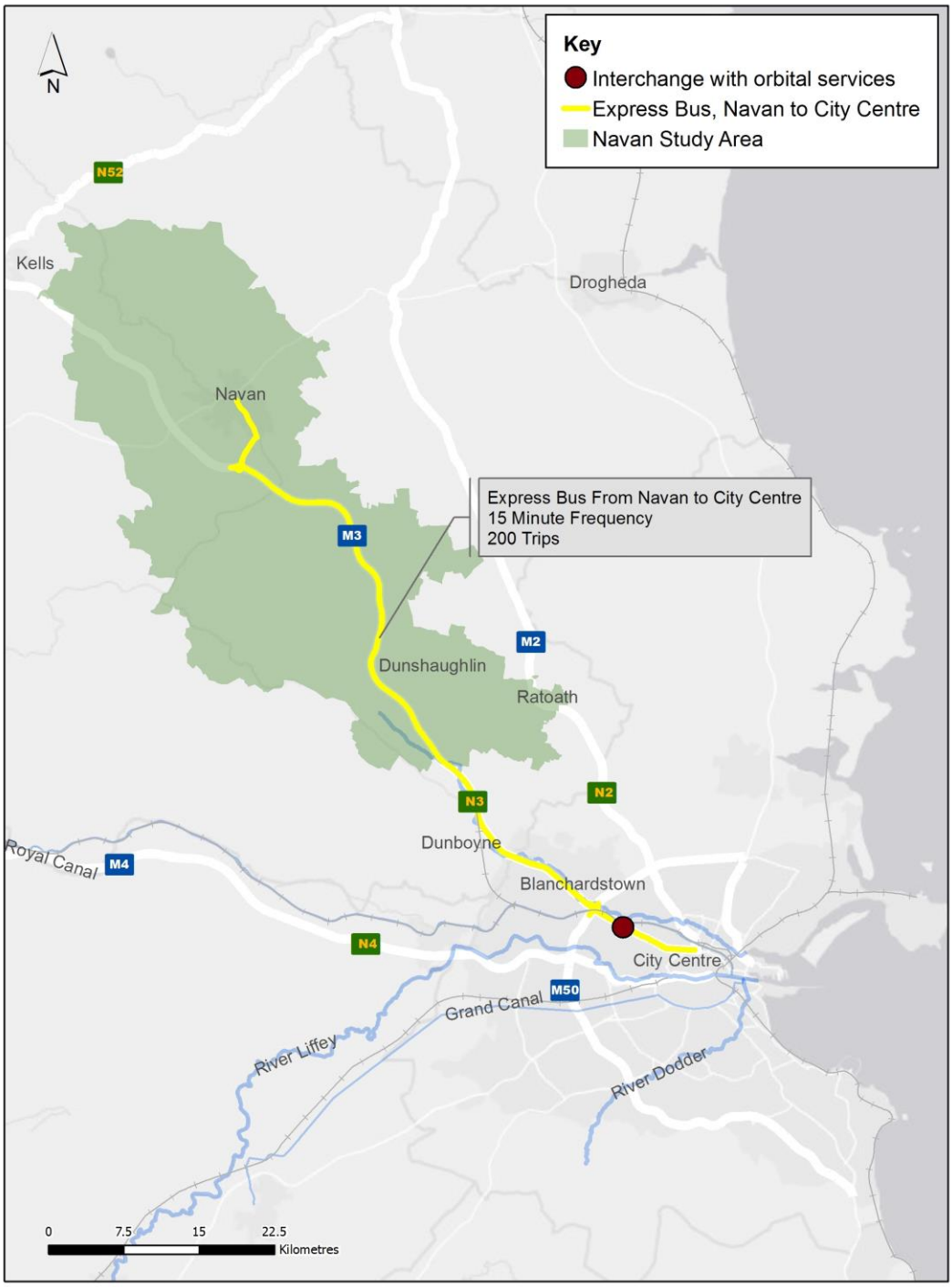


Figure 6-1: Recommended Option: Express Bus and Service to Inner/Outer Orbital

6.2 Specification of Public Transport Offering

During the AM peak hour an express bus service is proposed between Navan to the City Centre with stops in Dunshaughlin, and Finglas. This would operate at a 15 minute frequency in the AM peak hour, catering for a demand of 200.

Additional bus services in the Do Minimum and Do Strategy scenario will operate starting north of Navan and provide connections to the orbital services proposed in the outer orbital (outside the M50), and the inner orbital (inside the M50). Kells to Blanchardstown is 55 km and could take 1 hour and 20 minutes (comparable to the 109). Interchange hubs could be at Blanchardstown for the outer orbital services. For the inner orbital services hubs could be located at Ashtown and/or Broombridge. This service can be increased to a higher level if necessary in line with demand growth. The service can also be optimized as necessary to provide bespoke services from Navan to the City Centre, as well as services interchanging with orbital services, rail and light rail.

6.3 Benefits

- This option provides a feasible alternative to travel demand that currently uses car;
- This option makes a significant contribution in accommodating demand growth to 2035;
- This would provide for an approximate 11 per cent public transport mode share for Navan demand;
- The alignment of the Kells service makes public transport trips to the inner and outer orbital areas possible;
- This option makes most of existing infrastructure;
- The existing bus services can be extended to capture demand in growth area as and when this growth occurs;
- The existing bus service frequency can be increased in a phased manner over time to meet the growing demand;
- This option has flexibility provide access to a number of destinations, rather than just focusing on the City Centre. Can provide a service that is relatively high frequency, at a relatively low cost; and
- This option provides interchange with existing rail, and inner and outer orbital proposals.
- The modelling exercise hasn't included the collective benefits that could be provided by Park and Ride and demand management measures. Benefits of the proposed measures are likely to be greater with the introduction of Park and Ride and demand management;
- Park and Ride improvements would improve access to public transport and further increase public transport usage; and
- Implementation of GDA Demand Management measures will also further encourage the use of the public transport in the South East Study Area.

6.4 Risks

- Heavily reliant on Inner and Outer Orbital public transport proposals to provide access to inner orbital area;
- Detailed cost and risk assessment required; and
- Cost excludes operation costs.

6.5 Cost

Total Cost: capital costs expected to be minimal.

It is expected that there would be an uplift of existing services and therefore an increase in operational costs are expected.