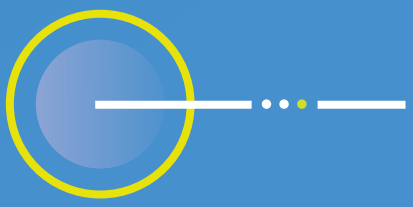
NTA
Údarás Náisiúnta Iompair
National Transport Authority

Jacobs SYSTRA

Greater Dublin Area Transport Strategy

2022 2042



Greater Dublin Area Transport Studies

North Kildare

November 2021

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Executive Summary

Introduction

The National Transport Authority (NTA) commissioned Jacobs Engineering Ireland Limited (Jacobs), in collaboration with Systra, to complete a series of Area Based Studies for the Greater Dublin Area (GDA). This study will inform the NTA's review of the Transport Strategy for the GDA (2016-2035) which will consider the future development of the transport network in the GDA for the period up to 2042.

This report details the findings for the North Kildare study area, which encompasses the Kildare County Council area and includes a small section of South Dublin County Council to the east. The Electoral Divisions of Leixlip, Maynooth and Celbridge are fully included within the study area whilst Donaghcumper and Lucan-St. Helens are partially located within the study area. The area is bounded to the north by the county boundary with Meath, to the north-east by the county boundary with Fingal and to the east by the county boundary with South Dublin County.

The methodology for this study is based on the Area Based Transport Assessment (ABTA) process which has been adapted and comprises the following key steps:

- Policy Context – understand the planning and transport policy context within which this study sits;
- Baseline Assessment – provide a clear understanding of the existing spatial characteristics, land uses, transport conditions and constraints in the study area;
- Establish Context – understand the future growth proposals for the study area as well as future travel patterns which proposed transport options need to serve;
- Options Development and Assessment – identify high-level transport options to serve demand in the study area and assess them via a multi-criteria analysis against the objectives of the study; and
- Final Summary – present the options to be taken forward and investigated further as part of the detailed preparation of the Draft Transport Strategy.

Policy Context

A comprehensive review of existing national, regional and local level legislation, policy and guidance relevant to this study has been undertaken in order to provide context for the identification of interventions which align with wider policy goals. Key documents include:

- Project Ireland 2040 – National Planning Framework;
- Project Ireland 2040 – National Development Plan;.
- Strategic Investment Framework for Land Transport (2014);
- Draft National Investment Framework for Transport in Ireland;
- Smarter Travel: A Sustainable Transport Future (2009 to 2020);
- The Climate Action Plan (2019);
- The Regional Spatial and Economic Strategy for the Eastern and Midland Region (2019 to 2031);
- Dublin Metropolitan Area Strategic Plan; and
- Transport Strategy for the Greater Dublin Area (2016 to 2035).

Baseline Assessment

Within the study area, there are three main settlements: Maynooth, Leixlip, and Celbridge. As well as being major towns with large populations, significant offerings of retail and other services, these settlements also contain key employment sites including Maynooth University, St Patrick's College, Maynooth Business Campus, Collinstown

Industrial Park (Intel), Liffey Business Park (Hewlett Packard) and Backweston Laboratory Complex (Department for Agriculture, Food and the Marine).

Maynooth is identified within regional and local plans as a key development area over the next 20 years, and as such, high employment and population growth are anticipated. Additionally, key strategic employment and residential sites are allocated within and around Leixlip.

Outside of the main settlements, the area is predominantly rural comprising of agricultural land (pastures and non-irrigated arable land). The River Liffey flows from the south-western edge of the study area to the north-east passing through Celbridge and Leixlip. The River Rye, a tributary of the River Liffey, convergences with the River Liffey in Leixlip. A key tributary to the River Rye is the Lyreen River which flows from the south to the north-west of the study area, converging with the River Rye in Maynooth. Additionally, the Royal Canal passes through the study area running from east to west across the northern part of the study area, through Leixlip and Maynooth.

Key transport infrastructure within the study area includes railway stations: Maynooth station; Leixlip (Confey) station and Leixlip (Louisa Bridge) station (all served by the Dublin-Sligo intercity and Maynooth commuter rail lines); and Hazelhatch and Celbridge station (served by intercity and commuter services). Walking and cycling infrastructure provides some key linkages within the study area whilst the Royal Canal Greenway links Maynooth and Mullingar. It is of note that the Royal Canal Greenway is anticipated to form part of the EuroVelo 2 Cycle Route which, when completed, will link Dublin and Galway.

Key roads within the study area are the M/N4 which runs from east to west, connecting Dublin City Centre and Sligo via Longford. Junctions 6 and 7 are within the study area and provide access to Celbridge/ western Leixlip and Maynooth, respectively. The regional roads within the study area provide links between the national road network and key settlements.

Car ownership is higher in the study area (90%) than the wider GDA (79%), as is the proportion of trips to work by car (65% vs. 55%). However, trips to work by public transport (18% vs. 17%) are higher in the study area than the wider GDA.

Context

Chapter 4 provides the context of the transport demand and supply in the forecast year, 2042. It considers the proposed growth in the area, transport proposals, travel patterns and forecast demand if modal shift was to occur. It demonstrates how there is minimal expected land use change in the study area. Population, Employment and Education are all expected to experience growth, 56%, 48% and 30% respectively. The majority of this employment growth is expected to be clustered between Celbridge, Leixlip and to the north of Maynooth.

The 2040 demand suggests that Dublin City Centre, parts of County Meath, Tallaght and Clondalkin form some of the key destinations for the study area. The study area has a relatively high car mode share and comparatively low public transport mode share, with the proportion of public transport trips being highest towards the east of the study area. Whilst a number of large junctions in the vicinity of the M4, between R148 and R449 in Collinstown Industrial Park, between Willowbrook Road and Maynooth Road in Celbridge and between R403 and 404 near Weston Airport operate near capacity, the road network in the study area is moderately congested with a large number of junctions demonstrating existing operational headroom. Similarly, the proposed bus network is expected to function primarily within capacity except for between Celbridge and Maynooth and through Lucan where the services are forecast to operate over 85% capacity at certain points.

Analysis is also undertaken to estimate the level of public transport demand along the key movement corridors if certain levels of mode shift away from car were to occur. This analysis is intended to provide an indicative level of demand to help inform the options development process, in terms of level of provision required. Analysis has been undertaken on one identified movement corridor passing through the study area,

- Radial corridor from Kilcock to Dublin City Centre;

This analysis determined that, in order to enable a car mode shift of 50% (i.e. 50% of all car trips in 2042 shift to other modes including public transport), capacity for 5,400 public transport trips would be required to cater for eastbound demand along the radial corridor. This figure includes both modelled public transport demand, and additional demand from shifted car trips.

It is noted that further analysis to cover orbital demand across a wider area across the GDA is likely to be required in order to inform options selection for orbital corridors.

Options Development

To identify options to serve demand in the study area in 2042, the following steps were completed:

- A review of relevant planning and transport policies and strategies has provided the overall context for options, and identified current thinking in relation to the future transport network;
- A baseline analysis of the existing transport network identified existing network issues and opportunities;
- An analysis of planning and travel data from the 2042 Planning Sheet and a DM run of the ERM for 2042 provided insights into future travel demand and network capacity constraints; and
- A review of the GDA strategy objectives against which all options should be aligned.

The above steps resulted in the preparation of an options list to serve demand in the study area:

Ref	Type of option	Description
Existing proposals		
	Highway	Enhance orbital movement, outside of the M50 Ring Road, between the N3, the N4 and N7 national roads, by the widening of existing roads and the development of new road links.
	Rail	DART+ will provide a sustainable, electrified, reliable and frequent rail service by significantly increasing capacity on all rail corridors serving the GDA. In the North Kildare study area, DART+ will provide electrified services and new additional railcar carriages from Dublin City Centre to: • Maynooth via the Maynooth Line (DART+ West) – An increase in capacity from 7 trains per hour (per direction) to 15 trains per hour, subject to demand, will increase capacity from 4,500 to 13,750 passengers (per hour per direction). Due to be delivered by 2027, this project will enhance connectivity from Dublin City Centre to both Leixlip and Maynooth. Hazelhatch and Celbridge via the Kildare Line (DART+ South West) – An increase in capacity from 12 trains per hour (per direction) to 23 trains per hour, subject to demand, will increase capacity from 5,000 to 20,000 passengers (per hour per direction).
New proposals		
1	Cycle Infrastructure	Cycle Infrastructure - R405 Missing Link - Maynooth to Celbridge (Salesian College)
2	Cycle Infrastructure	Cycle Infrastructure - North Kildare to Adamstown
3	PT Corridor	North Kildare to Blanchardstown by bus (Single Interchange) Extension of Route L58 and L59 to Clonsilla Station
4	PT Corridor	North Kildare to Blanchardstown - Rail:Bus (Single Interchange) Improve bus:rail interchange opportunities at Clonsilla Station
5	PT Corridor	Extend C3 bus service to Maynooth Business Campus
6	PT Corridor	Extend C4 bus service to Maynooth University
7	PT Corridor	Re-route W6 bus service through centre of Maynooth
8	Rail	Collinstown Strategic Rail Based Park+Ride
9	Rail	West of Maynooth Strategic Rail Based Park+Ride
10	Rail	Leixlip Confey – Station relocation and upgrade to Interchange
11	Travel Choices	North Kildare Travel Choices Programme

The list of options was assessed based on their ability to serve modelled demand in the forecast year. The main option to serve demand on the radial corridor was identified as the existing proposal for DART+ which will electrify the lines and deliver more frequent and reliable services between the study area and Dublin City Centre. As such, the remaining proposed options will largely be required to improve the situation for trip demand within and to/from the surrounding areas.

The Existing Proposals and Options 3 to 10 from the New Proposals were assessed using the multi-criteria analysis (MCA). The remaining options were considered to be complementary measures and have not been assessed as part of the MCA.

Options Assessment

The options are carried forward into Chapter 6 for a MCA, providing a high-level assessment based on professional judgement. Building on the key themes of the Common Appraisal Framework, a set of criteria which sit within these overarching themes were developed to enable a more detailed assessment of options to be undertaken. The criteria were based on the objectives for the Transport Strategy, as provided by the NTA.

The options brought forward to the assessment stage were compared via the comparative analysis which demonstrated that overall, the existing proposal for Dart+ performs best. However, it is noted that other bus, cycle and travel marketing options should be taken forward as part of further work in the development of the revised Transport Strategy for the GDA.

Summary

This study provides a comprehensive review of the North Kildare study area in relation to proposals for future land use and transport networks and identifies a series of transport options to serve future travel demand. One core radial movement corridor has been identified from the modelled data provided which caters for the majority of movements through the study area. A demand analysis has been undertaken, incorporating both modelled public transport demand and additional demand from car mode shift to identify the most appropriate options to serve these core corridors.

Overall, the existing heavy rail-based option has been assessed as being best suited to provide for future radial travel demand in the study area. Other internal options proposed align with the Transport Strategy objectives, with bus, interchange and Park+Ride improvements providing the best fit. In addition, it is suggested that other supplementary options are explored as part of wider orbital corridors for the GDA; a series of complementary measures to nudge travel behaviour and close gaps in the cycle network have been outlined for further consideration.

1. Introduction

1.1 Background to the study

The National Transport Authority (NTA) commissioned Jacobs Engineering Ireland Limited (Jacobs) in collaboration with Systra to complete an Area Based Study for North Kildare.

This study was commissioned in order to inform the NTA's review of the Transport Strategy for the Greater Dublin Area (GDA) 2016 – 2035, which will consider the future development of the transport system in the GDA for the period up to 2042. In this context, the purpose of this study is to:

- Provide a comprehensive assessment of future travel demand in the North Kildare area;
- Identify realistic potential options to meet future travel demand to and from this area, and in particular to cater for demand into Dublin City Centre and other key destinations;
- Focus in particular on options for public transport and active modes provision, taking account of emerging proposals;
- Assess potential options using a multi-criteria assessment framework; and
- Recommend options which can be taken forward for further assessment as part of the development of the revised Transport Strategy.

1.2 Overview of the study area

The North Kildare study area is located within the GDA, approximately 18.5km to the west of Dublin City Centre. The study area, as defined by the NTA, is shown in Figure 1.1.

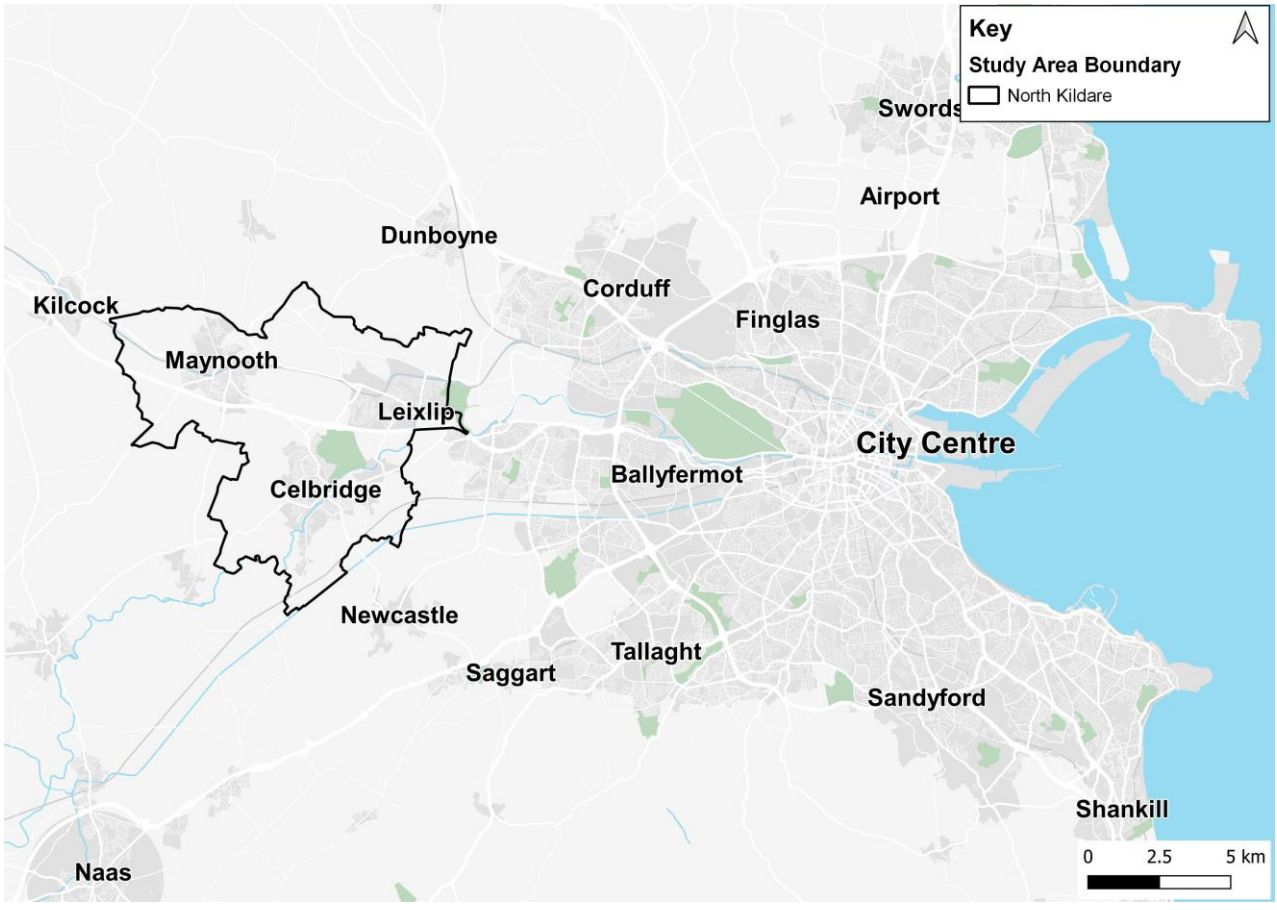

Figure 1.1: North Kildare Study Area (Wider Context)

Figure 1.2 provides a more detailed overview of the study area. The study area predominantly consists of Kildare County Council and includes a small section of South Dublin County Council to the east. The Electoral Divisions of Leixlip, Maynooth and Celbridge are fully included within the study area whilst Donaghcumper and Lucan-St. Helens are partially located within the study area. The area is bounded to the north by the county boundary with Meath, to the north-east by the county boundary with Fingal and to the east by the county boundary with South Dublin County.

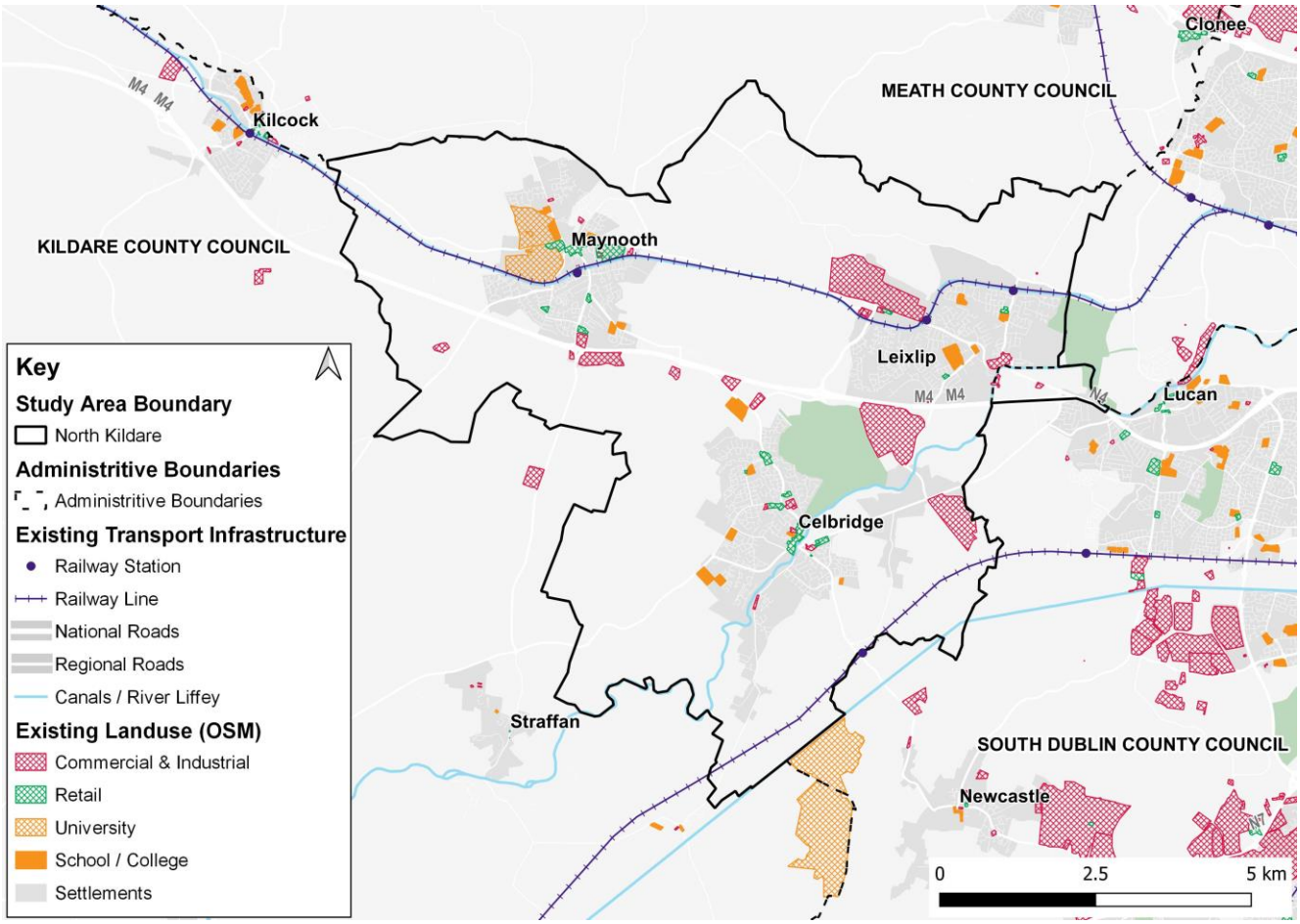

Figure 1.2: North Kildare Study Area (Study Area Context)

Within the study area, there are three main settlements: Maynooth, Leixlip, and Celbridge. As well as being major towns with large populations, significant offerings of retail and other services, these settlements also contain key employment sites including Maynooth University, St Patrick's College, Maynooth Business Campus, Collinstown Industrial Park (Intel), Liffey Business Park (Hewlett Packard) and Backweston Laboratory Complex (Department for Agriculture, Food and the Marine).

Maynooth is identified within regional and local plans as a key development area over the next 20 years, and as such, high employment and population growth are anticipated. Additionally, key strategic employment and residential sites are allocated within and around Leixlip.

Outside of the main settlements, the area is predominantly rural comprising of agricultural land (pastures and non-irrigated arable land). The River Liffey flows from the south-western edge of the study area to the north-east passing through Celbridge and Leixlip. The River Rye, a tributary of the River Liffey, convergences with the River Liffey in Leixlip. A key tributary to the River Rye is the Lyreen River which flows from the south to the north-west of the study area, converging with the River Rye in Maynooth. Additionally, the Royal Canal passes through the study area run from east to west across the northern part of the study area, through Leixlip and Maynooth.

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Future changes and proposals to transport infrastructure of relevance to this area including the Dart+ are summarised subsequently.

1.3 Study methodology

The methodology for this study is based on the Area Based Transport Assessment (ABTA) process, which has been developed by both the NTA and Transport Infrastructure Ireland (TII). This approach ensures that movement and accessibility of all forms, across all modes of travel, is considered in the development of areas at a local level. The ABTA approach has been adapted for the purposes of this study comprises the following key steps:

- Policy Context – understand the planning and transport policy context within which this study sits;
- Baseline Assessment – provide a clear understanding of the existing spatial characteristics, land uses, transport conditions and constraints in the study area;
- Establish Context – understand the future growth proposals for the study area as well as future travel patterns which proposed transport options need to serve;
- Options Development and Assessment – identify high-level transport options to serve demand in the study area and assess them via a multi-criteria analysis against the objectives of the study; and
- Final Summary – present the options to be taken forward and investigated further.

1.4 Report structure

This report is comprised of the following chapters:

- Chapter 2 – Policy context
- Chapter 3 – Baseline assessment;
- Chapter 4 – Future context;
- Chapter 5 – Options development;
- Chapter 6 – Options assessment; and
- Chapter 7 – Summary.

2. Policy context

This section provides a comprehensive review of existing national, regional and local level legislation, policy, and guidance relevant to this study. It examines plans, policies and objectives at all levels in order to provide the broad context for this area study. It therefore frames the development of the study and provides a context for the identification of interventions which align with wider policy goals.

2.1 National policy

2.1.1 Project Ireland 2040 - National Planning Framework

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

- National Planning Framework (NPF) - shaping development in economic, environmental and social terms to 2040; and
- National Development Plan (NDP) - setting out the investment priorities that will underpin the NPF from 2018 to 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 NPF is a tool to assist the achievement of more effective regional development.

The objectives of the NPF, in brief, are to:

- Guide the future development of Ireland, taking into account a projected million 1 increase in population and creation of 660,000 additional jobs and 550,000 more homes by 2040;
- Direct 25% of this growth to Dublin, 25% across Cork, Limerick, Galway and Waterford and the remaining 50% across key regional centres, towns and villages (as set out in the Regional Spatial and Economic Strategy (RSES)); and
- Co-ordinate delivery of infrastructure and services in tandem with growth, helping to tackle congestion and quality of life issues.

The NPF represents the overarching national planning policy document and is underpinned by a series of core principles named National Strategic Outcomes (NSOs) which include:

- NSO 1 Compact Growth;
- NSO 2 Enhanced Regional Accessibility;
- NSO 4 Sustainable Mobility;
- NSO 7 Enhanced Amenity and Heritage; and
- NSO 8 Transition to a Low Carbon and Climate Resilient Society.

These principles are translated by supporting policies and actions at a sectoral, regional and local level.

In relation to Dublin, the NPF requires the preparation of the *Dublin Metropolitan Area Strategic Plan* (part of the RSES), and notes that the identification of infrastructure required to sustain growth is a key priority of this Plan. In relation to Dublin, the NPF itself sets a clear focus on:

- Supporting future growth by better managing growth and ensuring it can be accommodated within and close to the city. This includes a focus on underutilised land within the canals and M50 ring road, and a more compact urban form.
- Enabling significant population and jobs growth in the Dublin metropolitan area, together with better management of the trend towards overspill into surrounding counties.

- There will be a requirement for significant greenfield development on sites which have good integration with the city and can be served by high capacity public transport. Some existing sites have already been designated as Strategic Development Zones (SDZs).
- Addressing infrastructural bottlenecks, improving quality of life and increasing housing supply in the right locations.

Key transport-related growth enablers for Dublin include:

- Delivering key rail projects set out in the Transport Strategy for the GDA including Metro Link, DART expansion and the Luas green line link to Metro Link;
- The development of an improved bus-based system, with better orbital connectivity and integration with other transport networks;
- Delivering the metropolitan cycle network set out in the GDA Cycle Network Plan, including key commuter routes and urban greenways; and
- Improving access to Dublin Airport, including public transport.

This policy sets the context for the development of transport interventions, including those considered through this study. It highlights that there will be significant growth to 2040 and that improvements to public transport and active mode provision are key to supporting the levels of planned development.

2.1.2 Project Ireland 2040 - National Development Plan

The NDP sets out the enabling investment to implement the strategy set out in the NPF, for the period 2018 to 2027. Under the NDP, investment in public transport infrastructure will be accelerated to support the development of an integrated and sustainable national public transport system consistent with the NPFs NSOs of Sustainable Mobility and Company Growth. Projects with allocated funding within the NDP include:

- Continued investment in bus and train fleets and infrastructure;
- The delivery of the Dublin BusConnects programme;
- The complete construction of Metro Link;
- Delivery of the priority elements of the DART Expansion Programme;
- A Park & Ride programme; and
- Cycling and walking networks in key urban areas.

These projects will deliver significant improvements. This study, and other work the NTA is doing to review the Transport Strategy for the Greater Dublin Area will consider other longer-term interventions required to support the NPF to 2040 and beyond.

2.1.3 Investing in Our Transport Future: Strategic Investment Framework for Land Transport (2014)

The Strategic Investment Framework for Land Transport (SIFLT) sets out the strategic framework to consider the role of transport in the future development of the Irish economy and estimate the appropriate level of investment required in the land transport system. The framework establishes:

- High-level priorities for future investment in land transport; and
- Key principles, reflective of those priorities, to which transport investment proposals will be required to adhere.

Priorities include:

- Achieving steady state maintenance – emphasising the importance of efficient maintenance and management;
- Addressing urban congestion – recognising that improvements to the efficiency and sustainability of urban transport systems are a key priority. The document specifically notes that this "must be guided by demand/capacity assessments and recognise the role of urban centres as key drivers of economic

activity, nationally and regionally." It goes on to say that measures should include improved and expanded public transport capacity, walking and cycling infrastructure as well as Intelligent Transport Systems to improve efficiency and capacity; and

- Maximising the contribution of land transport networks to national development.

The priorities and improvements set out in the SIFLT will be taken into consideration within this study whilst considering any other interventions required by 2040 and beyond.

2.1.4 Project Ireland 2040 - National Investment Framework for Transport in Ireland (NIFTI)

NIFTI is the Department of Transports new high-level strategic framework for prioritising future investment in the land transport network. At the time of writing, the public consultation for NIFTI is currently underway and expected to conclude in May 2021. Once published, NIFTI will replace SIFLT as the framework for future land transport investment. NIFTI is intended to ensure that transport investment is aligned with and supports the NPF and its NSOs. NIFTI outlines key investment priorities that future transport projects must align with to be considered for funding.

Priorities include:

- Decarbonisation – Recognises the fact transport accounts for approximately one-fifth of Irish greenhouse gas emissions, therefore decarbonisation is an urgent priority in the context of climate change targets;
- Protection and renewal – many of the challenges faced by the network can be addressed, at least partially, through protection and renewal. Adequate maintenance is necessary to ensure safety, make sustainable modes an attractive option, deliver connectivity and accessibility and ensure the resilience of key pieces of infrastructure;
- Mobility of people and goods in urban areas – requires prioritisation in order to facilitate compact and sustainable growth in towns and cities. Support will be given to projects that reduce urban congestion, especially through the use of sustainable mobility measures; and
- Enhanced regional and rural connectivity – through addressing priority bottleneck and network constraints as well as ensuring all parts of the country are well-served with access to major ports and airports.
- This framework highlights the need for this study to identify measures to address issues such as climate change and urban congestion through model shift and improved provision for sustainable modes.

2.1.5 Smarter Travel: A Sustainable Transport Future (2009 to 2020)

Smarter Travel: A Sustainable Transport Future 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 of achieving a more sustainable transport future.

Smarter Travel acknowledges that continued growth and dependency on the private car is not sustainable and therefore sets an objective to promote a significant mode shift in favour of public transport, walking and cycling. A key target in this regard is to reduce the proportion of travel to work trips by car.

Key goals of *Smarter Travel* include:

- Improving quality of life and accessibility to transport for all;
- Improving economic competitiveness through maximising the efficiency of the transport system and alleviating congestion and infrastructural bottlenecks;
- Minimising the negative impacts of transport on the environment through reducing air pollution;
- Reducing overall travel demand and commuting distances in the private car; and
- Reducing reliance on fossil-fuel-based transport modes.

This policy highlights the need for this study to place key emphasis on identifying the interventions required to support mode shift.

Please note, this policy is currently under review as part of the *Sustainability Mobility Policy Review*. Consultation on the review closed in early 2020. The consultation documents emphasised that the purpose of the review was to put in place a new policy which supports:

- A shift away from the private car to greater use of active travel and public transport;
- Travel by cleaner and greener transport; and
- Comfortable and affordable journeys to and from work, home, school, college, shops and leisure.

The new policy will align with the NPF and will replace the *Smarter Travel Policy*, plus the *National Cycle Network Policy Framework*.

2.1.6 National Cycle Policy Framework (2009 to 2020)

Ireland's first *National Cycle Policy Framework 2009-2020's* vision is that all cities, towns, villages and rural areas will be bicycle friendly. The overarching mission of the Framework is to create a strong national cycling culture to align with Smarter Travel's objective that 10% of all trips will be by bike by 2020.

The Framework sets out a comprehensive package of interventions – both 'hard' (planning and infrastructure) and 'soft' (communication and education) – to make cycling a convenient and safe option for everyone. The approach recommended is a hierarchy of measures, including:

- Reducing volumes of through-traffic, especially HGVs, in urban centres and in the vicinity of schools and colleges;
- Calming traffic/ enforcing low traffic speeds in urban areas; and
- Making junctions safe for cyclists and removing multi-lane one-way street systems.

A number of objectives relevant to this study include:

- Support the planning and design of urban centres to support cyclists and pedestrians;
- Improve integration between cycling and public transport to enable multi-modal travel;
- Provide secure parking for bikes; and
- Evaluate and monitor the implementation of measures.

Please note, this policy is currently under review as part of the Sustainability Mobility Policy Review (as detailed above).

This policy highlights the need for this study to proactively identify the cycle infrastructure required to support future growth.

2.1.7 Building on Recovery: Infrastructure and Capital Investment (2016 to 2021)

Building on Recovery: Infrastructure and Capital Investment 2016-2021, published by the Department of Public Expenditure and Reform in 2016, presents the Government's new €42 billion framework for infrastructure investment in Ireland over the period 2016 to 2021.

The Exchequer transport capital allocation is largely framed by the recommendations and priorities set out in the *Strategic Investment Framework for Land Transport* (superseded by the *Planning Land Use and Transport Outlook 2040* in 2018). These priorities are threefold:

- Maintain and renew the strategically important elements of existing land transport system;
- Address urban congestion; and
- Improve the efficiency and safety of existing transport networks.

Under the Plan, €100 million is being committed to smarter travel and carbon reduction measures, including Greenways, to ensure that the transport sector makes a major contribution to climate change mitigation targets.

2.1.8 Climate Action Plan (2019): To Tackle Climate Breakdown

The *Climate Action Plan*: *To Tackle Climate Breakdown* identifies how Ireland will achieve its 2030 targets for reduction in carbon emissions and a pathway towards achieving a net zero emissions by 2050.

A central pillar of this plan is the role that transport can play in reducing carbon footprint and improving air quality in 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.

The Climate Action Plan sets a target reduction of 45-50% in Ireland's transport emissions by 2030. In 2017, transport accounted for a significant proportion of Ireland's greenhouse gas emissions – approximately 20%.

Other targets in relation to transport include:

- Increasing the number of electric vehicles;
- Building the electric vehicle charging network at the rate required to meet demand;
- Require at least one recharging point in new non-residential buildings with more than 10 parking spaces;
- Raise the blend proportion of biofuels in road transport.

2.1.9 Road Safety Strategy (2013 to 2020)

The *Road Safety Strategy* 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.' It also notes that 'collisions involving cyclists account for 1 in 25 road deaths annually, and many collisions involving cyclists lead to serious head injuries.'

The Road Safety Authority (RSA) undertook a consultation on their new strategy 2021-2030, which closed in November 2020. The new strategy is proposed to have an end date of 2030 to align with the EU Road Safety Policy. The review document notes that while the long-term trend shows that roads in Ireland have become safer for road users overall, this has not been the case for all road user groups. It notes that the biggest decrease in fatalities was among pedestrians and that there were 68% fewer pedestrian causalities in 2019 compared to 2000, but that pedestrians are still the second largest fatality group, behind car occupants. The new strategy will look at how to further reduce fatalities and serious injuries and how to deal with new issues in road safety.

2.1.10 UN Convention for the Rights of People with Disabilities

In March 2019, Ireland ratified the *UN Convention on the Rights of People with Disabilities (*UNCPRD). Article 9 of the UNCPRD includes the right to transport and creating an accessible end to end journey, with the user focus central to this approach. Its focus is:

"To enable persons with disabilities to live independently and participate fully in all aspects of life, States Parties shall take appropriate measures to ensure to persons with disabilities access, on an equal basis with others, to the physical environment, to transportation, to information and communications, including information and

communications technologies and systems, and to other facilities and services open or provided to the public, both in urban and in rural areas. These measures, which shall include the identification and elimination of obstacles and barriers to accessibility, shall apply to, inter alia: Buildings, roads, transportation, and other indoor and outdoor facilities, including schools, housing, medical facilities and workplaces; and information, communications and other services, including electronic services and emergency services."

Article 9 for the first time enshrines the right to transport within Irish legislation. The focus on Usability and Accessibility has implications and opportunities across transport planning and provision, including the NPF and the way that schemes are appraised to capture wider benefits associated with ensuring this Right.

2.1.11 Other national guidance

The following national guidance has also been considered:

- Area Based Transport Assessment Guidance (ABTA), Transport Infrastructure Ireland, 2018;
- Design Manual for Urban Roads and Streets (DMURS), Department of Transport, Tourism and Sport, 2013 (updated 2019);
- National Physical Activity Plan, Healthy Ireland, 2019 (updated 2021);
- National Cycle Manual, National Transport Authority, 2011;
- Permeability: A Best Practice Guide, National Transport Authority, 2015;
- Achieving Effective Workplace Travel Plans; Guidance for Local Authorities, National Transport Authority[1].

2.2 Regional policy

2.2.1 Regional Spatial and Economic Strategy for the Eastern and Midland Region (2019 to 2031)

The *Regional Spatial and Economic Strategy for the Eastern and Midland Region* (RSES) translates the objectives of the NPF at a regional level and provides a link between the NPF and local plans. Overall, it provides a framework for investment to better manage spatial planning and economic development throughout the Region to 2031, and beyond to 2040.

The RSES identifies 16 regional strategic outcomes (RSOs). Integrated transport and land use is one of these, aiming to promote best use of transport infrastructure and promote sustainable and active modes of travel. The key challenge facing the region is identified as the transition to a low carbon society. The RSES therefore identified a number of primary areas of transition – with sustainable transport systems being one of these.

Maynooth is identified as a 'Key Town' whilst Leixlip and Celbridge are identified as large towns. A 'Key Town' is defined as a: *large economically active service and/or county towns that provide employment for their surrounding areas and with high-quality transport links and the capacity to act as growth drivers to complement the Regional Growth Centres.* The settlement strategy for Key Towns is to provide for sustainable compact, sequential growth and urban regeneration through consolidating the built footprint. As such, future development is largely centred around regeneration and identified infill / brownfield sites.

[1] https://www.nationaltransport.ie/wp-content/uploads/2012/03/Achieving-Effective-Workplace-Travel-Plans-Guidance-for-Local-Authorities11.pdf

Dublin Metropolitan Area Strategic Plan

The Metropolitan Area Strategic Plan (MASP) for Dublin sets out a strategic planning and investment framework for the Dublin Metropolitan Area covering the short term (to 2026), medium term (to 2031) and longer term (to 2040). It includes a vision for future growth to 2031 including large scale development opportunities and a sequence of infrastructure priorities. It envisages a 250,000 increase in population of the metropolitan area between 2016 and 2031.

The vision is underpinned by a spatial framework in line with the overall settlement strategy focussed on:

- Consolidation of Dublin City and suburbs;
- Key towns of Swords, Maynooth and Bray; and
- Planned development in strategic development areas in Donabate, Dunboyne, Leixlip and Greystones.

The MASP includes a number of guiding principles for development, with a key focus on integrated transport and land use, focussing growth on public transport corridor and nodes. It aims to see 50% of all new homes within or adjacent to the existing built up area in Dublin and 50% in other settlements. To unlock development capacity in strategic development areas, the MASP identifies sequencing of enabling infrastructure and directs the cross sectoral investment required to deliver development.

Figure 2.1 – Strategic development areas and corridors highlighted in the MASP

It identifies five strategic development corridors, as shown in Figure 2.1, and for each highlights:

- Population capacity in the short, medium and long term (where longer term is to 2040);
- The strategic residential development opportunities;
- The strategic employment opportunities;
- The infrastructure required to enable this development in the short to medium and medium to long term.

The MASP recognises that "Facilitating modal shift to more sustainable transport options, including walking and cycling is a key element in promoting better traffic management and climate change strategies in the metropolitan area." It supports the NTA Greater Dublin Area Cycle Network Plan and recognises that Greenways (such as the Royal Canal Greenway) are of strategic value as routes.

The following corridors outlined in the MASP are of significance for the North Kildare study area:

- North West Corridor which passes directly through the North Kildare study area. In the short to medium term, LUAS extension to Maynooth, DART expansion and the development of a Maynooth Outer Orbital Route are proposed to support strategic residential and employment growth focused in Maynooth and Leixlip.
- South West Corridor which passes through the south of the North Kildare study area. As part of this corridor, DART expansion to Celbridge-Hazelhatch is proposed.

2.2.2 Greater Dublin Area Transport Strategy (2016 to 2035)

The *Greater Dublin Area Transport Strategy 2016-2035* provides a framework for the planning and delivery of transport infrastructure and services in the Greater Dublin Area (GDA) up to 2035. It provides a transport planning policy around which other agencies involved in land use planning, environmental protection, and delivery of other infrastructure such as housing, water and power, can align their investment priorities.

The GDA's transport infrastructure and services must be planned for and invested in on the basis of the following:

- Assumed sustained economic growth;
- Substantial population growth;
- Full employment;
- That no one is excluded from society, by virtue of the design and layout of transport infrastructure and services or by the cost of public transport use; and
- That the environment in the GDA is protected and enhanced.

The Strategy sets out high-level proposals for the walking, cycling, public transport and road networks, as well as parking management measures and other supporting measures for the entire GDA. In developing and appraising transport options, the Strategy splits the GDA into six radial corridors, Corridor C (Maynooth – Leixlip – Lucan – to Dublin City Centre) includes the North Kildare study area.

2.2.3 Greater Dublin Area Transport Strategy Review

The NTA is required by legislation to review the Greater Dublin Area Transport Strategy every six years. The ongoing review will assess the implementation of the current plan, and look to produce an updated strategy which will set out the framework for investment in transport infrastructure and services, through to 2040. The NTA aims to complete the review by the end of 2021, so that the new strategy can be approved by the Minister for Transport in early 2022.

The review process recognises that the following are particular challenges and considerations for the new strategy:

- Climate change and the environment – recognising the need for transport to lead the way towards a net zero emissions future.
- Growth and change – ensuring the public transport investment aligns with changes in the location of population, jobs and schools.
- Health and quality – recognising that transport can open up opportunities and have a positive impact on health and wellbeing.
- The economy – with effective public transport being a major driver of economic activity.

This transport study will feed into the review process currently being undertaken by the NTA.

2.2.4 Greater Dublin Area Cycle Network Plan

The Greater Dublin Area Cycle Network Plan is identified as a key future growth enabler for Dublin in the NPF. The plan forms the strategy for the implementation of a high quality, integrated cycle network for the GDA. This involves the expansion of the urban cycle network from 500km to 2,480km, comprising a mix 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 plus overtaking width = 2.5m
- **Secondary** – link between principle cycle routes and local zones – target QoS of single file plus overtaking width = 1.75m

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

2.3 Local policy

A number of local policy documents are relevant to the North Kildare study area. Local policy documents have been reviewed to inform growth locations and future transport developments. The following documents have the future context set out in Section 4:

- Kildare County Development Plan (2017 – 2023);
- Kildare County Development Plan (2023 – 2029) Issues Paper;
- South Dublin County Council Development Plan (2016 – 2022);
- South Dublin County Council Development Plan (2022 – 2028) Issues Paper;
- Maynooth Local Area Plan (2013 – 2019);
- Celbridge Local Area Plan (2017 – 2023); and
- Leixlip Local Area Plan (2020 – 2023).

3. Baseline assessment

3.1 Description of the study area

3.1.1 General

The North Kildare study area is located to the west of Dublin and covers approximately 75km^2. It is predominantly comprised of the northern part of Kildare County with a small section of South Dublin County and can be described as semi-rural, surrounded to the north, south and west by deep rural areas., and the urban mass of Greater Dublin to the east.

There are three main settlements within the study area, within which most of the key residential and employment sites are located:

- **Celbridge** is in the centre of the study area and is, by population, the largest settlement in the study area with over 20,000 residents. There are several community facilities within the town including primary and secondary schools, St Raphael's Hospital, Celbridge Medical Centre and Celbridge AFC, as well as Castletown House (National Monument and visitor attraction). Hazelhatch and Celbridge railway station is located 2.4km south of the town centre. Ballyoulster is a small settlement of approximately 500 people to the east of Celbridge.
- **Leixlip** is located in the north-east of the study area and is the second largest settlement in the study area by population with over 15,500 residents. The River Liffey, River Rye and Royal Canal pass through the settlement. Collinstown Industrial Park (Intel) is a large employment location to the north-west of Leixlip whilst Liffey Business Park (formerly Hewlett Packard) is located to the south. Community facilities and attractors in Leixlip include primary and secondary schools and Leixlip Castle. The town has two stations; Leixlip Confey, which lies approximately 1.2km to the north of the town centre, and Leixlip Louisa Bridge which is approximately 1.6km to the west. The Royal Canal runs east to west through the settlement.
- **Maynooth** is located in the north-west of the study area and is a university town and home to Maynooth University and St Patrick's College. Whilst the third largest town in population in the study area with approximately 14,500 full time residents, the population fluctuates in term time with university students. In addition to the universities there are a number of community facilities within the town including primary and secondary schools and Carton Demesne. Maynooth Business Campus is located to the south of the town. Maynooth railway station is located 450 metres south of the town centre. The Royal Canal runs east to west through the settlement.

3.1.2 Transport network and services

Road network

The North Kildare study area is served by a network of national, regional and local roads, these are presented in Figure 3.1.

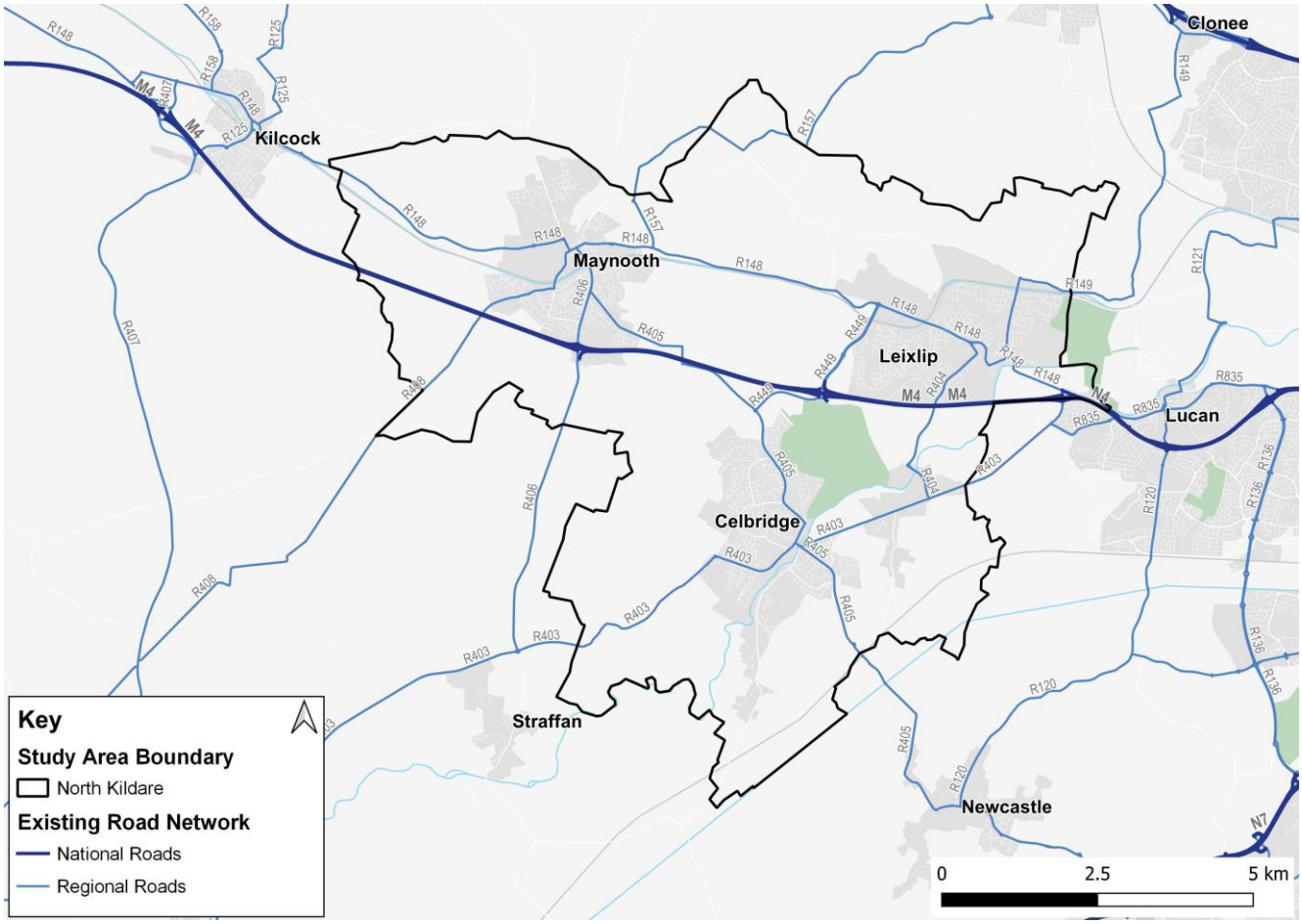


Figure 3.1: Road network in North Kildare

The national road network provides the basis for Dublin's wider national-level and inter-regional connectivity. There is one National Primary Route within the study area:

- **M4:** Runs east-to west connecting Dublin City Centre to the west of Ireland. Junctions 6 and 7 are within the study area and provide access to Celbridge/ western Leixlip and Maynooth, respectively. According to Transport Infrastructure Ireland (TII), the M4 through North Kildare is subject to severe congestion, particularly during peak travel times as a result of commuter traffic. TII highlights safety concerns and that the existing infrastructure is not fit for purpose due to the large volumes of commuter and freight traffic and junction constraints. Prior to the COVID 19 pandemic in 2019, the reported AADT for the section of the M4 between Maynooth and Leixlip was 59,350, further reinforcing that this route was operating at, or very close to designed capacity.

The study area's regional road network comprises of a number of routes which connect the key settlements in the study area (Maynooth, Leixlip and Celbridge/Ballyoulster) with adjacent settlements. A brief description of some of the key routes is provided below:

- **R148**: The R148 runs parallel to the M4 through the study area, linking Leixlip and Maynooth town centres with Kilcock in the west and Lucan in the east. The highway standard of this route is variable, entirely two-lane single carriageway, with some wider sections with on-road cycle lanes provided to the west of Leixlip Town Centre, east Maynooth and a short section as the R148 passes to the north of Maynooth University.

- **R403:** The R403 runs north east to south west through the study area, linking Ballyoulster and Celbridge. Beyond the study area, it connects to the M4 at Lucan to the north east and continues south

west towards Straffan and Clane (for Naas). The route is entirely two-lane single carriageway within the study area, with some narrow sections through Celbridge with no cycle provision and limited footways.

- **R405**: The R405 links Maynooth in the north west of the study area with Celbridge and Hazelhatch before leaving the study area to link to Newcastle to the south east. A two-lane single carriageway throughout, separated active travel (walking and cycling) facilities have been provided between Celbridge and Hazelhatch and Celbridge Station, and also on the section known as Maynooth Road between Celbridge and Celbridge Community School (just north of the junction with the R449).

- **R449:** The R449 links the R148 west of Leixlip to the north with Junction 6 of the M4 and the R405 to the south (north of Celbridge). The route appears to have been purpose built to connect the local highway network with the motorway, and is constructed to a high standard two-lane single carriageway to the south of Junction 6 and dual carriageway to the north. There is fully separated active travel provision on both sides of the carriageway along the full length of the route.

Heavy rail network

The heavy rail system in the GDA comprises several individual rail lines, including a combination of DART (urban), Commuter and Intercity services. At present the North Kildare study area is served by two rail lines:

- The Maynooth line currently has up to 7 trains per hour per direction, with a total capacity of around 4,500 passengers. These are currently operated as diesel commuter services between central Dublin and Maynooth, with a lower frequency service extending to Longford, as well as Intercity services further afield to Sligo.
- The Kildare line is currently operated as diesel commuter services between central Dublin (Docklands/Heuston) and Hazelhatch and Celbridge, with a lower frequency service extending to Portlaoise, as well as Intercity services further afield to Cork, Galway, Limerick and Ennis and Waterford.

At peak times, in particular the AM peak, there is significant pressure on service capacity on both routes.

There are three heavy rail stations on the Maynooth line within the study area, as shown on Figure 3.2. These are as follows (note that the same services generally call at all three stations):

- **Leixlip Confey** is located approximately 1.2 km north of Leixlip Town Centre, just off the R149 Captains Hill and adjacent the Royal Canal. There is a small car park providing 40 paid parking spaces, automatic ticket vending machines and covered cycle parking. The nearest bus stops (for interchange) are 350 metres south of the station on Captains Hill (R149). These stops are served by bus service 66a, which offers a 2 buses per hour service between Leixlip (River Forest) and Dublin City Centre (Merrion Square), via Leixlip Town Centre. The walking route from Leixlip Confey from the town centre is direct but involves a fairly steep hill, taking about 15 minutes. There are no dedicated cycle links connecting the station to the town centre or adjacent residential areas currently, but the Royal Canal towpath route is close by.
- **Leixlip Louisa Bridge** is located approximately 1.6km west of Leixlip Town Centre, just off the R148 Station Road and adjacent to the Royal Canal. There is a large car park providing 309 paid parking spaces, automatic ticket vending machines and covered cycle parking. The nearest bus stops are adjacent the station on the R148 and are served by bus route 66 bus, which offers a 2 buses per hour service west to Maynooth or east to Dublin City Centre (Merrion Square) via Leixlip Town Centre. The walking route from Leixlip Louisa Bridge to the town centre is direct and flat, alongside the R148 and takes about 18 minutes. The R148 has on-road cycle facilities in both directions, which connect Leixlip Louisa Bridge to adjacent residential areas and beyond.
- **Maynooth** is located approximately 400 metres south of Maynooth Town Centre (6 minutes' walk), just off the R406 Straffan Road, adjacent to the Royal Canal. There is a large car park providing 222 paid parking spaces, automatic ticket vending machines and covered cycle parking. The nearest bus stops are 400 metres away on the R406 Straffan Road (Old Greenfield Road). These stops are served by bus route 66, which provides a 2 buses per hour service from here to Maynooth Town Centre, Leixlip and Dublin

City Centre (Merrion Square). The station is well integrated into the local active travel network, with several walking and cycling routes converging on the station, linking to the town centre and nearby residential and commercial areas.

There is one station on the Kildare line within the study area: Hazelhatch and Celbridge. This station is located 2.2km south of Celbridge Town Centre, which represents a 27-minute walk or 8-minute cycle ride using the separated active travel facilities provided on the R405 between Celbridge and Hazelhatch and Celbridge rail station. The station is manned, but also has automatic ticket vending machines. There is a large car park offering 228 paid parking spaces and a large, covered cycle parking facility. Irish Rail currently provides a connecting bus service between Hazelhatch and Celbridge and Celbridge Town Centre one an hour in peak hours. It is of note that this service is infrequent.

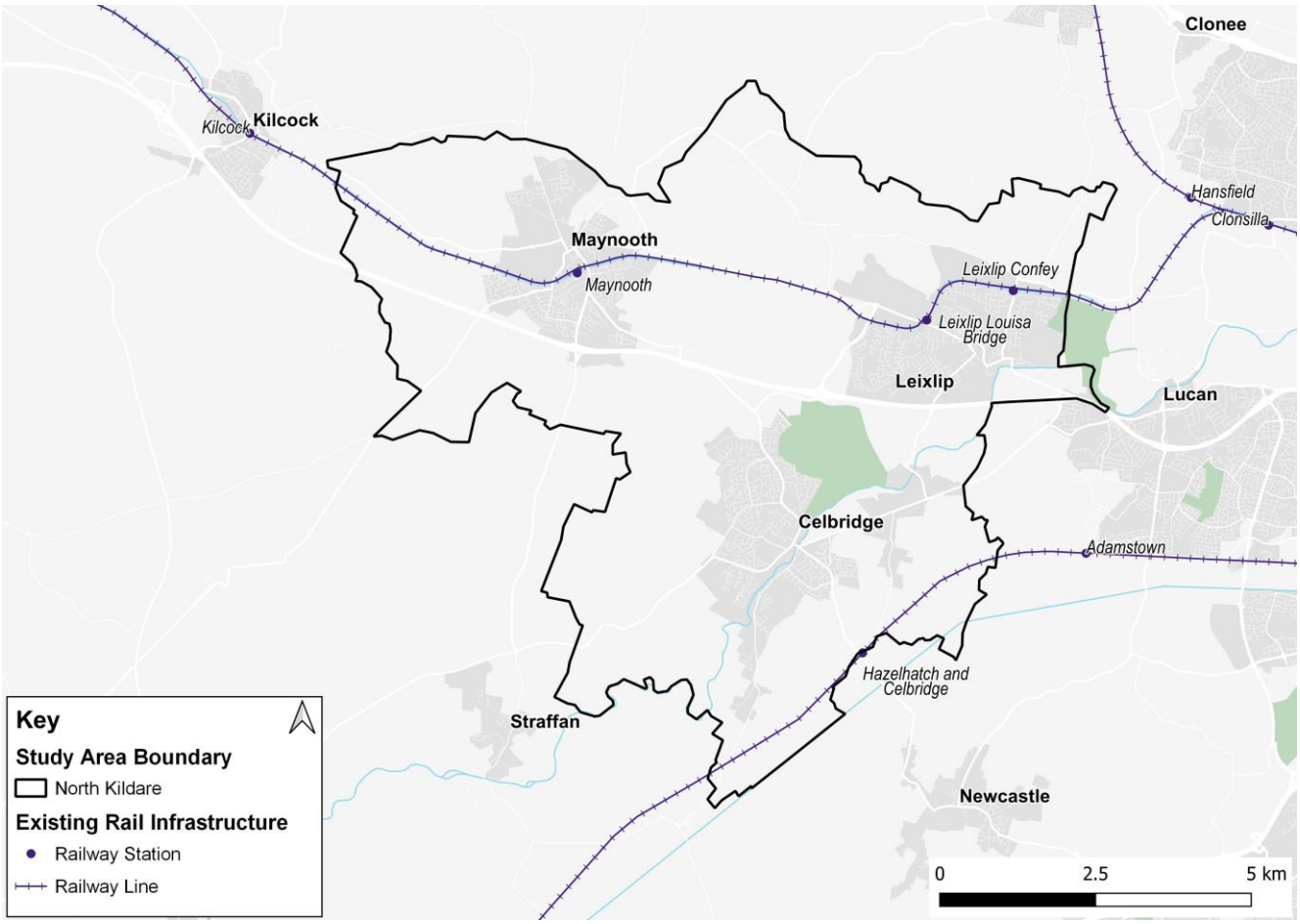


Figure 3.2: Rail network in North Kildare

The existing railway stations within the settlements act as Park & Ride sites and provide links to Dublin City Centre. Table 3.1 summarises the number of parking spaces available and approximately usage levels (2018).

Table 3.1 North Kildare Park + Ride Parking Capacity

Station	Mode	Park & Ride Spaces available in 2015	Typical car park occupancy
Hazelhatch and Celbridge	Train	400	75 - 80%
Leixlip	Train	40	50%
Leixlip (Louisa Bridge)	Train	270	75 - 80%
Maynooth	Train	180	100%

Bus network

As part of the BusConnects programme, a redesign of the bus network in the GDA is proposed to provide greater capacity, enhance priority and a more coherently planned network. The implementation of the New Dublin Area Bus Network will be completed in phases commencing in 2021, as such the proposed network is set out here as part of the baseline. The new network features:

- **Spines** – frequent routes made up of bus services timetabled to work together along a radial corridor;
- **Orbitals** – providing connections between the suburbs, town centres and key transport interchanges without requiring travel into the city centre;
- **Other city-bound routes** – other routes which operate on their own timetables outside of spine routes;
- **Local routes** – routes providing connections within local areas;
- **Peak only** – services operating during peak periods to provide additional capacity on key corridors; and
- **Express** – direct services from outer suburbs to city centre at peak times.

The New Bus Network which serves the North Kildare study area is outlined in Figure 3.3. Frequencies vary slightly but generally provide buses every 30 minutes (spine and orbital) and between 12-20 minutes (express).

Table 3.2 presents the services within the New Dublin Bus Network that pass through the North Kildare study area. The table details the route, route type and weekday peak headway. Peak period times are typically between 07:00 to 09:00 for the AM period, and 16:00 and 18:00 for the PM period.

Key spine services which are proposed to link the North Kildare study area with the City Centre are the C3 (operating along the R148 to Leixlip and Maynooth) and the C4 (operating along the R403 to Celbridge). The W6 Orbital route will provide a regular 30-minute (2 buses per hour) service between Maynooth, Celbridge and Hazelhatch and Celbridge rail station within the study area, with onwards connections to Citywest and Tallaght major employment areas.

The L58 and L59 local services will link Leixlip Confey Station with Hazelhatch and Celbridge Station, via Celbridge and Leixlip Town Centres, and the L54 provides a local service from Leixlip to neighbouring Lucan and on to Red Cow, with the ability to interchange to join the Luas Red Line at Red Cow.

Based on the service and frequencies information provided in Figure 3.3 and Table 3.2, gaps and opportunities for further improvement in the new network have been identified for demand levels and trip patterns forecast for 2042. These predominantly relate to connectivity with key trip attractors within the study area as follows:

- Between the North Kildare study area and Blanchardstown, which is a major focus for employment outside of the study area;
- Connecting Maynooth and Liffey Business Park (formerly Hewlett Packard);
- Connecting Celbridge and Collinstown Industrial Park (Intel);
- Serving Maynooth Business Campus. – The nearest bus stop is 800 metres north of the site on Straffan Road (R406) which limit modal shift potential to access the expanding employment site; and
- Service to Backweston Laboratory Campus - The nearest bus stop is 800 metres north of the site on Dublin Road (R403) which limit modal shift potential to access this site.

Figure 3.3: New Dublin Area Bus Network in the North Kildare study area

Table 3.2 BusConnects proposed services and headways within the North Kildare study area

Route Type	Service	Route	Service Frequency (Weekday)
Spine routes	C3	Maynooth – Leixlip – Dublin City Centre (Busáras)	Every 30 minutes
	C4	Celbridge – Dublin City Centre (Busáras)	Every 30 minutes
Orbital routes	W6	Maynooth – Celbridge - (Hazelhatch) – Citywest - Tallaght	Every 30 minutes
Local routes	L54	River Forest (Leixlip) – Lucan – Clondalkin – Red Cow	Every 30 minutes
	L58	Hazelhatch – Celbridge – Castletown – Leixlip - Confey	Every 30 minutes
	L59	Hazelhatch – Celbridge – Glen Easton – Leixlip - Confey	Every 30 minutes
Peak only routes	X25	Maynooth – Glen Easton – Dublin City Centre	4 buses per day
	X26	Maynooth – Dublin City Centre - UCD	6 buses per day
	X27	Celbridge Aghards Road – Dublin City Centre - UCD	9 buses per day
	X28	Celbridge Main Street – Dublin City Centre - UCD	8 buses per day
	X31	Leixlip River Forest – Dublin City Centre	6 buses per day
	X32	Leixlip Castletown – Dublin City Centre	4 buses per day

Cycling network

There is currently limited cycling infrastructure available within the main settlements of Celbridge, Leixlip and Maynooth shown in Figure 3.4. Existing interurban cycling routes are very limited , and many are not continuous, which will act as a major barrier to greater levels of cycling. It is considered that once the proposed improvements set out in the GDA Cycle Network Plan (detailed Section 4) are delivered, this will deliver strong cycle connectivity across the study area in future.

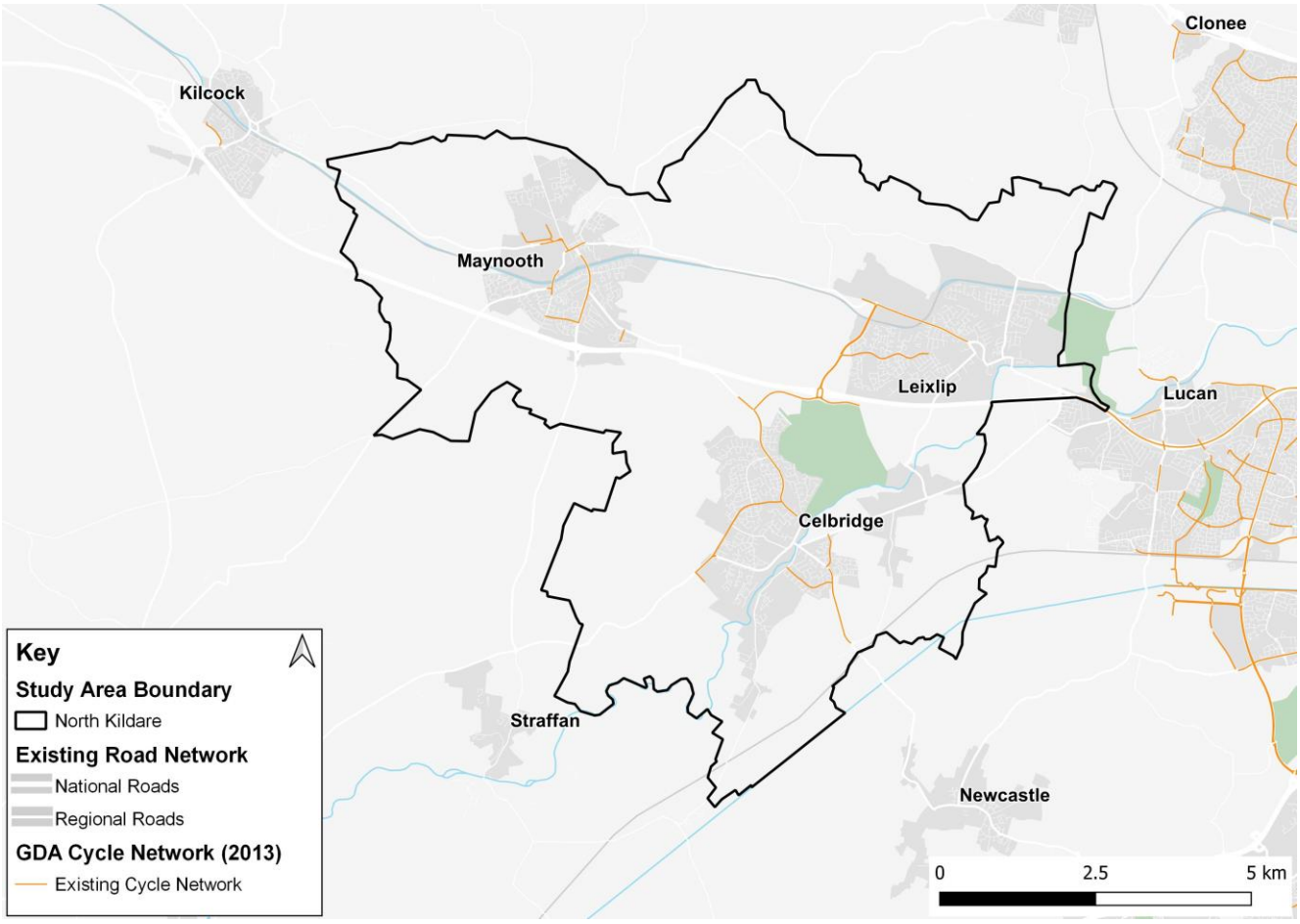


Figure 3.4: Cycle facilities in North Kildare

Walking Network

Throughout the study area, surfaced footpaths and street lighting are generally provided adjacent to all roads providing good connectivity within and between settlements and to key facilities such as employment sites, schools, universities and town centres.

Footpaths are not provided adjacent to some sections of the R405 and R148 (between Maynooth and Celbridge) however an alternative route (the Royal Canal Way) runs parallel to the R148. This route is unpaved, unlit and variable width, so this may present a barrier to use for some user groups. Given the distances involved (approximately 5.8km between Maynooth Station and Leixlip Louisa Bridge or a 70+ minute walk), whilst this has the potential to be developed into a very attractive cycling commuter route, the number of people who may consider walking this route on a regular basis, such as for accessing employment and education, is limited.

Parking provision

Kildare County Council have parking demand management measures in place in the main town centres (Celbridge, Maynooth and Leixlip) with chargeable short and long-stay, on and off-street parking provision.

Similarly APCOA, operating on behalf of Irish Rail, manage car parking provision at the four stations in the study area. This is charged at a uniform rate of €4.50 a day, €11 a week or €30 a month with discounts available for advance purchase (€3.50 a day, €9 a week, €30 a month or €360 a year).

There is significant Private Non-Residential (PNR) parking provided throughout Maynooth, Celbridge and Leixlip, clustered around key trip attractors. Outside of town centres, most short-stay parking provision appears to be free of charge, such as at retail parks and supermarkets. Major employment sites such as Collinstown Industrial Park (Intel), Liffey Business Park (formerly Hewlett Packard), Maynooth University/St Patrick's College and Backweston Laboratory Complex have sizeable off-street car parks.

Road safety

In comparison with other areas in Ireland, levels of Killed and Seriously Injured (KSI) accidents in Kildare County are low, there were just 30 fatal accidents in Kildare County between 2014 to 2018. According to Transport Infrastructure Ireland, levels of collisions on the stretch of the M4 through North Kildare are twice the national average.

3.2 Existing travel patterns

3.2.1 Key trip attractors

Key attractors within the study area can be slip into three main categories: workplace / employment locations, education locations and retail. As such, key attractors include the following:

- **Workplace / employment locations:** Maynooth Business Campus, Collinstown Industrial Park (Intel), Liffey Business Park (formerly Hewlett Packard) and Backweston Laboratory Complex;
- **Education locations**: Maynooth University, St Patrick's College and primary / secondary schools / colleges within the town centres; and
- **Retail**: Manor Mills Shopping Centre and Carton Park Shopping Centre.

In addition to the above, there are several tourist attractions within the study area which also attract trips, such as Castletown and Carton Demesne.

3.2.2 Car Ownership

Table 3.3 displays car ownership data. The proportion of houses with at least one car within the Study Area (90%) is higher than across the Greater Dublin Area (78%). Within the Study Area the proportion of houses with at least one car is highest in Celbridge (93%) and Leixlip (91%). The proportion of houses with at least two cars within the Study Area (51%) is also higher than across the Greater Dublin Area (37%).

Table 3.3: North Kildare Car Ownership Data (2016 Census)

Settlement	Total Households	Cars per household				
		0	1	2	3	4+
Greater Dublin Area	666,724	18%	41%	31%	5%	2%
Total Study Area	17,335	9%	39%	42%	7%	2%
Maynooth	4,674	13%	39%	39%	5%	1%
Celbridge	6,544	7%	39%	45%	7%	2%
Leixlip	5,219	8%	41%	40%	8%	2%

3.2.3 Travel data

The 2016 Place of Work, School or College Anonymised Records (POWSCAR) census data has been analysed by Electoral Division. The Electoral Divisions of Leixlip, Maynooth and Celbridge are fully included within the study area whilst Donaghcumper and Lucan-St. Helens are partially located within the study area. For analysis purposes, Donaghcumper has been included within the study area whilst Lucan-St. Helens, due to it predominantly being outside the study area, has been excluded.

There are 32,124 people live within the Electoral Divisions of Leixlip, Maynooth, Celbridge and Donaghcumper. Of those living in the study area, 48% remain in the study area for work/ school / college whilst 52% leave the study area. Of the trips leaving the study area to travel to work / school / college, the majority remain within the GDA travelling north to North Blanchardstown, east to Palmerstown / Dublin City or south to Naas.

There 34,211 people who travel to work / school / college within the study area. Of those who attend / school / college within the study area, 45% live within the study area whilst 43% travel from the GDA and 12% travel from beyond the GDA. It is notable that North Kildare attracts trips from a range of areas as far north as Drogheda and Navan and as far west as Mullingar. Key locations where high numbers of trips travel from are Kilcock, Clane, Clonee / Clonsilla and Lucan (south-east).

Travel to work / school / college by mode

As shown in Table 3.4, the proportion of people who travel to work by active modes (on foot or by bicycle) within the Study Area (8%) is lower than the proportion for the Greater Dublin Area (15%). Overall, the proportion of people who travel to work by bus, minibus or coach within the Study Area (10%) is in line with the Greater Dublin Area (10%) whilst those using the train is higher. High proportions of train users predominantly live within Maynooth (14%) and Leixlip (11%) whilst the proportions from Celbridge (3%) and Ballyoulster (3%) are lower.

Car / van usage within the Study Area (65%) is greater than the Greater Dublin Area (55%) and is particularly high in Celbridge (70%).

Table 3.4: Travel to work data (2016 Census)

Settlement	Total Work	On foot	Bicycle	Bus, minibus or coach	Train, DART or LUAS	Motorcycle or scooter	Car / van driver	Car passenger
Greater Dublin Area	835,694	10%	5%	10%	7%	1%	55%	3%
Total Study Area	24,026	6%	2%	10%	8%	1%	65%	3%
Maynooth	6,254	9%	2%	6%	14%	0%	60%	3%
Celbridge	9,344	4%	1%	12%	3%	1%	70%	3%
Leixlip	7,137	6%	1%	10%	11%	1%	63%	3%

Table 3.5 displays travel to school / college data by mode. The proportion of people who travel to school / college on foot within the Study Area (40%) is higher than the average for the Greater Dublin Area (31%). High proportions of walking trips predominantly take place from / within Maynooth (58%) and Leixlip (42%) whilst the proportion from Celbridge (27%) is lower.

The proportion of people who travel to school / college by bicycle within the Study Area (5%) is broadly in line with the average for the Greater Dublin Area (4%) with higher proportions in Celbridge (7%). Car passengers within the Study Area (32%) is broadly similar to the Greater Dublin Area (35%) however there are large differences within the settlements. Lower proportions of car passengers trips take place from / within Maynooth (21%) and Leixlip (29%).

Table 3.5: Travel to school / college data (2016 Census)

Settlement	Total School / College	On foot	Bicycle	Bus, minibus or coach	Train, DART or LUAS	Motorcycle or scooter	Car / van driver	Car passenger
Greater Dublin Area	427,946	31%	4%	18%	4%	0%	4%	35%
Total Study Area	13,955	40%	5%	13%	3%	0%	4%	32%
Maynooth	4,483	58%	3%	7%	4%	0%	4%	21%
Celbridge	5,337	27%	7%	19%	1%	0%	4%	38%
Leixlip	3,464	42%	3%	13%	6%	0%	4%	29%

Journey time to work / school / college

Table 3.6 displays travel times to work / school / college. In line with the figure for the Greater Dublin Area, the majority of trips to work / school / college in the study area have a journey time under 30 minutes.

Table 3.6: Journey time to work / school / college data (2016 Census)

Settlement	Travel to Work / School / College	Under 15 minutes	15 minutes to under 30 minutes	30 minutes to under 45 minutes	45 minutes to under one hour	1 hour to under 1.5 hours	1.5 hours and over
Greater Dublin Area	1,237,858	24%	29%	21%	8%	8%	2%
Total Study Area	37,304	26%	28%	19%	9%	12%	3%
Maynooth	10,590	28%	30%	15%	7%	13%	3%
Celbridge	14,441	24%	28%	20%	9%	12%	3%
Leixlip	10,421	27%	25%	20%	10%	11%	2%

Table 3.7 displays time leaving home to travel to work / school / college data. In line with the pattern for the Greater Dublin Area, the majority of trips in the study area take place between 8:00 and 9:00.

Table 3.7: Time leaving home to travel to work / school / college data (2016 Census)

Settlement	Travel to Work / School / College	Before 06:30	06:30 - 07:00	07:01 - 07:30	07:31 - 08:00	08:01 - 08:30	08:31 - 09:00	09:01 - 09:30	After 09:30
Greater Dublin Area	1,237,858	6%	8%	11%	16%	22%	19%	5%	8%
Total Study Area	37,304	7%	10%	11%	15%	19%	19%	7%	8%
Maynooth	10,590	6%	9%	10%	13%	19%	21%	7%	12%
Celbridge	14,441	6%	10%	13%	16%	20%	21%	4%	7%
Leixlip	10,421	7%	11%	11%	17%	17%	15%	11%	6%

3.3 Environmental conditions

The following environmental conditions are of note for the North Kildare study area:

- The Rye Water Valley / Carton Special Areas of Conservation (001398) is located immediately north of Maynooth;
- The study area is located in the Liffey and Dublin Bay Catchment, in Hydrometric Area 09. A number of watercourses transverse the study area, these include:
    - The River Liffey flows from the south-western edge of the study area to the north-eastern side passing through Celbridge and Leixlip;
    - The River Rye, a tributary of the River Liffey, convergences with the River Liffey in Leixlip;
    - The Lyreen River, a key tributary to the River Rye, flows from the south to the north-west of the study area, convergences with the River Rye in Maynooth;
    - The Royal Canal passes through the study area run from east to west across the northern section of the study area;
- Sections of the River Rye Water, the River Liffey within the study area are classed as being a Nutrient Sensitive River and in a Nutrient Sensitive Area;
- All the rivers within the study area are subject to periodic flooding issues at times of elevated rainfall;

  The Royal Canal and Rye Water Valley / Carton are located within the study area and are designated as Proposed Natural Heritage Areas. Additionally, the Liffey Valley is located east of the study area and is designated as a Proposed Natural Heritage Area;
- County Kildare has a range of habitats and landscapes. Within the study area the landcovers include grassland, woodland, stream courses and canal habitats.
- The soils within the study area support a variety of uses including agriculture. As identified by the Geological Survey of Ireland, soils types include made ground and fine loamy drift with limestone such as Elton, Straffan and Faoldroim.
- There is one Geological Heritage Site located within the study area which is Louisa Bridge Warm and Cold Springs (Site Codes KE016 and KE017), this is located to the west of Louisa Bridge Station. Further sites are located to the south of the study area.
- Air quality monitoring sites[2] within the study area demonstrate that air quality is generally good to moderate at peak times.
- Within the study area there are a range of cultural features including Maynooth Castle (National Monuments in State Care).

3.4 Summary

The review of existing transport infrastructure and services, and travel demand patterns in North Kildare has identified several key conclusions:

- **Roads** - North Kildare is directly served by the M4, an existing, high-capacity National Road, and a network of regional roads which link local communities. Prior to the pandemic, the section of the M4 between Maynooth and Leixlip was operating at capacity, and subject to severe congestion, particularly at peak travel periods. This aligns with data analysed from the 2016 Census which identifies that car ownership and use in the study area is high. 90% of households in North Kildare own at least one car compared with the 79% across the Greater Dublin Area, and 65% of trips to work are made in a car or van, compared to only 55% across the Greater Dublin Area.

- **Rail** - Maynooth, Leixlip and Celbridge all benefit from heavy rail access on either the Maynooth or Kildare Commuter Rail Lines, but Celbridge's nearest heavy rail station (Hazelhatch and Celbridge) is

[2] aqicn.org/station/ireland/maynooth-electoral-division/r148

located 1.2km south of the edge of the urban area. Whilst there is a separated active travel route linking the station to Celbridge, bus connections between the station and the town centre are currently limited. Demand to use rail services from North Kildare is higher than the Greater Dublin Area as whole, with 9% of journeys to work made by rail, compared to 7%. Maynooth has the highest levels of rail commuting (14%) followed by Leixlip (11%).

- **Bus –** Whilst the current bus network across North Kildare has some notable gaps in service provision (no/limited links to Hazelhatch and Celbridge and Leixlip Confey Stations and no direct access to CityWest/Tallaght, for example), the proposed BusConnects network in North Kildare will resolve the majority of access issues for residents of North Kildare wishing to access key trips attractors both within and outside the study area (particularly Dublin City Centre). Some key employment sites within the study area are not directly accessible from some or all of the three main urban areas (Celbridge, Leixlip and Maynooth) without the need to interchange. However, it should be noted that, given the short distances involved, investment in improving and expanding the local active travel network has significant potential to provide an attractive alternative for these shorter trips.

- **Active Travel -** A low percentage of the main regional road network has segregated or on-road cycling facilities in place, currently, with the result that cycle connectivity is poor, particularly between towns and to key employment trip attractors. The distances between the three urban areas and major employment sites are short, so there is significant potential to increase active travel mode shares to provide direct access to local key trip attractors, services and facilities, releasing capacity on local, regional and strategic transport networks for essential strategic trips. All stations within the study area have secure storage facilities for bicycles, and all stations but Leixlip Confey benefit from enhanced facilities to support access by bicycle, currently. In North Kildare, most of the regional road network has surfaced pavements provided alongside, both within and between urban areas. The majority of footways within urban areas are lit, surfaced to a good standard and of an acceptable width, so infrastructure provision to support walking trips is considered acceptable. Census 2016 data suggests that levels of walking and cycling in the study area are very low, with just 2% of all journeys to work made by bicycle (compared to 5% across the Greater Dublin Area) and only 6% of journeys to work made on foot (compared to 10% across the Greater Dublin Area.)

4. Context

4.1 Future land use

4.1.1 Overview

The future land use scenario presented here is based on a Planning Sheet for 2040 provided by the NTA in discussion with relevant local authorities. It reflects the 2016 and 2040 population, employment, and education places across the study area in line with regional and local planning aspirations. It is aligned with the overall objectives of the NPF and the RSES.

As Table 4.1 demonstrates, the growth percentage in the North Kildare study area is high when compared to the GDA with the study area anticipating a higher proportion of population, employment and education growth than the average for the GDA.

Table 4.1: NTA Planning Sheet population, employment and education statistics

Area	2016	2040	Growth	
			Absolute	Percentage
Population				
North Kildare	53,148	83,164	30,015	56%
GDA	4,761,865	5,790,237	1,028,372	22%
Employment				
North Kildare	16,290	24,081	7,791	48%
GDA	1,468,093	1,996,002	527,909	36%
Education				
North Kildare	17,734	22,992	5,258	30%
GDA	982,185	1,186,472	204,287	21%

4.1.2 Population

Figure 4.1 to Figure 4.3 present the 2016 population for North Kildare (and surrounding areas) and projected growth to 2040. They demonstrate how the majority of population growth is expected to occur around the existing settlements of Maynooth, Celbridge and Leixlip. Within the RSES, Maynooth is allocated as a Key Town, Leixlip as a Self-Sustaining Growth Town and Celbridge as a Self-Sustaining Town.

The highest levels of population growth are expected within the electoral district of Maynooth where population is anticipated to growth by approximately 15,000 by 2040. Growth in Maynooth is anticipated to the north east of the town centre around Mariavilla, Dunboyne Road and Dublin Road which is in line with the designations in the Maynooth Local Area Plan (LAP) (2013-2019). Additionally, the LAP and RSES identify significant population growth at Railpark South East Quadrant and the Blacklion development.

Moderate levels of population growth are expected in Leixlip (approximately 6,000) and Celbridge (approximately 3,000). Within Leixlip, residential development is anticipated on lands surrounding the town centre, particularly to the north west (Collinstown) and the east (St. Catherine's Park). Around Celbridge, development is expected within the town centre (Simmonstown and Ballyoulster), to the north (Crodaun) and to the south. Additional growth is set out at and greenfield lands at Confey in the LAP and RSES.

Immediately adjacent to the North Kildare study area, high levels of population growth are expected in Adamstown, Kilcock and north of Maynooth (County Meath). Adamstown is located within South Dublin County Council and is allocated as a Strategic Development Zone (SDZ) with 10,000 residential units planned. Kilcock is allocated, within the RSES, as a Self-Sustaining Town. North of Maynooth (Maynooth Environs) is located within the administrative area of Meath, the Meath County Development Plan highlights the importance of integrated growth in Maynooth Environs to support Maynooth as a Key Town.

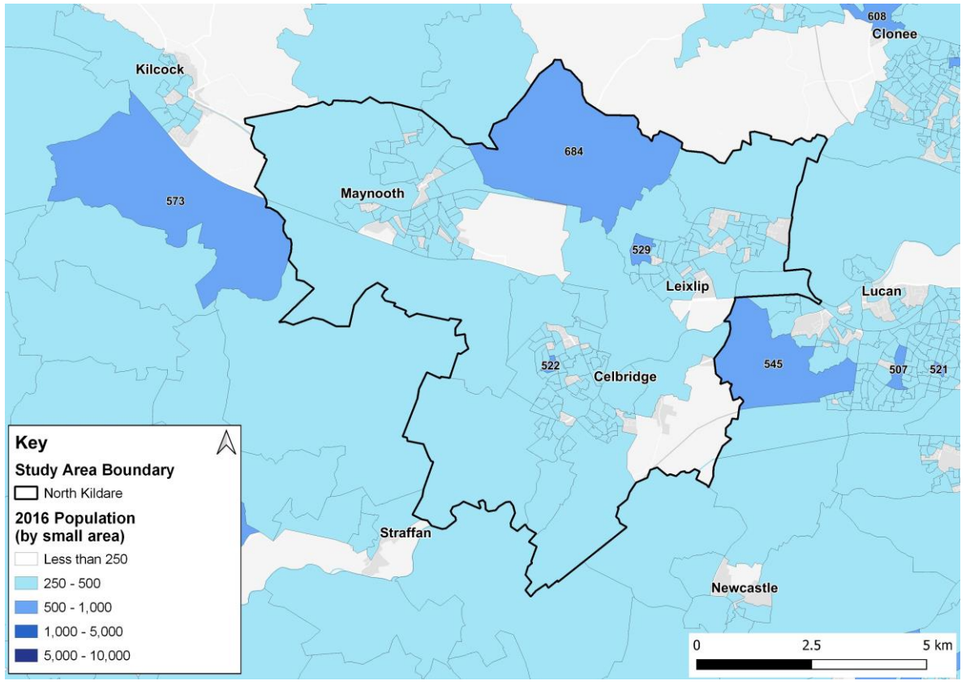


Figure 4.2: 2016 Population by Census Small Area

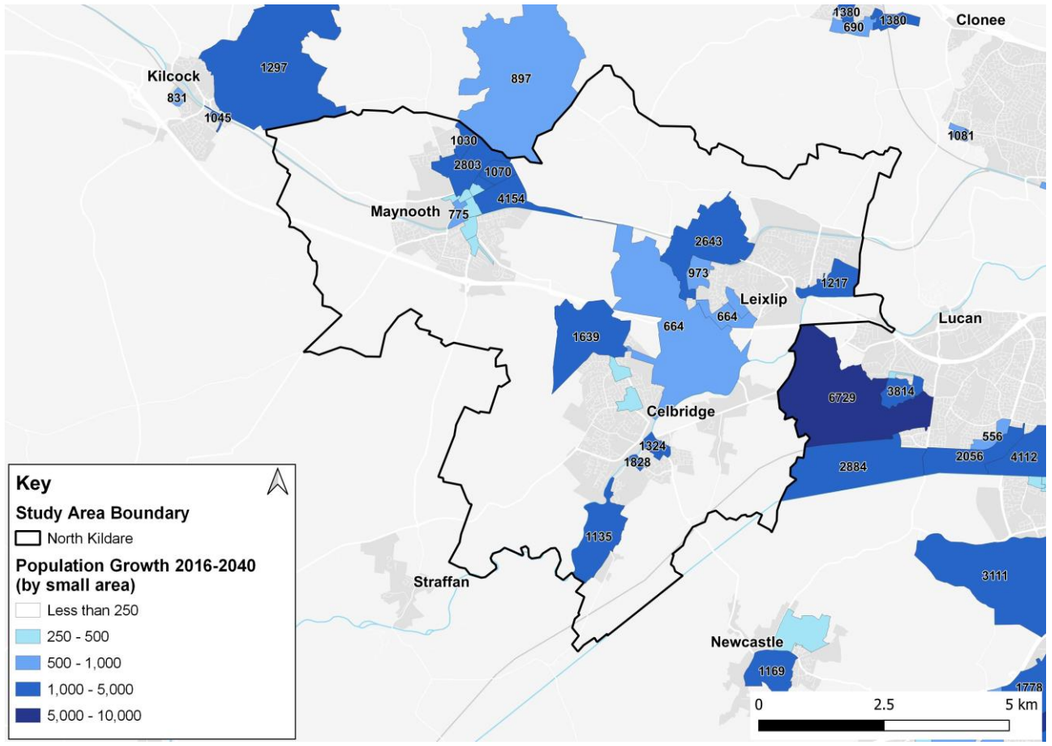


Figure 4.1: 2040 Population Growth by Census Small Area

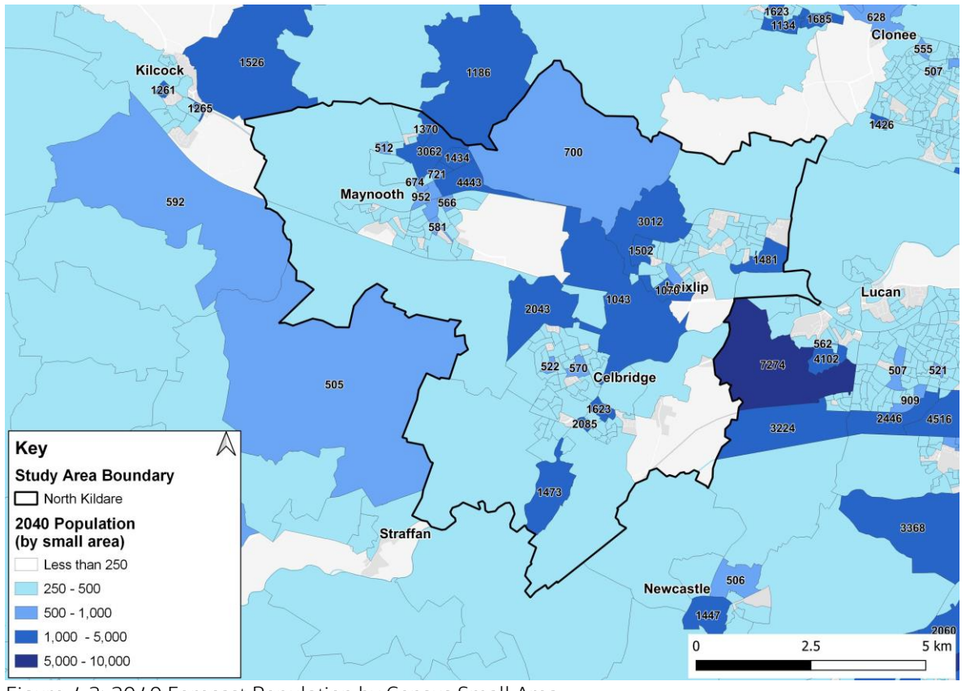


Figure 4.3: 2040 Forecast Population by Census Small Area

4.1.3 Employment

Figure 4.4 to Figure 4.6 show the proposed changes in employment between 2016 and 2040 in the North Kildare study area.

Employment growth of 48% (from 16,290 to 24,081) is projected for North Kildare, the highest proportion of which is forecast within the Electoral District of Maynooth, followed by Celbridge and Leixlip.

The County Kildare Development Plan and LAPs identify growth key growth locations in Maynooth and Leixlip as Maynooth University (where a new Maynooth Research & Technology Park is proposed), lands at Moygaddy, Collinstown Industrial Park and the former Hewlett Packard site. In Celbridge, employment growth is predominantly focused in the town centre and the M4 Business Park..

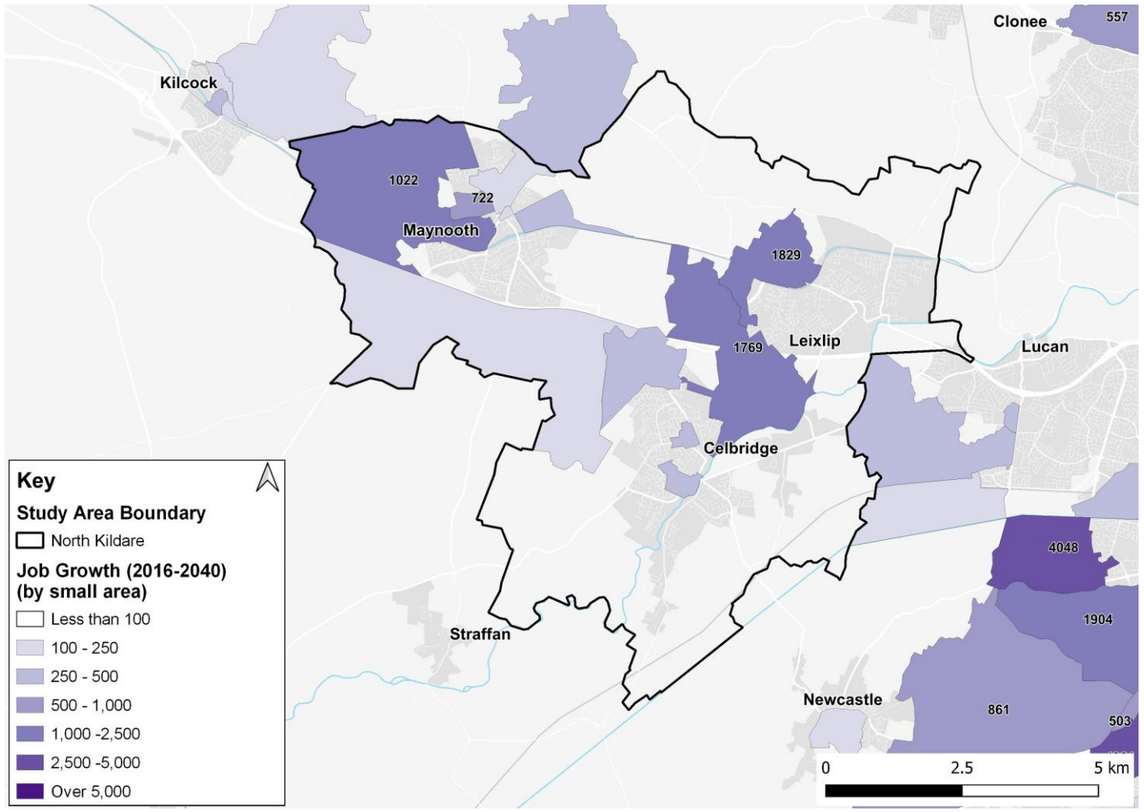


Figure 4.4: 2040 Jobs Growth by Census Small Area

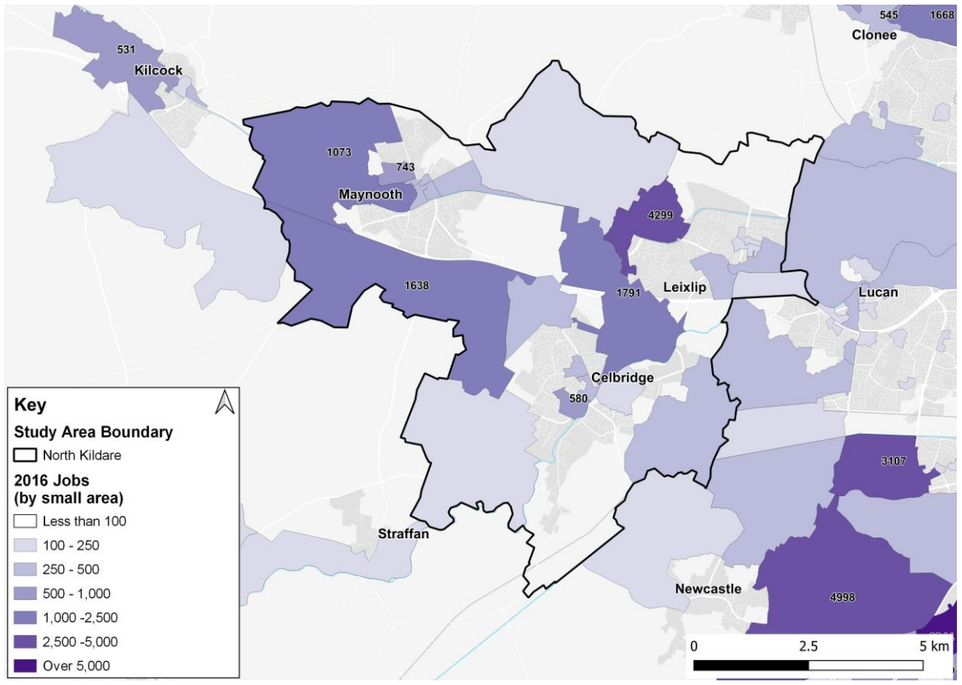


Figure 4.5: 2016 Jobs by Census Small Area

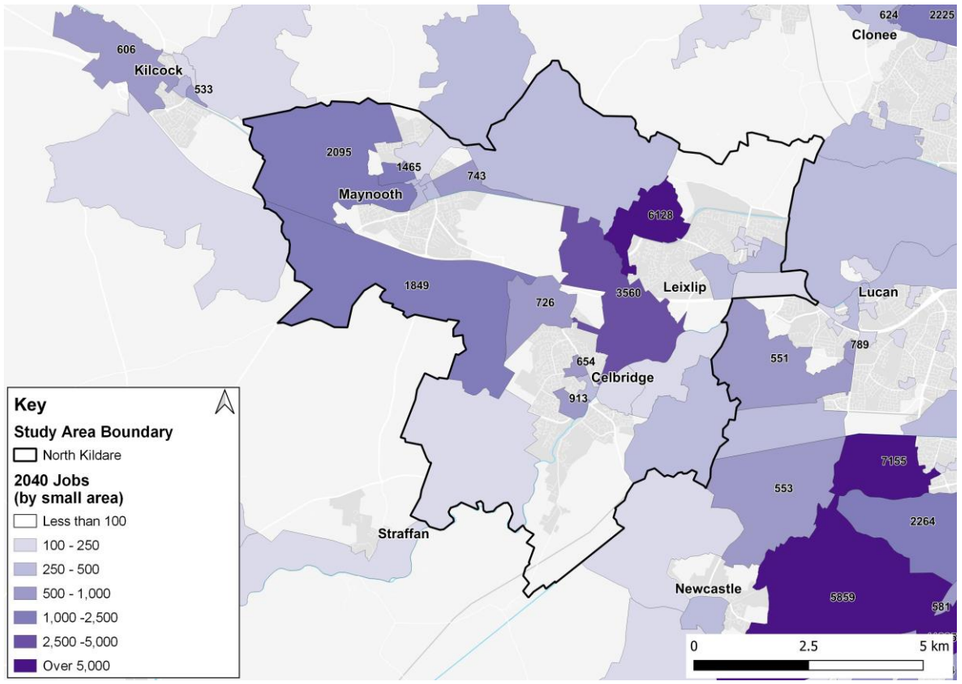


Figure 4.6: 2040 Forecast Jobs by Census Small Area

4.1.4 Education

The 2016 and 2040 education places in North Kildare are shown below in Figure 4.7 to Figure 4.9 .

Education growth of 30% (from 17,734 to 22,992) is projected for North Kildare, the highest proportion of which is forecast within the Electoral District of Maynooth where Maynooth University and St Patrick's College are located. Expansion of the two universities within Maynooth is set out in the County Kildare Development Plan, particularly the development of Maynooth University as a leading third level research and educational facility.

Education growth is also anticipated surrounding the town centres of Leixlip and Celbridge.

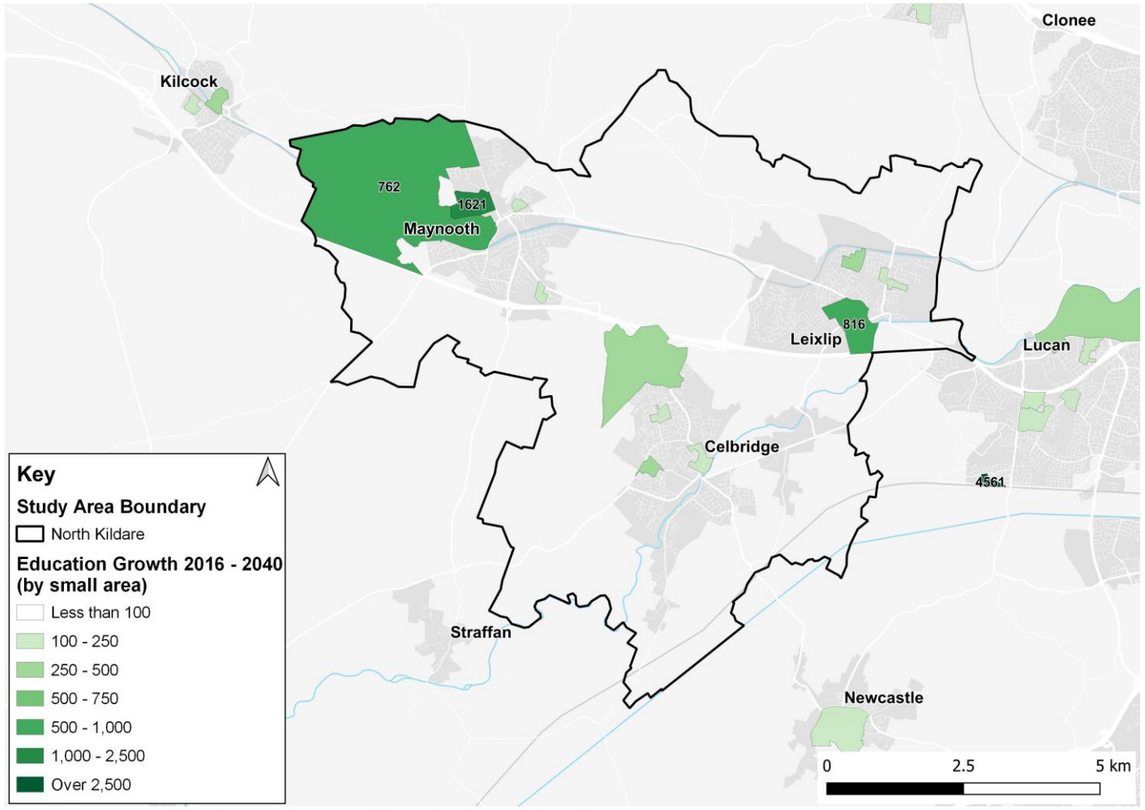


Figure 4.7: 2040 Population Education Places by Census Small Area

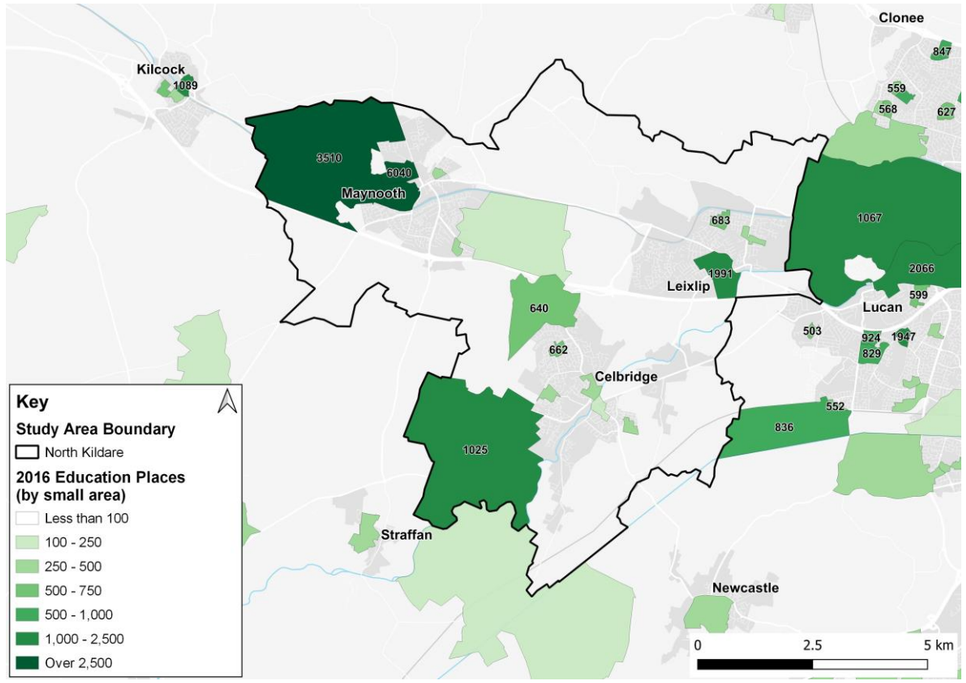


Figure 4.8: 2016 Education Places by Census Small Area

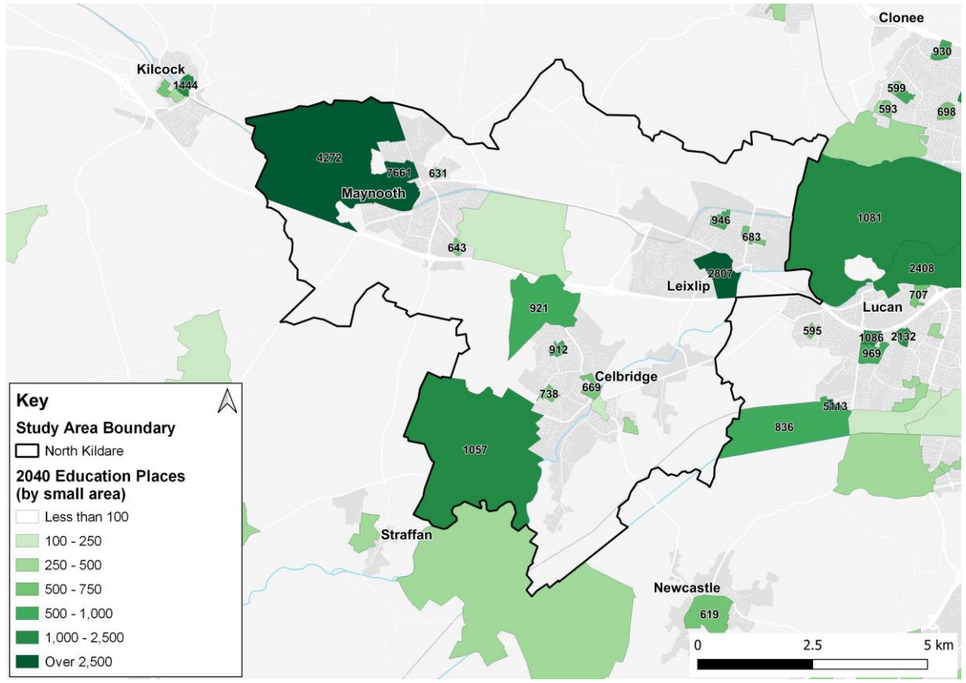


Figure 4.9: 2040 Forecast Education Places by Census Small Area

4.2 Proposals for future transport interventions

4.2.1 Overview

A range of proposals for future transport interventions have been highlighted in previous policies, strategies and plans. This section provides a brief summary of the schemes in policy documents which, alongside new proposals, will be considered when identifying options to serve demand in 2042.

4.2.2 Road network

The following road proposals are included in the GDA Transport Strategy and RSES MASP:

- Reconfiguration of the N4 from its junction with the M50 to Leixlip to rationalise accesses and to provide additional capacity at the Quarryvale junction;
- Upgrades to the M4 between Maynooth and Leixlip (identified as enabling infrastructure);
- Enhance orbital movement, outside of the M50 Ring Road, between the N3, the N4 and N7 national roads, by the widening of existing roads and the development of new road links; and
- Develop orbital roads around town centres accompanied by and facilitating enhanced public transport, cycling and pedestrian facilities in the relevant centre.

Local policy provides further detail on aspirational link roads within the study area. Those within Maynooth are identified as enabling infrastructure to support the delivery of anticipated growth as set out in the RSES. The proposals are as follows:

Maynooth:

- Maynooth Eastern Relief Road to link R148 Leixlip Road and R405 Celbridge Road;
- New road provision between R406 Straffan Road and R405 Celbridge Road;
- Maynooth Outer Orbital Route linking the east of the town and lands within the Maynooth Environs of Meath and to the west of the town (Kilcock Road and Moyglare Road);

Leixlip:

- A potential link road connecting R404 Celbridge Road to the south of the M4 (with links to the M4 Leixlip/Celbridge Interchange);

Celbridge:

- A link road connecting Hazelhatch Park to Newtown Road (to support development at Simmonstown);
- A link road connecting Primrose Hill to Loughlinstown Road (to support development at Ballyoulster);
- Western Link Road to link R405 Maynooth Road with R403 Clane Road;
- New vehicular river crossing between R403 Clane Road and Newtown Road; and
- A new road (including a new bridge over the River Liffey) between R403 Clane Road and Hazelhatch Park.

Given known high levels of car ownership and use in the study area, it is important that the business case for any new highway infrastructure is carefully considered in line with ABTA guidance. Specifically, in terms of balancing:

- Its intended purpose (strategic and/or local significance);
- The risks of unlocking further increases in private car use;
- The opportunities to reallocate space within urban areas for enhanced public transport and active travel (walking and cycling) facilities; and
- The ability to unlock sustainable development growth.

4.2.3 Heavy and light rail network

Key rail improvements within the study area are associated with the Dart+ and LUAS extension to Maynooth.

DART+ will provide a sustainable, electrified, reliable and frequent rail service by significantly increasing capacity on all rail corridors serving the GDA. In the North Kildare study area, DART+ will provide electrified services from Dublin City Centre to:

- Maynooth via the Maynooth Line (DART+ West) – An increase in capacity from 7 trains per hour (per direction) to 15 trains per hour, subject to demand, will increase capacity from 4,500 to 13,750 passengers. Due to be delivered by 2027, this project will enhance connectivity from Dublin City Centre to both Leixlip and Maynooth.
- Hazelhatch and Celbridge via the Kildare Line (DART+ South West).

Whilst there is no existing provision of light rail within the North Kildare study area, improvements to the Luas Red line, extending services to Lucan, may serve trips in the study area. Lucan is located 3.6km from Leixlip, and is connected to Celbridge by regular bus services (X27, X28 and C4) and Dublin City Centre. The extension of the Luas to Lucan could provide alternative journey opportunities for existing bus users from the study area to interchange from bus to light rail in Lucan for onward travel to Dublin City Centre. An interchange could be located in the vicinity of the Liffey Valley shopping centre which would present an opportunity for greater connectivity between the North Kildare Study Area, Liffey Valley and west of the city centre which is currently inaccessible via the Maynooth line. Given the Dart+ proposals, it is not considered that an interchange linking Maynooth and Leixlip would offer an attractive alternative journey to the city centre.

In addition to the DART+ and Luas extension, the potential for a new railway station and strategic Park+Ride facility on lands at Collinstown are considered within local policies.

4.2.4 Bus network

As noted in Chapter 3, the new Dublin Area Bus Network is being rolled out from early 2021 and has been taken as the 'base' situation within this study. As a result of the network, the North Kildare study area will be served by a combination of spine, orbital, local and express routes (Figure 3.3). Frequencies vary slightly but generally provide buses every 30 minutes (spine and orbital) and between 12-20 minutes (express).

Objectives set out in local policy relating to services have been met by the updated bus network:

- Promote alternative routes of the bus service to Hazelhatch Train Station so that it serves Main Street, Maynooth Road, Shackleton Road and Clane Road – this is achieved through the redesigned bus services (L59 and W6) which provide regular connections between locations in Celbridge and Hazelhatch Train Station; and

Further objectives relating to bus services include:

- 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 Core Regional Bus Network includes the M4 / N4 bus corridor which runs through the study area.
- Review the configuration and movement of pedestrian, cycle, public transport and private vehicle modes at the junction of Main Street and Captain's Hill in order to prioritise the sustainable movement of people; and
- Bus priority measures in Leixlip town centre and the provision of bus turn around facilities proximate to Confey Station.

4.2.5 Cycle network

The GDA Cycle Network Plan forms the strategy for the implementation of a high quality, integrated cycle network for the GDA. The GDA Cycle Network Plan outlines a number of proposed cycle routes within the North

Kildare study area. These include routes within existing urban areas, largely to connect missing links between existing routes and key destinations, and importantly routes within rural areas which provide new links to improve connectivity between Maynooth, Leixlip and Celbridge. The routes proposed in the Cycle Network Plan are set out in Figure 4.10.

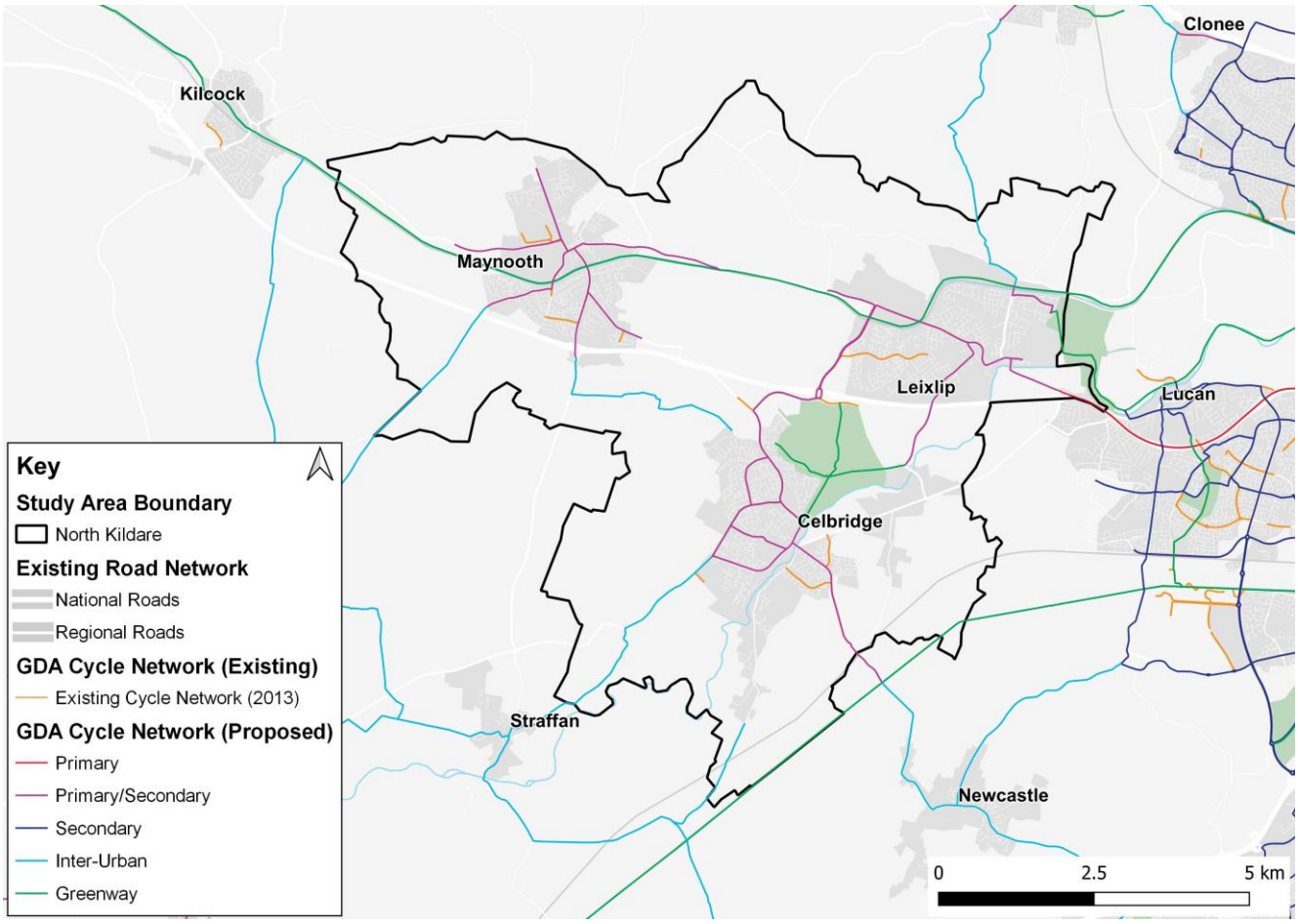


Figure 4.10: Proposed cycle network in North Kildare (Source: GDA Cycle Network Plan)

Figure 4.10 highlights how the GDA cycle proposals improve connectivity within the study area. The proposed links improve connections between Kilcock, Maynooth, Leixlip Lucan and Dublin via the proposed Greenway which is located adjacent to the Royal Canal. This improvement could be key to increasing cycle uptake through offering a traffic free cycle route between Maynooth and Leixlip. Additionally, improvements between Leixlip and Celbridge are proposed via a proposed Greenway through Castletown House and new links between Celbridge, Hazelhatch and Celbridge Station and Newcastle are proposed.

A gap analysis has confirmed that the cycle network proposals are quite comprehensive and largely link key destinations however there are some gaps which have been identified. It is considered that these could be developed in conjunction to the GDA cycle proposals:

- Continuous cycle provision between Celbridge and Maynooth – whilst cycle improvements are proposed on the R405 in the vicinity of Maynooth, there is no connectivity on the R405 between south of Maynooth and north of Celbridge.
- Direct cycle links between Celbridge and Adamstown.

4.2.6 Parking Provision

There are no proposals for changing to car parking provision within the North Kildare study area. Maximum parking standards are set out in the Kildare County Development Plan (2017 – 2023). These standards alone are unlikely to result in a significant modal shift within the study area.

4.3 Future travel patterns

4.3.1 Model assumptions

The assessment of future travel demand is based on the outputs from the NTA Eastern Regional Model (ERM)..

The ERM represents a 2042 scenario including:

Five time periods:

- AM 07:00 to 10:00
- Lunch time 10:00 to 13:00
- School run 13:00 to 16:00
- PM 16:00 to 19:00
- Off peak 19:00 to 07:00

Three mode classes;

- Public transport (bus, Luas, rail and light rail)
- Road (cars, LGV, HGV and taxi)
- Active modes (walk and cycle)

Five trip purposes:

- Employers Business
- Education
- Commute
- Other
- Retired

Do Minimum

The model run represents a 'Do Minimum' scenario which includes proposed development, all existing transport provision, plus a number of changes to the transport network. Details of the transport schemes included are provided in Appendix A.

The model trips are assigned to a constrained network, meaning route choice of each trip is affected by capacities and journey times (e.g. impacts from queuing) in the model in relation to all the other trips. This means there is a likelihood that due to the volume of trips in the model, some journeys use routes through local roads, instead of using the key strategic movements which are the focus of this study.

The ERM has been used to understand some of the key transport patterns in 2042 such as mode share, trip lengths, origins and destinations, route capacity and volume to capacity. These are described in the subsequent paragraphs in this section, and this information will be used to support the option development process.

4.3.2 Origins and destinations

Spatial analysis has been undertaken on trips that have an origin and/or destination within the study area, using the demand outputs from the model.

Trips from the North Kildare study area

Figure 4.11 presents the origins and destination of trips which originate within the study area in the AM peak. Key movements from the study area in the AM are to:

- Dublin City Centre (east)
- Meath (directly north)
- Tallaght (south east)
- Clondalkin

The trip movements in PM have also been analysed. Overall, the main destinations for trips from the study area in the PM peak are to:

- Sector to the west side of study area (Clane, Prosperous, Edenderry);

- Sector to the north side of study area (Dunboyne, Ratoath, Dunshaughlin);
- Kilcock

The trip demand analysis shows that there is a key commuter corridor through the North Kildare study area to Kilcock, Maynooth and Leixlip to Dublin City Centre. Trips originating from Celbridge tend to travel in higher proportions to northern sectors. Trips originating from Leixlip tend to travel in higher proportions to southern sectors.

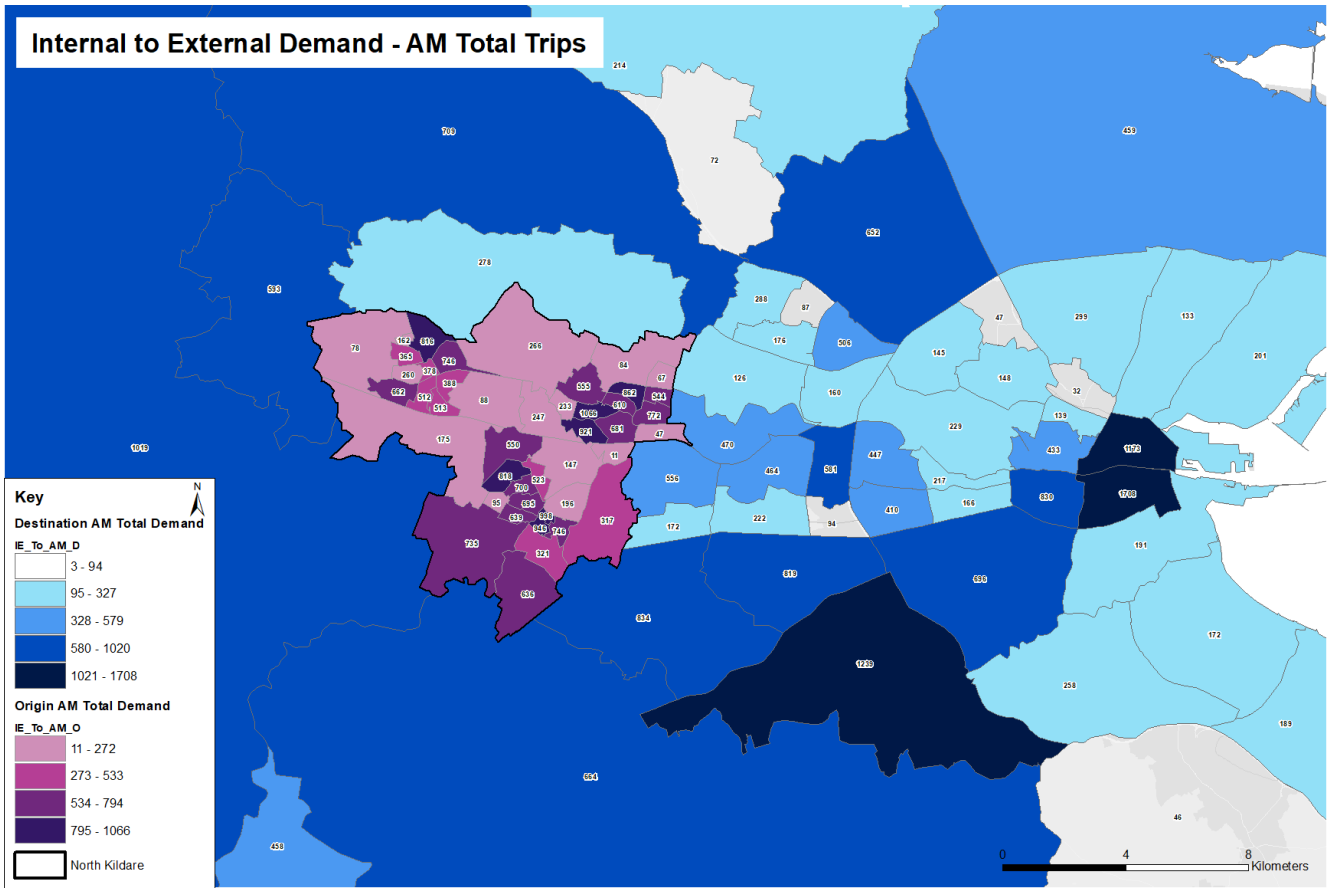


Figure 4.11: Total trips by all modes from the study area (AM peak)

Trips to the North Kildare study area

Figure 4.12 shows the origins and destination of trips which have destinations within the study area in the AM peak. The figure shows that the main movements into the study area in the AM peak originate from:

- Sector to the west side of study area (Clane, Prosperous, Edenderry);
- Sector to the east side of study area (Adamstown);
- Sector to the south side of study area (Dunboyne, Ratoath, Dunshaughlin); and
- Kilcock.

The trip movements in the PM peak have also been analysed. Overall, key movements to the study area in the PM peak originate from:

- Dublin City Centre (east);
- Meath (directly north);
- Blanchardstown (north);
- Tallaght (south east); and
- Sector on the west side of study area (Clane, Prosperous, Edenderry).

This analysis demonstrates that trips which have destinations in the study area are in in most cases from west and north.

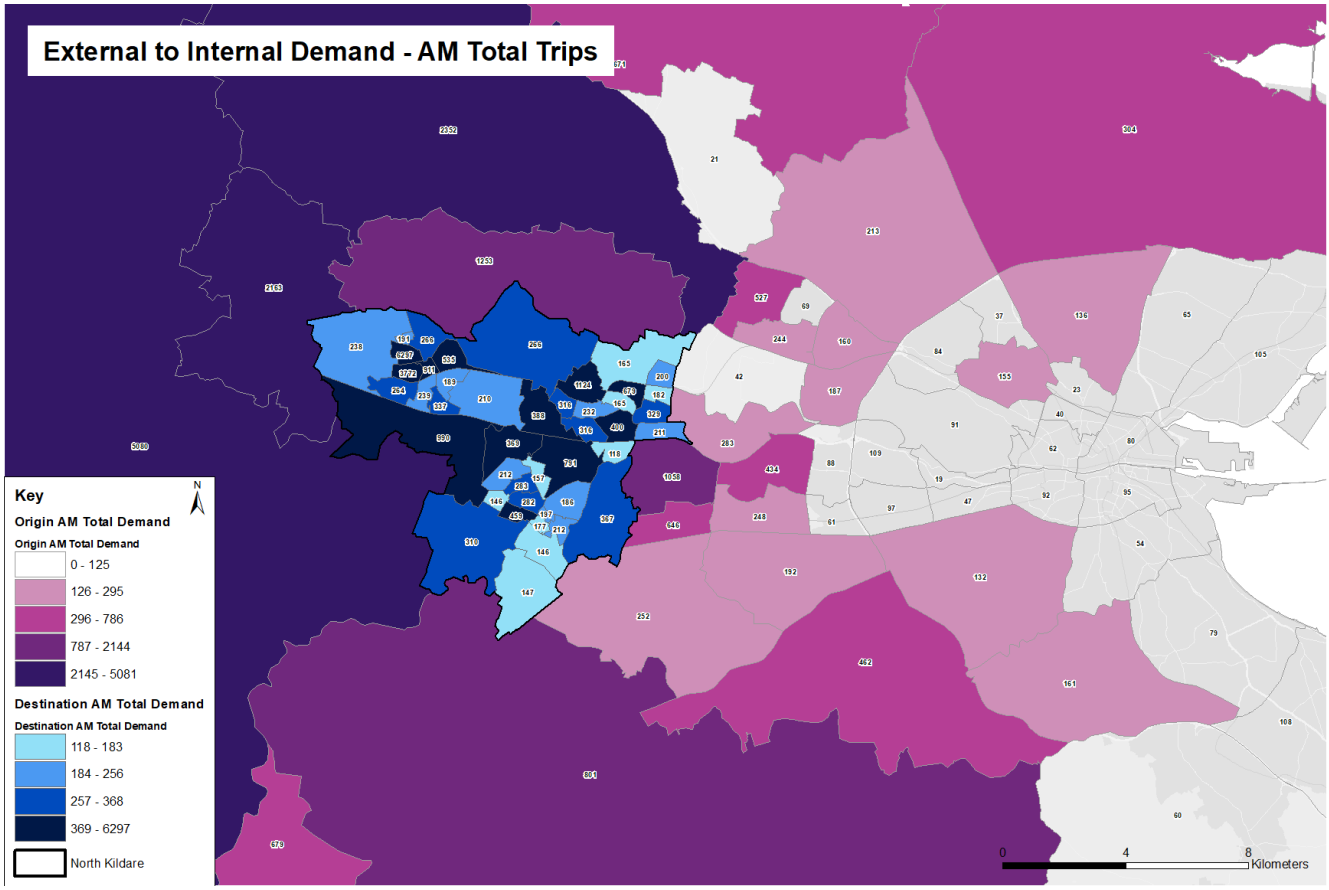


Figure 4.12: Total trips by all modes to the study area (AM peak)

Both **Figure 4.11** and Figure 4.12 are shown in full in Appendix B.

Trips within the North Kildare study area

Figure 4.13 shows the internal movements in the North Kildare study area for all modes in the AM peak.

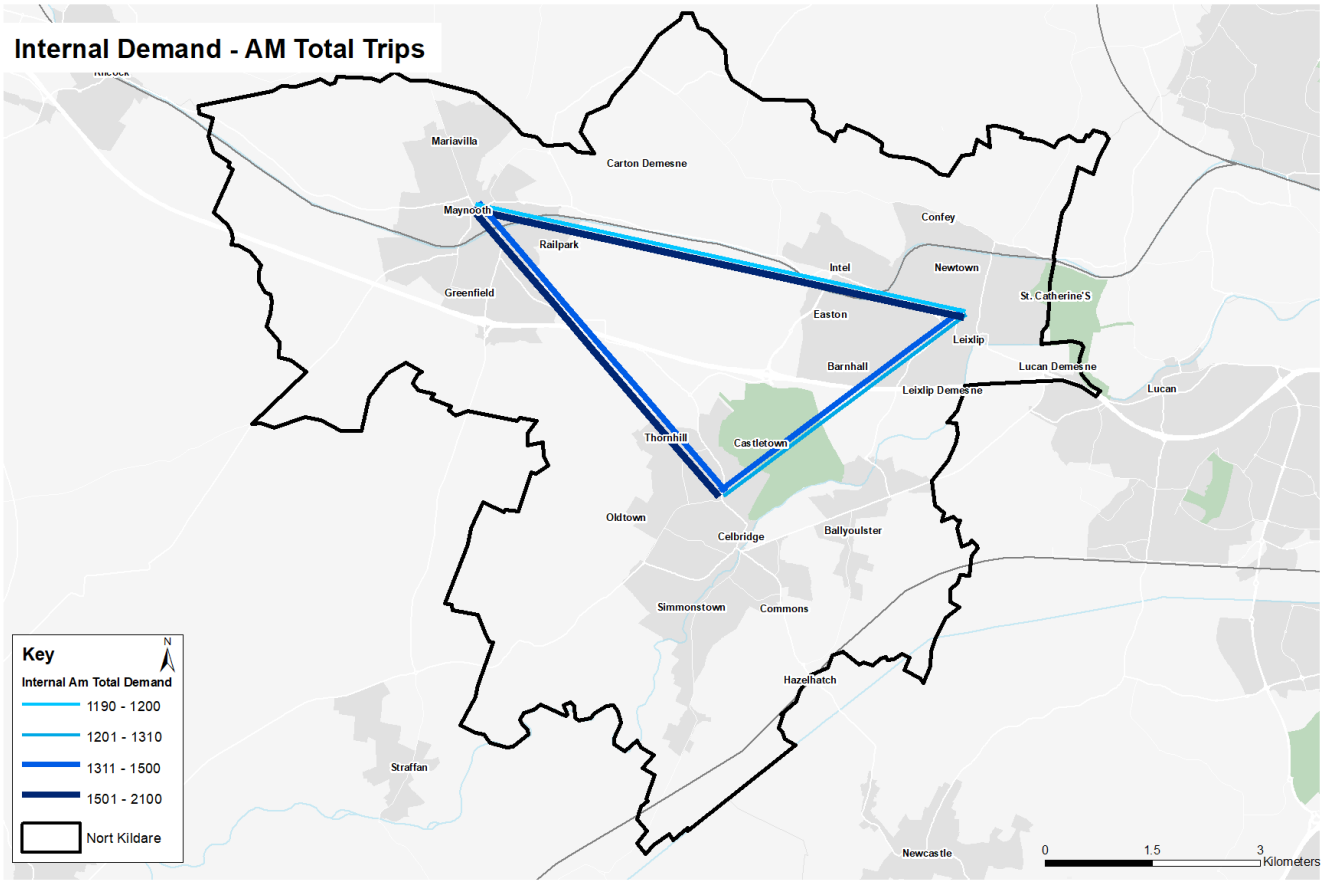


Figure 4.13 Total internal trips within the study area (AM peak)

Table 4.2 shows the internal movements in the North Kildare study area for all modes in the AM peak. The highest proportion of movements are within each of the three settlements. Maynooth circa 15,000, Celbridge circa 10,000, Leixlip circa 7,000. Maynooth is the biggest attractor inside the North Kildare study area with approximately 2,000 trips from Leixlip and Celbridge. The lowest value of trips is between Maynooth and Celbridge with approximately 1,200.

Table 4.2: North Kildare internal movements (AM peak)

Demand by District					
AM		Destinations			
Total		Leixlip	Celbridge	Maynooth	Total
Origins	Leixlip	7,256	1,324	2,025	10,604
	Celbridge	1,304	10,481	1,990	13,775
	Maynooth	1,361	1,190	15,083	17,634
	Total	9,921	12,995	19,098	**42,014**

4.3.3 Mode share

Trips have been categorised as car, public transport, walk and cycle mode trips. Maps are provided in Figure 4.14 for the AM peak.

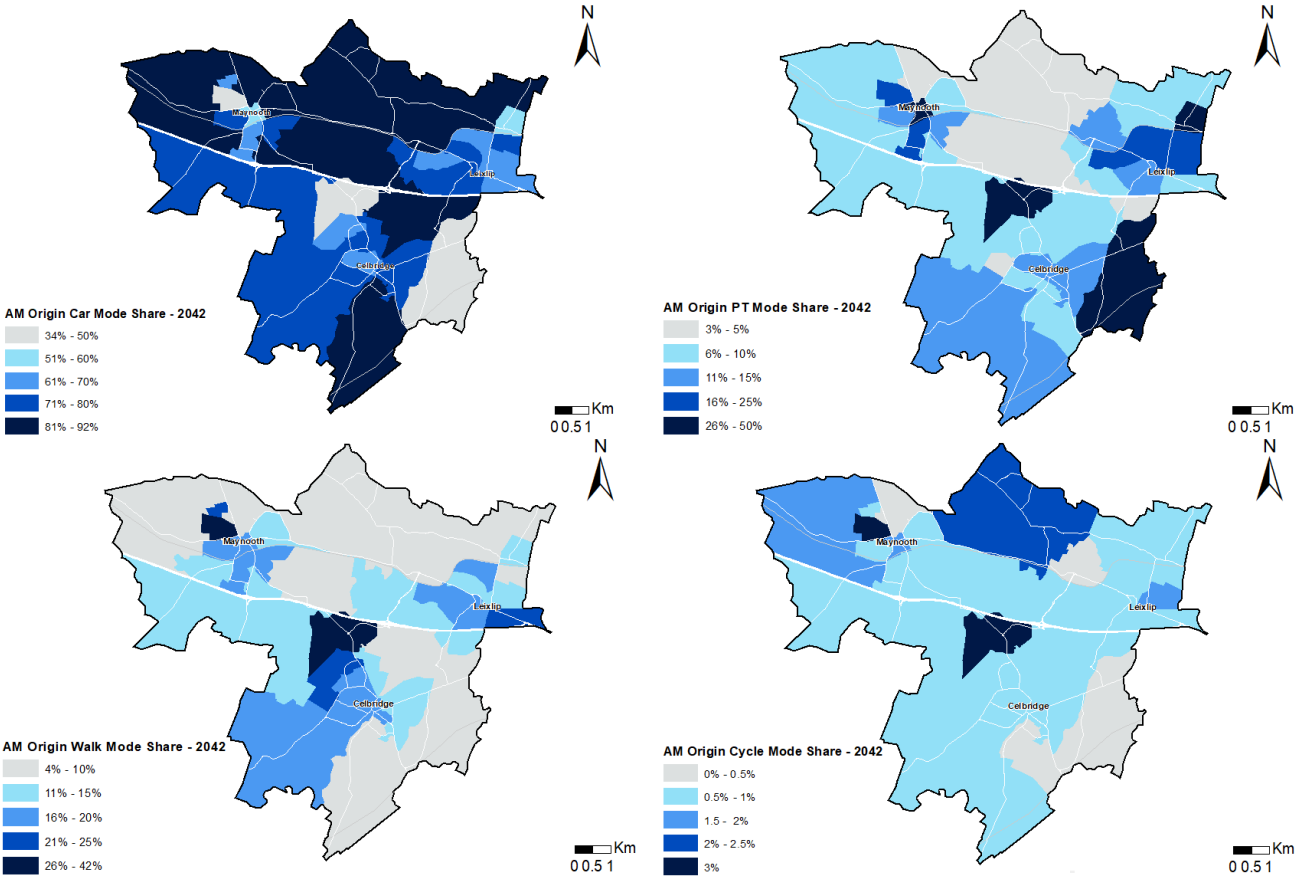


Figure 4.14: AM peak mode share

Mode share data has been extracted from the model for trips originating in the North Kildare study area for car, public transport, cycling and walking trips. This has been spatially analysed for the AM Peak and 24-hour periods. Overall, the AM Peak data shows that:

- Car is the dominant mode for trips originating from within the study area. Within the majority of model zones, car trips account for over 61% of trips. Car usage is particularly dominant within the rural northern sectors of the North Kildare study area (outside of Maynooth and Leixlip).
- The greatest proportion of public transport trips, 26-50%, take place from central Maynooth, northern Leixlip (near Confey station) and eastern Celbridge (near Hazelhatch and Celbridge station).
- Walking trips are highest, 20%+ in Celbridge, Leixlip and Maynooth; and
- Cycling is low across the study area and accounts for less than 3% of trips.

Car mode share

Car mode share for North Kildare study area is relatively high, especially north towards the M4. Only 3 sectors have car mode share in the AM peak less than 50%, Castletown Demesne, Backweston and Maynooth University North Campus.

Implication – Car mode share is significantly higher relative to the GDA as a whole.

Public transport mode share

Public transport mode share in the North Kildare study area is higher in sectors south of the M4. Most sectors to the south of the M4 are between 6% and 25% with the exception of Backweston which is approximately 49%. The higher public transport mode share could be attributed to the location of Hazelhatch and Celbridge station within the zone.

Implication – there needs to be large improvements in provision to drive uptake in public transport usage to serve both internal and radial movement and enhanced access to public transport services.

Cycle mode share

Cycle mode share is very low across the whole study area. Less than 1% for the most part with the highest value around 3%.

Implication – it is likely that this is due to inconsistent provision for cyclists within the study area to and from employment and or education sites, not encouraging cycling for casual trips or encouraging cycling as a longer distance trip.

Walking mode share

Walking mode share is between 4% and 16% in most sectors of North Kildare study area. Only in Celbridge, Leixlip and Maynooth is this mode share higher than 20%.

Implication - some local provisions should be made in some areas to further encourage walking around local centres.

4.3.4 Capacity by mode

Roads

Figure 4.15 identifies junctions within the North Kildare study area that experience a volume over capacity ratio more than 60% (orange, red) in the 2042 forecast model run for the AM Peak. A number of junctions struggling with capacity can be seen in the vicinity of the M4. Junctions between R148 and R449 in Collinstown Industrial Park, between Willowbrook Road and Maynooth Road in Celbridge and between R403 and R404 near Weston Airport are also at high volume to capacity (over 85%).

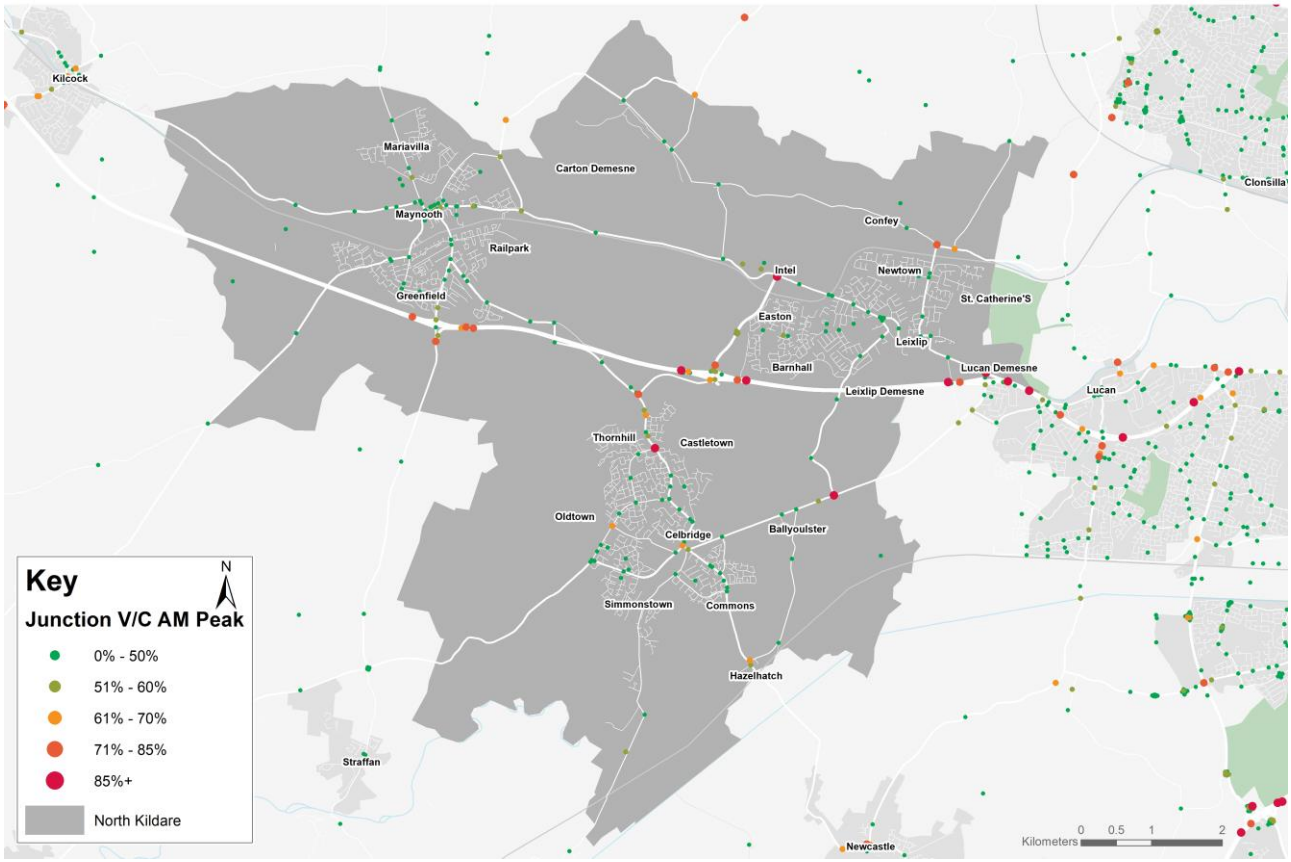


Figure 4.15 Volume to capacity ratio of junctions in the North Kildare study area for the AM Peak

Overall, within the study area the road network is moderately congested, with many junctions demonstrating existing operational headroom and spare capacity. This allows for growth and a degree of flexibility to introduce meaningful measures to build greater resilience into the network through enhanced public transport and cycling infrastructure.

Public transport

Public transport demand outputs from the model have been analysed to determine which routes are forecast to operate over capacity in the forecast year. For the purposes of this analysis the capacity, termed the design capacity, has been calculated at 85% of the crush capacity. Figure 4.16 to Figure 4.18 show the bus spine, orbital bus routes and commuter rail lines volume to capacity experienced during the AM peak in 2042.

- The X27/X28 radial spine route which connects Celbridge to Dublin City Centre and UCD. This route is over design capacity from Celbridge to Maynooth;
- The X32 radial spine which connects Leixlip Castletown to Dublin City Centre. This route is over capacity running through Lucan.
- Orbital bus routes within North Kildare are not expected to be over capacity.
- The Maynooth rail line runs within capacity whilst the Kildare rail line is expected to run within capacity before approaching capacity as it reaches Dublin.

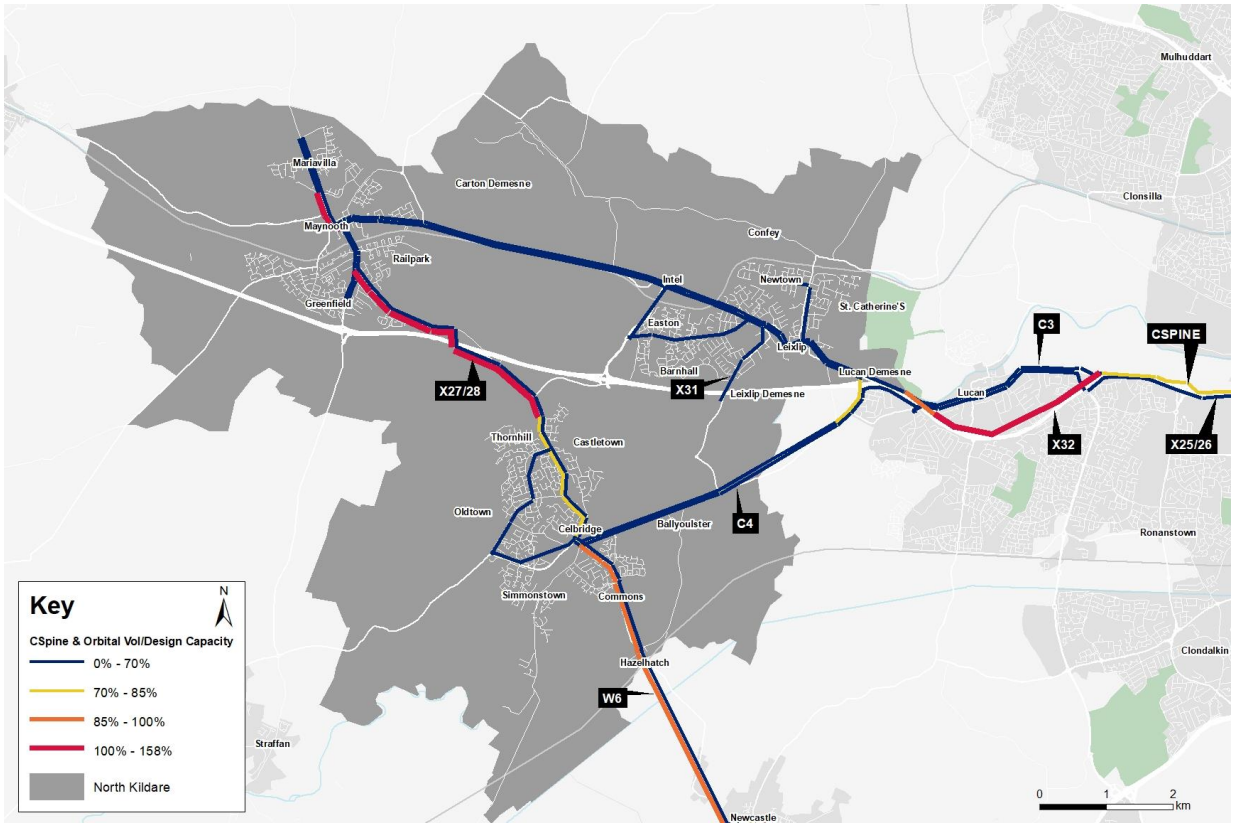


Figure 4.16 Capacity utilisation of spine & orbital bus routes (AM peak)

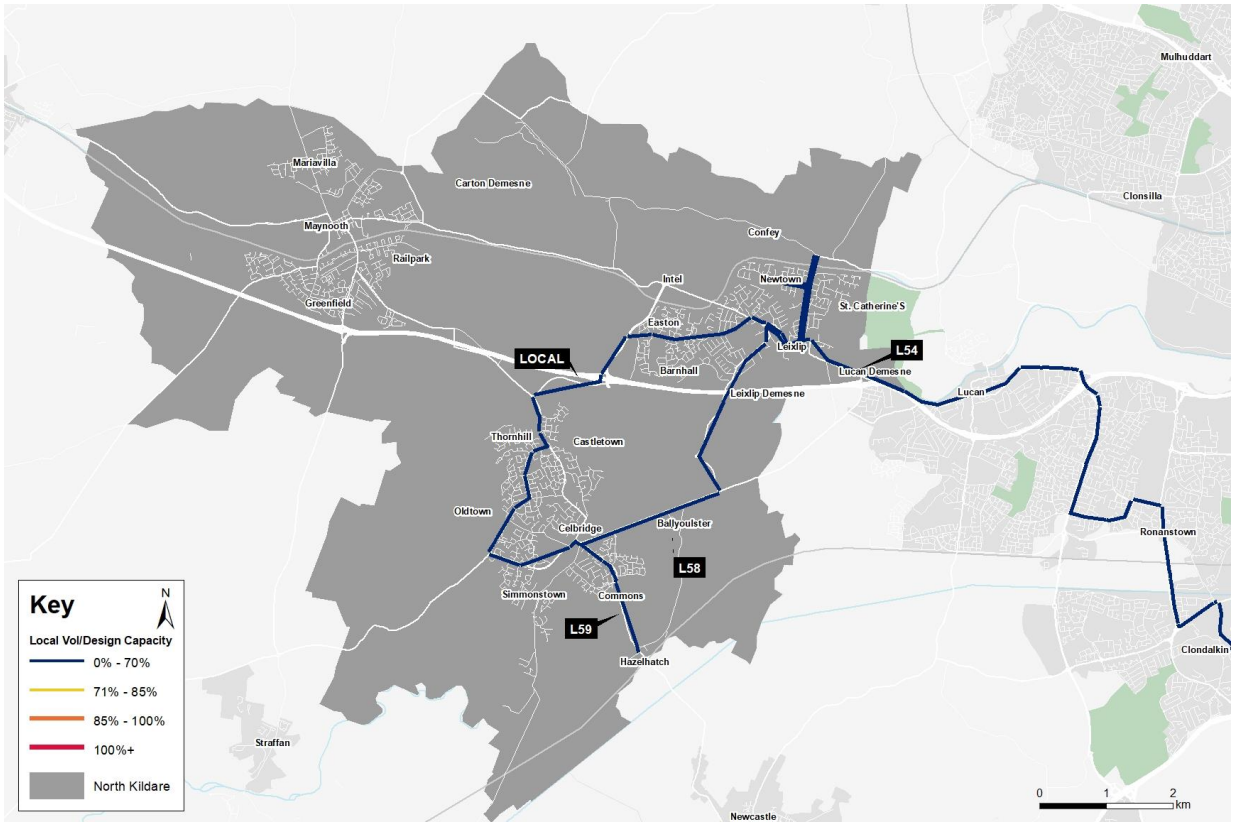


Figure 4.17 Capacity utilisation of local bus routes (AM peak)

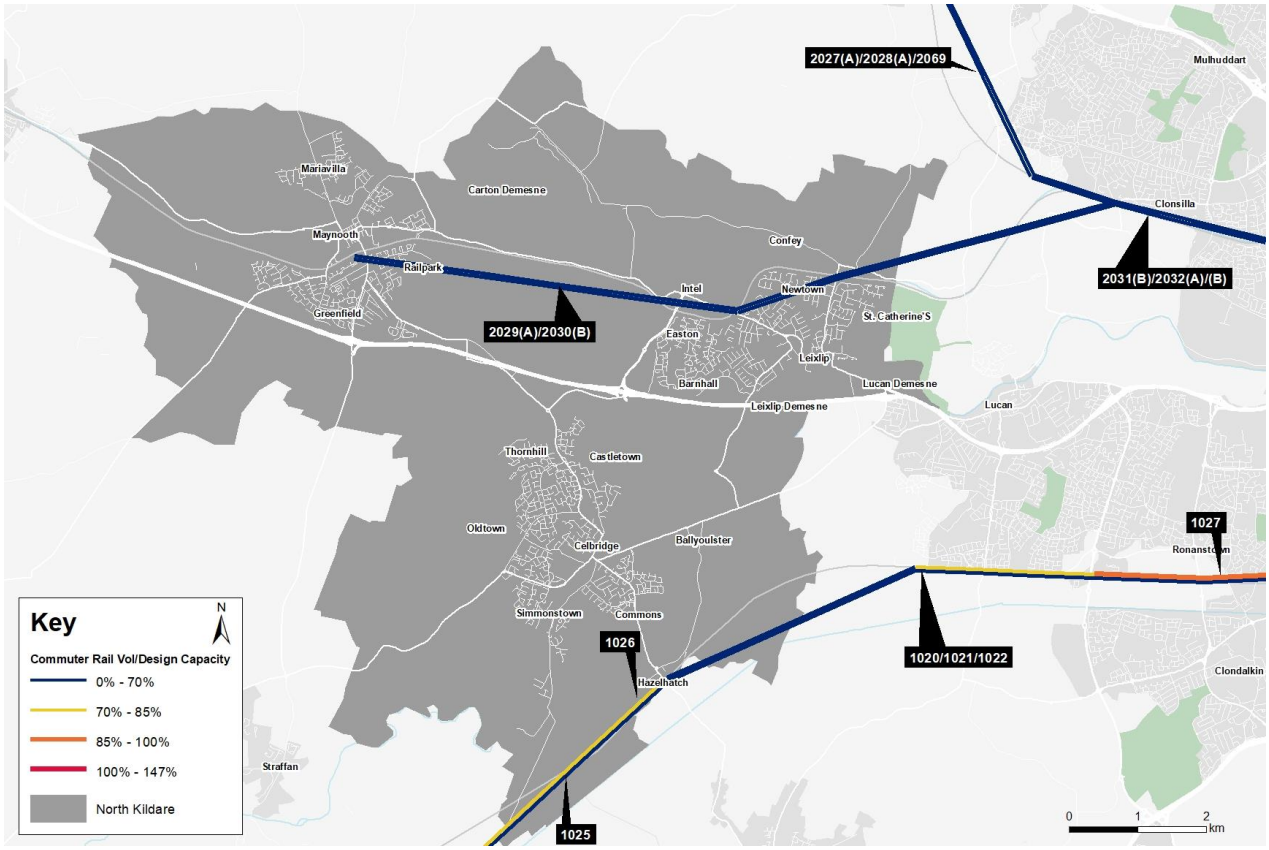
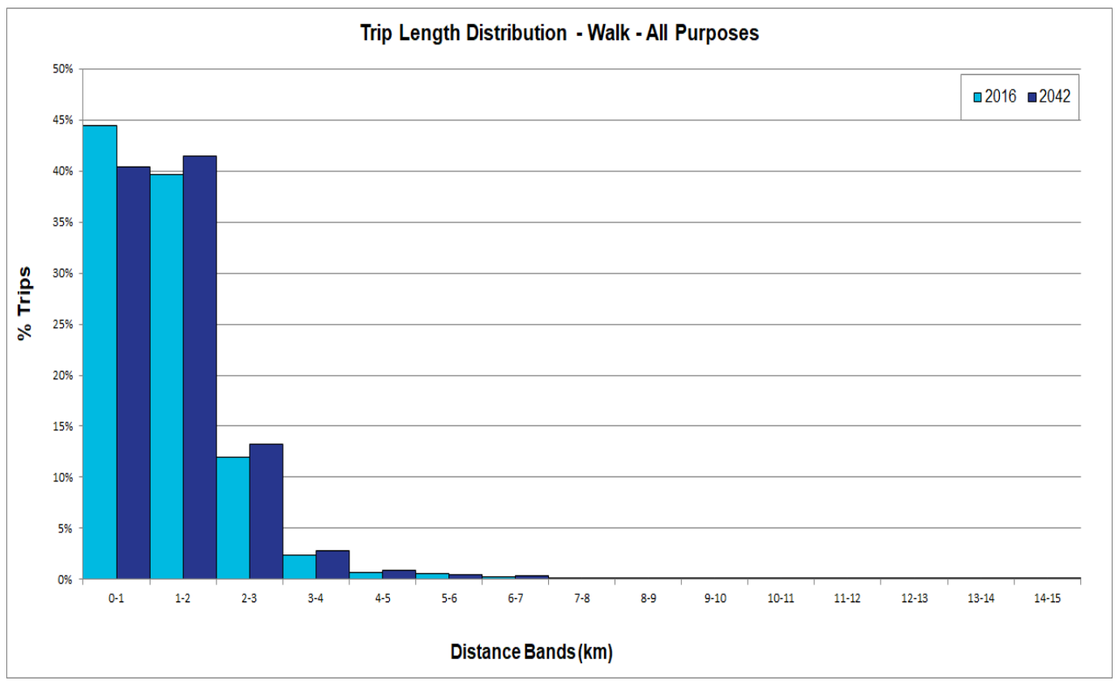


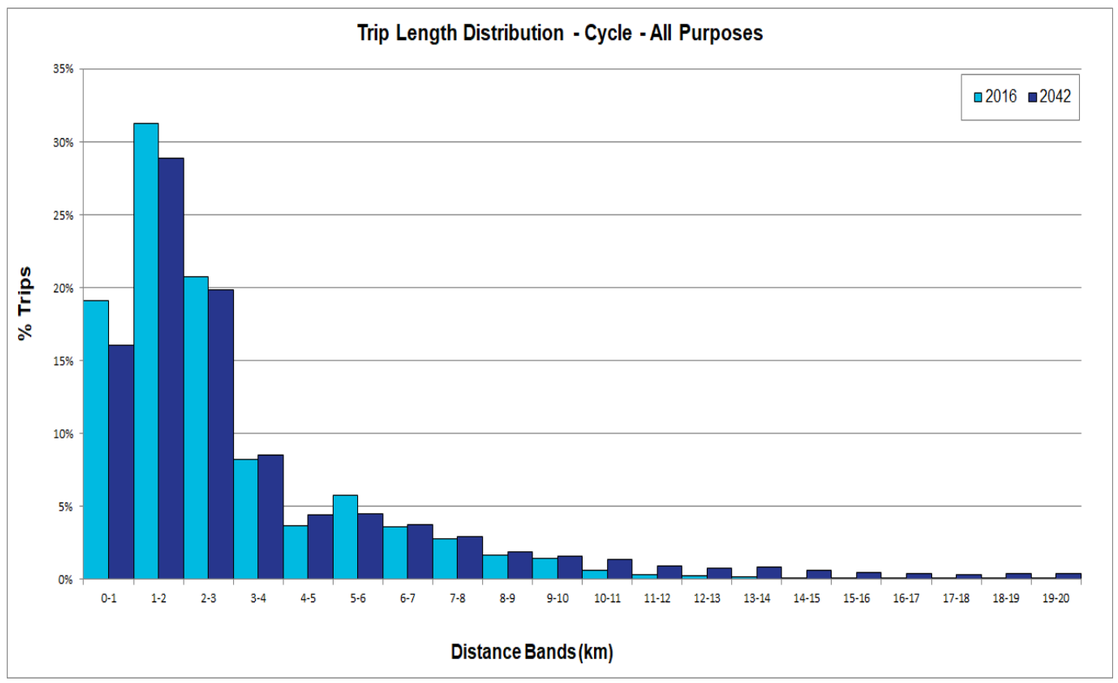
Figure 4.18 Capacity utilisation of commuter rail lines (AM peak)

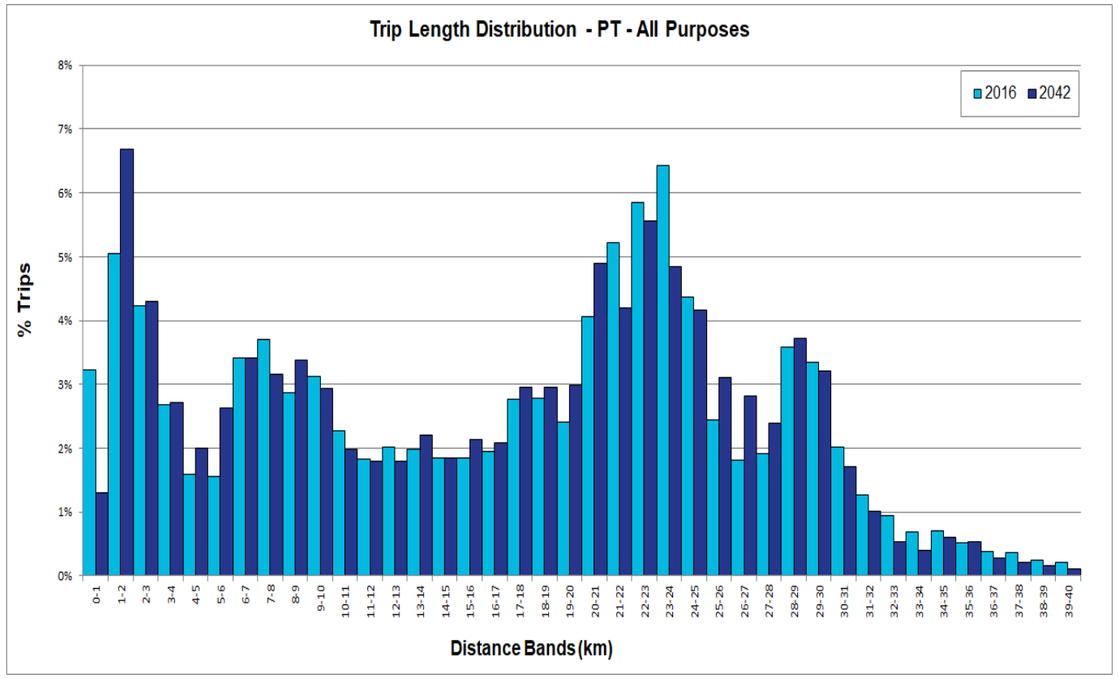
4.3.5 Trip lengths

Data on the distribution of trip lengths for the North Kildare study area has been extracted from the model for the 2016 and 2042 forecast year. It is split by mode and is presented in Figure 4.19. Overall, the data shows:

- Car – an increase in the proportion of short distance car trips (less than 4km) is anticipated between 2016 and 2042. For journeys over 4km, the proportion of car trips is anticipated to marginally decrease / remain broadly similar.
- Walking – most walking trips are short with over 80% of trips being less than 2km in distance. In the forecast year there are little change in trends with circa 80% of walking trips being less than 2km.
- Cycling – an increase in trips over 3km is anticipated between 2016 and 2042 resulting in a shift from shorter distance trips;
- Public transport trips – for short trips under 7 kilometres there is a slight increase in public transport trips between 2016 and 2042 whilst there is a marginal decrease in the proportion of public transport trips between 20-25km anticipated by 2042; and
- A large proportion of car trips from the study area are under eight kilometres in length. Car trips between 0-4 km see an increase in 2042. This provides opportunity for a large shift to public transport or active modes if improved facilities are made available.







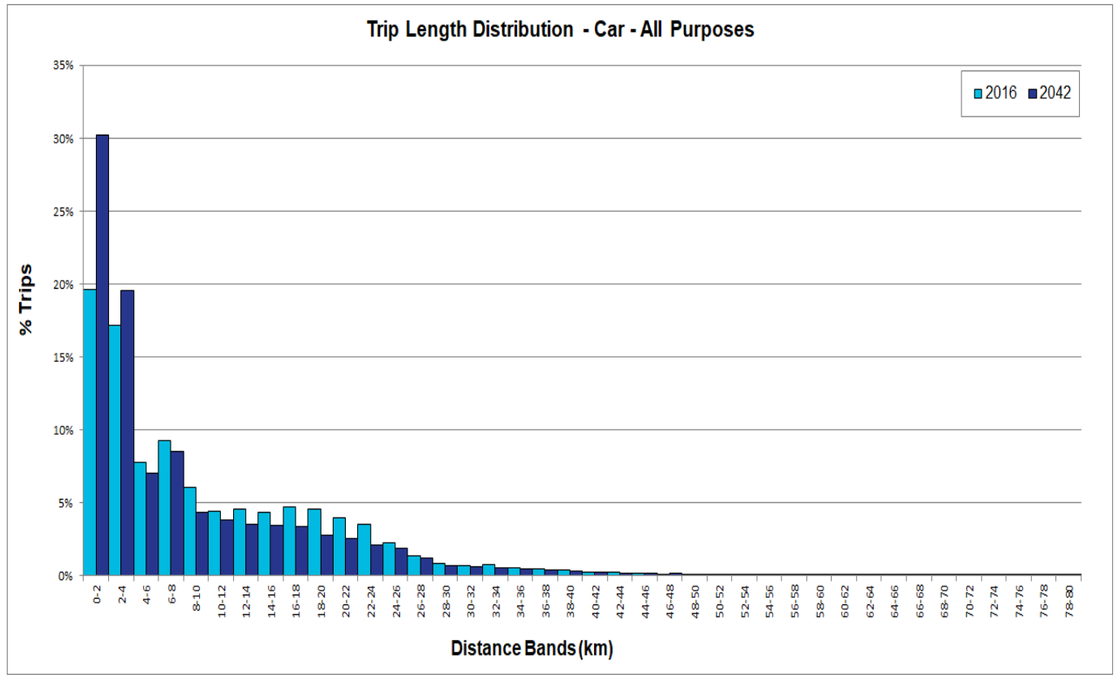


Figure 4.19: **North Kildare trip length distribution for all modes (AM peak)**

4.3.6 Journey time by mode

4.3.7 Bus speeds

Figure 4.20 presents the model output 2042 bus speeds for the AM peak. The figure shows a number of key areas in the network that experience low speeds, this increases bus journey times and inhibits modal shift to bus from car. The key areas experiencing low speeds are:

- The R406 Straffan Road between its junctions with Main Street and Celbridge Road (Maynooth);
- Near M4 junction 7 Maynooth;
- The R405 Maynooth Road between its junctions with R449 and Willowbrook Road (Celbridge);
- The R405 Primrose Hill Road between its junctions with Hazelhatch Park and Loughlinstown Road (Celbridge); and
- Leixlip Centre.

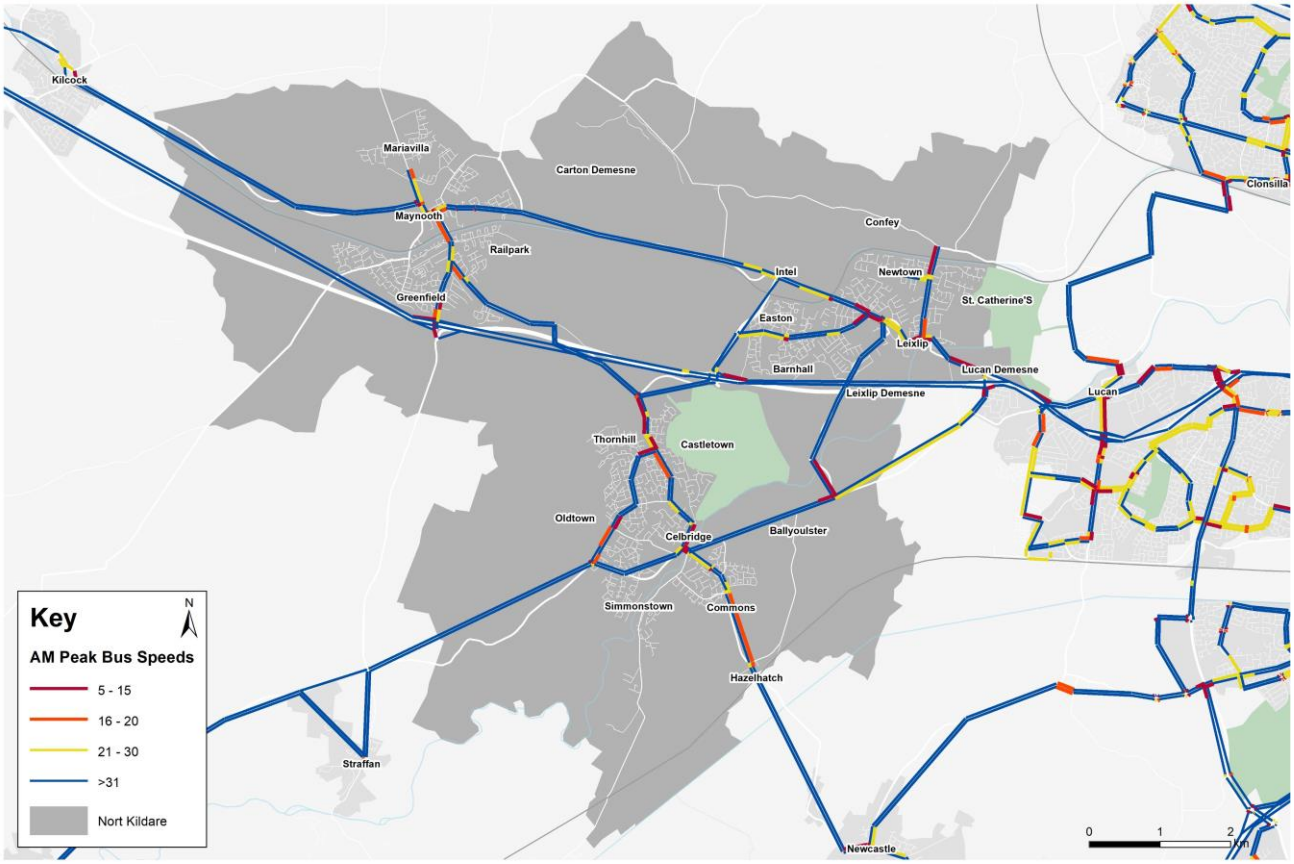


Figure 4.20: Bus speeds (AM peak)

4.4 Mode shift analysis

The previous section has considered the estimated travel demand and network performance in 2042. As well as the public transport network needing to accommodate public transport demand in 2042, there is also a need to cater for a mode shift from private car to sustainable modes such as walking, cycling and public transport. This section considers different levels of mode shift for key movement corridors through the study area.

4.4.1 Methodology

A process has been developed to simulate how a change in mode shift could increase the demand for public transport trips. The potential number of public transport trips from the shift can then be used to indicate the level of public transport improvements which would be needed to accommodate a mode shift.

This process has been undertaken for three key movement corridors which pass through the North Kildare study area. The corridors were identified by identifying key origins and destinations using the data discussed in Section 4.3. The key movement corridor lies on an East / West axis.

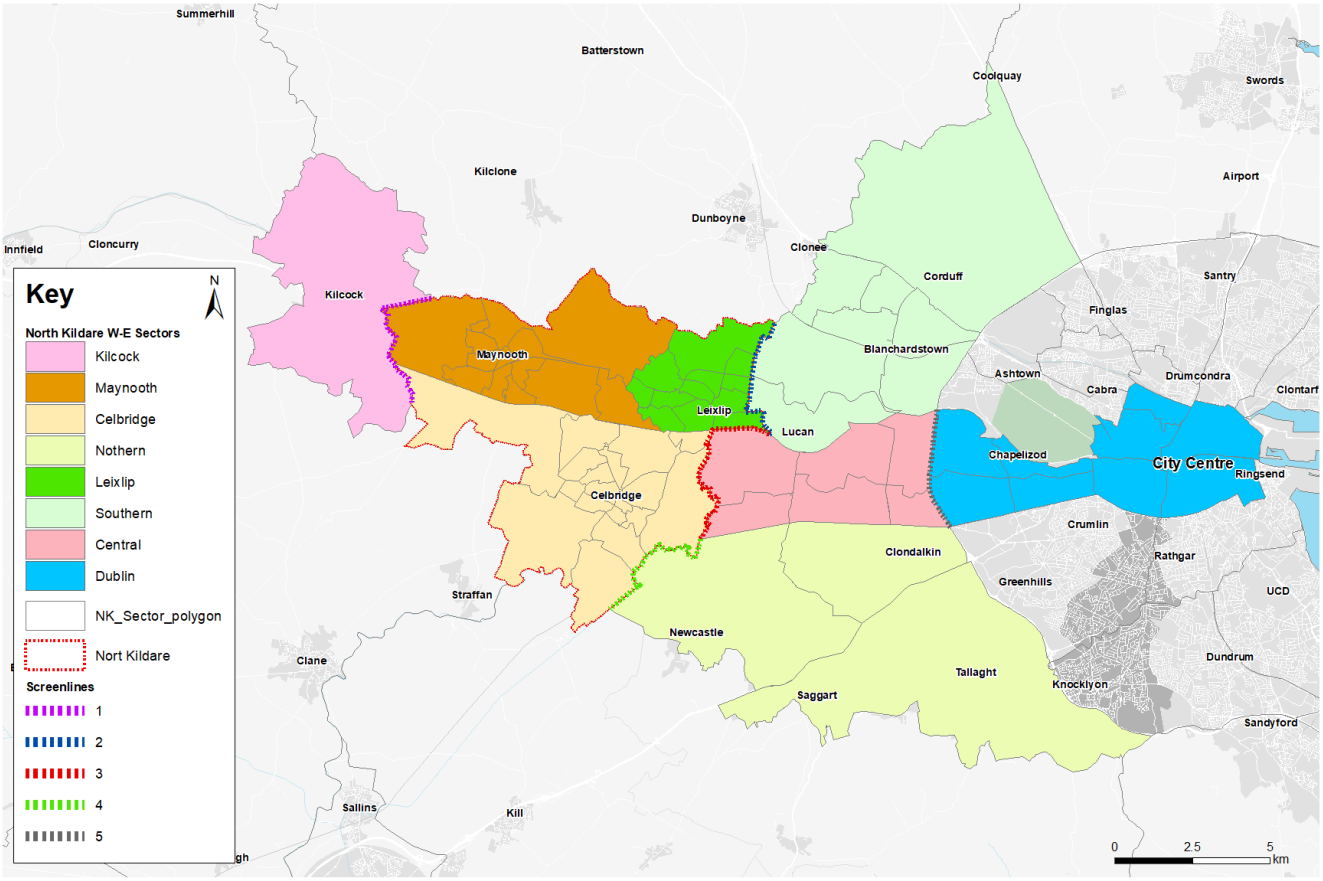


Figure 4.21 Corridor Definition and Screenlines

For this corridor, model zones have been grouped into sectors and districts. The district boundaries form the screenlines for further analysis. Therefore, sectors are grouped into districts in accordance with where the screenlines are required. The screenlines were selected to analyse key movements in to and out of the study area alongside key movements within the study area, such as crossing the M4 and or travel to/from Dublin Centre. The 2042 model demand outputs provide a baseline number of trips between each pair of sectors for car, public transport, cycle and walk. For a specified percentage car mode shift, the process estimates how many of the car trips become walk, cycle or public transport trips.

The distance between each pair of sectors has been estimated by calculating as the crow flies distance between the centroids of each sector. This allows the mode shift to be based on distance, as shorter trips are more likely to become walking trips and longer trips are more likely to become public transport trips. The distances have been divided into three bands based on the trip length distribution information in Section 4.3.5. Each sector to sector movement is then allocated one distance band.

Distance bands used for the North Kildare study area were: <1.8km; 1.8-4.4km; and >4.4km.

Table 4.3 shows the mode shares for 'sustainable modes only' from the model by distance band across the Study Area. These percentage values were used to split the chosen total number of car trips shifted to walk/cycle/public transport respectively; For example, only 17 % of car trips are shifted to public transport in the 0-1.8km distance band, increasing to 36% in the 1.8-4.4km band and then 83% for the >4.4km band.

Table 4.3 Mode splits by distance band (AM Peak)

Distance band (km)	Walk	Cycle	Public transport
	%	%	%
0-1.8	78.0%	5.1%	16.9%
1.8-4.4	52.6%	11.0%	36.4%
>4.4	4.7%	12.3%	83.0%

4.4.2 Results

The information in this section outlines high-level, indicative results to inform option development, by providing order of magnitude changes in demand resulting from an assumed mode shift. Due to the assumptions underpinning the transport model run used for this study, it is not possible to provide an exact figure for the demand relating to further mode shift without re-running the model. For the same reason, wider corridor catchments than shown could have been considered. Further analysis of mode shift and associated changes in demand for public transport has been undertaken in the strategic analysis for the GDA as a whole as part of the wider strategy development process.

Radial West / East corridor

The Department of Transport's Smarter Travel: A Sustainable Transport Future aspires to a reduction in trips made by car by 2040. According to the outputs from the ERM model run, the car mode shares in 2042 for the West/East radial corridor are shown in Table 4.4. It should be noted that the uplift public transport demand over and above that already shown to be catered for in the corridor by public transport services already in the 2042 ERM scenario is that for a three hour AM peak period from 7-10 am. In contrast the ranges of public transport mode capacities are hourly directional capacities.

Table 4.4 2042 Corridor Car Mode Share by Screenline (AM Peak)

Screenline	Car demand - ERM (Two-Way)	Car mode shift	Public transport demand - ERM		Shifted public transport demand		Total public transport demand after mode shift	
			EB	WB	EB	WB	EB	WB
1	3,679	0%	400	100	0	0	400	100
		25%	400	100	600	200	1,000	300
		50%	400	100	1,100	400	1,500	500
2	3,699	0%	400	500	0	0	400	500
		25%	400	500	500	300	900	800
		50%	400	500	1,000	500	1,400	1,000
3	8,100	0%	3,400	500	0	0	3,400	500
		25%	3,400	500	1,000	600	4,400	1,100
		50%	3,400	500	2,000	1,200	5,400	1,700
4	3,831	0%	300	200	0	0	300	200
		25%	300	200	600	200	900	400
		50%	300	200	1,200	400	1,500	600
5	3,820	0%	3,000	200	0	0	3,000	200
		25%	3,000	200	700	100	3,700	300
		50%	3,000	200	1,300	300	4,300	500

Note: Figures in this table have been rounded to the nearest 100

To achieve a car mode shift of 50%, provision for approximately 5,400 public transport trips would be required to cater for eastbound or 'inbound' demand across screenline 3, which is the highest level of directional demand over all screenlines. At 50% the highest directional 'shift' to be accommodated at the individual screenlines requires a service capacity uplift of approximately 2,000 at screenline 3 eastbound and 1,200 at screenline 3 westbound. Screenlines 1,2,4,5 are similar with uplifts of around 1,200 eastbound and 400 westbound.

4.5 Summary

4.5.1 Issues

Approximately 56% growth in population is expected in the North Kildare study area up to 2040 and beyond, this includes growth in employment and education through the area.

Currently within the study area there is a high car mode share (about 65%). This is likely due to the dispersed nature of residential development and of employment destinations for trips from the study area, which are difficult to serve by alternative modes. There is also a low cycle mode share (2%) throughout the area, which is likely due to the same reason as well as a lack of high-quality cycle infrastructure.

Analysis also shows that public transport services are approaching or over capacity in the AM Peak, including routes into Maynooth from Celbridge, this may further encourage people to make journeys by car instead of public transport.

4.5.2 Constraints

With regards to public transport there is existing heavy rail within North Kildare study area with two rail lines Maynooth Commuter and Kildare Commuter. At peak times, in particular the AM peak, there is significant pressure on service capacity on both routes. For bus travel, there are constraints on the capacity of the existing

services as well as an identified lack of direct services between North Kildare and external employments centres (Blanchardstown), and between settlements in North Kildare and internal employments centres (Maynooth and Liffey Business Park).

In terms of car travel, the M4 dissects the study area. This experiences heavy congestion and also has limited crossing points. Several junctions along the major routes into Dublin City Centre are also at or near capacity. However, car continues to be the mode travel option for trips departing or originating from the study area, and particularly inward trips to the various employment areas.

For walking and cycling there is limited opportunity to safely cross key infrastructure routes within the area, particularly large barriers such as the M4 and water bodies which flow through the study area. A lack of high-quality cycle infrastructure, particularly between local centres, reduces the attractiveness of cycling as a potential transport mode.

4.5.3 Opportunities

The main opportunities for the North Kildare study area lie in providing access to public transport to encourage people to use these modes, and providing interchange facilities at key transport hubs to facilitate modal shift away from car to active modes and public transport for longer length trips. Enhanced cycling provision to encourage people to use active modes for shorter journeys. The forecast data shows a large proportion of short distance trips are undertaken using the car rather than sustainable modes.

The proposed GDA cycle network goes some way to introduce infrastructure into the study area to create a network, however there are still gaps that are not served by routes on which key desire lines are located. These include to and from existing/proposed educational and employment sites such as Salesian College, M4 Business Park, the State Laboratory and Department of Agriculture, Food & the Marine at Backweston and Adamstown.

There also may be opportunities to encourage Park & Ride along the M4 corridor and Maynooth rail line alongside station and rail capacity upgrades. Interventions could encourage mode shift from private car prior to entering the more constrained Dublin City Centre area.

5. Options development

5.1 Strategy objectives

To guide the identification of options for the Dublin South West study area, the NTA have outlined a set of overarching themes, outcomes and objectives for the GDA Transport Strategy; these are outlined in Table 5.1.

Table 5.1: GDA Transport Strategy theme, outcomes and objectives

Strategy theme	Strategy outcome	Strategy objective
Environment	An enhanced natural and built environment	To meet our environmental obligations by transitioning to a clean, low emission transport system through reducing car dependency and increasing walking, cycling and public transport use.
Community	Connected communities and better quality of life	To improve health and quality of life of our society by improving connectivity between people and places, delivering safe and integrated transport options, and increasing opportunities for walking and cycling.
Economy	A strong sustainable economy	Supporting economic activity and growth by improving the opportunity for people to travel for work or business where and when they need to and facilitating the efficient movement of goods.
Accessibility	An inclusive transport system	To deliver a high quality, equitable and accessible transport system, which caters for the needs of all members of society.

5.2 Options development

To identify options to serve travel demand in the study area in 2042, the following steps have been completed:

- A review of relevant planning and transport policies and strategies has provided the overall context for options, and identified current thinking in relation to the future transport network;
- A baseline analysis of the existing transport network identified existing network issues and opportunities;
- An analysis of planning and travel data from the 2040 Planning Sheet and a DM run of the ERM for 2042 provided insights into future travel demand and network capacity constraints; and
- A review of the GDA strategy objectives against which all options should be aligned.

The above steps resulted in the preparation of an options list for each of the key transport patterns as detailed in Table 5.2.

Table 5.2 Transport Options

Ref	Type of option	Description
Existing proposals		
	Highway	Enhance orbital movement, outside of the M50 Ring Road, between the N3, the N4 and N7 national roads, by the widening of existing roads and the development of new road links.
	Rail	DART+ will provide a sustainable, electrified, reliable and frequent rail service by significantly increasing capacity on all rail corridors serving the GDA. In the North Kildare study area, DART+ will provide electrified services and new additional railcar carriages from Dublin City Centre to: • Maynooth via the Maynooth Line (DART+ West) – An increase in capacity from 7 trains per hour (per direction) to 15 trains per hour, subject to demand, will increase capacity from 4,500 to 13,750 passengers (per hour per direction). Due to be delivered by 2027, this project will enhance connectivity from Dublin City Centre to both Leixlip and Maynooth. Hazelhatch and Celbridge via the Kildare Line (DART+ South West) – An increase in capacity from 12 trains per hour (per direction) to 23 trains per hour, subject to demand, will increase capacity from 5,000 to 20,000 passengers (per hour per direction).
New proposals		
1	Cycle Infrastructure	Cycle Infrastructure - R405 Missing Link - Maynooth to Celbridge (Salesian College)
2	Cycle Infrastructure	Cycle Infrastructure - North Kildare to Adamstown
3	PT Corridor	North Kildare to Blanchardstown by bus (Single Interchange) Extension of Route L58 and L59 to Clonsilla Station
4	PT Corridor	North Kildare to Blanchardstown - Rail:Bus (Single Interchange) Improve bus:rail interchange opportunities at Clonsilla Station
5	PT Corridor	Extend C3 bus service to Maynooth Business Campus
6	PT Corridor	Extend C4 bus service to Maynooth University
7	PT Corridor	Re-route W6 bus service through centre of Maynooth
8	Rail	Collinstown Strategic Rail Based Park+Ride
9	Rail	West of Maynooth Strategic Rail Based Park+Ride
10	Rail	Leixlip Confey – Station relocation and upgrade to Interchange
11	Travel Choices	North Kildare Travel Choices Programme

Below Figure 5.1 to Figure 5.3 show the various options spatially across the study area. The Existing Proposed options for road and rail form part of the MCA along with a selection of the New Proposed options.

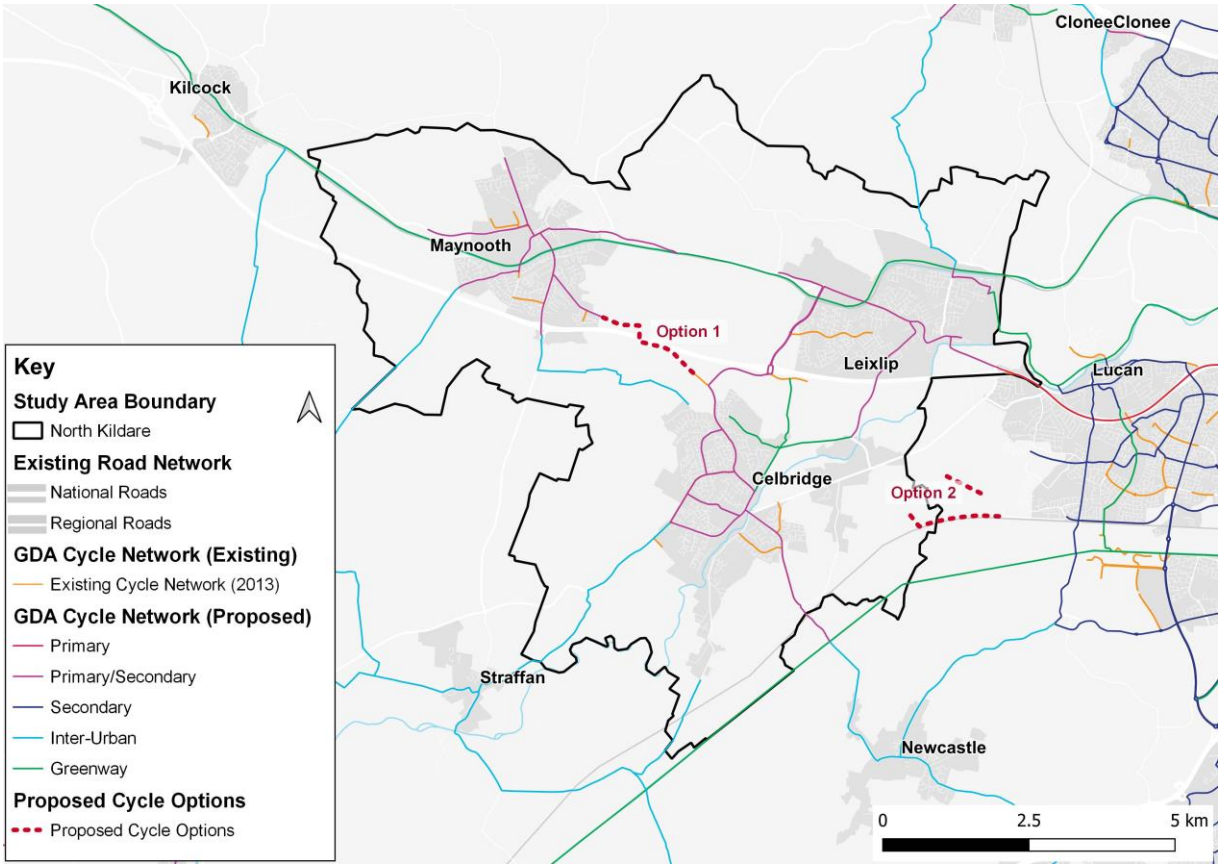


Figure 5.1 Cycle Options

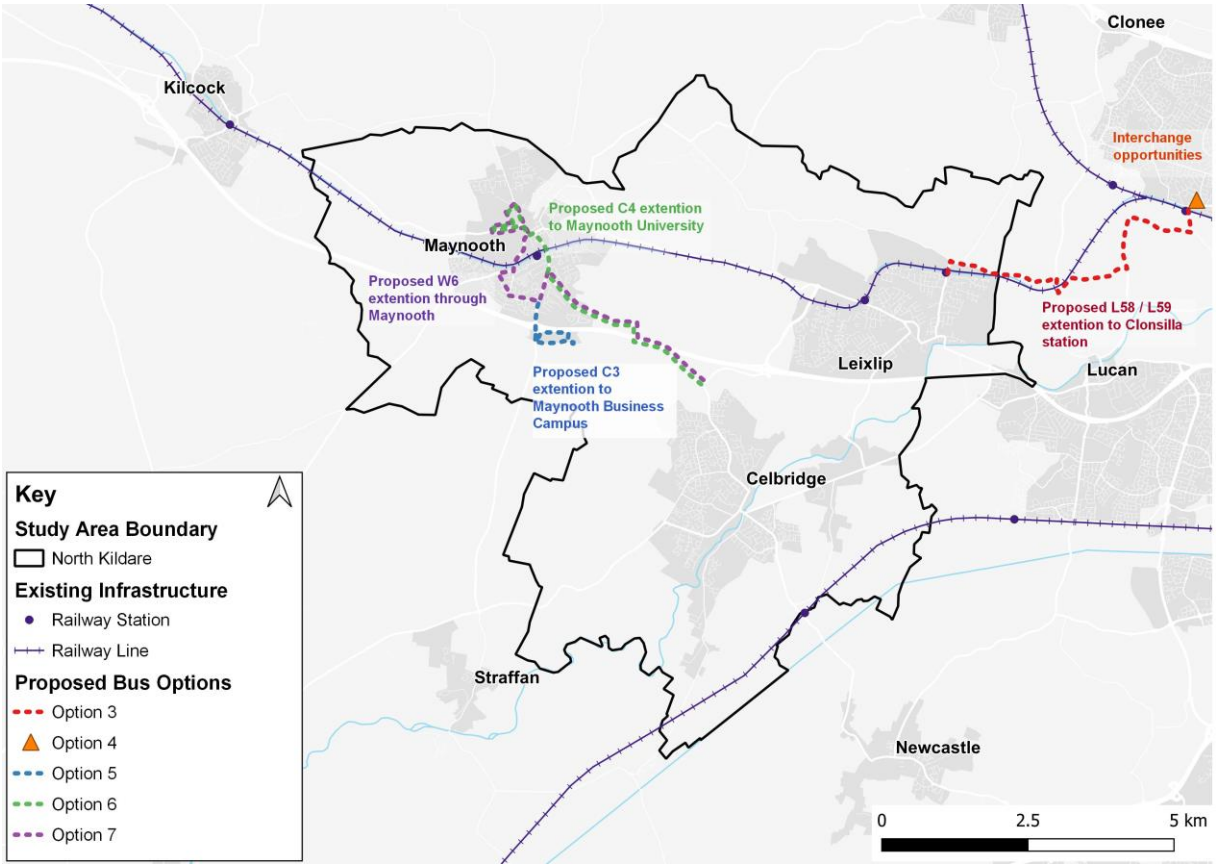


Figure 5.2 Bus Options

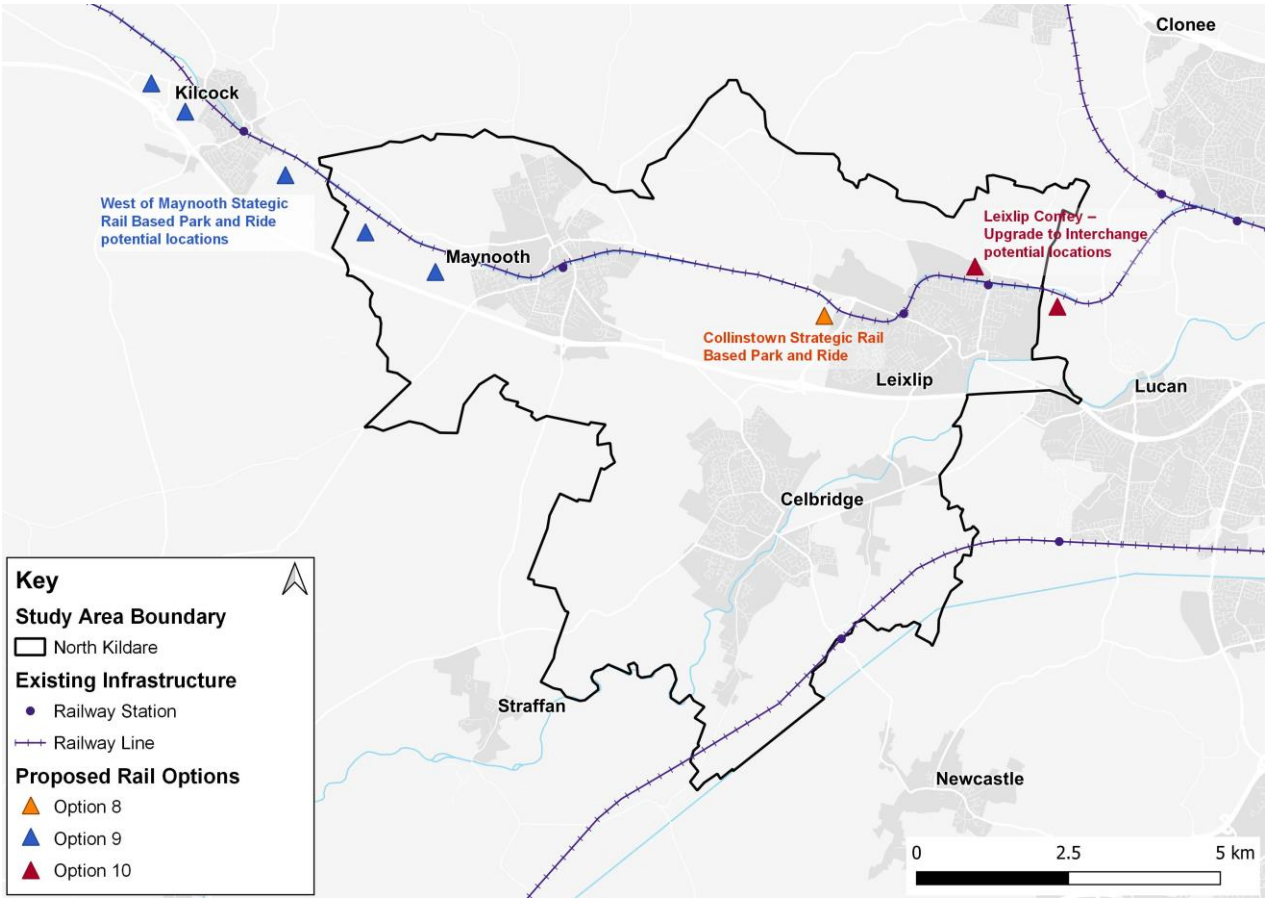


Figure 5.3: Rail Options

It should be noted that inherent within these new options, in particular those that require intervention in the streetscape, is the intention to address the weaknesses of the pedestrian environment in the study area through improvements to junctions including additional crossing points, increased pedestrian crossing times, and where identified, the implementation of additional sustainable links to connect residential areas with public transport services and local employment/education centres.

The NTA will consider the Park & Ride options in conjunction with the recommendations of the Park & Ride Study being undertaken as part of the GDA Transport Strategy.

5.2.1 Cycling interventions

Based on the assessment of 'gaps' in the cycle network connectivity in Chapter 3 two options are considered as follows:

Option 1 – Introduce a new segregated cycle link between Maynooth and Salesian College following the R405 road link. This corridor lacks existing and proposed separated active travel facilities. It is a noticeable gap in the network that the proposed cycle network does not serve. The travel demand data indicates that a significant amount of movement occurs between origins and destinations along the corridor and this link would serve both educational and employment commuter trips.

Currently the unlit conditions and high speed limits may deter cyclists from using the route. It Is considered that cycle intervention here should consider lighting / and segregation where possible, however, it is unlikely that segregation would be feasible at the R405 / M4 overbridge due to width constraints.

Option 2 – Introduce a new segregated cycle link between development on the western edge of Adamstown and employment areas in Backweston. This link could take the form of one of two sub options: One from Tubber Lane

east of the Backweston Laboratory Complex to join with a new road which connects to Adamstown Way to its east, and the other from south of the Backweston Laboratory Complex to join with Station Road just west of Adamstown Railway Station.

Currently there is no link between Celbridge and Adamstown. As such, cyclists are either routed via the R835, adjacent to the M4 where there is limited segregation or R405 all of which are anticipated to take approximately 30 minutes. The proposed link would offer a direct link significantly reducing distance and time. Land acquisition would likely be required for this option

It is recommended that these options be taken forward due to the localised improvements they offer for further consideration as part of the GDA strategy work but are not considered as part of the MCA within this report.

5.2.2 Public transport

Improvements to proposed GDA conventional bus services is the only 'new' public transport option to have been considered for internal and local movements, as trip numbers are fairly low in relation to the mode capacity range, shown in Table 5.3. The capacity range for each mode is presented and based on UITP's 'Making the right mobility choices.' It should be noted that the capacity range for these modes have significant overlaps and are approximate.

Table 5.3:Public transport mode capacity range

Mode		Min (per hr)	Max (per hr)
1	Conventional Bus	0	2,400
2	Bus with priority infrastructure	2,400	4,000
3	Light rail	3,600	7,000
4	Heavy Rail	5,000	50,000
5	Metro	7,500	25,000

The radial corridor demand calculated in Table 4.4 is used to inform the identification of appropriate options that could serve this corridor. Any additional light rail, heavy rail and metro options for have been discounted as the capacity range is considered too high for the study area.

12 new options were considered as part of this study in order to meet anticipated demand within and to / from the study area. The corridor demand has been compared against the mode capacity range outlined in Table 5.3. The corridor uplift demand figure used has been obtained from Table 4.4. For each direction the demand has been obtained from the screenline that has the highest level of demand when a 50% car mode shift has been applied. For eastbound movements this was screenline 3 with an uplift of approximately 2,000 trips and for westbound movement this was also screenline 3 with an approximate 1,200 trip uplift. This demand is expected to be served by the existing proposal of Dart+ through increased capacity electrified services running from Dublin City Centre to Maynooth and to Hazelhatch (Dart+ West) and Celbridge (Dart+ South West). The Dart+ West will increase capacity from 7 to 15 trains per hour per direction and 4,500 passengers to 13,750. Similarly, the Dart+ South West will increase train capacity from the current 12 trains per hour per direction to 23 trains per hour per direction and from 1,000 passengers per hour to 20,000.

Table 5.4 presents the public transport options (3-7) alongside the initial assessment result.

Table 5.4: Public transport options Initial assessment

AM Demand PT Uplift 7-10am		Option		Min Capacity	Max Capacity (per hour)	Initial Assessment	Reason
EB	WB						
2,000	1,200	3-7	Conventional Bus	0	2,400	Progress	Sufficient capacity

As a result of the initial assessment presented in Table 5.4 and the capacity improvements already proposed under DART+ improvements, the bus options being taken forward to the MCA stage are as follows:

- Options 3, 4, 5, 6 and 7

5.2.3 Rail

Three rail related options are also proposed to alleviate capacity from the M4, to provide better connections with interchange services and to increase future capacity to cope with forecast demand. All rail options are assessed under the MCA.

Option 8 – Construction of a new station to the west of Leixlip Louisa Bridge, effectively replacing the existing station of Louisa bridge which would be closed. Alongside this new station the provision of a strategic rail-based Park+Ride facility, similar to the existing M3 facility, at Collinstown. This would act to capture those car based journeys travelling through North Kildare on the M4 and other strategic roads which are already at capacity.

Option 9 – In order to provide for the DART+ extension and new stabling/depot facility west of Maynooth proposal, a new Park + Ride facility is proposed to the west of Kilcock to both integrate Kilcock into the Greater Dublin public transport System and alleviate capacity issues on the M4 before it reaches the central part of the study area.

Option 10 – Upgrading to a multimodal interchange and or relocation of Leixlip Confey station to enable a more enhanced role on the public transport network to take the demand expected in the Confey area. This options also relates to Option 3 which proposes extension to bus services north to Clonsilla and Blanchardstown and Option 9 which could see Leixlip Louisa Bridge station close to accommodate a new Park + Ride facility.

Option 11 – Lucan Luas, including an interchange located in the vicinity of the Liffey Valley shopping centre which would present an opportunity for greater connectivity between the North Kildare Study Area, Liffey Valley and west of the city centre which is currently inaccessible via the Maynooth line. This would require alterations to some express bus services which service the study area to route them via the proposed interchange. Given the DART+ proposals, it is not considered that an interchange linking Maynooth and Leixlip would offer an attractive alternative journey to the city centre.

5.2.4 Behavioural Change

Option 12- Walking and cycling provide healthy alternatives to journeys by private car while also offering clear financial and environmental benefits. For residents of the study area, walking and cycling may also form part of longer journeys incorporating public transport. This option aims to:

- Minimise the carbon footprint of people traveling to and from the study area;
- Minimise the proportion of trips made to and from the site by car and thereby reduce the impact on the local highway network; and
- Maximise the mode share of journeys made by walking, cycling and public transport.

Information on walking and cycling, including local routes with distances displayed in terms of the time required to reach each destination, should be featured prominently throughout the study area.

Cycle training for children and adults should be offered and visits from bike maintenance businesses to transport hubs and employment areas encouraged.

Public transport information including route maps, information on fares and season tickets and basic information about the locations of bus stops and how to use the bus should be advertised and made available on Council websites and marketed more broadly. The implementation of 'Taster Tickets' to residents to allow them to utilise and explore public transport throughout North Kildare should also be investigated.

It is recommended that this option be taken forward for further consideration as part of the GDA strategy work but is not considered as part of the MCA within this report. These softer style measures are key to unlocking mode shift and nudging people away from their private vehicles.

6. Options Assessment

6.1 Methodology

The approach to the assessment of options is guided by the 'Guidelines on a Common Appraisal Framework (CAF) for Transport Project and Programmes' (Department for Transport, Tourism and Sport). This requires all schemes to be appraised under the general themes of:

- Economy;
- Environment;
- Safety;
- Integration; and
- Accessibility / Social Inclusion.

Given the early nature of this study, a largely qualitative Multi Criteria Analysis (MCA) was considered an appropriate tool to guide the assessment of options. Building on the key themes of the CAF, a set of criteria which sit within these overarching themes have been developed to enable a more detailed assessment of options to be undertaken. These criteria have been based on the GDA Transport Strategy objectives provided by the NTA as outlined in Table 6.1.

Table 6.1:Assessment criteria

Theme	Criteria	Description
Environment	Decarbonisation	Supporting the decarbonisation of transport by encouraging mode shift away from private car.
	Environmental Impact	Provides positive impact on the local built and natural environment e.g. landscape, air quality etc.
Economy	Sustainable growth	Support sustainable development and facilitate growth to 2040 by providing capacity aligned with demand.
	Journey Times	Improves time it takes to undertake similar end to end journey.
	Value for Money	Potentially provides good value for money.
	Resilience	Provide resilience for the future (beyond 2040).
Integration	Integration	Provides integration with the existing and future proposed transport network.
Accessibility and Inclusion	Accessibility and Inclusion	Improves accessibility to public transport services and enhances inclusion, catering for the needs of all members of society.
Safety	Road Safety	Improves road safety.
Health	Physical Activity	Increases physical activity.

The options identified have been assessed relative to each other against the aforementioned criteria using the rating scale outlined in Table 6.2.

Table 6.2: Rating scale

Colour	Definition
	The option has significant advantages over other options
	The option has some advantages over other options
	The option is comparable to others
	The option has some disadvantages over other options
	The option has significant disadvantages over other options

6.2 Initial Review

To assist with the qualitative scoring the specific advantages and disadvantages of the options considered in the MCA are set out in Table 6.3. As a means of reference and to compare how the proposed options aim to solve specific issues, the following information is repeated from Chapter 3:

- The GDA Transport Strategy proposes to enhance orbital movement, outside of the M50 Ring Road, between the N3, the N4 and N7 national roads, by the widening of existing roads and the development of new road links.
- DART+ will provide a sustainable, electrified, reliable and frequent rail service by significantly increasing capacity on all rail corridors serving the GDA. In the North Kildare study area, DART+ will provide electrified services from Dublin City Centre to:
  - Maynooth via the Maynooth Line (DART+ West) – An increase in capacity from 7 trains per hour (per direction) to 15 trains per hour, subject to demand, will increase capacity from 4,500 to 13,750 passengers. Due to be delivered by 2027, this project will enhance connectivity from Dublin City Centre to both Leixlip and Maynooth.
  - Hazelhatch and Celbridge via the Kildare Line (DART+ South West). An increase in capacity from 12 trains per hour (per direction) to 23 trains per hour, subject to demand, will increase capacity from 5,000 to 20,000 passengers.
- TII state that the M4 through North Kildare is subject to severe congestion, particularly during peak travel times as a result of commuter traffic. TII highlights safety concerns and that the existing infrastructure is not fit for purpose due to the large volumes of commuter and freight traffic and junction constraints. Prior to the COVID 19 pandemic in 2019, the reported AADT for the section of the M4 between Maynooth and Leixlip was 59,350, further reinforcing that this route was operating at, or very close to designed capacity.
- The proposed BusConnects network in North Kildare will resolve the majority of access issues for residents of North Kildare wishing to access key trips attractors both within and outside the study area (particularly Dublin City Centre). Some key employment sites within the study area are not directly accessible from some or all of the three main urban areas (Celbridge, Leixlip and Maynooth) without the need to interchange. However, it should be noted that, given the short distances involved, investment in improving and expanding the local active travel network has significant potential to provide an attractive alternative for these shorter trips:
  - Between the North Kildare study area and Blanchardstown, which is a major focus for employment outside of the study area;
  - Connecting Maynooth and Liffey Business Park (formerly Hewlett Packard);
  - Connecting Celbridge and Collinstown Industrial Park (Intel);

- Serving Maynooth Business Campus. – The nearest bus stop is 800 metres north of the site on Straffan Road (R406) which limit modal shift potential to access the expanding employment site; and
- Service to Backweston Laboratory Campus - The nearest bus stop is 800 metres north of the site on Dublin Road (R403) which limit modal shift potential to access this site.

Table 6.3: MCA Assessed Options Comments

Option	Comments
Existing Proposed	
Highway	Constructing a new road link between the M3 and M4 would ultimately increase capacity and journey times orbitally across the study area to the north. However, this also would serve to make car travel more attractive and increase non sustainable mode journeys in the area, as well as impacting negatively on the local environment and having significant cost implications. There is the opportunity to consider a public transport only link, this should be investigated before a new highway link is implemented.
Rail	The capacity increase through service frequency improvements and electrification of the DART+ on both the Maynooth and Kildare lines is able to serve the forecast 2042 demand from/to the North Kildare study area. Electrification will also improve air quality and noise pollution in the region.
New Proposed	
Option 3 Extension of Route L58 and L59 to Clonsilla Station	Confey area is forecast to be developed as an urban extension, to the north of the Royal Canal. Extending the L58/L59 through this new development would provide direct bus connections to Clonsilla (with onward connections to Blanchardstown etc.) Leixlip Town Centre, Celbridge (Donaghcumper) and on to Hazelhatch Station. Confey station currently has insufficient room in the forecourt (or in the vicinity) to support bus interchange and turnaround. Extending the bus onwards to Clonsilla resolves this issue.
Option 4 North Kildare to Blanchardstown - Rail:Bus Interchange	Inter-related with the above - enhancing bus access from Clonsilla Station (and improvements to interchange facilities) will mean residents of North Kildare can catch a train at Maynooth, Leixlip Louisa Bridge or Leixlip Confey and interchange to a bus at Clonsilla to get to employment destinations north of Blanchardstown with only one change.
Option 5 Extend C3 bus service to Maynooth Business Campus	This brings the bus service directly into this major employment site. There is also the opportunity to consider a bus-based Park+Ride facility for Maynooth Town Centre (or Dublin) if a car park was provided at this convenient location with good motorway links.
Option 6 Extend C2 bus service to Maynooth University	This bus service extension provides resilience in the system by providing a direct bus service to Dublin operating from Maynooth University, and also provides an enhanced link between Celbridge and Maynooth (this route is expected to experience a demand/supply issue in future years). This could also eventually lead to a bus station at the University once the demand arises.
Option 7 Re-route W6 bus service through Maynooth	Re-routing the W6 bus service to serve west Maynooth provides a large part of the residential west of the town with much better access to a regular bus service. It also reduces duplication on the above, which may help spread demand better (i.e. a 'fast' and a 'slow' service)

Option 8 Collinstown Strategic Rail Based Park & Ride	This would involve the construction of a new station to the west of Leixlip Louisa Bridge. NTA identified that this would force closure of Louisa Bridge if pursued. Benefit of providing a large (M3 style) Park+Ride facility is that it already has excellent motorway and rail access, but the downside of this is that it would be likely to be well used by local residents, which would take up previous capacity which was intended for strategic trips (i.e. getting longer distance journeys off the motorway). This could be supported by the DART + proposals which would provide a more attractive and reliable service with increased capacity.
Option 9 West of Maynooth Strategic Rail Based Park & Ride	As part of the DART+ extension, an electric train stabling/depot facility is proposed west of Maynooth. This will need good access from the motorway, for deliveries/staff access etc. The existing Maynooth motorway access is sub-standard, and unless a ring road was built around Maynooth, would require trips to pass through Maynooth town centre to access a new facility to the west of the town. However, if a new combined stabling/M3-style Park+Ride facility was provided to the west of Kilcock, this could deliver multiple benefits, including integrating Kilcock into the greater Dublin public transport system, capturing strategic demand off the M4 before it entered North Kildare proper without being attractive to NK residents and taking full advantage of the purpose built motorway junction at Kilcock. The downside of this proposal is that the rail line would need to be electrified, and possibly double tracked up to this point, which would have significant cost implications. Business case analysis is needed to clarify whether it would be more cost effective to invest in rail infrastructure extension or new highway capacity. This could be supported by the DART+ proposals, requiring additional expansion as part of the option, which would provide a more attractive and reliable service with increased capacity.
Option 10 Leixlip Confey – Station relocation and upgrade to Interchange	See 'Option 3'. Upgrading Leixlip Confey to an interchange (with a large car park, bus turning circle, taxi and enhanced cycle facilities etc.) would enable the station to take on an enhanced role for the town. This would become particularly valuable once the Confey area is built out, and also if Louisa Bridge was closed to accommodate a new P&R at Collinstown. The western location could allow for links to urban greenway proposals and attract more varied multi modal trips as a result. The eastern location could impact more on existing green space and public footpaths. This would be supported by the Dart + proposals which would provide a more attractive and reliable service with increased capacity.
Option 11 Luas to Lucan extension with interchange in the vicinity of Liffey Valley shopping centre	Advancement of the Luas line to Lucan with an interchange located in the vicinity of the Liffey Valley shopping centre which would present an opportunity for greater connectivity between the North Kildare Study Area, Liffey Valley and west of the city centre which is currently inaccessible via the Maynooth line. This would require alterations to some express bus services which service the study area to route them via the proposed interchange. Given the DART+ proposals, it is not considered that an interchange linking Maynooth and Leixlip would offer an attractive alternative journey to the city centre.

6.3 Results

6.3.1 Radial corridor

Criteria	Description	Existing Rail Proposal (DART +)	Option 8 Collinstown Strategic Rail Based Park & Ride (Dart+ included)	Option 9 West of Maynooth Strategic Rail Based Park & Ride (Dart+ with further expansion)	Option 10 Leixlip Confey – Station relocation and upgrade to Interchange (Dart+ included)	Option 11 Luas to Lucan extension with interchange in the vicinity of Liffey Valley shopping centre
Environment						
Decarbonisation	Supporting the decarbonisation of transport by encouraging mode shift away from private car.					
Environmental Impact	Provides positive impact on the local built and natural environment e.g. landscape, air quality etc.					
Economy						
Sustainable Growth	Support sustainable development and facilitate growth to 2040 by providing capacity aligned with demand.					
Journey Times	Improves time it takes to undertake similar end to end journey.					
Value for Money	Potentially provides good value for money.					
Resilience	Provide resilience for the future (beyond 2040).					
Integration						
Integration	Provide integration with the existing and future proposed transport network.					
Accessibility						
Accessibility and Inclusion	Improves accessibility to public transport services and enhances inclusion, catering					

	for the needs of all members of society.					
Safety						
Road Safety	Improves road safety.					
Health						
Physical Activity	Increases physical activity.					

6.3.2 Internal corridors

Criteria	Description	Existing Highway Proposal	Option 3 Extension of Route L58 and L59 to Clonsilla Station	Option 4 Blanchardstown - Rail:Bus (Single Interchange)	Option 5 Extend C3 bus to Maynooth Business Campus	Option 6 Extend C2 bus to Maynooth University	Option 7 Re-route W6 bus through Maynooth
Environment							
Decarbonisation	Supporting the decarbonisation of transport by encouraging mode shift away from private car.						
Environmental Impact	Provides positive impact on the local built and natural environment e.g. landscape, air quality etc.						
Economy							
Sustainable Growth	Support sustainable development and facilitate growth to 2040 by providing capacity aligned with demand.						
Journey Times	Improves time it takes to undertake similar end to end journey.						
Value for Money	Potentially provides good value for money.						
Resilience	Provide resilience for the future (beyond 2040).						

Integration							
Integration	Provide integration with the existing and future proposed transport network.						
Accessibility							
Accessibility and Inclusion	Improves accessibility to public transport services and enhances inclusion, catering for the needs of all members of society.						
Safety							
Road Safety	Improves road safety.						
Health							
Physical Activity	Increases physical activity.						

6.3.3 Summary

For radial movements (to / from the city centre), the Dart+ rail proposal scores highly in the Environmental Impact, Journey Time, Value for Money and Integration assessment criteria. Due to the capacity increase and electrification as part of the of Dart+ proposals it is considered that the option will support sustainable growth and modal shift whilst increasing journey time reliability.

The Park & Ride proposals in combination with the DART+ proposals (Options 8, 9 and 10) are generally considered to offer greater benefits than the DART+ as a standalone option due to the greater capacity to support sustainable growth and modal shift. The Park & Ride options fared worse on Environmental Impact due to potential construction affects and increase in local vehicle trips. Notably, the West of Maynooth Park and Ride (Option 9) scored highest in Decarbonisation due to its potential to remove car trips earlier in their journeys than Option 8 and 10 however, the option scored lowest in Value for Money and Integration due to the requirement for the DART+ proposals to be expanded to Kilcock (dependent on the site location).

Of the Park & Ride station proposals, Option 10 (Leixlip Confey) scores highly due to the proposal for the station to operate as an interchange and therefore, whilst it is likely to have the lowest demand, it has greatest potential to improve modal shift.

For Options 8-10, it should be recognised that the construction of new Park & Ride sites may encourage car trips to the area and reduce capacity on local roads (specifically Option 8 in Collinstown) during the peak hours, the benefit is the overall drop in longer private vehicle journeys on the already congested strategic road network.

The Luas Lucan and Liffey Valley Interchange (Option 11) scores lowest out of the options as it is likely to be the least attractive of the options to the city centre and as such, will intercept least demand resulting in a lower modal shift. Therefore, compared to other options, Option 11 is likely to offer the lowest value for Money. It is of note that this is relative to the options presented and in the context of trips from North Kildare only and therefore demand along the Luas line has not been considered.

For orbital options, most bus options show varying benefits across the criteria, particularly Option 4 (Blanchardstown rail interchange). The worst perform options are the existing highway proposals with significant disadvantages across Decarbonisation, Environmental Impact, Road Safety and Physical Activity, comparative to the other orbital options.

The Bus proposals (Option 3-7) scored similarly, with Option 4 providing an orbital link to North Blanchardstown scoring slightly higher in Sustainable Growth, and Resilience due to the links into infrastructure suggestions in the North Blanchardstown area report.

The other bus options have broadly similar scores across the categories with an exception to Options 6 and 7 which were assessed to provide higher Value for Money; both these options are deemed to be key to serving some of the key internal demand movements within the Study Area. Option 5 has been identified as the providing the least journey time benefits of the orbital options due to the minor length of improvements proposed. The impact of bus options on both the environment and the carbon emissions could be mitigated through an electrification of the bus fleet, which would improve the scores in these areas.

7. Summary

This report has outlined the approach and results from the study of the North Kildare area, as defined by the NTA for the purposes of providing input into the preparation of the revised Transport Strategy for the Greater Dublin Area. The study area is heavily reliant on the existing road network which is forecast to operate at or over capacity at certain junctions with an overall moderate level of congestion in 2042.

This, alongside the study area's proximity to key trip attractors in Dublin City Centre and employment within and to the north and south of the Study Area provide an opportunity to shift car trips to public transport and active modes through the provision of high-quality infrastructure and services. The demand analysis considered radial spine and internal movements, the future forecast demand was used to both assess existing proposals and advocate other new transport proposals.

7.1 Public Transport Options

Given the early nature of this study, a qualitative Multi Criteria Analysis (MCA) was considered an appropriate tool to guide the assessment of public transport options. Building on the key themes of the CAF, a set of criteria which sit within these overarching themes has been developed to enable a more detailed assessment of options to be undertaken. These criteria have been based on the current Transport Strategy for the Greater Dublin Area objectives provided by the NTA.

7.1.1 Radial Corridor/Internal Connectivity

Following the development of a list of public transport options for the radial corridor and internal demand, a high level assessment was undertaken using forecast trips from the Eastern Regional Model (ERM). The radial corridor demand calculated in Section 4 was used to inform the identification of appropriate options to serve this specific corridor. Different public transport modes have theoretical capacity ranges, and so demand level viabilities, which were used as the basis by which to develop options to assess.

In the case of North Kildare, heavy rail already exists and is proposed to be improved; it forms the primary travel mode to serve demand through the radial corridor. The internal demand was judged to be able to rely on proposals involving bus services, transport interchanges and Park & Ride.

The existing proposal for capacity increase and electrification of Dart+ scored highly in the MCA for radial movements in terms of decarbonisation and encouraging sustainable growth through modal shift whilst Park & Ride proposals in combination with the DART+ proposals (Options 8, 9 and 10) are generally considered to offer greater benefits due to the greater capacity to support sustainable growth and modal shift. Of the Park & Ride station proposals, Option 10 (Leixlip Confey) scores highly due to the proposal for the station to operate as an interchange and therefore, whilst it is likely to have the lowest demand, it has greatest potential to improve modal shift.

For orbital options, most bus options show varying benefits across the MCA criteria whilst the existing highway proposals displayed significant disadvantages across Decarbonisation, Environmental Impact, Road Safety and Physical Activity, comparative to the other orbital options.

7.2 Supplementary Options

Alongside the public transport provision outlined above, it is recommended that consideration be given to further supplementary options. These options should complement existing and proposed public transport services as well as improve accessibility and interchange for active travel users.

7.2.1 Cycle Interventions

Based on an assessment of connectivity 'gaps' in the proposed GDA cycle network, this Study suggests two options are investigated as follows:

- Introduce a new segregated cycle link between Maynooth and Salesian College following the R405 road link.
- Introduce a new segregated cycle link between development on the western edge of Adamstown and employment areas in Backweston.

It is recommended that these options be taken forward for further consideration as part of the GDA strategy work but is not considered as part of the MCA within this report.

7.2.2 Behaviour Change Measures

This Study recommends efficient marketing of sustainable travel both walk and cycle focused as well as public transport; this would improve knowledge of existing and new infrastructure which is key to achieving mode shift.

It is recommended that these soft measures be taken forward for further consideration as part of the GDA strategy work but they are not considered as part of the MCA within this report. These softer style measures are key to unlocking mode shift and nudging people away from their private vehicles.

A focus away from heavy road infrastructure to satisfy forecast demand is necessary to increase sustainable mode share in the North Kildare area, a move to 'Decide and Provide' rather than 'Predict and Provide' should drive optioneering in the region.

Appendix A. Do Minimum Model Run Transport Scheme

A.1 Road Schemes

The Do Minimum model run contains the following road schemes:

- N3 Castaheany Interchange Upgrade;
- N3-N4 Barnhill to Leixlip Interchange;
- North-South Road – west of Adamstown SDZ linking the N7 to N4 and on to Fingal;
- Glenamuck District Distributor Road;
- Leopardstown Link Road Phase 2;
- Porterstown Distributor Link Road;
- R126 Donabate Relief Road: R132 to Portrane Demesne;
- Oldtown-Mooretown Western Distributor Link Road;
- Swords relief Road at Lord Mayors;
- Poolbeg development roads;
- Cherrywood development roads;
- Widening of the M7 between Junction 9 (Naas Norther) and Junction 11 (M7/M9) to provide an additional lane in each direction; and
- Capacity enhancement and reconfiguration of the M11/N11 from Junction 4 (M50) to Junction 14 (Ashford) inclusive of ancillary and associated road schemes, to provide additional lanes and upgraded junctions, plus service roads and linkages to cater for local traffic movements.

A.2 Bus schemes

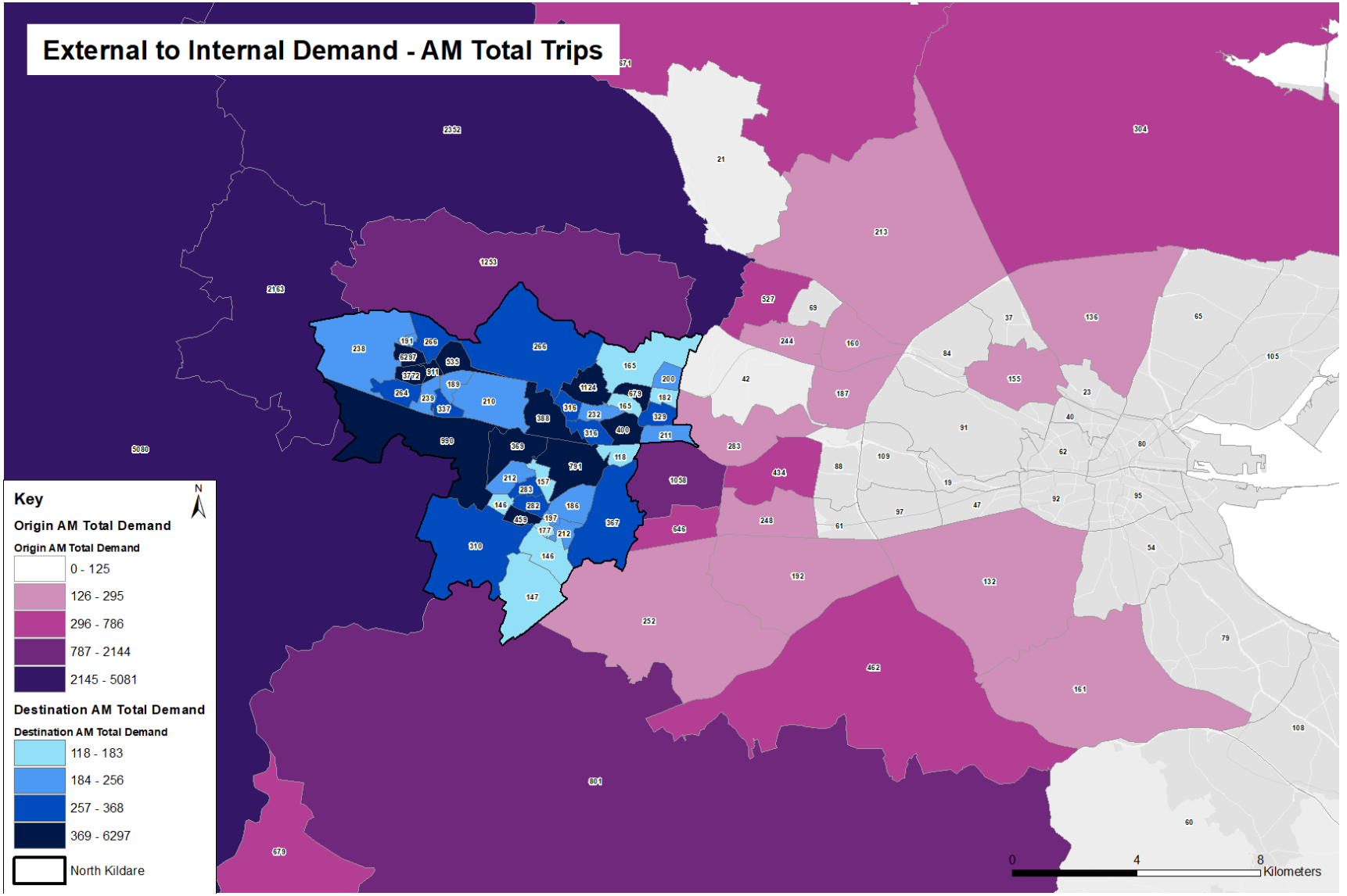
The Do Minimum model runs contains the bus services and frequencies related to the New Dublin Area Bus Network. The model does not include any of the of the associated BusConnects bus priority infrastructure proposals which would improve journey times.

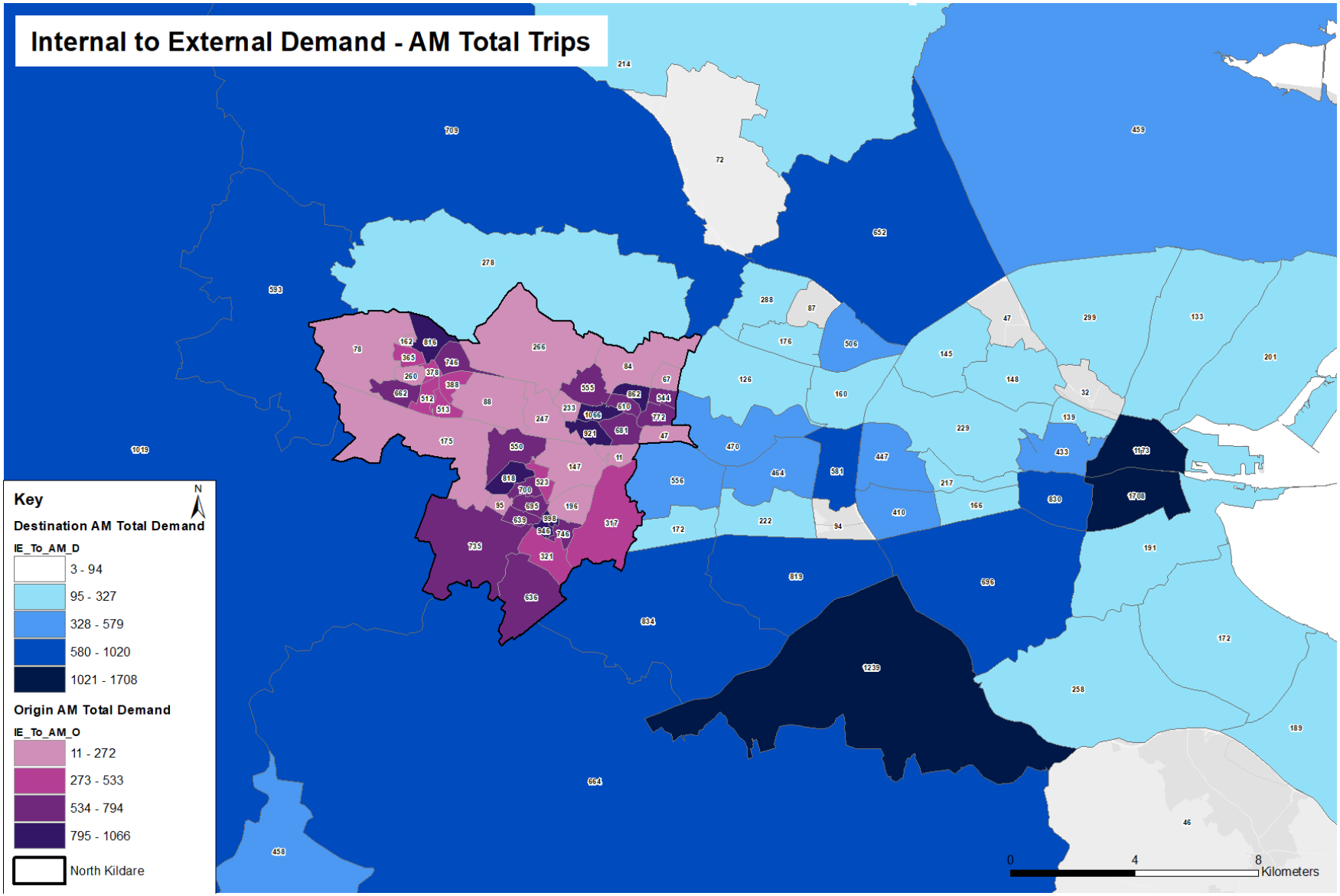
A.3 Rail schemes

The Do Minimum model runs contains the following rail schemes:

- Revised Irish Rail timetable;
- Interim DART Expansion Programme (non-tunnel elements) including additional stations at Kishogue and Pelletstown; and
- Luas Cross City incorporating LUAS Green Line Capacity Enhancement - Phase 1.

Appendix B. Internal and External Trip Diagrams

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95 - 327
328 - 579
580 - 1020
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North Kildare
N
0
4
8
Kilometers