Kilkenny Local Transport Plan

Option Development Report

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Kilkenny County Council

Kilkenny Local Transport Plan

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1. Introduction

1.1 Overview

Kilkenny County Council (KCC) has commissioned Jacobs Engineering Ireland Ltd. (Jacobs) to develop a Local Transport Plan for the City of Kilkenny and its Environs. Kilkenny City is a designated 'Key Town' in the recently adopted *Regional Spatial and Economic Strategy* (RSES) *for the Southern Region* and the second largest settlement in the South-East Region.

Kilkenny City's development in the period up to 2040 is based upon ambitious growth targets, investment in sustainable transport, and a regeneration agenda predicated on the redevelopment of accessible town centre sites and the '10-minute city' concept. The Kilkenny Local Transport Plan (KLTP) must therefore articulate these ambitions in a robust and evidence-based fashion to provide Kilkenny with a framework for prioritising and obtaining sustainable transport investment.

The KLTP is envisaged to be a short to medium term plan to cover the period 2020-2026 and beyond to support the development of a comprehensive, sustainable transport network and to inform the preparation of the forthcoming *Kilkenny City and County Development Plan 2020-2026*.

Jacobs will undertake the KLTP in line with the *Area Based Transport Assessment (ABTA) Guidance Note* produced by Transport Infrastructure Ireland (TII) and the National Transport Authority (NTA). The overarching aim of the ABTA process is to place the integration of land use and transport planning at the centre of the Plan preparation process. The methodology for the development of the ABTA is outlined as follows:

- Baseline Assessment;
- Establish Context for ABTA;
- Options Assessment;
- Refinement and Sense-Check the Proposals; and
- Finalisation of the Plan.

1.2 Purpose of this Report

The Option Development Report builds on the KLTP Context Report which made recommendations in relation to the preferred Movement Strategy, the 10-Minute City approach as well as identified mode share targets.

These recommendations from the Context Report will form the starting point for the development of options for each transport mode, and the sifting and assessment process. The Report sets out the option development process by proposing and evaluating a range of transport proposals for all modes that are most in line with the transport objectives for the Study Area.

1.3 Report Structure

The Report is structured as follows:

- **Section 2:** outlines the **Assessment Methodology** applied to developing the Transport Network Options for all modes;
- **Section 3:** summarises the **Context** for the KLTP;
- **Section 4:** sets out the development of the **KLTP Public Transport Network**;
- **Section 5:** describes the development of the **KLTP Cycling Network**;
- **Section 6:** set out the development of the **KLTP Walking Network**;
- **Section 7:** outlines the options considered for the **KLTP Road Network**;

- **Section 8:** introduces **Demand Management Measures**;
- **Section 9:** sets out the recent National policy in relation to parking and a number of proposed **Parking Management Measures**;
- **Section 10:** describes a set of **Supporting Measures**; and
- **Section 11: Concludes** the Option Development Report.

2. Option Development and Assessment Methodology

2.1 Overall Approach

Figure 2-1 presents an overview of the robust tiered assessment approach that will be taken to produce preferred transport options for Kilkenny City and Environs for the Walking Network, Cycling Network, Public Transport Network, Road and Street Network and Demand Management Measures.

Tier 1 of the Option Development process was undertaken during the KLTP Context Stage. During this Stage, the 10-Minute City Context and Movement Strategy was established, as well as the 2040 mode share targets. Further detail can be found in the KLTP Context Report, and is summarised in Section. 3 of this Report.

This Report outlines Tier 2 of the overall approach, which examines the high-level demand for all transport modes, proposes a suite of options and uses a series of analyses to sift through options to produce an Initial Preferred Option using the South East Regional Model (SERM) and Multi-Criteria Analysis (MCA). This process will enable the identification of Emerging Preferred Options.

Following on from this, Tier 3 will provide a detailed assessment of the Emerging Preferred Option, including the use of the SERM and SATURN models. This process further refined the Emerging Preferred Option during the Refinement and Optimisation Stage. The KLTP is subject to a Strategic Environmental Assessment (SEA) in line with the SEA Directive (2001/42/EU) to contribute to the integration of environmental considerations into the preparation and adoption of the Plan as concluded by the SEA Screening process. The SEA is being undertaken in parallel with the development of the KLTP and will influence the option development process.

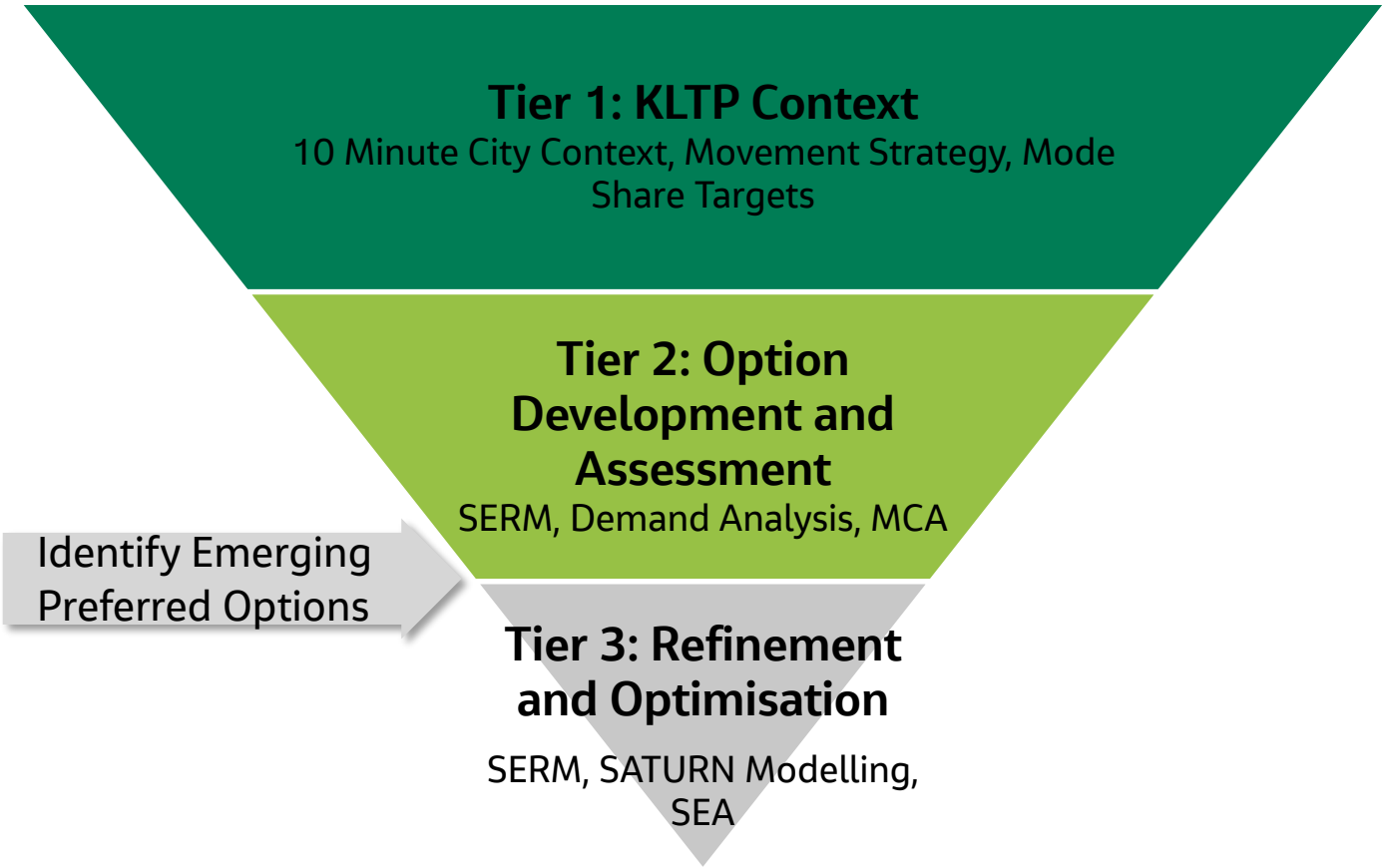


Figure 2-1 KLTP Option Development Methodology.

2.2 Development and Assessment of Transport Networks

2.2.1 Objectives-Led Approach

An objectives-led approach has been adopted for the development of the KLTP, in line with the Department of Transport, Tourism and Sport's (DTTaS) *Guidelines on a Common Appraisal Framework for Transport Projects and Programmes* (CAF).

In order to inform the development of all modes for the KLTP, the following are over-arching objectives:

1) Support the future growth of Kilkenny City and Environs through the provision of an integrated, safe, reliable and sustainable transport network;
2) Close integration of land use and transport planning;
3) Support the realisation of the 10-minute city;
4) Improved safety, accessibility and permeability throughout the Study Area for pedestrians, cyclists and public transport users;
5) Actively discourage vehicular through-traffic;
6) Reduce dependency on the private car;
7) Increase public transport capacity and provision to maximise catchment;
8) Enhance the public realm through traffic management and transport interventions; and
9) Limit the impact of Kilkenny's transport network on the environment.

2.2.2 Land Use and Demand Assumptions

The Network Options Development and Assessment has been undertaken in the absence of 2040 future land use scenarios and planning data sheets. Instead, it is based on the 2012 demand and land use with 2040 mode share targets that were set in the Context Stage applied. However, development planned for the Western Environs and Loughmacask has been accounted for within the Network Development process.

This approach is considered appropriate at this stage of the process as the target changes to walking, cycling and public transport are far in excess of the proposed population growth numbers. Therefore, to achieve the target mode shares will require significant proposals, regardless of growth forecasts. Upon receipt of the 2040 future land use scenarios the proposed networks and proposals will be optimised and refined in line with Stage 4 of the ABTA process.

2.2.3 Pedestrian Network

The KLTP Walking Network will build on the existing network, taking desire lines based on 2012 demand with the 2040 mode share target of 35% applied. Any relevant proposals from the *Kilkenny City and Environs Development Plan 2014-2020* will also be taken into consideration. The Walking Network will be reviewed to ensure integration and alignment with the proposals for the Cycle, Public Transport and Road Networks proposed by the Plan.

2.2.4 Cycle Network

The KLTP Cycle Network will focus on improving and expanding upon the existing cycle network to create a comprehensive network that serves high-demand areas such as key residential, retail, employment and education areas. This assessment will be based on the 2012 demand factored to align with the 2040 mode share

target of 10%. The Cycle Network will be aligned with the proposals for the Walking, Public Transport and Road Networks proposed by the KLTP.

2.2.5 Public Transport Network

As noted above, the KLTP Public Transport Network options will be developed based on the 2012 demand factored to align with the 2040 mode share target of 15%. The proposed routes, service type, service frequency and level of priority will be developed based on this demand.

2.2.6 Road Network

A review of Kilkenny's Road Network demand will be undertaken to determine the requirement for road network improvements and traffic management within the City Centre. A review of currently proposed road network infrastructure will be undertaken and aligned to policy and demand needs within the Study Area. The road network will also be reviewed with the aim of aligning Road network provision with Public Transport, Walking and Cycling provision.

2.3 Design Manual for Urban Roads and Streets

The *Design Manual for Urban Roads and Streets* (DMURS) promotes a holistic approach to the design of roads and streets within urban areas focused on balancing the needs of all users. It aims to put well designed streets at the heart of sustainable communities to promote access by walking, cycling and public transport, influenced by the type of place in which the street is located. DMURS promotes active and vibrant streets, which can balance their function as both a place and a link.

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

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

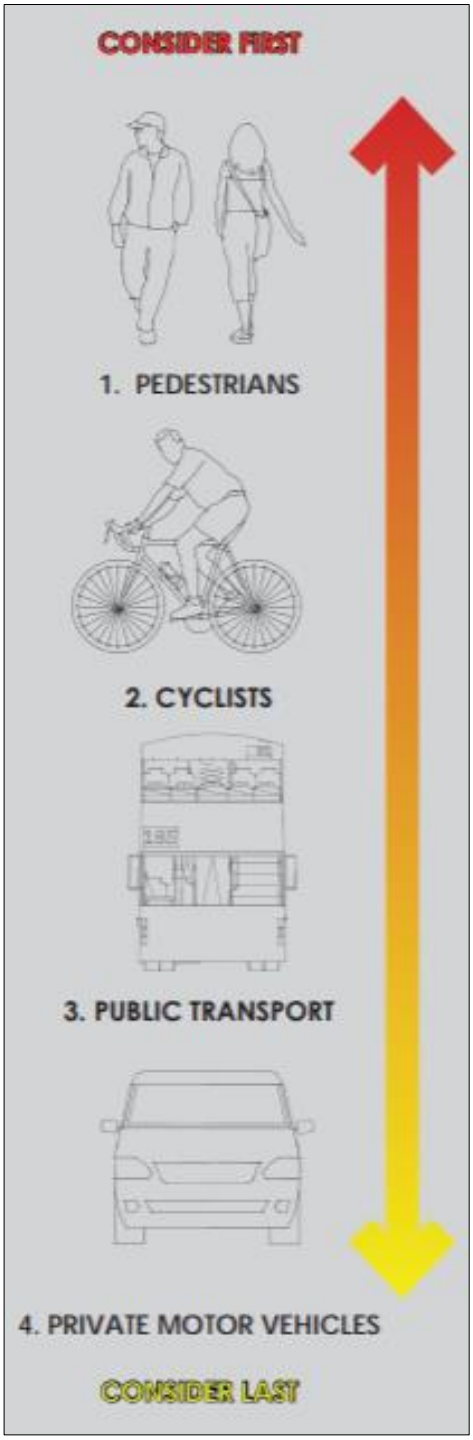


Figure 2-2 User Hierarchy. Source: DMURS, 2019.

The KLTP transport network options will be developed in line with DMURS principles and user hierarchy.

2.4 10-Minute City

The '10-Minute City/Town' concept is about creating connected communities where residents can walk and cycle short distances from their homes to destinations that meet their daily needs. It is about creating neighbourhoods that have a compact and permeable urban form that provide high-quality, safe and attractive links to public transport, shops, services schools and green spaces, reducing the overall need to travel.

It has been a long-standing objective of Kilkenny County Council to develop the 10-Minute City and has most recently been supported by the *Regional Spatial and Economic Strategy* (RSES). Regional Policy Objective (RPO) 176 sets out an objective to "attain sustainable compact settlements with the 10-Minute City/Town concepts, whereby, a range of community facilities and services are accessible in short walking and cycle timeframes from homes or are accessible by high-quality public transport services by connecting people to larger scaled settlements delivering these services".

The main focus of the 10-Minute City Concept will be applied to accessibility to/from Kilkenny City Centre for walking, cycling and public transport access, however, consideration will also be given to accessibility for the suburban neighbourhoods and community facilities.

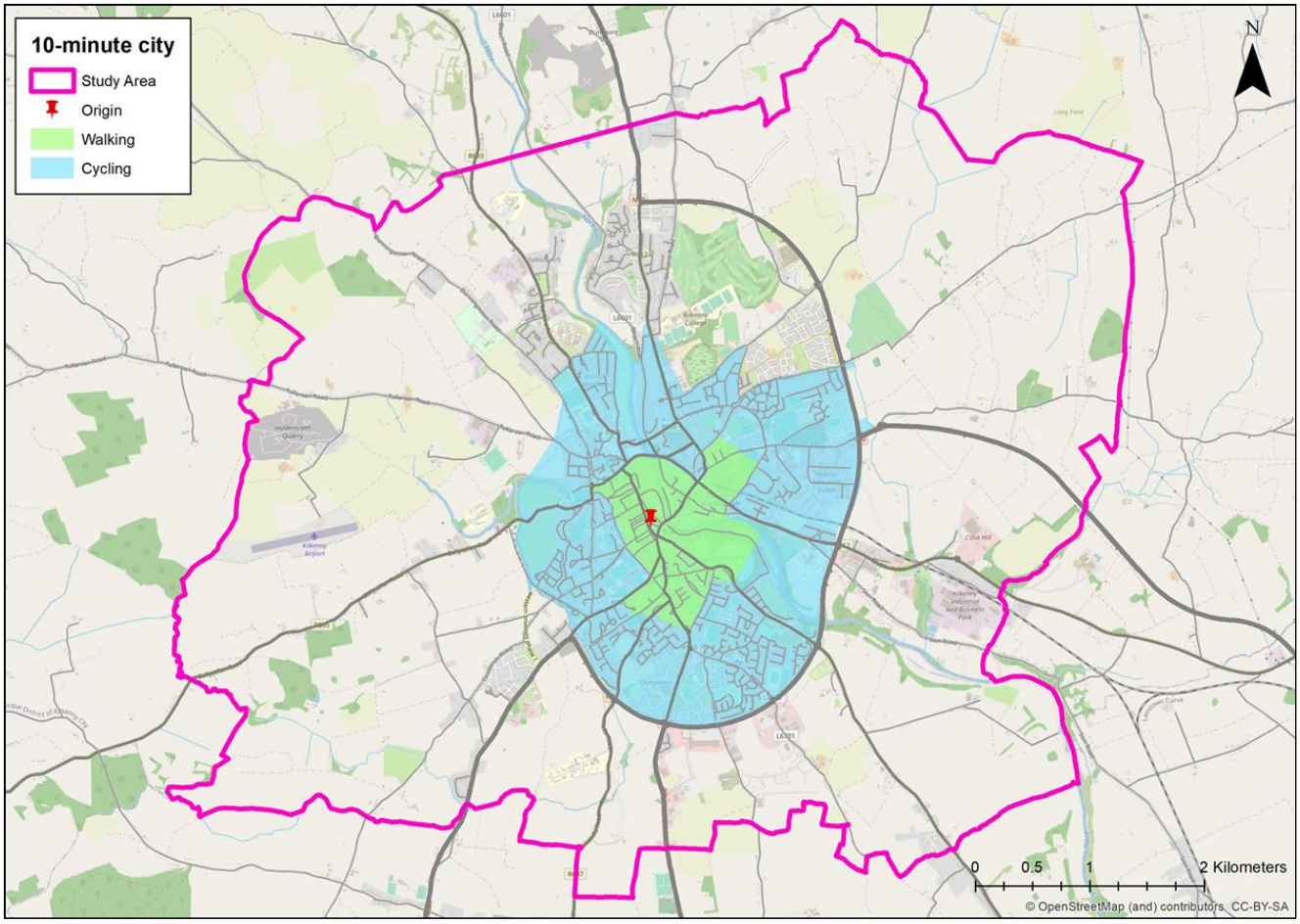


Figure 2-3 10-Minute City Catchment Analysis for Walking and Cycling Modes

3. Context for the KLTP

A Context Report was prepared for the KLTP following the Baseline Assessment. The Context Report set out the context upon which the Option Development Stage and subsequent stages will be based. This section summarises the key conclusions of the Context Report.

3.1 High-Level Movement Strategy

The KLTP movement strategy employs the following over-arching principles:

- Maximise permeability and accessibility throughout the City Centre for pedestrians and cyclists;
- Provide bus priority measures through the City Centre, such as bus lanes, bus gates and Intelligent Transport Systems (ITS); and
- Actively discourage vehicular through-traffic in the urban core, while still allowing access for commercial activities and emergency vehicles.

The movement strategy aims to remove non-essential vehicular through-traffic from the City Centre. This will be achieved by directing vehicle movement around the existing Kilkenny Ring Road and other routes, supported by filtered permeability measures and traffic calming techniques.

Movement for walking and cycling will be prioritised in the core City Centre, with opportunities to improve the public realm. Kilkenny's medieval laneways and slips will maximise permeability through the Centre.

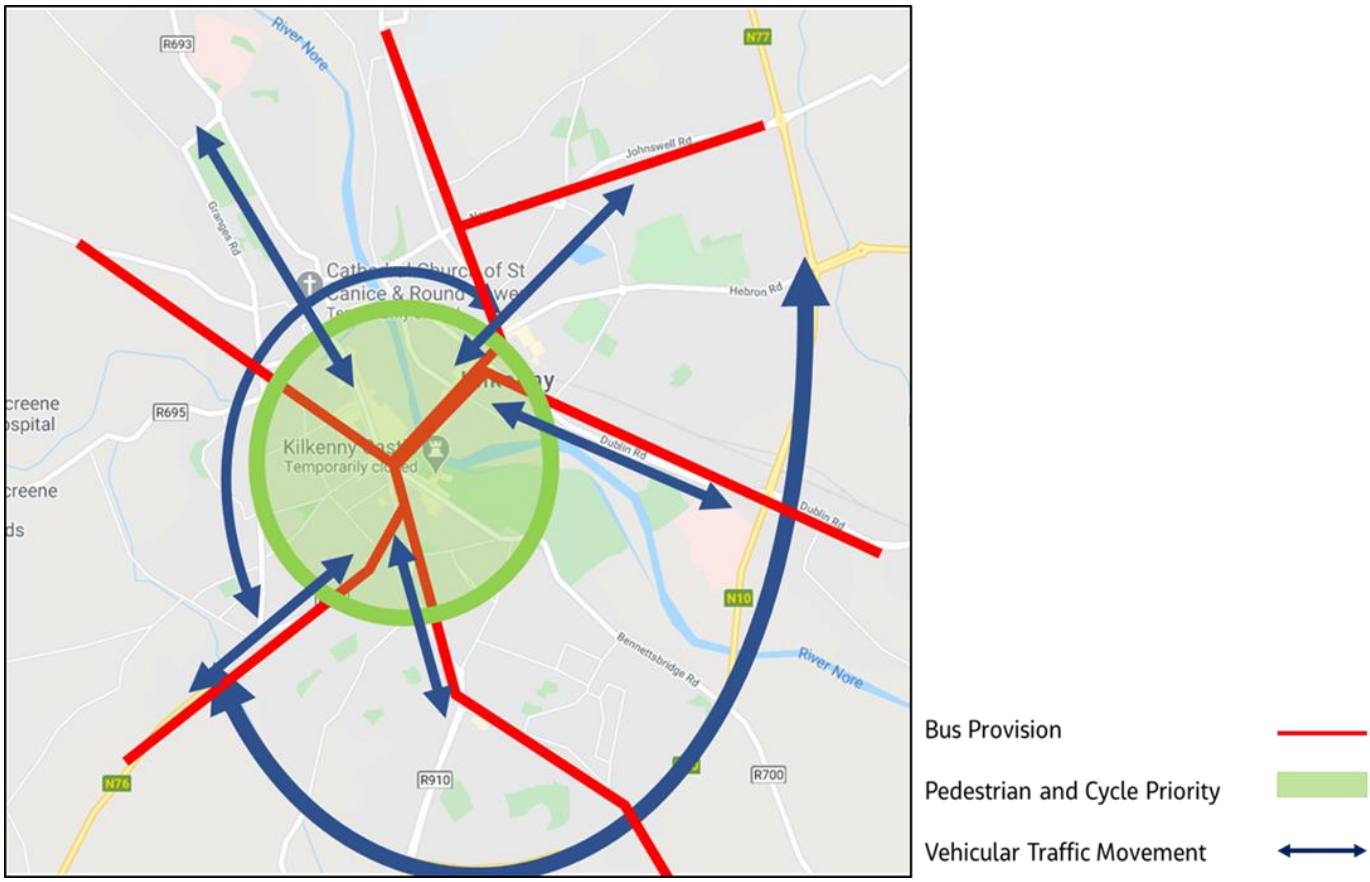


Figure 3-1 High-Level Movement Strategy.

3.2 Mode Share

The mode share targets set for Kilkenny City and Environs are focused on internal trips, i.e. trips that have both an origin and destination within the Study Area. In terms of sustainable modes, a 60% mode share target is set for the Study Area, which is an approximate increase of 23% compared to the 2020 mode share. The development of multi-modal options has been based on these mode share targets and are described in the following chapters.

Table 3-1 KLTP 2040 Mode Share Targets.

Mode Share	Walk	Cycle	Public Transport	Car
2020 Internal Trips	26.57%	3.98%	6.81%	62.64%
2040 Target	35%	10%	15%	40%

4. Public Transport Network Option Development

This chapter outlines the demand analysis, option development and route selection for the public transport network and services within Kilkenny City. Radial public transport targets demand is considered and used to identify the appropriate form of public transport to meet this demand, and then further developed into potential routes and service patterns. The cross city demand is considered and utilised to pair radial public transport routes to create a more efficient and effective network.

4.1 Demand Corridors

To facilitate analysis of travel demand within Kilkenny City and Environs, the area was divided into several corridors based on the national and regional transport networks around a central city centre core. These corridors are primarily used to describe radially-based trips, which represents the most dominant trip pattern within the Study Area. The corridors and the settlements within each corridor are follows:

- Corridor A: Blanchfieldsland, Leggetsrath West, Newpark Upper and Purcellsinch;
- Corridor B: Springhill, Loughboy, Smithsland, Western Environs and Walkinslough;
- Corridor C: Loughmacask and Jamespark;
- Corridor D: Glendine and Newpark Lower.

The corridors have been subdivided into smaller segments based on inner and outer sectors which allow for the greater understanding of movements along the corridor. The city core, sectors, corridors and segments are shown in Figure 3-2. The segments are named based on their corridor letter and sector number (i.e. Segment B1 lies with corridor B and sector 1).

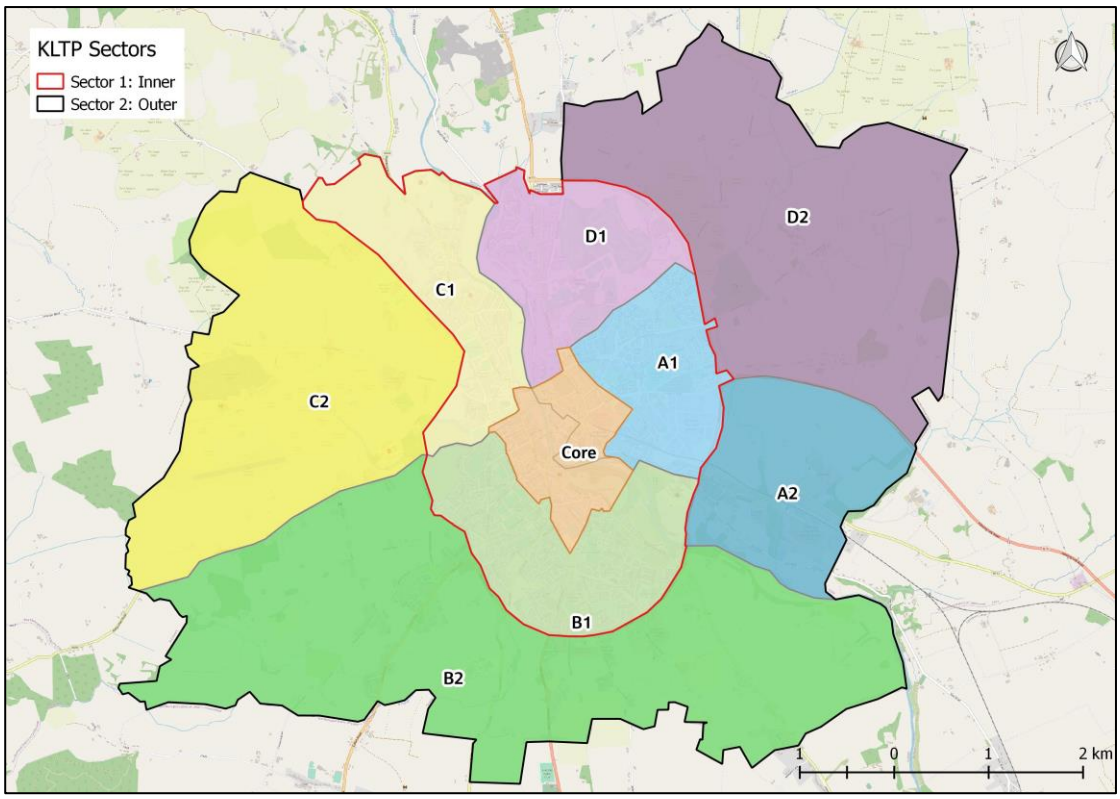


Figure 3-2 KLTP Corridors and Segments

Figure 3-3 shows the AM peak hour public transport demand associated with these corridors. As anticipated with the AM peak demand the inbound demand to the Core has the largest demands. The demand is based on simplified 'spider's web' network. As shown, the highest radial public transport demand is along corridors A and B followed by C and D. It is important to note that the demand shown along one arm of the spider's web may in reality be across more than one route or road link in the corridor.

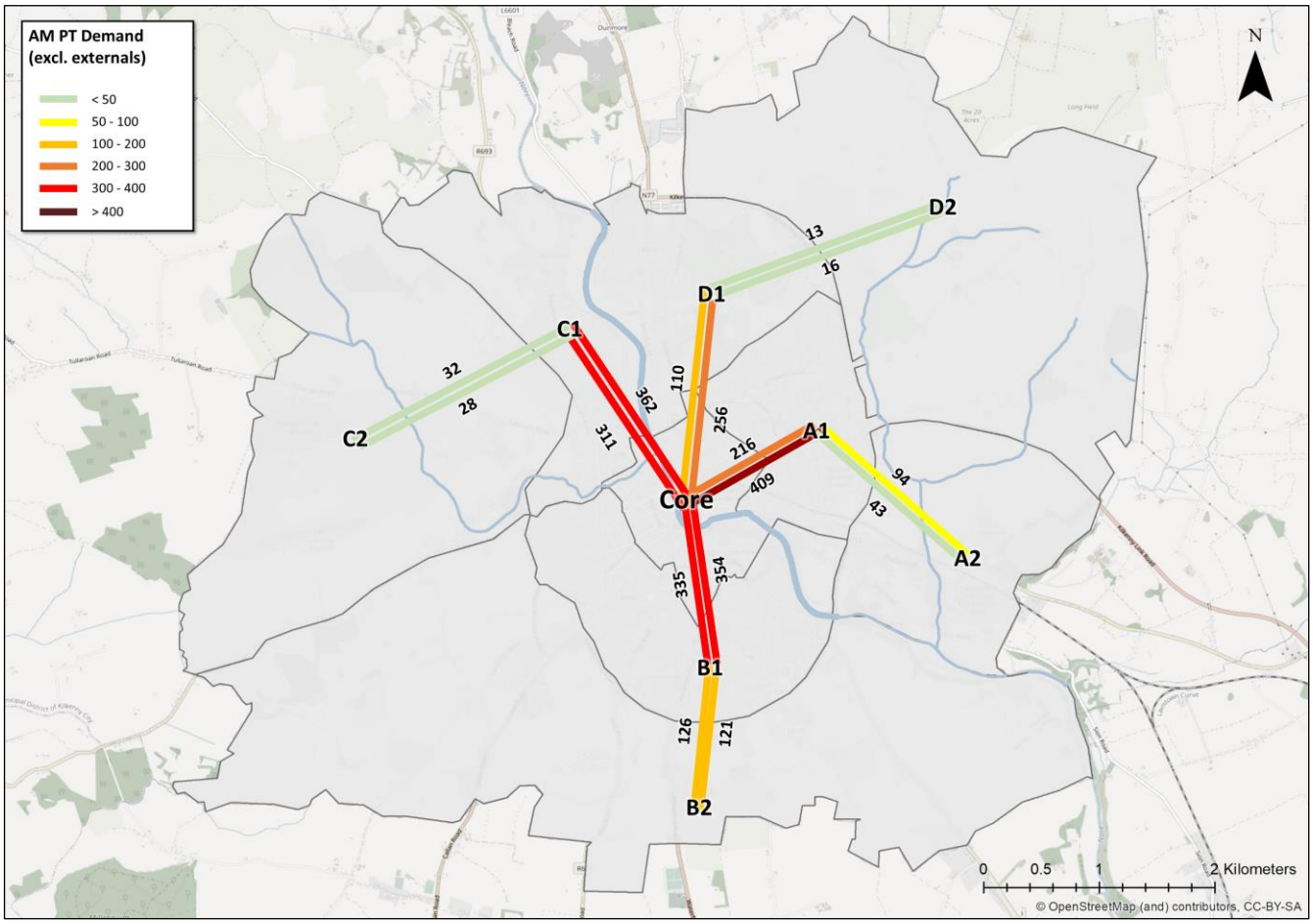


Figure 3-3 AM Peak Public Transport Demand

4.2 Public Transport Assessment of Alternatives

4.2.1 Common Appraisal Framework (CAF) and Assessment of Alternatives

The procedure for the assessment of the options is guided by the 'Common Appraisal Framework (CAF) for Transport Projects and Programmes, March 2016' published by the Department of Transport, Tourism and Sport (DTTAS), which requires schemes to be appraised under the general criteria of **Economy, Safety, Environment, Accessibility & Social Inclusion and Integration**. Alternative provisions for the overarching public transport network have been considered to ensure that the identified proposals meet the requirements of the CAF. It should be noted that a more detailed feasibility assessment and appraisal of the public transport schemes identified within the preferred option will be required at a later stage in the planning process.

The alternatives considered to meet the public transport demand within each corridor include the following:

- **Option 1:** Bus Services;
- **Option 2:** Bus Rapid Transit;

- **Option 3:** Light Rail Transit; and
- **Option 4:** Suburban Rail.

The options identified have been assessed relative to each other under the above five criteria using the following rating system outlined in Table 3-2. The assessment covers the overarching public transport network including the four corridors identified in Section 4.1.

Table 3-2 Assessment Rating Table

Colour	Relative Performance
	Very Good
	Good
	Neutral
	Poor
	Very Poor

Figure 3-4 illustrates the range of public transport capacities, in passengers per hour per direction, that can be achieved by difference public transport models of Bus, Bus Rapid Transit (BRT), Light Rail Transit (LRT) and Metro / Heavy Rail.

It can be seen that bus based public transport can cater for capacities of up to 2,000pax/hr/dir, BRT can cater for capacities between 1,000 and 4,000pax/hr/dir, LRT can cater for capacities between 3,000 and 7,000pax/hr/dir, with Metro catering for capacities above 5,000pax/hr/dir. While the values outlined in the graphic are not set in stone, they provide an indication as to the likely public transport requirements for the strategic corridors.

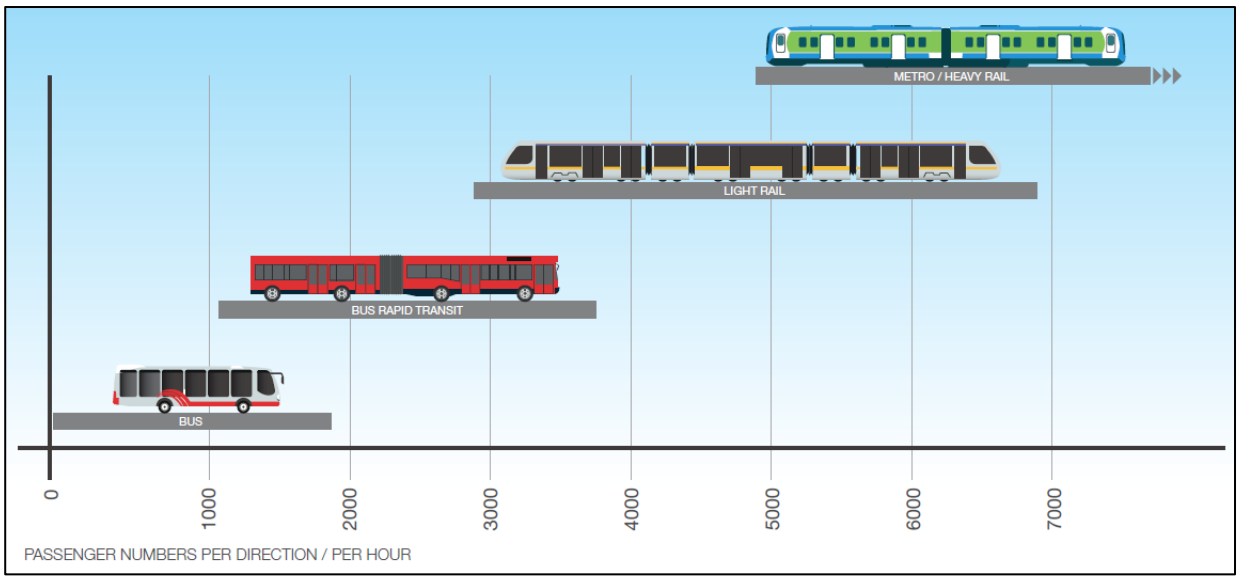


Figure 3-4 Public Transport Capacity Ranges. Source: Public Transport Making the Right Mobility Choices, UITP Conference, 2009.

Table 3-3 outlines the results of the multi-criteria assessment in line the CAF requirements. The table describes how each of the options compares against each criterion and the cells are colour coded to indicate relative performance.

From Table 3-3, "Option 1 Bus Services" are considered to be the preferred option for the Kilkenny-wide public transport network based on the multi-criteria assessment, providing the most benefits overall whilst maximising value for money. Travel demand, population and employment densities are below that required for any other alternative public transport measures along the corridor.

Table 3-3 Assessment of Alternative Transport Measures

	Economy	Environment	Safety	Integration	Accessibility and social Inclusion
Option 1: Bus services	Demand levels suggest buses can provide the appropriate level of capacity-based on the capacities of different modes outlined in Figure 3-4. This will make the best use of investment by improving current network and could provide greater returns on investment in terms of benefit to cost ratio.	Produces less GHG than private car alternative. Options available for different fuel sources.	Bus travel would reduce the number of cars in use and would reduce the potential accident rate.	Better integrated bus network can connect with rail station, but journey times can be hindered by private car traffic, if not prioritised appropriately.	An integrated bus network can improve the accessibility and social inclusion to users and the flexible network can access most areas even with network constraints.
Option 2: Bus Rapid Transit	Travel demand is well below capacity of BRT and unlikely to provide value for money, based on cost associated with introduction of BRT.	Produce less GHG than private transport. Options available for different fuel sources. May have some impact on surrounding environment in order to accommodate.	Higher safety rate than car mode due to dedicated infrastructure segregating from other road users.	Better integrated bus network can connect with rail stations, but journey times can be hindered by private car traffic, if not prioritised appropriately	Potentially enhances accessibility however, access may be limited in areas where infrastructure constrained resulting in longer walk time to access services.
Option 3: Light Rail Transit	Travel demand is well below capacity of Light Rail, particular given it is combined demand across the corridor. Unlikely that Light Rail would provide value for money given construction costs. Significant costs also associated with operation.	Environmental impacts in terms of construction. Particularly within the city where significant land take may be required. Potentially produces less GHG than private transport. Options available for different fuel sources.	Higher safety rate than car mode due to dedicated infrastructure segregating from other road users.	Can connect with rail stations and bus interchanges, but journey times can be hindered by private car traffic, if not prioritised appropriately.	Potentially enhances accessibility however, access may be limited in areas where infrastructure constrained resulting in longer walk time to access services.
Option 4: Suburban Rail	Travel demand is well below capacity of heavy rail, particular given it is combined demand across the corridor. Unlikely that Suburban Rail would provide value for money given construction costs. Significant costs also associated with operation.	Environmental impacts in terms of widening to dual track. Particularly within existing urban footprint. Potentially produces less GHG than private transport. Options available for different fuel sources.	Higher safety rate than car mode due to dedicated infrastructure segregating from other road users.	Integration with other services and land-use would be limited to the rail corridor.	Enhances accessibility for those living along rail routes but has limited flexibility in serving other areas of the corridor.

4.3 Bus Network Development Guiding Principles

Having identified that a bus based solution is the appropriate public transport proposal for Kilkenny, the public transport network was developed based on six principles that created a network that maximises the public transport mode share. Figure 3-5 outlines the principles that underpin the performance of the public transport network. In order to develop the KLTP public transport network in more detail and to maximise the public transport mode share the principles that underpin the performance of the PT network should be applied to the network options.

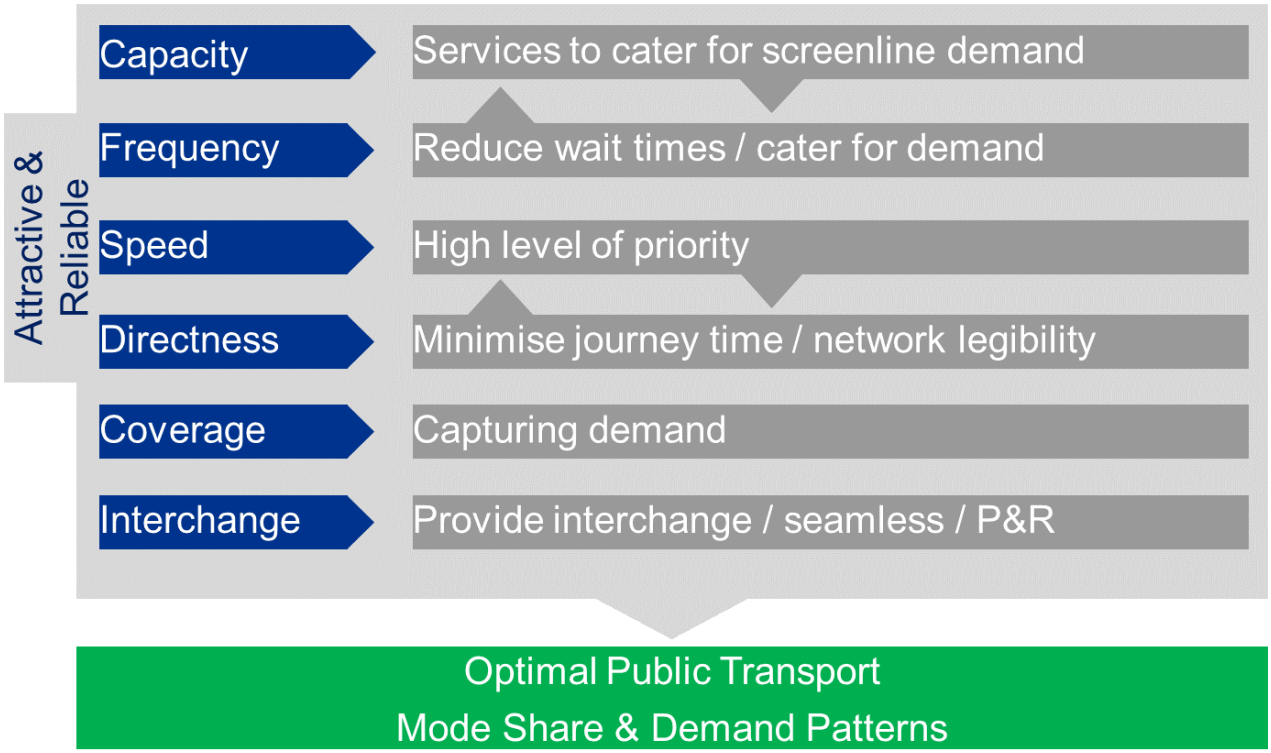


Figure 3-5 Principles of the Public Transport Network

In order to ensure that the route option alignment and the proposed priority measures can be accommodated, a review was undertaken in the context of determining potential route alignments that meet these six principles.

This review included:

- Existing Transport Network;
- Population Distribution & Density;
- Employment and Education distribution;
- Network Constraints; and
- Public Transport Service Catchment.

The capacity of each proposed route was then combined and compared against the target demand to ensure that a surplus of capacity was available. The capacity associated with different public transport options and frequency is outlined in Figure 3-4.

4.4 Corridor A

4.4.1 Target Demand

Based on the public transport demand identified for Corridor A from the Spider's Web diagram, which is based on the "Target Demand", the maximum demand can be identified. Table 3-4 shows the two-way AM Peak Corridor A screenline demand on the radial movements. It can be seen that the highest demand for the corridor is 409 passengers.

Table 3-4 Corridor A: Identifying Maximum Demand

Service Type	Inner City (A1 – Core)	Environs (A2 – A1)
Inbound	409	43
Outbound	216	94

4.4.2 Services and Routes

The number of bus routes and frequency of these services were reviewed to meet the target demand in addition to providing sufficient coverage. Table 3-5 below shows an example of the methodology applied in determining potential public transport options to cater for the maximum target demand (between A2 and the Core City Centre Area). It can be seen that all three potential route options can cater for the target demand.

The table shows the breakdown of the number of routes by type and frequency of service with the associated carrying capacity by design capacity. This is presented alongside the maximum demand for the service to indicate whether or not the Option caters for the target demand. For Corridor A, it is clear that the Design Capacity caters for the target demand. It is apparent that in general the maximum screenline target demand in Corridor A is of a scale that would require high frequency bus services across multiple routes.

Option 3 has retained a 30-minute frequency in order to maintain service frequency and reduce wait times, while also providing future resilience for forecast growth. Lower frequencies could be provided in Corridor A and still meet the required level of capacity. However, this must be balanced against the attractiveness of frequency and the need to form a coherent cross city network, as detailed in Section 4.3.

While all options can cater sufficiently for the target demand, Option 3 has been identified as the preferred option in terms of meeting the six identified principles, in particular: Capacity, Frequency, Directness and Coverage.

Table 3-5 Option Development to Cater for Maximum Screenline Demand

Max Demand: 409 **Service Type**	**Design Capacity**	**Option 1**	**Option 2**	**Option 3**
City Coach Bus	70	1 route x 10 minutes	2 routes x 20 minutes	3 routes x 30 minutes
Design Capacity		**418**	**418**	**418**

4.4.3 Route Options Alignments

The route option alignments have been developed taking into account the six guiding principles that underpin the performance of the public transport network presented in Section 4.3. Three main routes were identified in order to cater for the proposed public transport options. Figure 3-6 illustrates the proposed public transport options for Corridor A, outlining how the options have been developed to align with the six guiding principles as much as feasibly possible.

Bus Route A-1 (Green Route)

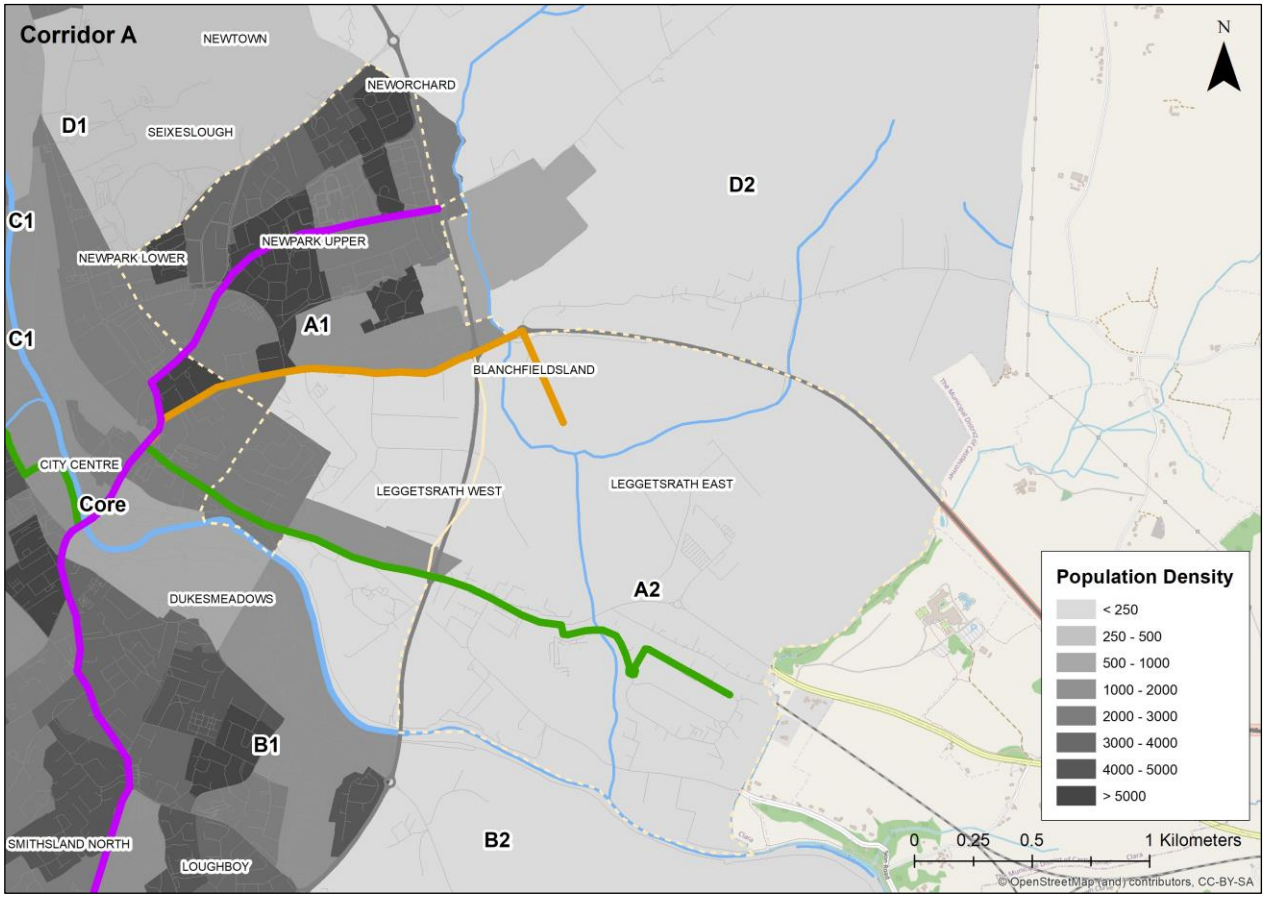
Bus Route A-1 has been identified to run from the Ormond and Purcellsinch Business Park, Dublin Road and into the City Centre.

Bus Route A-2 (Orange Route)

Bus Route A-2 has been identified to run from the area around Hebron Industrial State, Hebron Road, Castlecomer New Road and into the City Centre. The proposed route would benefit future residents of Leggettsrath.

Bus Route A-3 (Purple Route)

Bus Route A-3 has been identified to run from Johnswell Road, Golf Link Road, Castlecomer New Road and into the City Centre. This route serves a large number of residential estates with high population densities.



Guiding Principles	
Capacity	Forecast demand is 409, which is 65% of design capacity.
Frequency	Service passing from Corridor A into City Centre approximately every 10 minutes.
Speed	Provision of bus priority measures can increase speed on proposed routes.
Coverage	85.6% of the Corridor A's population and 71.9% of Corridor A's employment are within the walking catchment.
Interchange	Interchange opportunities with other radial bus services in the city. All routes also provide a connection to Kilkenny MacDonagh Train Station.
Directness	Routes provide direct radial services into the city.

Route / Service	Headway	Capacity
A-1	30 min	139
A-2	30 min	139
A-3	30 min	139

Figure 3-6 Corridor A - Route Alignment Options

4.5 Corridor B

Based on the public transport demand identified for Corridor B from the Spider Web diagram, which is based on the Target Demand, the maximum demand can be identified. Table 3-6 shows the two-way AM Peak Corridor B screenline demand on the radial movements. It can be seen that the highest demand for the corridor is 354 passengers.

Table 3-6 Corridor B: Identifying Maximum Demand

Service Type	Inner City (B1 – Core)	Environs (B2 – B1)
Inbound	335	126
Outbound	354	121

4.5.1 Services and Routes

The number of bus routes and frequency of these services were reviewed to meet the target demand in addition to providing sufficient coverage. It is worth note that 100 in bound additional passenger demand was included to future proof the future demand from the Loughboy Business Area and the Western Environs, in advance of receipt of the 2040 land use projections. Table 3-7 shows an example of the methodology applied in determining potential public transport options to cater for the maximum target demand (between B2 and the Core City Centre Area). It can be seen that all three potential route options can cater for the target demand.

The table shows the breakdown of the number of routes by type and frequency of service with the associated carrying capacity by design capacity. This is presented alongside the maximum demand for the service to indicate whether or not the Option caters for the target demand. For Corridor B, it is clear that the Design Capacity caters for the target demand. It is apparent that in general the maximum screenline target demand in Corridor B is of a scale that would require high frequency bus services across multiple routes.

Option 3 has retained a 20-minute frequency in order to maintain service frequency and reduce wait times, while also providing future resilience for forecast growth. Lower frequencies could be provided in Corridor B and still meet the required level of capacity. However, this must be balanced against the attractiveness of frequency and the need to form a coherent cross city network, as detailed in Section 4.3.

While all options can cater sufficiently for the target demand, Option 3 has been identified as the preferred option in terms of meeting the six identified principles, in particular: Capacity, Frequency, Directness and Coverage.

Table 3-7 Option Development to Cater for Maximum Screenline Demand

Max Demand: 454 Service Type	Design Capacity	Option 1	Option 2	Option 3
City Coach Bus	70	1 route x 9 minutes	2 routes x 15 minutes	3 routes x 20 minutes
Design Capacity		**465**	**558**	**627**

4.5.2 Route Options Alignments

The route option alignments have been developed taking into account the six principles that underpin the performance of the public transport network presented in Section 4.3. Three main routes were identified in order to cater for the proposed public transport options. Figure 3-7**Error! Reference source not found.** illustrates the proposed public transport options for Corridor B, outlining how the options have been developed to align with the six principles as much as feasible possible.

Bus Route B-1 (Red Route)

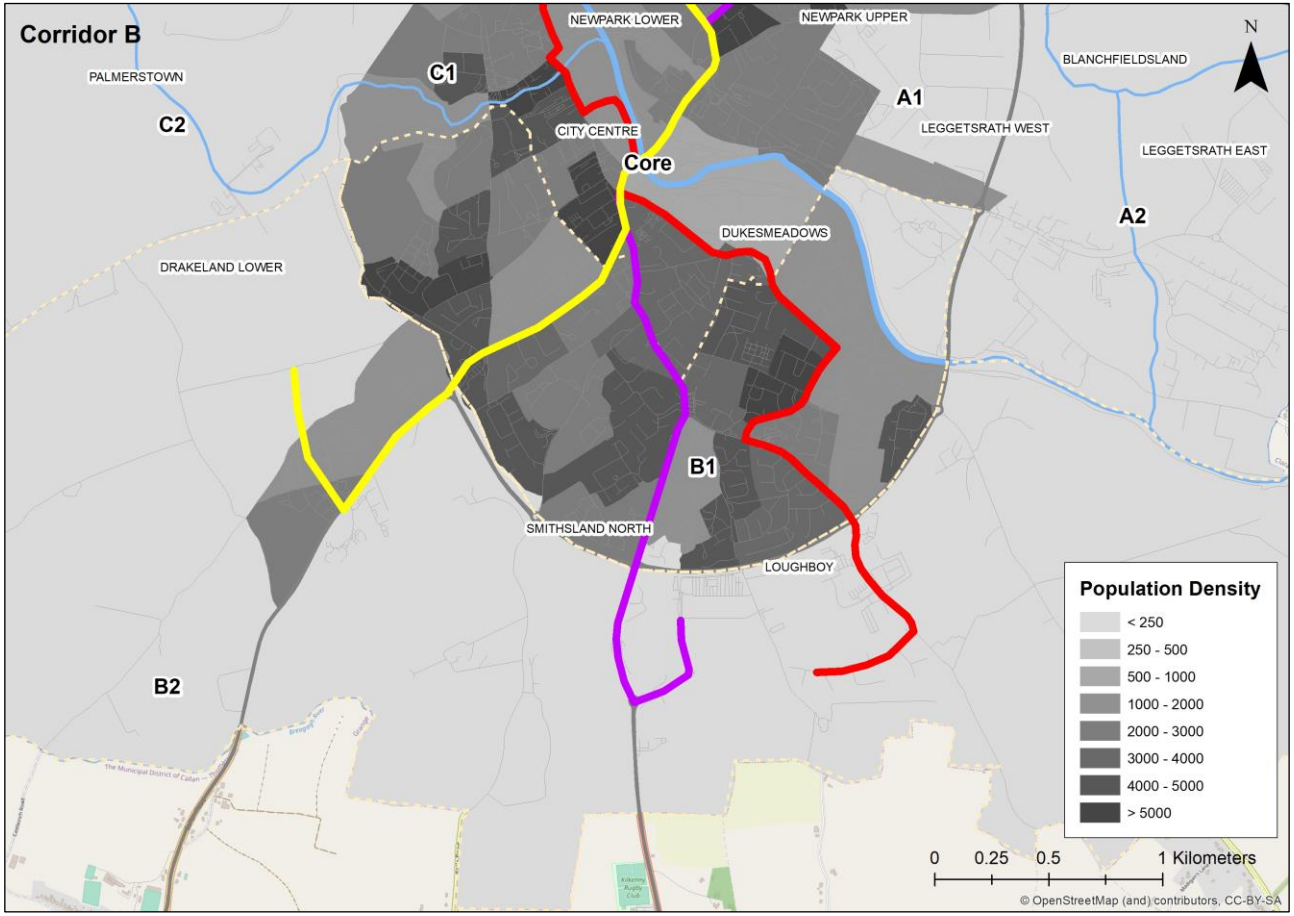
Bus Route B-1 has been identified to run from the Loughboy Industrial Estate, Loughboy Park, Bohernatounish Road, Laurel Dr, Woodbine Ave, Bennettsbridge Road, Castle Road, The Parade and into the City Centre.

Bus Route B-2 (Purple Route)

Bus Route B-2 has been identified to run from the Kilkenny Retail & Business Park, N10, R910 Waterford Road, Upper Patrick St and into the City Centre.

Bus Route B-3 (Yellow Route)

Bus Route B-3 has been identified to run from the future Western Environs development, Callan Road, College Road, N76 Callan Road, R909 College Rd, Ormond Road and into the City Centre. The proposed route would benefit future residents of the Western Environs.



Guiding Principles	
Capacity	Forecast demand is 454, which is 72% of design capacity.
Frequency	Service passing from Corridor B into City Centre approximately every 6.5 minutes.
Speed	Provision of bus priority measures can increase speed on proposed routes.
Coverage	95.3% of the Corridor B's population and 74.5% of Corridor B's employment are within the route's walking catchment.
Interchange	Interchange opportunities with other radial bus services in the City Centre.
Directness	Routes provide direct radial services into the City Centre.

Route / Service	Headway	Capacity
B-1	20 min	209
B-2	20 min	209
B-3	20 min	209

Figure 3-7 Corridor B - Route Alignment Options

4.6 Corridor C

Based on the public transport demand identified for Corridor C from the Spider's Web diagram, which is based on the "Target Demand", the maximum demand can be identified. Table 3-8 shows the two-way AM Peak Corridor C screenline demand on the radial movements. It can be seen that the highest demand for the corridor is 362 passengers.

Table 3-8 Corridor C: Identifying Maximum Demand

Service Type	Inner City (C1 – Core)	Environs (C2 – C1)
Inbound	362	32
Outbound	311	28

4.6.1 Services and Routes

The number of bus routes and frequency of these services were reviewed to meet the target demand in addition to providing sufficient coverage. It is worth note that 100 in bound additional passenger demand was included to future proof the future demand from the Loughmacask, in advance of receipt of the 2040 land use. Table 3-9 below shows an example of the methodology applied in determining potential public transport options to cater for the maximum target demand (between C2 and the Core City Centre Area). It can be seen that all three potential route options can cater for the target demand.

The table shows the breakdown of the number of routes by type and frequency of service with the associated carrying capacity by design capacity. This is presented alongside the maximum demand for the service to indicate whether or not the Option caters for the target demand. For Corridor C, it is clear that the Design Capacity caters for the target demand. It is apparent that in general the maximum screenline target demand in Corridor C is of a scale that would require high frequency bus services across multiple routes.

Option 3 has retained a 20-minute frequency in order to maintain service frequency and reduce wait times, while also providing future resilience for forecast growth. Lower frequencies could be provided in Corridor C and still meet the required level of capacity. However, this must be balanced against the attractiveness of frequency and the need to form a coherent cross city network, as detailed in Section 4.3.

While all options can cater sufficiently for the target demand, Option 3 has been identified as the preferred option in terms of meeting the six identified principles, in particular: Capacity, Frequency, Directness and Coverage.

Table 3-9 Option Development to Cater for Maximum Screenline Demand

Max Demand: 462 Service Type	Design Capacity	Option 1	Option 2	Option 3
City Coach Bus	70	1 route x 9 minutes	2 routes x 15 minutes	3 routes x 20 minutes
Design Capacity		**465**	**558**	**627**

4.6.2 Route Options Alignments

The route option alignments have been developed taking into account the six principles that underpin the performance of the public transport network presented in Section 4.3. Three main routes were identified in order to cater for the proposed public transport options. Figure 3-8 illustrates the proposed public transport options for Corridor C, outlining how the options have been developed to align with the six principles as much as feasible possible.

Bus Route C-1 (Orange Route)

Bus Route C-1 has been identified to run from the future Western Environs development, R695 Rushbrook, Dominic Street and into the City Centre. The proposed route would benefit future residents of the Western Environs.

Bus Route C-2 (Green Route)

Bus Route C-2 has been identified to run from the future Loughmacask neighbourhood, Bonnetstown Road, Butt's Green, Deans Street and into the City Centre. The proposed route would benefit future residents of the future Loughmacask development.

Bus Route C-3 (Red Route)

Bus Route C-3 has been identified to run from R693, nearby Aut Eve Hospital, Freshford Road, Bishop's Hill, Troy's Gate and into the City Centre.

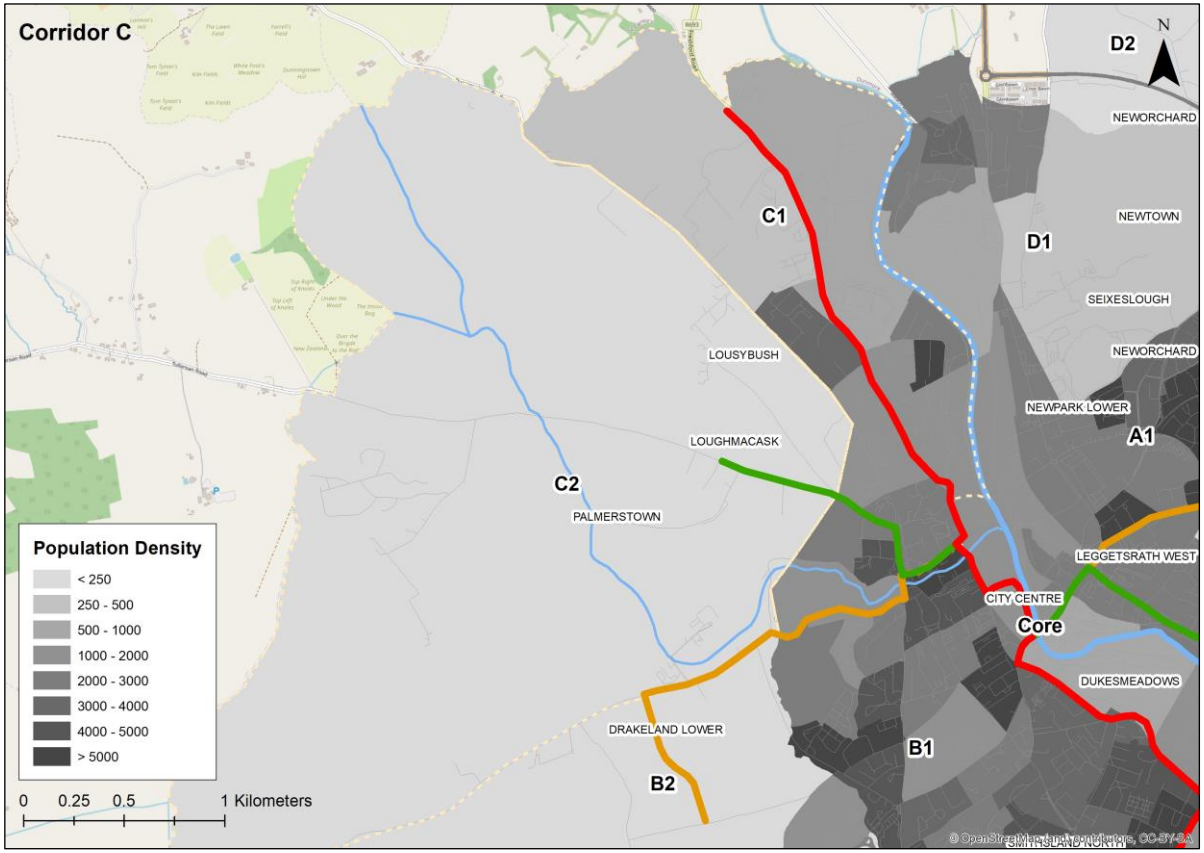


Figure 3-8 Corridor C - Route Alignment Options

Guiding Principles	
Capacity	Forecast demand is 462, which is 74% of design capacity.
Frequency	Service passing from Corridor C into City Centre approximately every 6.5 minutes.
Speed	Provision of bus priority measures can increase speed on proposed routes.
Coverage	86.4% of the Corridor C's population and 73.2% of Corridor C's employment are within walking catchment.
Interchange	Interchange opportunities with other radial bus services in the city.
Directness	Routes provide direct radial services into the City.

Route / Service	Headway	Capacity
C–1	20 min	209
C-2	20 min	209
C-3	20 min	209

4.7 Corridor D

Based on the public transport demand identified for Corridor D from the Spider's Web diagram, which is based on the "Target Demand", the maximum demand can be identified. Table 3-10 shows the two-way AM Peak Corridor D screenline demand on the radial movements. It can be seen that the highest demand for the corridor is 256 passengers.

Table 3-10 Corridor D: Maximum Demand

Service Type	Inner City (D1 – Core)	Environs (D2 – D1)
Inbound	256	16
Outbound	110	13

4.7.1 Services and Routes

The number of bus routes and frequency of these services were reviewed to meet the target demand in addition to providing sufficient coverage. Table 3-11 below shows an example of the methodology applied in determining potential public transport options to cater for the maximum target demand (between D2 and the Core City Centre Area). It can be seen that both potential route options can cater for the target demand.

The table shows the breakdown of the number of routes by type and frequency of service with the associated carrying capacity by design capacity. This is presented alongside the maximum demand for the service to indicate whether or not the Option caters for the target demand. For Corridor D, it is clear that the Design Capacity caters for the target demand. It is apparent that, in general, the maximum screenline target demand in Corridor D is of a scale that would not require higher frequency bus services across multiple routes.

Option 2 has retained a 30-minute frequency in order to maintain service frequency and reduce wait times, while also providing future resilience for forecast growth. Lower frequencies could be provided in Corridor D and still meet the required level of capacity. However, this must be balanced against the attractiveness of frequency and the need to form a coherent cross city network, as detailed in Section 4.3.

While both options can cater sufficiently for the target demand, Option 2 has been identified as the preferred option in terms of meeting the six identified principles, in particular: Capacity, Frequency, Directness and Coverage.

Table 3-11 Option Development to Cater for Maximum Screenline Demand

Max Demand: 256 Service Type	Design Capacity	Option 1	Option 2
City Coach Bus	70	1 route x 15 minutes	2 routes x 30 minutes
Design Capacity		**279**	**279**

4.7.2 Route Options Alignments

The route option alignments have been developed taking into account the six principles that underpin the performance of the public transport network presented in Section 4.3. Two main routes were identified in order to cater for the proposed public transport options. Figure 3-9 illustrates the proposed public transport options for Corridor D, outlining how the options have been developed to align with the six principles as much as feasible possible.

Bus Route D-1 (Yellow route)

Bus Route D-1 has been identified to run from the N77 Roundabout, Castlecomer Road and into the City Centre.

Bus Route D-2 (Blue route)

Bus Route D-2 has been identified to run from the New Orchard Roundabout, New Orchard Road, Golf Link Rd, Castlecomer Road and into the City Centre.

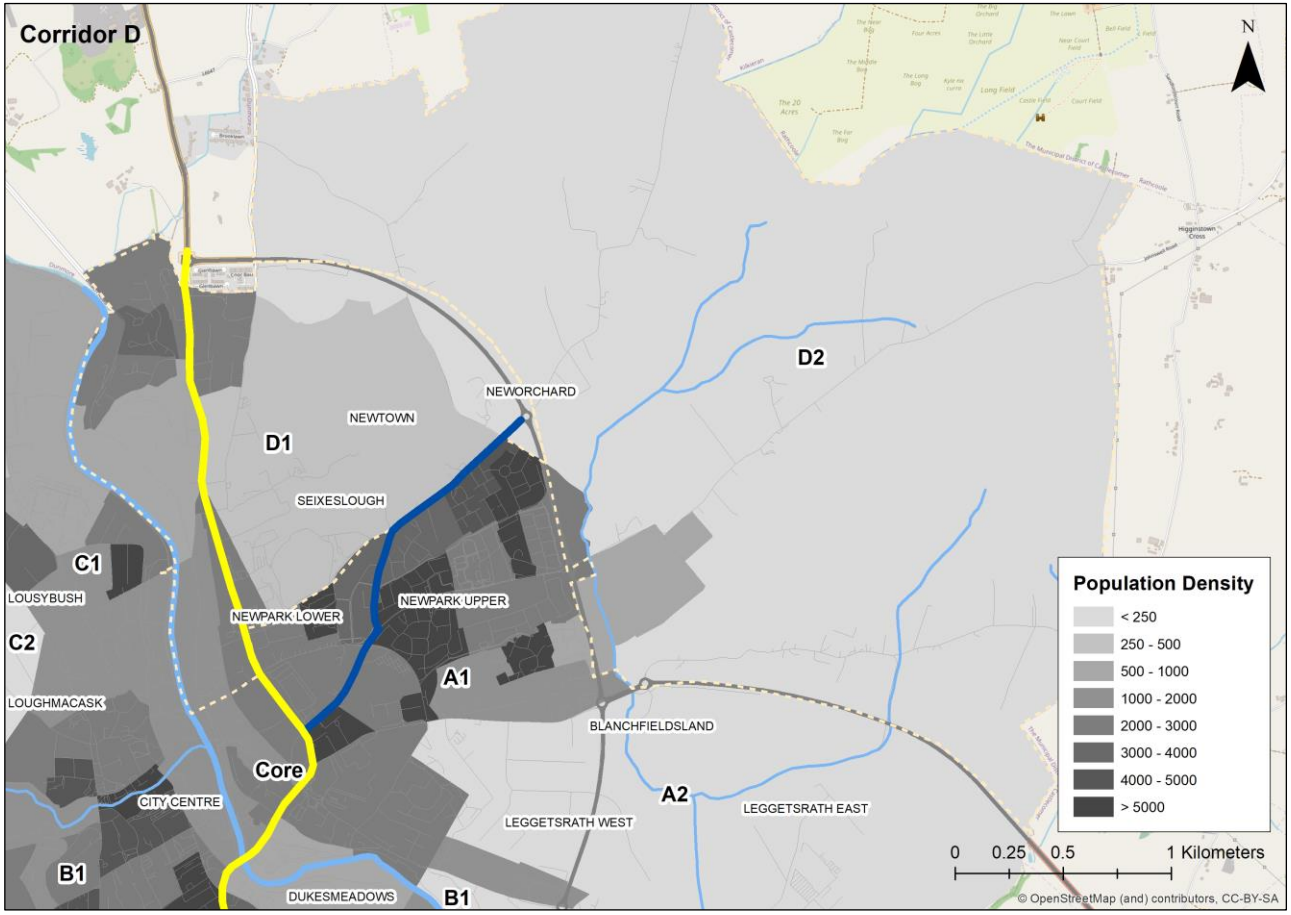


Figure 3-9 Corridor D – Route Alignment Options

Guiding Principles		
Capacity	The forecast demand is 256, which is 61% of design capacity.	
Frequency	Service passing from Corridor D into City Centre approximately every 15 minutes.	
Speed	Provision of bus priority measures can increase speed on proposed routes.	
Coverage	83.4% of the Corridor D's population and 42.3% of Corridor D's employment are within walking catchment.	
Interchange	Interchange opportunities with other radial bus services in the city. The route also provides a connection to Kilkenny MacDonagh Train Station.	
Directness	The routes provide direct radial services into the City.	
Route / Service	**Headway**	**Capacity**
D-1	30 min	139
D-2	30 min	139

4.8 Cross City Public Transport Services

4.8.1 Methodology

The public transport corridor assessment developed radial public transport services and applied service frequencies and headways to each radial route. Cross City linkage between these radial routes can help to further increase the efficiency and effectiveness of the public transport routes by widening the catchment of the radial routes and providing connectivity between areas external to the City Centre.

The following outlines the methodology applied in determining the Cross-city services, and also the route alignment that is taken through the Core City Centre area:

- Determine cross city public transport demand;
- Identify radial services frequencies;
- Match radial services with high cross city demand and similar service frequencies;
- Identify public transport route entry points to City Centre;
- Align routes with future developments;
- Maximise use of two-way streets to avoid splitting services into one-way routes (if possible); and
- Target key interchange locations within the City Centre.

4.8.2 Determine Cross City Demand

As outlined earlier in this report, the two-way cross city demand between the Corridors was determined. This two-way cross city demand is shown in Table 3-12. It can be seen that the highest cross city demand is between Corridors A & B and B & C.

Table 3-12 Two-Way Cross-City AM Peak Target Demand

	Corridor B	Corridor C	Corridor D
Corridor A	220	127	64
Corridor B		211	80
Corridor C			61

Based on the above table, there are two emerging cross city routes from Corridor A to B and Corridor B to C. These corridors could be served by a higher frequency and/or capacity service and additional priority. Corridor A to C also could be served by reasonable frequency bus services. For the remaining corridors, low frequency cross city routes or interchange opportunities at the City Centre could serve the demand.

4.8.3 Matching Cross City Services

To determine the cross city services a route matching exercise was undertaken. This route matching exercise involves identifying proposed public transport services that have a high cross city demand and also have similar

service frequencies. Table 3-13 shows the matches for each corridor as well as the proposed frequencies for each one of them.

Table 3-13 Proposed Bus Routes - Matched Pairs

Corridor	Matched Pair	Proposed Corridor Frequency
A–B	**A-3** (30min) / **B-2** (20 min)	20 min
A–C	**A-2** (30min) / **C-1** (20min) **A-1** (30min) / **C-2** (20min)	20 min 20 min
A–D	Interchange	N/A
B–C	**B-1** (20min) / **C-3** (20min)	20 min
B–D	**B-3** (20min) /**D-1** (30min)	20 min
C-D	Interchange	N/A
-	**D-2** (30min)	N/A

As shown above, five cross city routes have been identified to cater for the demand within Kilkenny City and Environs. For corridor D, it was identified that Route D-2 shares commonalities with Route A-3, as illustrated in Figure 3-10, therefore Route A-3 would cater for the demand within corridor D.

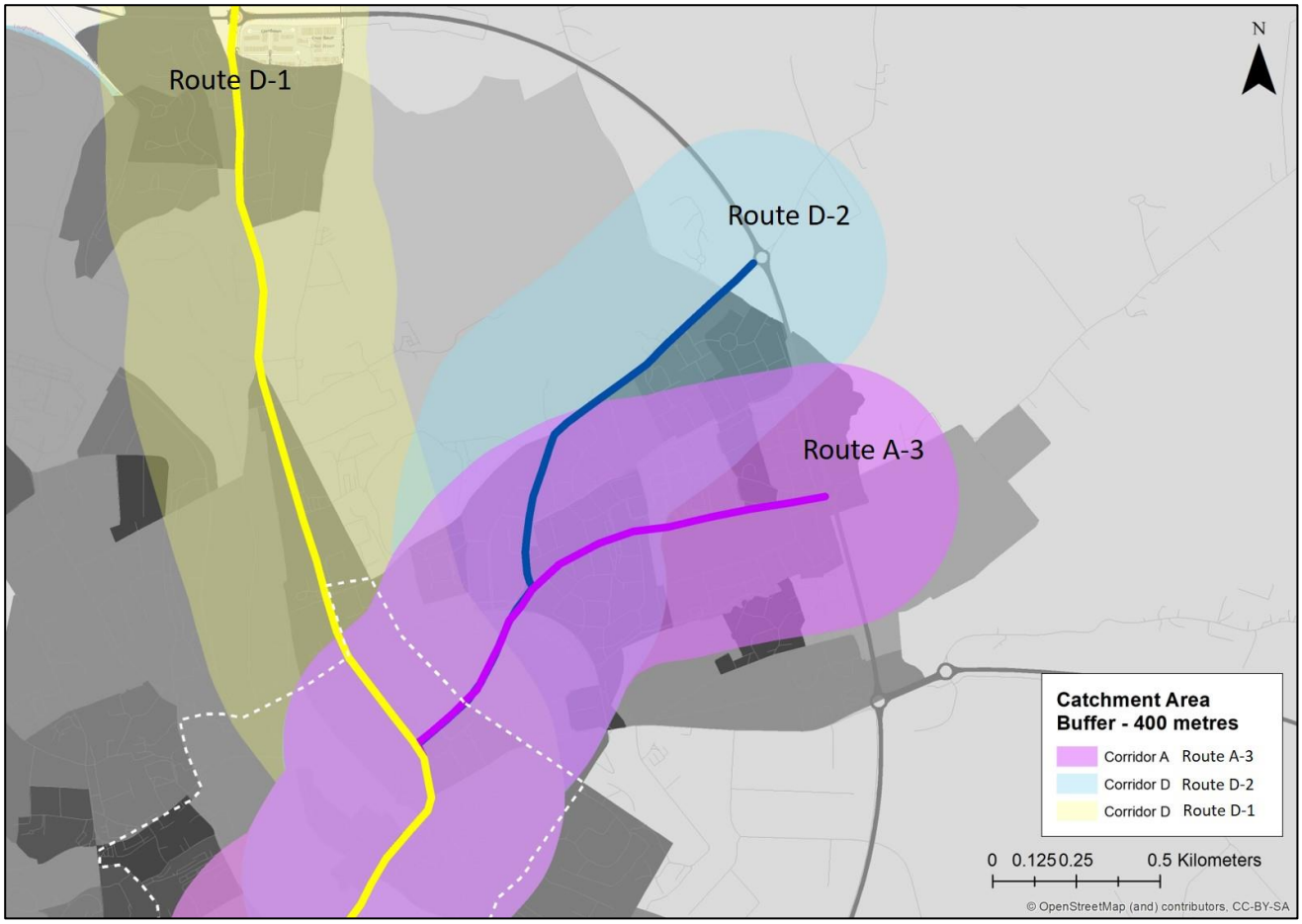


Figure 3-10 Corridor D - Catchment Area Overlap

Figure 3-11 illustrates the process and results of the cross city bus route service matching, with the proposed matched services colour coded and also identified in the matrix to align with the cross city demand matrix.

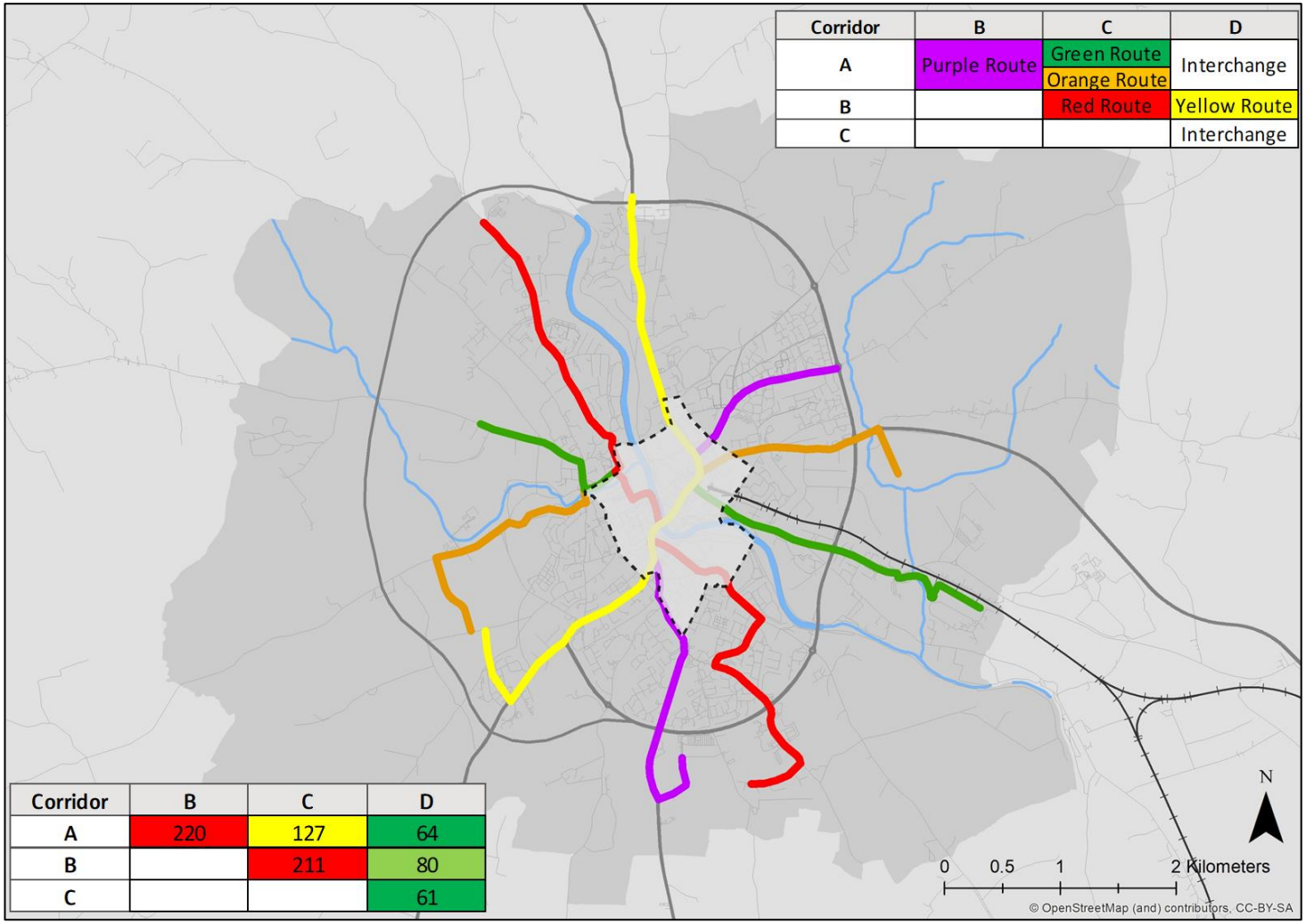


Figure 3-11 Matching Cross City Demand with Proposed Radial Services

4.8.4 City Centre Route Alignment

As the public transport routes converge on the Core City Centre they were combine and group into roads and streets, as shown in Figure 3-12. The proposed route alignment in the Core City Centre includes the following roads:

- Castlecomer New Road;
- R887 John Street Upper;
- R887 St. John's Bridge;
- St. John's Bridge;
- Parliament Street;
- Bateman Quay; and,
- Rose Inn Street.

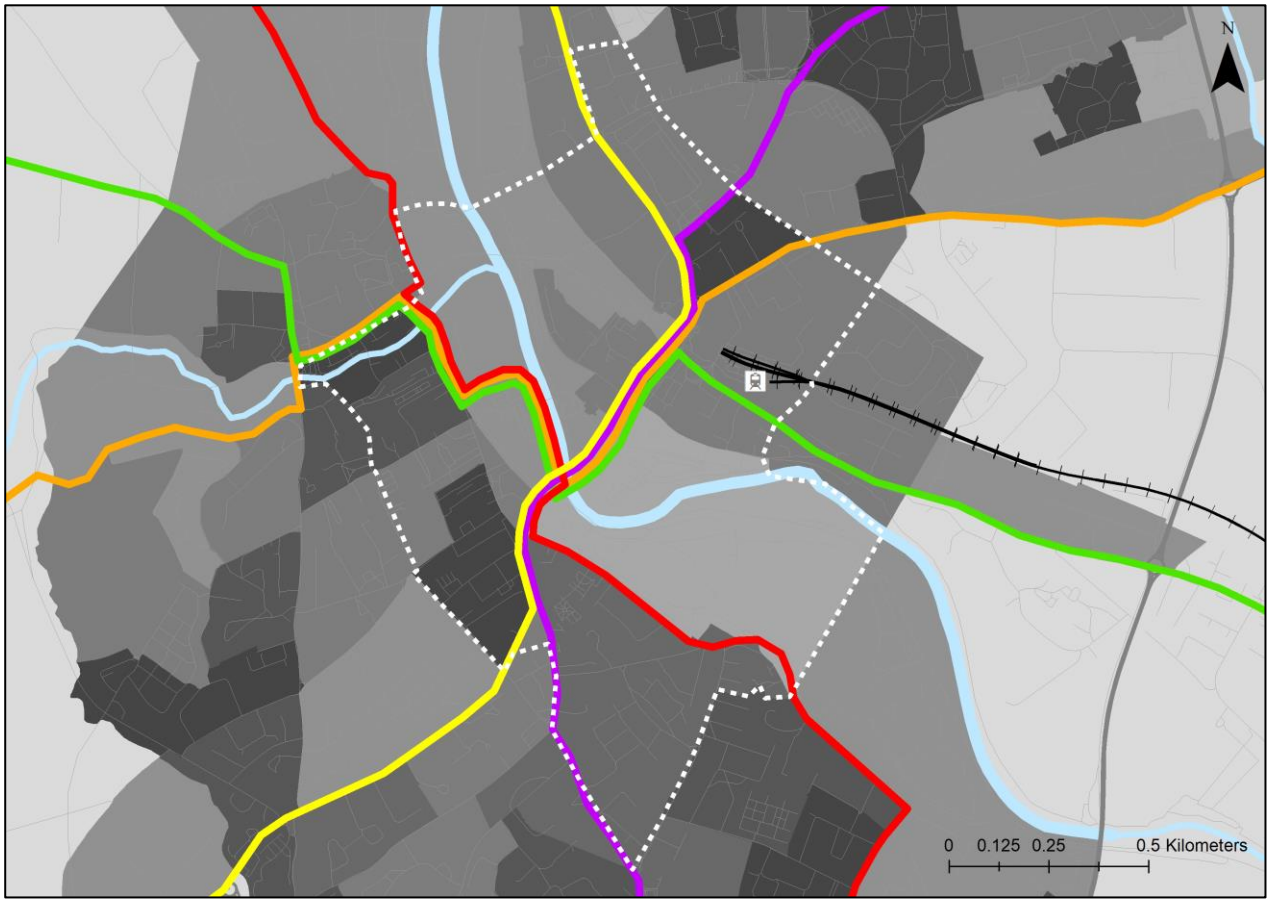


Figure 3-12 City Centre Bus Route Alignment – Proposed Local Routes

The following summarises the rationale of the City Centre route alignment:

- Interchange opportunities with Kilkenny MacDonagh Station at Castlecomer New Road;
- Interchange opportunities with local and regional bus routes at Rose Inn St, Bateman Quay and John Street Lower;

- As identified in the Context Report, approximately 40% of the demand passing through John's Bridge corresponds to sustainable transport modes. Therefore, John's Bridge could be consolidated as the main cross river connection within the City Centre for public transport; and
- Bateman Quay diversion rather than routing via High Street due to the significant number of pedestrians on High Street as well as geometric constraints.

4.9 Bus Network Catchment

The catchment area for each bus route was defined as the area within 400 metres of each proposed bus route. Population and jobs catchment were calculated as a proportion of the number of people and jobs within the CSO Small Areas (SA). In terms of coverage, Figure 3-13 and Figure 3-14 show the catchment area overlap for the proposed public transport network over the population and job density respectively. Approximately 86% population and 83% jobs are within the catchment area of the proposed radial services.

This estimative is considered conservative due to the methodology applied to calculate the catchment, which is associated to a ratio between the area and the number of people and jobs within each CSO SA boundary.

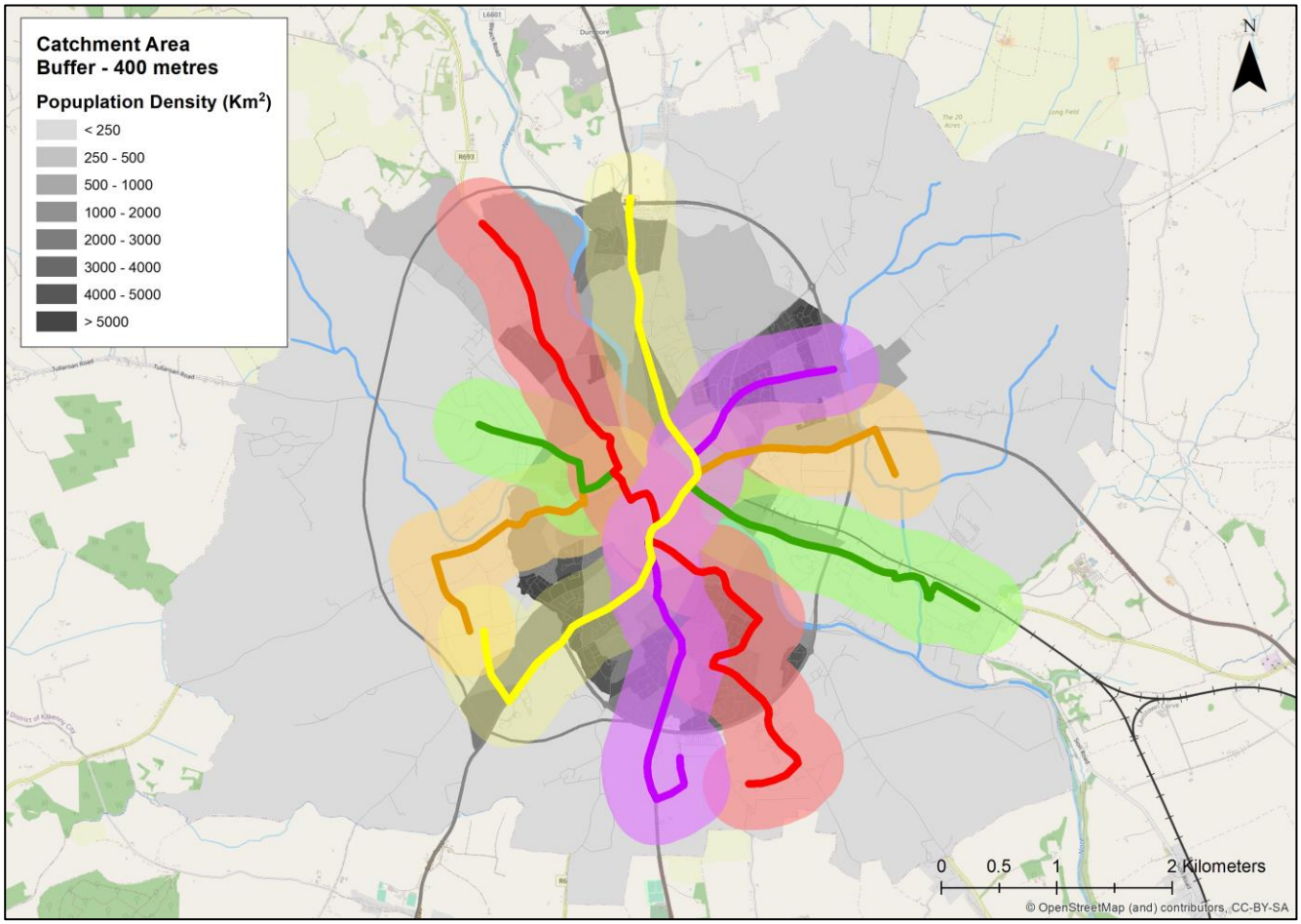


Figure 3-13 Catchment of Proposed Bus Network over the Population Density Map

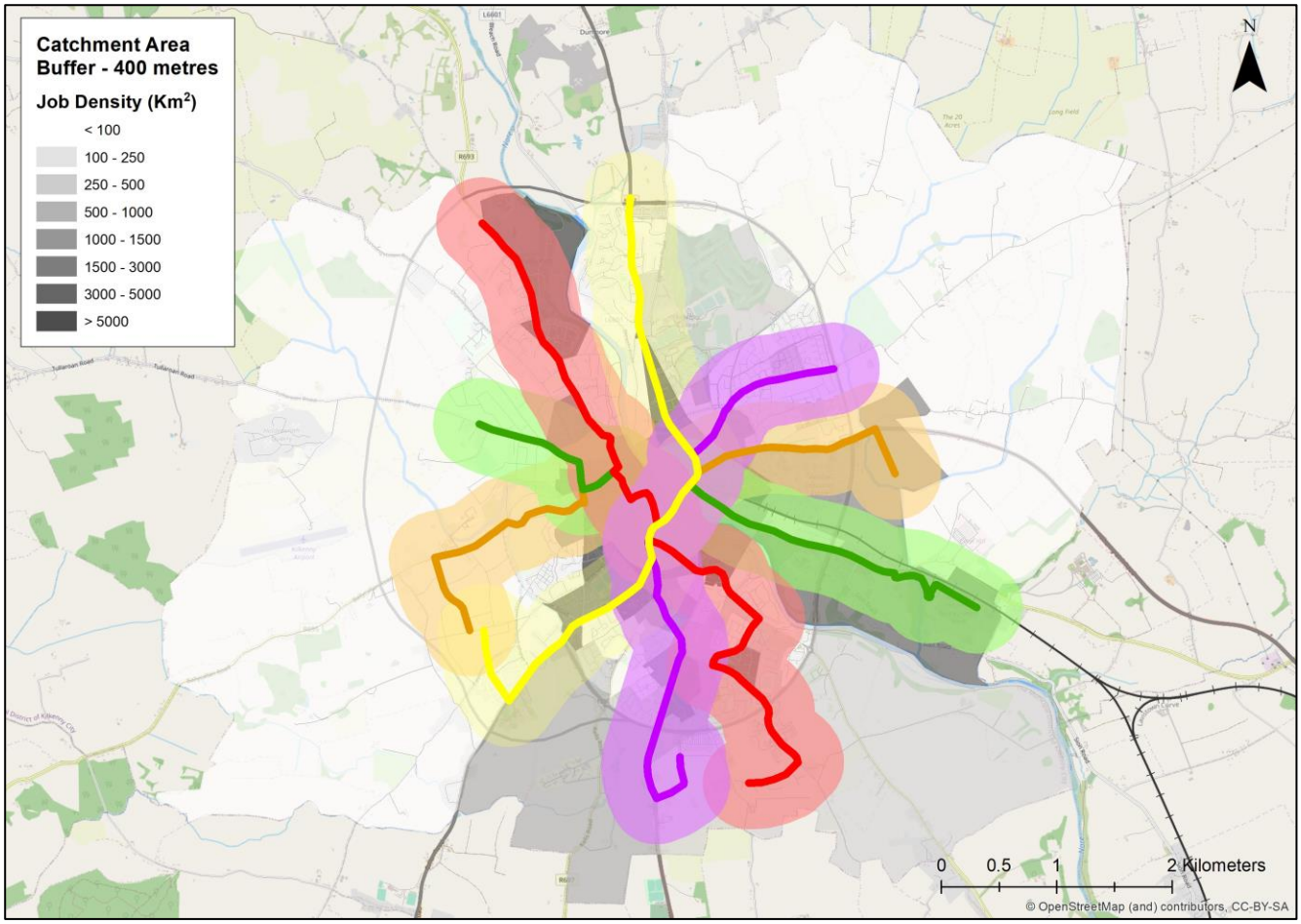


Figure 3-14 Catchment of Proposed Bus Network over the Job Density Map

4.10 Public Transport Priority Measures

4.10.1 City Centre Public Transport Priority

As shown in Figure 3-12, John Street Lower, John Street Upper, St. John's Bridge, Bateman Quay, Parliament Street and Rose Inn Street cater for multiple bus route services. As the highest concentration of public transport services are within the Core City Centre, public transport priority measures would be focused in this area.

The following outlines the proposed public transport priority measures:

- St. John's Bridge exclusive for public transport, active modes and taxis;
- Rose Inn Street exclusive for public transport, active modes, taxis and deliveries;
- Enhancement of the junction between St. John's Bridge and Bateman Quay;
- Traffic signalling priority at the junction between Patrick Street and The Parade; and
- Enhancement at MacDonagh Junction including bus lane on Castlecomer New Road, as shown in Figure 3-16.

4.10.2 Proposed Development Public Transport Priority

Besides the Core City Centre are, public transport measures could be implemented in both new developments to the west and northwest side of Kilkenny. The implementation of measures such as bus lanes are required to enhance attractiveness of the proposed local services that will serve these developments, as illustrated in Figure 3-15.

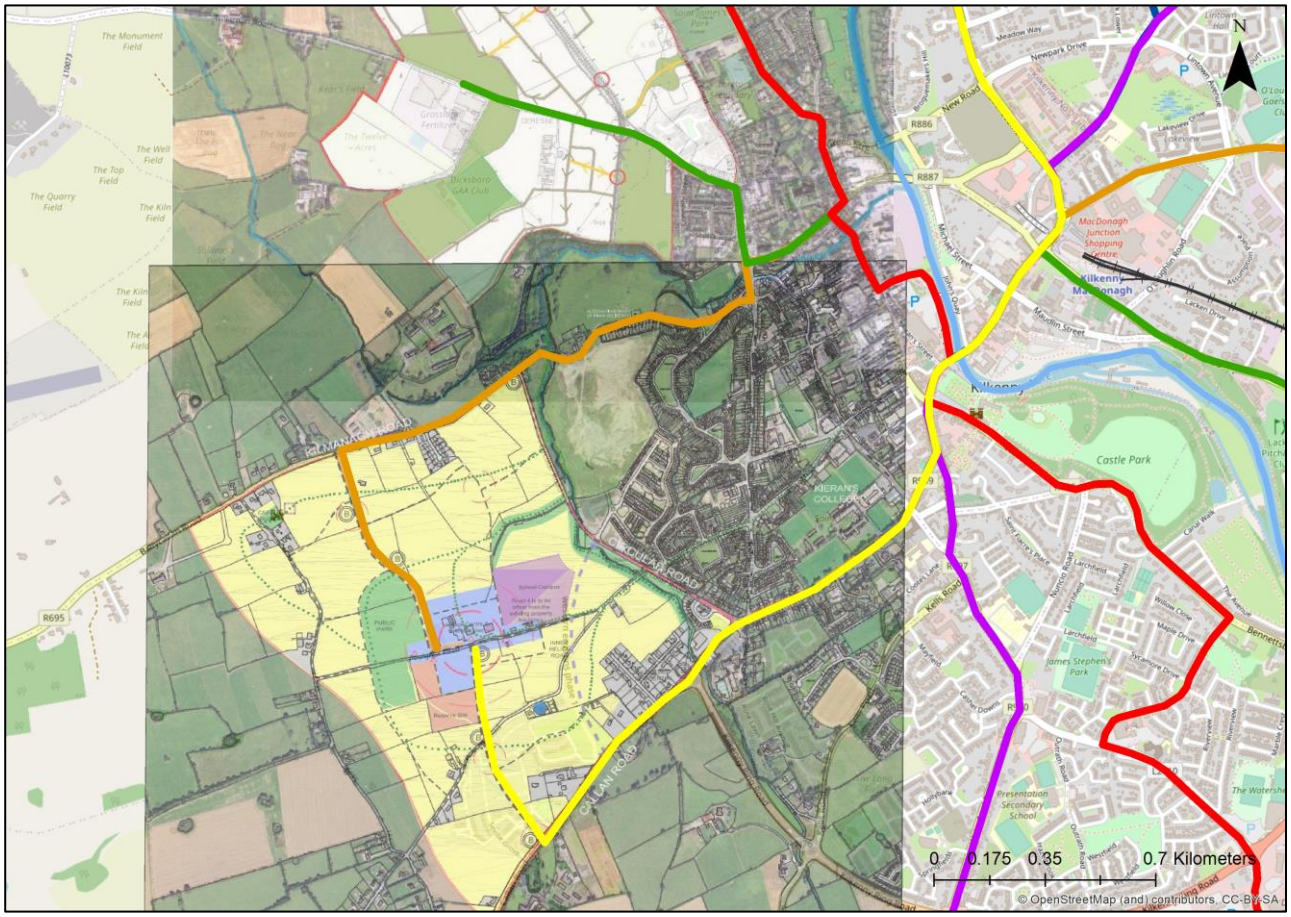


Figure 3-15 Priority Measures within New Developments at Western Environs and Loughmacask.

The proposals outlined are preliminary only and will require further analysis to understand the full impacts of its implementation. It is acknowledged that priority measures are essential to ensure the proposed public transport network is attractive relative to car in order to promote a change in mode share.

4.11 MacDonagh Junction Public Transport Interchange

MacDonagh Junction Station has excellent public transport interchange opportunities given that the rail, regional bus services and the majority of the proposed local routes pass through this point. Figure 3-16 illustrates measures that are required to enhance public transport interchange in the area.

Other proposed measures for the Interchange Hub include:

- Bus lane on each side of Castlecomer New Road;
- Regional bus parking;
- Bus stops for local services; and

- Sheltered and secure cycle parking hub at Station.

The current layout of the junction to MacDonagh Station at Dublin Road poorly serves the needs of pedestrians, cyclists and public transport users. It is recommended that a Quality Audit of the junction(s) is undertaken as a short-term objective of the Plan. The Quality Audit, in line with DMURS principles, should consider:

- Removal of slip lanes and multi-stage crossings;
- Removal of all pedestrian guardrails;
- Footpath widening on approaches to junction, in particular on John Street and Castlecomer New Road;
- Pedestrian priority over local junctions, e.g. John's Green; and
- Provision for cyclists, including Advanced Stop Lines at junctions (ASL).

Further discussion on City Centre Junction Improvements is set out in Section 7.4.3 below.

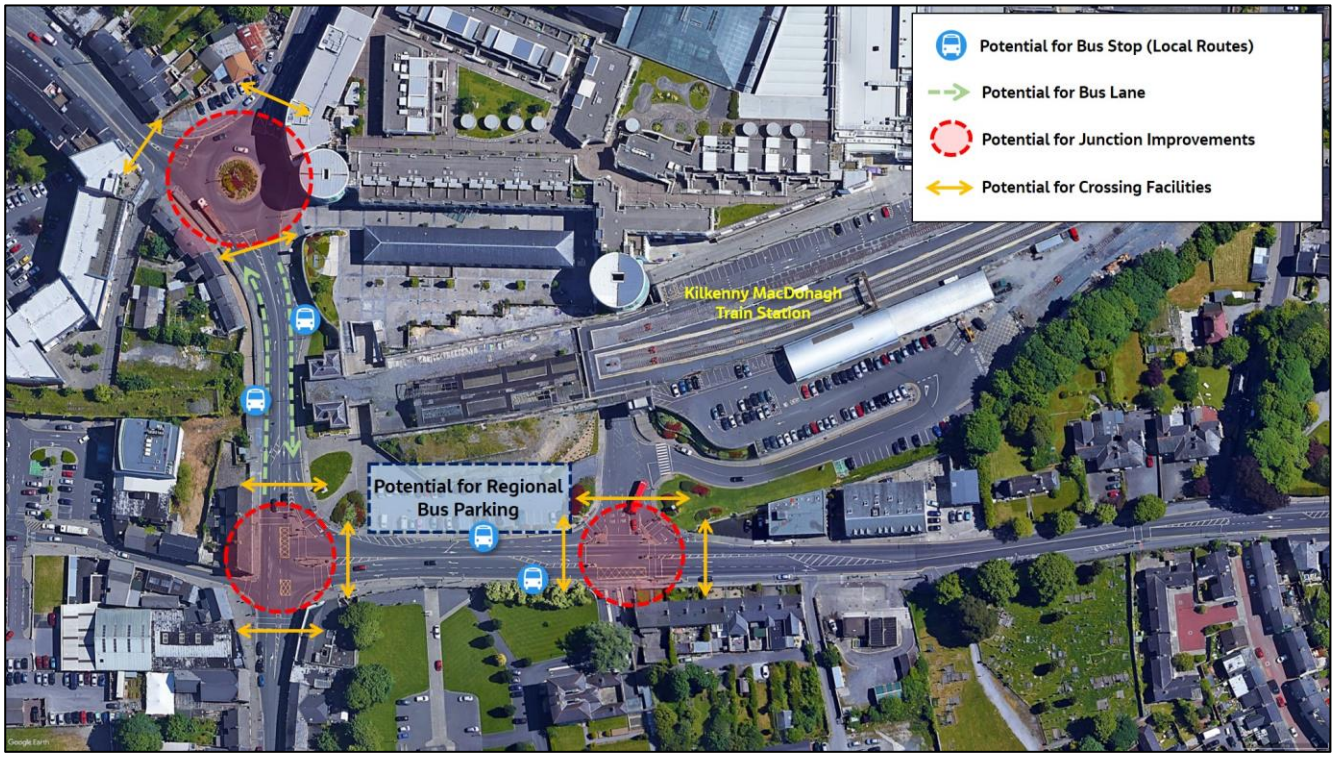


Figure 3-16 Public Transport Interchange Opportunities

5. Cycle Network Option Development

5.1 Overview

Kilkenny is relatively flat and compact with approximately 75% of its population living within the 10-minute cycle catchment of the City Centre, making it an ideal location for both leisure and utility cycling. In general, cycle lanes and tracks are provided along radial routes up until the City's gateways where the speed limit transitions from 50kph to 30kph, wherein there is no dedicated cycle infrastructure. However, these lanes are intermittent and of mixed quality.

This section presents the demand analysis and option development for the cycle network within Kilkenny City. The 2040 target demand is used to identify appropriate network requirements and to create an attractive, coherent and safe cycle network.

5.2 Hierarchy of Cycle Provision

The *National Cycle Policy Framework* (NCPF), echoed by the *National Cycle Manual* (NCM), recommends that infrastructural provision for a cycle network should consider the following steps in hierarchical order:

1. **Traffic Reduction**: reduce volumes of through-traffic as well as traffic in the vicinity of schools and colleges;
2. **Traffic Calming**: design for low traffic speeds. This can allow the creation of 'Mixed/Shared Streets' where cyclists share the space with general car traffic;
3. **Junction Treatment and Traffic Management**: make junctions safe for cyclists and remove multi-lane, one-way street systems;
4. **Redistribution of Carriageway**: reallocate existing road space for cyclists;
5. **Cycle Lanes and Cycle Tracks**: provide dedicated space for cyclists; and
6. **Cycleway**: public roads for the exclusive use of cyclists and pedestrians, such as greenways.

The NCM considers how the appropriate cycle facility might be chosen, influenced by the following:

- Overall vision for the route and the surrounding area in the context of delivering sustainable travel patterns;
- Principles of Sustainable Safety; and
- Target Quality of Service (QoS).

The NCM also outlines 'Five Needs of a Cyclist' including:

- Road Safety;
- Coherence;
- Directness;
- Attractiveness; and
- Comfort.

5.3 Cycle Network Development

The proposed KLTP Cycle Network has been developed based on the following:

- NCM and *Design Manual for Urban Roads and Streets* (DMURS);
- Minimum 10% mode share target for cycling;

- Assessment of travel demand within the Study Area using outputs from the SERM;
- Existing cycle infrastructure;
- Need to create a coherent network of cycle routes across the Study Area accessible for people of all ages and abilities; and
- Creation of the 10-Minute City and the need to ensure access between residential areas, schools, community facilities and key employment areas.

5.3.1 Cycle Facilities

As part of the cycle network option development, a high-level quantitative assessment was carried out using the NCM's Guidance Graph in Figure 5-1. Figure 5-1 presents guiding thresholds which represent the most widely internationally accepted values of traffic speed and traffic volume and the various types of cycle facilities that are considered appropriate; Cycle Track, Cycle Lane and Shared Street. The NCM's guidance provision is based on the creation of a safe and comfortable environment for cyclists in the context of their interactions with vehicular traffic, i.e. the higher the volume and speed of traffic, the more protection is recommended for the cyclist. The graph can also be read inversely, i.e. first choose the type of facility preferred and then reduce the speeds and volumes of traffic accordingly.

Based on these thresholds, this section assesses and identifies the type of cycle facility that could be considered on each radial route based on the existing speed limits in place and AADT values from the 2020 network model run in the SERM. Table 5-1 summarises this assessment.

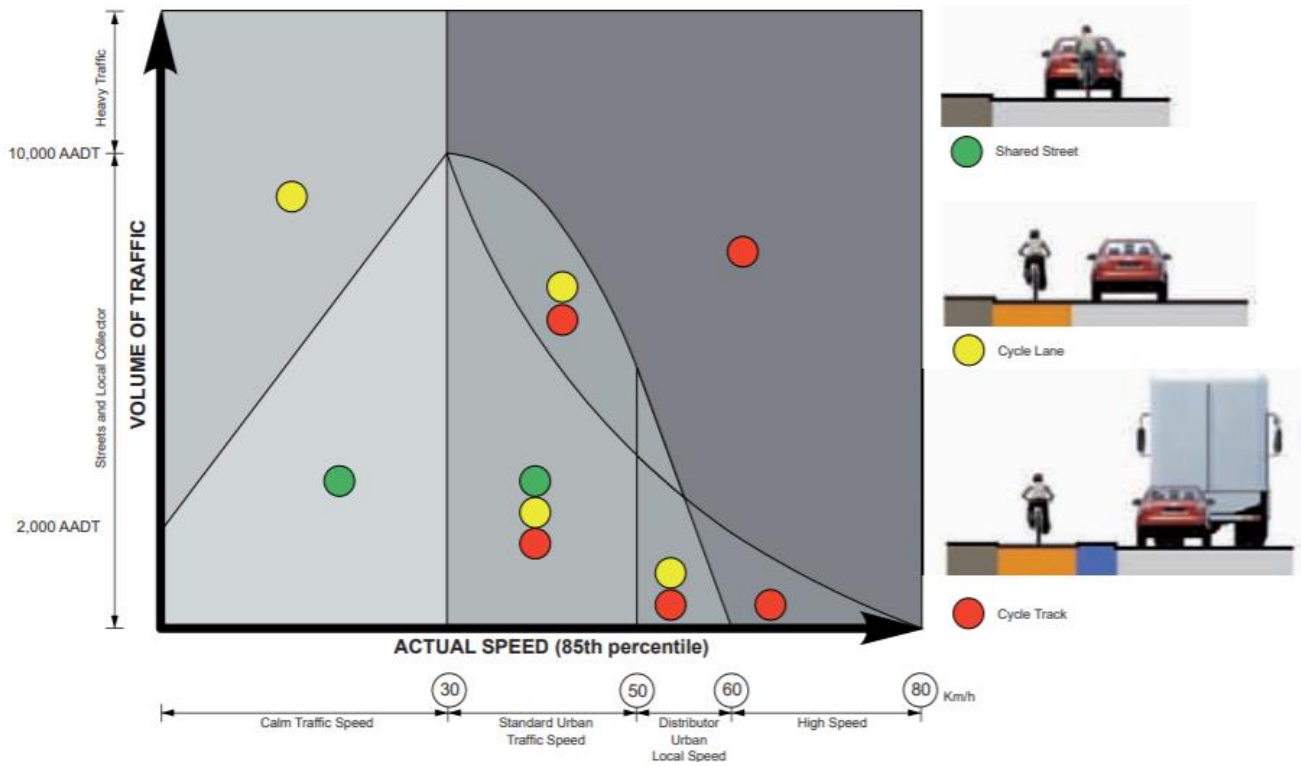


Figure 5-1 Guidance Graph for the Provision of Cycle Facilities Based on Traffic Speed and Volume. Source: Section 1.7.4, National Cycle Manual, NTA.

Table 5-1 Assessment of AADT and speed limit to determine cycle facility type recommended.

Route	Traffic Volumes	Speed Limit	Cycle Facility Type Recommended
Castlecomer Road	9,500 AADT	50kph	Cycle Lane Cycle Track
Johnswell Road	7,200 AADT	50kph	Cycle Lane Cycle Track
Hebron Road	15,400 AADT	50kph	Cycle Track
Dublin Road	12,300 AADT	50kph	Cycle Track
Bennettsbridge Road	12,700 AADT	50kph	Cycle Track
Bohernatounish Road	6,700 AADT	50kph	Cycle Lane Cycle Track
Waterford Road	9,400 AADT	50kph	Cycle Lane Cycle Track
Kells Road	3,200 AADT	50kph	Cycle Lane Cycle Track
College Road	9,400 AADT	50kph	Cycle Lane Cycle Track
Freshford Road	25,300 AADT	50kph	Cycle Track
City Centre	Varies	30kph	Cycle Lane Shared Street

5.3.2 Radial Route Demand and Hierarchy

Figure 5-2 illustrates the volume of cyclists on the existing road and cycle network during the AM peak period travelling in both inbound and outbound directions, highlighting cycling desire lines. As noted earlier in the Report, the option development stage has been undertaken in the absence of future land use scenarios and is based on the 2012 demand, factored to align with the target cycling mode share.

As can be seen from Figure 5-2, radial routes that have the highest demand and carry the most cyclists include:

- Freshford Road;
- Castlecomer Road;
- Johnswell Road;
- Dublin Road;
- Bennettsbridge Road;
- Bohernatounish Road;
- Waterford Road;
- Kells Road; and
- College Road.

High demand routes have been identified as Primary Routes, with the remainder as Secondary, Feeder and Greenway, depending on various network requirements. Route categorisation is explained further in Table 5-6.

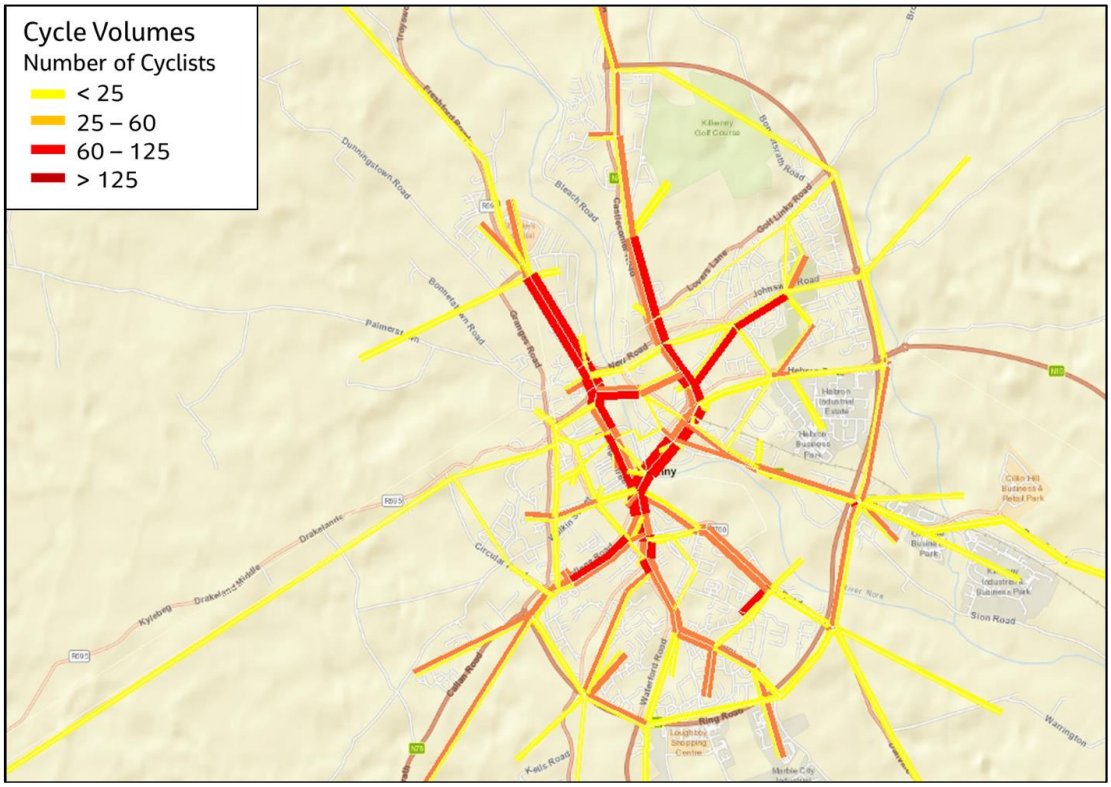


Figure 5-2 AM Peak Cycle Flows.

5.3.3 Assessment of Radial Route Options

In addition to the above assessment, a qualitative, desk-based assessment was also carried out of these routes against the design considerations set out in 5.2 Hierarchy of Cycle Provision, taken from the NCM. Table 5-3 and Table 5-4 present the assessment of these routes against the design considerations, and make recommendations for interventions that are needed and/or possible to improve cycle infrastructure provision along these key routes. The cells are colour coded to indicate relative performance.

Table 5-2 Rationale of Colour Coding for Assessment.

Possibility of Design Solution	Colour Code
Existing Facility/Possible Intervention	
May be Challenging to Achieve	
Difficult to Achieve	

Table 5-3 Assessment of Cycle Network Radial Routes.

	Castlecomer Road (Castlecomer Rd Rbt - New Rd Rbt)	**Johnswell Rd/ Golflinks Rd** (Johnswell Rd Rbt - Ballybought St.)	**Hebron Rd** (Hebron Rd Rbt - Junction with Castlecomer New Rd)	**Dublin Rd** (Old Dublin Rd Rbt - Junction with Castlecomer New Rd)	**Bennetsbridge Rd** (Bennetsbridge Rd Rbt - Castle Rd)
Existing Facility	▪ Continuous provision of cycle infrastructure. ▪ Mix of advisory cycle lanes and mixed facility/cycle track on footpath. ▪ Mixed quality.	▪ Continuous provision of shared facilities up to the 30kph zone on Golflinks Rd. ▪ Narrow in sections.	▪ Intermittent provision. ▪ Mix of advisory cycle lanes and mixed facility/cycle track on footpath. ▪ Mixed quality.	▪ Intermittent provision, especially on outbound. ▪ Mix of advisory cycle lanes and mixed facility/cycle track on footpath. ▪ Mixed quality.	▪ Continuous cycle lane up to 30kph zone. ▪ No physical segregation from general traffic. ▪ Mixed quality. ▪ Narrow in parts.
Key Origins & Destinations	Kilkenny College, Kilkenny Model School and many residential estates such as The Weir View, Glenbawn and Meadow Way.	Many residential estates such as Beechlawns, Rosewood, Ashfield, The Orchard and Lintown, Newpark Shopping Centre and LIDL.	Nowlan Park, O'Loughlin GAA Gaels Club, Intreo Centre, ALDI, many residential and industrial estates.	St. Canice's Hospital, Kilkenny MacDonagh Train Station, several residential estates such as Shandon Park and a number of industrial estates outside of the Kilkenny Ring Road in the Leggettsrath area.	Many residential areas such as Larchfield, Dukesmeadow Avenue and Melville Heights.
Traffic Reduction	▪ Challenging to remove vehicular traffic. ▪ Caters for a high demand of traffic connecting National road network to Kilkenny City.	▪ Low level of traffic (100-250 car trips during AM Peak).	▪ Challenging to remove vehicular traffic. ▪ Caters for a high demand of traffic connecting National road network to Kilkenny City.	▪ Challenging to remove vehicular traffic. ▪ Caters for a high demand of traffic connecting National road network to Kilkenny City.	▪ Challenging to remove vehicular traffic. ▪ Caters for a high demand of traffic connecting National road network to Kilkenny City.
Traffic Calming	▪ Further reduction in speed limit (50kph) not appropriate on key radial route. ▪ Scope to implement localised traffic calming measures around Kilkenny National School and Kilkenny College.	▪ Further reduction in speed limit (50kph) not appropriate on key radial route. ▪ 30kph zone begins on the approach to St. John's Senior National School.	▪ Further reduction in speed limit (50kph) not appropriate on key radial route. ▪ 30kph zone begins after the O'Loughlin Rd Rbt.	▪ Further reduction in speed limit (50kph) not appropriate on key radial route.	▪ Further reduction in speed limit (50kph) not appropriate on key radial route.
Junction Treatment	▪ New Road Rbt should be upgraded to improve cyclist safety and comfort in line with DMURS and NCM.	▪ Newpark Drive Rbt should be upgraded to improve cyclist safety and comfort in line with DMURS and NCM. ▪ Corner radii should be tightened.	▪ Corner radii should be tightened. ▪ O'Loughlin Rd Rbt should be upgraded to improve cyclist safety and comfort in line with DMURS and NCM.	▪ Formal pedestrian crossing should be upgraded to be more cycle-friendly, e.g. toucan crossing.	▪ Corner radii should be tightened.
Redistribution of Carriageway	▪ Potential to widen cycle lanes, particularly along the northern half of the route.	▪ Scope to provide more space for cyclists, e.g. use of grass verges	▪ May be challenging to provide more space for cyclists within existing cross-section, particularly after the O'Loughlin Rd Rbt on the approach to City.	▪ Scope to provide more space for cyclists, e.g. removal of on-street parking. ▪ Access to MacDonagh Junction should be significantly improved for cyclists.	▪ Scope to provide more space for cyclists.
Cycle Lanes/ Tracks	▪ NCM recommends provision of cycle track or lane. ▪ Existing cycle lanes/tracks should be upgraded.	▪ NCM recommends provision of cycle track or lane. ▪ Upgrade existing cycle infrastructure. ▪ Scope to provide segregated cycle lanes, however narrow sections of the road would be challenging.	▪ NCM recommends provision of segregated cycle track. ▪ Upgrade existing infrastructure and complete gaps. ▪ Some pinch-points on route. ▪ Section after O'Loughlin Rd Rbt could be a mixed street environment due to 30kph zone.	▪ NCM recommends provision of cycle track. ▪ Upgrade existing cycle infrastructure. ▪ Scope to provide segregated cycle tracks, e.g. removal of on-street parking. ▪ Some pinch-points on route.	▪ NCM recommends provision of cycle track. ▪ Upgrade existing infrastructure. ▪ Scope to provide segregated cycle tracks.
Cycleway	▪ No suitable Cycleway available. Green's Hill is a lower trafficked route parallel to Castlecomer Rd, however there are few permeability opportunities between two routes.	▪ Existing filtered permeability measures through residential estates.	▪ No suitable Cycleway available.	▪ The River Nore raised wooden walkway may provide a Cycleway into the City Centre.	▪ An existing Cycleway route is available via River Nore Linear Park.

Table 5-4 Assessment of Cycle Network Radial Routes.

	Bohernatounish Rd (Bohernatounish Rd Rbt - R910)	**Kells Rd** (Kells Rd Rbt - R910)	**R910 (Waterford Rd)** (Waterford Rd Rbt - Upper Patrick St)	**R909 (College Rd)** (Callan Rbt - Lower New Street)	**R693 (Freshford Rd)** (Aut Even Hospital - Green St)
Existing Facility	▪ Mix of advisory cycle lanes and shared facilities. ▪ Mixed quality. ▪ Narrow.	▪ Continuous shared facility.	▪ Continuous provision of advisory cycle lanes up until the 30kph zone. ▪ Mixed quality.	▪ Mix of advisory cycle lanes and shared facilities. ▪ Intermittent provision of cycle infrastructure.	▪ Mandatory cycle lanes from The Sycamores on both sides until the 30kph zone. ▪ No physical segregation from general traffic.
Key Origins & Destinations	IDA Business and Technology Park, Loughboy Shopping Centre, Presentation Secondary School, The Watershed sports complex, LIDl, ALDI and residential estates.	Several residential estates.	Kilkenny Project National School, LIDL, ALDI, St. John of God National School and several residential estates such as Hollybank Park.	St. Kiernan's College, a number of retail outlets such as Spar and Centra, St. Patrick's Catholic Church and several residential estates such as College Square.	Aut Even Hospital, St. Luke's General Hospital, Loreto Secondary School, St. James Park, Kilkenny Greyhound Stadium and a number of residential estates such as The Sycamores and Talbot's Gate.
Traffic Reduction	▪ Challenging to remove vehicular traffic. ▪ Caters for a high demand of traffic connecting National road network to Kilkenny City.	▪ Low level of traffic (less than 100 car trips during AM Peak).	▪ Challenging to remove vehicular traffic. ▪ Caters for a high demand of traffic connecting National road network to Kilkenny City.	▪ Challenging to remove vehicular traffic. ▪ Caters for a high demand of traffic connecting National road network to Kilkenny City.	▪ Challenging to remove vehicular traffic. ▪ Caters for a high demand of traffic connecting National road network to Kilkenny City. ▪ No alternative route in the north-west of the City.
Traffic Calming	▪ Further reduction in speed limit (50kph) not appropriate on key radial route. ▪ Some localised traffic calming measures already in place such as speed pillows.	▪ Further reduction in speed limit (50kph) not appropriate on key radial route.	▪ Further reduction in speed limit (50kph) not appropriate on key radial route. ▪ Implement traffic calming measures at Kilkenny Project and St. John of God National Schools.	▪ Further reduction in speed limit (50kph) not appropriate on key radial route.	▪ Further reduction in speed limit (50kph) not appropriate on key radial route.
Junction Treatment	▪ Rbt at northern end of route should be upgraded to be more cycle-friendly in line with DMURS and NCM.	▪ No major junctions on this route.	▪ Corner radii should be tightened on some access points. ▪ Upgrade Rbt at junction with Bohernatounish Rd to improve cyclist safety and comfort in line with DMURS and NCM.	▪ Upgrade College Rd Rbt to improve cyclist safety and comfort in line with DMURS and NCM.	▪ Corner radii should be tightened on some access points in line with DMURS.
Redistribution of Carriageway	▪ Scope to provide more space for cyclists, e.g. grass strips.	▪ Scope to provide more space for cyclists, e.g. grass verges, ghost island.	▪ Scope to widen existing cycle lanes by removing central ghost island and on-street parking.	▪ Potential to widen cycle lanes by removing on-street parking and reallocating road space.	▪ Scope to increase space for cyclists along some sections of the road, however there may be competing demand with need to widen footpaths.
Cycle Lanes/ Tracks	▪ NCM recommends provision of a cycle lane, cycle track or a Shared Street may be appropriate. ▪ Upgrade existing infrastructure. ▪ Scope to provide segregated cycle lanes.	▪ NCM recommends provision of a cycle lane, cycle track or a Shared Street may be appropriate. ▪ Upgrade existing infrastructure. ▪ Scope to provide segregated cycle lanes.	▪ NCM recommends provision of cycle track or lane. ▪ Upgrade existing infrastructure. ▪ Scope to provide segregated cycle lanes.	▪ NCM recommends provision of cycle track or lane. ▪ Upgrade existing infrastructure. ▪ Scope to provide segregated cycle lanes, e.g. removal of on-street parking.	▪ NCM recommends provision of cycle track. ▪ Upgrade existing infrastructure. ▪ Difficult to provide continuous segregated cycle lanes due to width constraints. Section of route along Bishops Hill could be a mixed environment as speed limit is 30kph.
Cycleway	▪ Potential to expand Quietway through residential estates (existing paths between Cedarwood Dr.).	▪ No suitable Cycleway available.	▪ No suitable Cycleway available.	▪ No suitable Cycleway available.	▪ Several Quietways are available: River Nore Linear Park; Riverside Drive; and Granges Rd (mandatory cycle lanes along most of route).

5.3.4 Assessment of City Centre Network Options

Similar to the methodology employed for the Radial Routes, Options for the City Centre Network are based on existing cycle desire lines and where the highest demand is. These were then assessed following the *National Cycle Manual's* Hierarchy of Provision. The assessment undertaken was a high-level qualitative, desk-based assessment.

Within the City Centre core central area, no dedicated cycle lanes or tracks are proposed on some routes. Instead, traffic calming, removal of through traffic, contraflows and lower speed limits are proposed. This is in line with the *National Cycle Manual* and DMURS.

Table 5-5 Assessment of City Centre Cycle Network.

	High Street	Parliament Street	John Street	St. John's Bridge	Rose Inn Street
Existing Facility	▪ No dedicated cycle lanes or tracks. ▪ Bike parking provided at a number of locations along the street.	▪ No dedicated cycle lanes or tracks.	▪ No dedicated cycle lanes or tracks.	▪ No dedicated cycle lanes or tracks.	▪ No dedicated cycle lanes or tracks. ▪ Bike parking provided at The Parade.
Traffic Reduction	▪ Vehicular traffic could be diverted around the central core.	▪ Vehicular traffic could be diverted around the central core.	▪ Vehicular traffic could be diverted around the central core.	▪ Vehicular traffic could be diverted around the central core.	▪ Vehicular traffic could be diverted around the central core.
Traffic Calming	▪ Speed limit set at 30kph. ▪ Lower speeds could be achieved through design.	▪ Speed limit set at 30kph. ▪ Lower speeds could be achieved through design.	▪ Speed limit set at 30kph. ▪ Lower speeds could be achieved through design.	▪ Speed limit set at 30kph. ▪ Lower speeds could be achieved through design.	▪ Speed limit set at 30kph. ▪ Lower speeds could be achieved through design.
Redistribution of Carriageway	▪ Difficult to cater for all modes adequately with segregated infrastructure due to width constraints. ▪ Traffic and/or on-street parking would need to be removed. ▪ Mixed Street/Shared Street environment could be achieved as it is a low speed environment. ▪ Junction with High Street/Rose Inn Street should be upgraded to provide a safe and legible environment that prioritises movement of pedestrians and cyclists in line with DMURS principles.	▪ Difficult to cater for all modes adequately with segregated infrastructure due to width constraints. ▪ Traffic and/or on-street parking would need to be removed. ▪ Mixed Street/Shared Street environment could be achieved as it is a low speed environment.	▪ Difficult to cater for all modes adequately with segregated infrastructure due to width constraints. ▪ Traffic and/or on-street parking would need to be removed. ▪ Mixed Street/Shared Street environment could be achieved as it is a low speed environment. ▪ Junction with Dublin Rd should be upgraded to provide a safe and legible environment that prioritises movement of pedestrians and cyclists in line with DMURS principles.	▪ Difficult to cater for all modes adequately with segregated infrastructure due to width constraints. ▪ Traffic would need to be removed. ▪ Mixed Street/Shared Street environment could be achieved as it is a low speed environment.	▪ Difficult to cater for all modes adequately with segregated infrastructure due to width constraints. ▪ Traffic and/or on-street parking would need to be removed. ▪ Mixed Street/Shared Street environment could be achieved as it is a low speed environment. ▪ Junction with High Street/Rose Inn Street should be upgraded to provide a safe and legible environment that prioritises movement of pedestrians and cyclists in line with DMURS principles.
Cycle Lanes and Tracks	▪ As above.	▪ As above.	▪ As above.	▪ As above.	▪ As above.
Quietway	▪ A Quietway to this route may include Parnell Street, the proposed extension to River Nore Linear Park, the proposed urban street through the Abbey Quarter or the network of slips and laneways.	▪ A Quietway to this route may include the number of slips and laneways off of Parliament St, the proposed urban street through the Abbey Quarter.	▪ No suitable Quietway route.	▪ Possible to cross River Nore on Lady Desart Bridge, a dedicated footbridge.	▪ No suitable Quietway route.

5.4 KLTP Cycle Network

5.4.1 Route Categorisation

Routes on the proposed KLTP Cycle Network are classified as Primary, Secondary, Feeder, Greenway and Inter-Urban in line with the *National Cycle Manual*. This classification has been applied in development of options for the KLTP Cycle Network.

Table 5-6 KLTP Cycle Network Route Categories

Category	Description
Primary	Primary Routes are the main cycle arteries that cross the urban area and carry most cycle traffic.
Secondary	Secondary Routes link between principal cycle routes and zones.
Feeder	Feeder Routes are cycle routes within local zones and/or connections from zones to the network levels above (Primary and Secondary).
Greenway	Greenway Routes are developed predominantly for tourist, recreational and leisure purposes but may also carry elements of the utility cycle route network.
Inter-Urban	Inter-Urban Routes link towns and cities across rural areas and include elements of the National Cycle Network.

5.4.2 Proposed KLTP Cycle Network Plan

The option development process for Kilkenny's cycle network has been informed by the guidance outlined in the *National Cycle Manual.* A comprehensive review and assessment of cycle desire lines and demand based on 2040 mode share targets and existing conditions has resulted in the emerging KLTP Cycle Network Plan.

Figure 5-3 illustrates the proposed KLTP Cycle Network. Each route is indicative and will be subject to its own individual statutory scheme appraisal process.

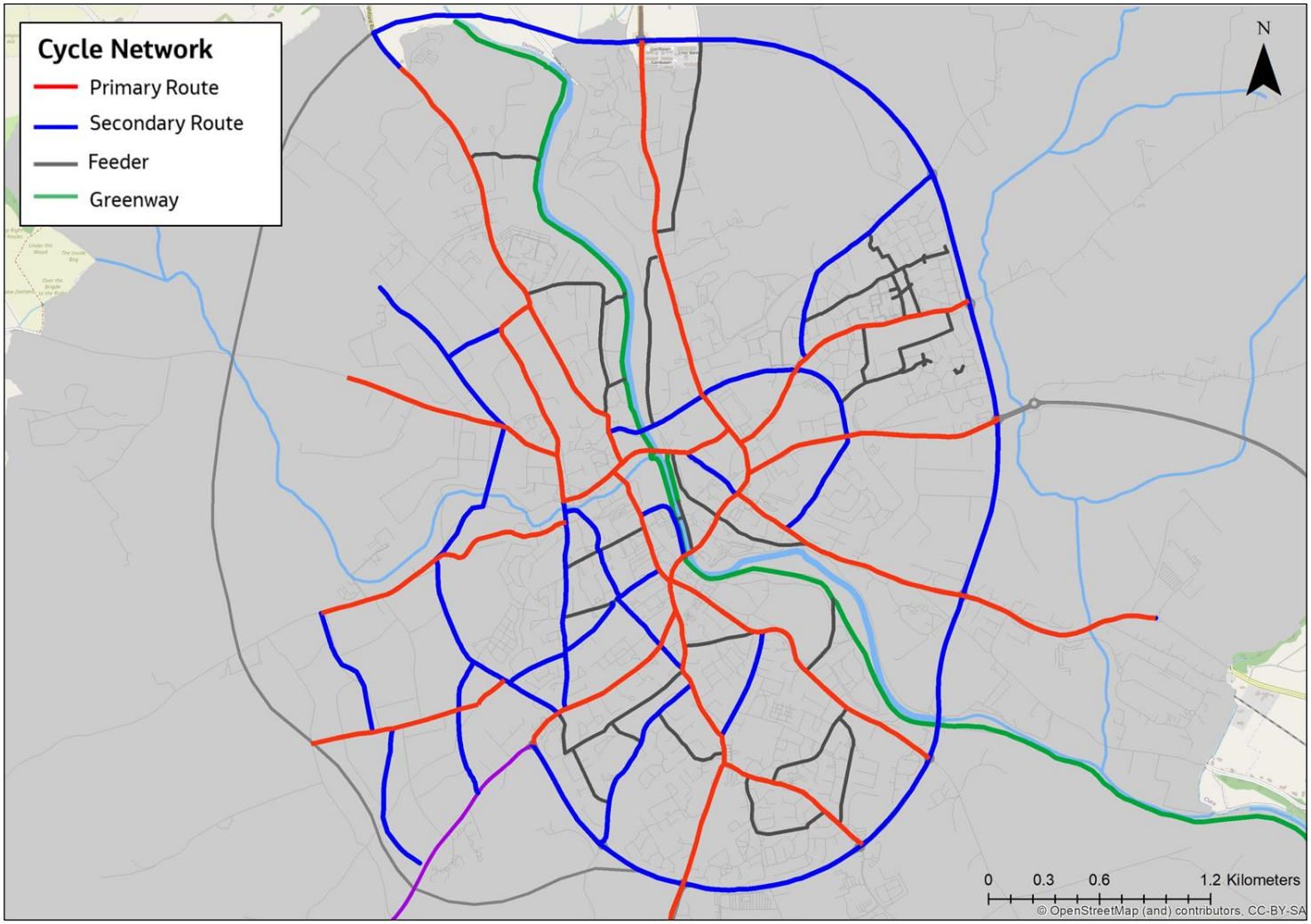


Figure 5-3 Proposed KLTP Cycle Network.

5.5 Cycle Parking

A key component of a successful Cycle Network is high-quality cycle parking. Making cycle parking consistently available, convenient, secure and weather-proof will help to encourage people to cycle. Cycle parking facilities must be conveniently located, adequately lit and should not be located in out-of-the-way locations, in line with the NTA's *National Cycle Manual*. All cycle parking facilities within multi-storey car parks should be provided at the entry level, as well as designated entry and exit routes to the car park for cyclists, to provide safe and convenient cycle access.

Individual bike lockers, cycle hubs and shared on-street hangars such as Dublin City Council's recent BETA project BikeBunkers offer security to cyclists and provide an innovative solution to cycle parking requirements for longer periods of time, particularly where internal storage space is limited in both residential and commercial settings.

The *Kilkenny City and Environs Development Plan 2014-2020* sets out bicycle parking standards per development type. Standards for primary schools require that spaces should be provided for 20% of children, with spaces to be provided for 33% of children in secondary schools. These standards should be revised upwards in tandem with other measures to encourage and enable more children to walk and cycle to school.

5.6 Public Awareness Campaigns

Information and education campaigns are an important 'soft' supporting measure to raise awareness and improve understanding of the travel choices available to people. Information campaigns play an important role in helping the general public to overcome the barriers of switching from private car use to sustainable modes such as cycling.

Similarly, raising awareness of the multitude of health, social, environmental and economic benefits of cycling and creating people-friendly places is also an effective way of encouraging people to change habits, as well as securing buy-in from the general public and business owners.

In delivering sustainable transport improvements, consideration should be given to branding, marketing, and advertising and using smart, creative, cost-efficient campaigns targeted at increasing and maintaining sustainable transport demand. Information campaigns should be an integral part of the successful delivery of the KLTP. It is noted that Waterford Institute of Technology, as part of their research, in collaboration with Kilkenny County Council, Kilkenny Leader Partnership, Kilkenny Recreation and Sports Partnership, Kilkenny Chamber of Commerce and Cartoon Saloon recently launched a survey around cycling and travel behaviour. This will help raise awareness among the local community in Kilkenny of the benefits of cycling, and inform future public awareness campaigns.

6. Walking Network Option Development

6.1 Overview

Walking is the most sustainable form of transport. Though often undervalued, walking links all modes of transport and is therefore critical to the overall network. Compared to other users, pedestrians cover less ground in the same amount of time, and experience the street most intensely. Planning for walking is complex and requires an appreciation of how the whole urban system is designed to better facilitate walking: from streets, urban roads and open spaces to the buildings that front onto them as well as connections to public transport stops and stations that support onward movement.

The pedestrian environment must therefore be safe, inclusive, legible, permeable, interesting and attractive for people of all ages and abilities. By prioritising design for pedestrians first in line with the *Design Manual for Urban Roads and Streets* (DMURS) user hierarchy, the number of short journeys taken by car can be reduced and public transport made more accessible.

This section will propose a set of options for the KLTP Walking Network based on:

- Minimum 35% mode share target for walking;
- Assessment of travel demand within the Study Area using outputs from the SERM;
- *Design Manual for Urban Roads and Streets* and other policies, plans and guidelines;
- Need to support a high quality and fully accessible environment for all abilities and ages by continuing to develop a safe, legible, inclusive and attractive public realm in a manner that prioritises pedestrian movement over that of the private car; and
- Creation of the 10-Minute City and the need to ensure access between residential areas, schools, community facilities and key employment areas.

6.2 Walking Network Development

This section presents the demand analysis and option development for the walking network within Kilkenny City. The 2040 target demand is used to identify appropriate network requirements and to create an attractive, permeable, accessible and safe walking network.

General improvements to the Walking Network envisaged for Kilkenny City Centre over the lifetime of the KLTP include:

- Reallocation of road space to prioritise pedestrian movement either through the widening of footpaths and provision of additional crossing points;
- Creation of Mixed Streets/Shared Streets.;
- Key junction improvements to prioritise pedestrian connectivity and permeability, particularly at roundabouts;
- Enhanced connectivity between the City Centre and MacDonagh Station via St. John's Bridge;
- Matching crossing facilities with pedestrian desire lines;
- Removal of street clutter;
- Regular Walkability Audits with a variety of stakeholder groups;
- Adequate provision of publicly-accessible toilets, lighting and seating; and
- High-quality place-making and urban design improvements.

6.2.1 Radial Route Demand

A number of routes have been identified as strategic routes for the KLTP Walking Network as they connect residential areas to key employment and educational uses, predominantly on the radial approach routes to and from the City Centre. Many of these routes experience the highest level of demand during the AM peak period, as illustrated in Figure 6-1. This map shows existing desire lines and the volume of pedestrians on the existing network during the AM peak period travelling in both inbound and outbound directions. As noted earlier in the Report, the option development stage has been undertaken in the absence of future land use scenarios and is based on the 2012 demand, factored to align with the target walking mode share.

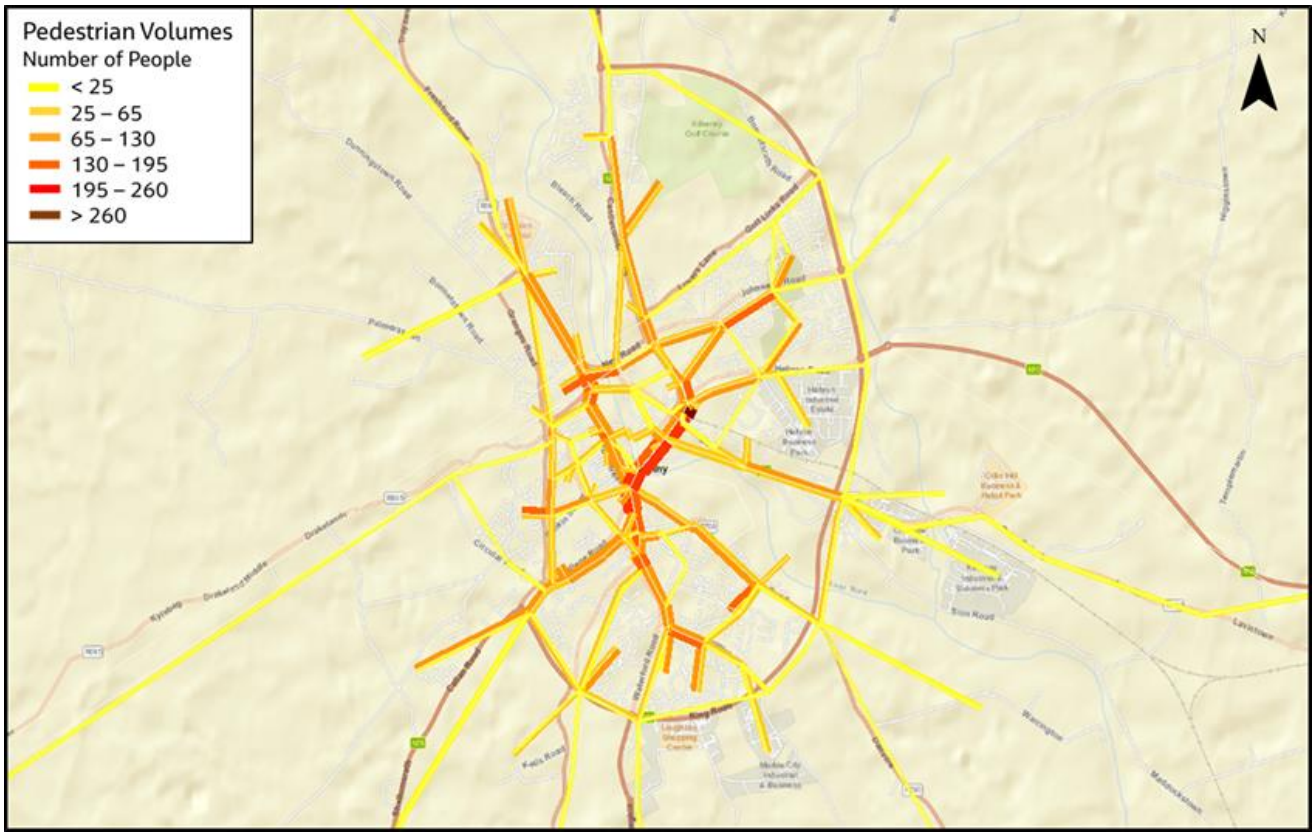


Figure 6-1 AM Peak Pedestrian Flows.

These strategic radial routes include:

- **Castlecomer Road:** serves Kilkenny College and many residential estates such as The Weir View, Glenbawn and Meadow Way;
- **Johnswell Road/Golflinks Road:** serves many residential estates such as Beechlawns, Rosewood, Ashfield, The Orchard and Lintown, Newpark Shopping Centre and LIDL;
- **Hebron Road:** serves Nowlan Park, O'Loughlin GAA Gaels Club, Intreo Centre, ALDI, many residential and industrial estates;
- **Dublin Road**: serves St. Canice's Hospital, Kilkenny MacDonagh Train Station, several residential estates such as Shandon Park and Lacken Drive and a number of industrial estates outside of the Kilkenny Ring Road in the Leggettsrath area;
- **Bennetsbridge Road**: serves a largely residential area including estates such as Larchfield, Dukesmeadow Avenue and Melville Heights;

- **Bohernatounish Road**: serves Loughboy Shopping Centre, Presentation Secondary School, The Watershed sports complex, LIDl, ALDI and a number of residential estates;
- **R910 (Waterford Road):** serves Kilkenny Project National School, a number of residential estates such as Hollybank Park and Springfields and several health centres such as Lime Tree House Dental Clinic and Kilkenny Osteopathic and Therapy Clinic;
- **R909 (College Road)**: serves St. Kiernan's College, a number of retail outlets such as Spar and Centra, St. Patrick's Catholic Church and several residential estates such as College Square;
- **Connections to Western Environs:** connecting the existing City Centre with a new neighbourhood;
- Connections to **Loughmacask**: connecting the existing City Centre with a new neighbourhood; and
- **R693 (Freshford Road):** serves Aut Even Hospital, St. Luke's General Hospital, Loreto Secondary School, St. James Park, Kilkenny Greyhound Stadium and a number of residential estates such as The Sycamores and Talbot's Gate.

Table 6-2 and Table 6-3 present a high-level qualitative assessment of these radial routes as part of the proposed KLTP Walking Network. The analysis assesses the routes under the following headings:

- Increase Footpath Width;
- Junction Treatment and Access;
- Traffic Reduction; and
- Traffic Calming.

The Tables also present recommendations for interventions that are needed and/or possible to improve the pedestrian environment along these key routes. The cells are colour coded to indicate relative performance.

Table 6-1 Rationale of Colour Coding for Assessment.

Possibility of Design Solution	Colour Code
Existing Facility/Possible Intervention	
May be Challenging to Achieve	
Difficult to Achieve	

Figure 6-2 Diagram showing the amount of space needed for pedestrians to pass each other with regard to pedestrian activity levels Source: Pg. 87, DMURS, 2019.

While there is generally a continuous provision of footpaths both inbound and outbound, the pedestrian environment is negatively impacted by substandard crossing facilities, dominance of car traffic, a proliferation of roundabout junctions and narrow footpaths. According to DMURS, studies show that providing wider and better quality facilities, free of obstacles, can lead to an increase in walking. Figure 6-2 illustrates the space that is needed for pedestrians to pass each other comfortably and safely in relation to the level of pedestrian activity on a route.

Table 6-2 Assessment of Radial Routes of the Proposed KLTP Walking Network

	Castlecomer Road	Johnswell Rd/ Golflinks Rd	Hebron Rd.	Dublin Rd
Existing	▪ Continuous provision of footpaths on both sides of the road. Very narrow in parts. ▪ Mixed quality. ▪ Intermittent shared facilities with cyclists which reduces the Quality of Service for pedestrians, particularly vulnerable pedestrians. ▪ Few formal crossing opportunities.	▪ Continuous provision of footpaths on both sides of the road. Overall good quality. ▪ Shared facilities with cyclists which reduces the Quality of Service for pedestrians, particularly vulnerable pedestrians. ▪ Few formal crossing opportunities.	▪ Continuous provision of footpaths on both sides of the road. ▪ Narrow in sections. ▪ Mixed quality.	▪ Continuous provision of footpaths on both sides of the road. ▪ Mixed quality. Pedestrian environment disimproves significantly on approach to City Centre, particularly around MacDonagh Station with multi-stage crossings, slip lanes and guardrails. ▪ Shared facility on part of the route which reduces the Quality of Service for pedestrians, particularly vulnerable pedestrians. ▪ Several formal crossing opportunities.
Key Origins/ Destinations	Kilkenny College, Kilkenny Model School and many residential estates such as The Weir View, Glenbawn and Meadow Way.	Many residential estates such as Beechlawns, Rosewood, Ashfield, The Orchard and Lintown, Newpark Shopping Centre and LIDL.	Nowlan Park, O'Loughlin GAA Gaels Club, Intreo Centre, ALDI, many residential and industrial estates.	St. Canice's Hospital, Kilkenny MacDonagh Train Station, several residential estates such as Shandon Park and Lacken Drive and a number of industrial estates outside of the Kilkenny Ring Road in the Leggettsrath area.
Increase Footpath Width	▪ Scope to widen footpath particularly along the northern half of the route., e.g. use of grass verges.	▪ Scope to widen footpaths, e.g. use of grass verges.	▪ May be challenging to provide more space for pedestrians within existing cross-section, particularly after the O'Loughlin Rd Rbt on the approach to City.	▪ Scope to widen footpaths, e.g. removal of on-street parking and grass verges. ▪ Some pinch-points on route, particularly on the approach to the City Centre. ▪ Scope to create a more pedestrian-friendly environment around MacDonagh Station on Dublin Road.
Junction Treatment & Access	▪ New Road Rbt should be upgraded to improve pedestrian comfort and safety. ▪ Vehicular entrances to development should be improved, i.e. tighter corner radii, at grade pedestrian crossing.	▪ Vehicular entrances to development should be improved, i.e. tighter corner radii, at grade pedestrian crossing. ▪ Newpark Drive Rbt should be upgraded to improve pedestrian comfort and safety.	▪ Vehicular entrances to development should be improved, i.e. tighter corner radii, at grade pedestrian crossing. ▪ O'Loughlin Rd Rbt should be upgraded to be more pedestrian-friendly.	▪ Vehicular entrances to development should be improved, i.e. tighter corner radii, at grade pedestrian crossing. ▪ Access to MacDonagh Station should be upgraded to provide a safe and legible environment that prioritises movement of pedestrians and cyclists in line with DMURS principles. Some proposed improvements are set out in Section 4.11.
Traffic Reduction	▪ Challenging to remove vehicular traffic. ▪ Caters for a high demand of traffic connecting National road network to Kilkenny City.	▪ Low level of traffic (100-250 car trips during AM Peak).	▪ Challenging to remove vehicular traffic. ▪ Caters for a high demand of traffic connecting National road network to Kilkenny City.	▪ Challenging to remove vehicular traffic. ▪ Caters for a high demand of traffic connecting National road network to Kilkenny City.
Traffic Calming	▪ Further reduction in speed limit (50kph) not appropriate on key radial route. ▪ Scope to implement localised traffic calming measures around access to Kilkenny National School and Kilkenny College.	▪ Further reduction of speed limit (50kph) not appropriate on key radial route. ▪ 30kph Gateway begins on the approach to St. John's Senior National School.	▪ Further reduction in speed limit (50kph) not appropriate on key radial route.	▪ Further reduction in speed limit (50kph) not appropriate on key radial route.

Table 6-3 Assessment of Radial Routes of the Proposed KLTP Walking Network.

	Bennettsbridge Rd	Bohernatounish Rd	Waterford Rd. (R910)	R909 (College Road)	R693
Existing	▪ Continuous provision of footpaths on both sides. ▪ Narrow in sections.	▪ Continuous provision of footpaths on both sides. ▪ Several formal crossing opportunities. ▪ Narrow in sections.	▪ Continuous provision of footpaths on both sides. ▪ Generally good quality.	▪ Continuous provision of footpaths on both sides. ▪ Shared facility on part of the route which reduces the Quality of Service for pedestrians. ▪ Several formal crossings.	▪ Continuous provision of footpaths where necessary. ▪ Overall poor quality footpaths, i.e. narrow in parts, broken.
Key Origins/ Destinations	Many residential areas such as Larchfield, Dukesmeadow Avenue and Melville Heights.	Loughboy Shopping Centre, Presentation Secondary School, The Watershed sports complex, LIDl, ALDI and a number of residential estates. Route also extends beyond the Kilkenny Ring Road to the IDA Kilkenny Business and Technology Park.	Kilkenny Project National School, LIDL, ALDI, St. John of God National School and several residential estates such as Hollybank Park and Hawthorn Walk	St. Kiernan's College, a number of retail outlets such as Spar and Centra, St. Patrick's Catholic Church and several residential estates such as College Square.	Aut Even Hospital, St. Luke's General Hospital, Loreto Secondary School, St. James Park, Kilkenny Greyhound Stadium and a number of residential estates such as The Sycamores and Talbot's Gate.
Increase Footpath Width	▪ Scope to provide more space for pedestrians, e.g. use of grass verges.	▪ Scope to provide more space for pedestrians, e.g. grass strips could be repurposed to provide wider footpaths.	▪ Existing footpaths quite wide along most of the route. ▪ Scope to widen footpaths.	▪ Potential to widen footpaths by removing on-street parking.	▪ Scope to increase space for pedestrians along some sections of the road. Challenging to provide along entire route due to width constraints.
Junction Treatment & Access	▪ Vehicular entrances to development should be improved, i.e. tighter corner radii, at grade pedestrian crossing.	▪ Rbt at northern end of route should be upgraded to improve pedestrian safety and comfort.	▪ Vehicular entrances to development should be improved, i.e. tighter corner radii, at grade pedestrian crossing. ▪ Rbt at junction with Kells Rd should be upgraded to improve pedestrian safety and comfort.	▪ College Rd Rbt should be upgraded to improve pedestrian safety and comfort.	▪ Vehicular entrances to development should be improved, i.e. tighter corner radii, at grade pedestrian crossing. ▪ Provide pedestrian crossing by St. Luke's Hospital to access bus stop and residential areas.
Traffic Reduction	▪ Challenging to remove vehicular traffic. ▪ Caters for high demand of traffic connecting National road network to the City.	▪ Challenging to remove vehicular traffic. ▪ Caters for a high demand of traffic connecting National road network to Kilkenny City.	▪ Challenging to remove vehicular traffic. ▪ Caters for a high demand of traffic connecting National road network to Kilkenny City.	▪ Challenging to remove vehicular traffic. ▪ Caters for a high demand of traffic connecting National road network to Kilkenny City.	▪ Challenging to remove vehicular traffic. ▪ Caters for a high demand of traffic. ▪ No alternative route for traffic entering the north-west of the City.
Traffic Calming	▪ Further reduction in speed limit (50kph) not appropriate on key radial route.	▪ Further reduction in speed limit (50kph) not appropriate on key radial route. ▪ Some traffic calming measures already in place, e.g. speed pillows.	▪ Further reduction in speed limit (50kph) not appropriate on key radial route. ▪ Scope to implement localised traffic calming measures around access to Kilkenny Project National School and St. John of God National School.	▪ Further reduction in speed limit (50kph) not appropriate on key radial route.	▪ Further reduction in speed limit (50kph) not appropriate on key radial route.

6.3 City Centre Street Network

The City Centre Street Network should enable the safe, convenient and comfortable movement of pedestrians throughout the central core area.

Whilst Kilkenny City's medieval core is compact, the pedestrian environment in some areas is negatively impacted by substandard crossing facilities, dominance of car traffic and narrow footpaths. Kilkenny City has significant potential to enhance its walkability due to its favourable flat topography and public realm improvements in recent years such as The Parade and the time-restricted pedestrianisation of St. Kieran's Street, which has been temporarily extended to 09:00-21:00 as part of Kilkenny County Council's Covid-19 response to facilitate social distancing.

Considerable growth within the Study Area is envisaged up to 2040, with a significant portion of that growth earmarked for the City Centre core in the Abbey Quarter and Old Mart site. These developments will attract increased pedestrian activity across the City meaning that an uplift in the quality of the pedestrian environment is required.

In order to achieve the mode share target and the KLTP objectives such as: creating the 10-minute city; improve the accessibility, permeability and safety of the public realm for pedestrians; and to enhance the public realm through traffic management and transport interventions, the following options are to be considered for Kilkenny's Walking Network:

- Pedestrianisation;
- Pedestrian priority areas;
- Shared Spaces;
- Reallocate more space for pedestrians through widening footpaths or providing footpaths where needed;
- Junction improvements to ensure the safe and convenient movement of pedestrians;
- Ensure that the design and layout for new development provides connectivity to the existing street network and is fully permeable for walking and cycling; and
- Safe, high-quality walking routes must be a priority between schools and local residential areas or designated drop-off zones (i.e. Safe Routes to School, Walking Bus).

Similar to the methodology employed for the Radial Routes, Table 6-5 presents a high-level qualitative assessment of key City Centre streets as part of the proposed KLTP Walking Network. The streets are assessed under the following headings:

- Pedestrianisation;
- Widen Footpath;

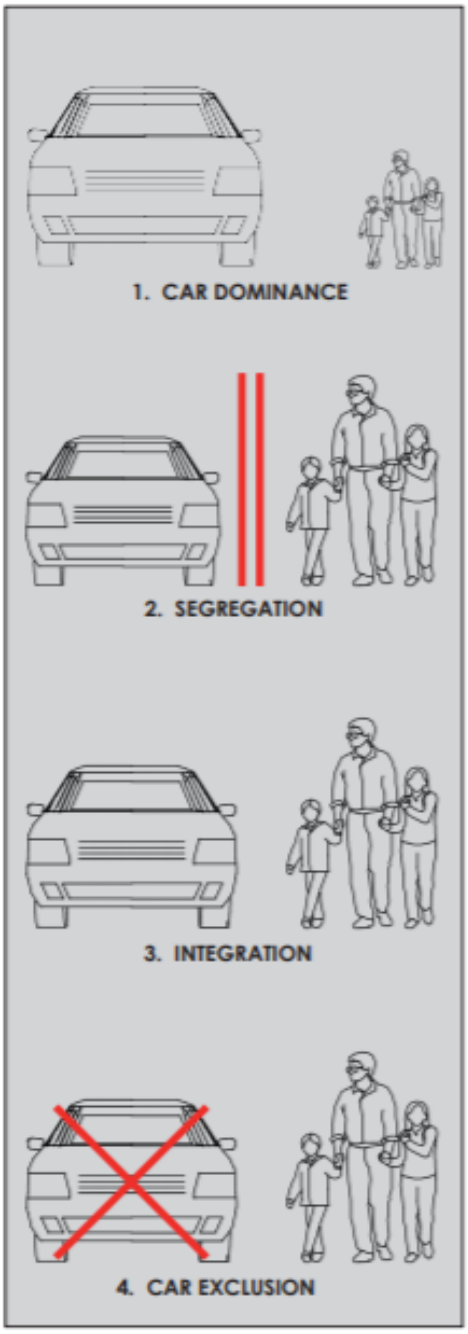


Figure 6-3 Four models of road design, adapted from Jan Gehl within Life Between Buildings (1971), illustrating the relationship between cars and people within a road or street. Source: Pg. 17, DMURS, 2019.

- Traffic Reduction/Traffic Management;
- Traffic Calming; and
- Junction Treatment.

The cells are colour coded to indicate relative performance.

Table 6-4 Rationale of Colour Coding for Assessment.

Possibility of Design Solution	Colour Code
Existing Facility/Possible Intervention	
May be Challenging to Achieve	
Difficult to Achieve	

Table 6-5 Assessment of Key City Centre Streets part of the proposed KLTP Walking Network.

	High Street	Parliament St.	John's Street / St. John's Bridge	Rose Inn Street	The Parade
Existing Conditions and Context	▪ Main street of the City Centre core and forms part of the Medieval Mile. ▪ High-quality materials and attractive public realm with seating, lighting and bike parking. ▪ Several zebra crossings. ▪ Pinch points on footpaths as a result of on-street parking, loading bays and street width constrains due to building lines. ▪ One lane of vehicular traffic in each direction.	▪ Runs to the north of High Street. ▪ Forms part of the main street of the City Centre core and the Medieval Mile. ▪ Pinch points on footpaths as a result of on-street parking, loading bays and street width constrains due to building lines. ▪ One lane of vehicular traffic in each direction. ▪ Wide, sweeping junction into Abbey Quarter site which results in a dangerous crossing environment for pedestrians.	▪ Runs east-west connecting MacDonagh Station/Dublin Road with the main retail area of the City Centre. ▪ One lane of vehicular traffic in each traffic and on-street parking along parts of the northern side. ▪ Narrow footpaths due to limited space between buildings and on bridge. ▪ Raised table pedestrian crossings present.	▪ Runs east-west connecting St. John's Bridge to High Street/The Parade/Patrick Street. ▪ Mainly retail/commercial uses. ▪ Narrow street. ▪ One lane of vehicular traffic in each direction. ▪ Zebra crossing present.	▪ Runs to the north of Bennettsbridge Road. ▪ High-quality materials and attractive public space on the eastern side outside Kilkenny Castle used for markets and event gatherings. ▪ Seating, lighting, planters and bike parking present. ▪ Generally wide footpaths, however pinch point on the western side of the street due to on-street parking and stairs outside Castle Cabinets. ▪ One lane of vehicular traffic in each direction.
Pedestrianisation	▪ Vehicular traffic could be diverted around the central core. ▪ Deliveries could be time-limited or be encouraged via cargo bikes.	▪ Vehicular traffic could be diverted around the central core. ▪ May be challenging as proposed bus routes travel through Bateman Quay and the Abbey Quarter to Parliament Street. ▪ May be challenging as several off-street parking facilities are accessed via this street.	▪ Not possible as this is a key bus corridor with three of five proposed bus routes serving the street, as well as regional bus services.	▪ Not possible as this is a key bus corridor with three of five proposed bus routes serving the street, as well as regional bus services.	▪ May be challenging to remove vehicular traffic. ▪ Caters for a high demand of traffic connecting National road network to Kilkenny City from Bennettsbridge Road.
Widen Footpath	▪ Pedestrianisation and traffic reduction measures would enable more space to be given to pedestrians, either by widening footpaths or creating a Shared Street environment.	▪ Time-limiting access to loading bays to off-peak periods would limit pinch-points as a result of bays. Enforcement of the use of loading bays is critical. ▪ Traffic reduction measures would enable more space to be given to pedestrians, either by widening footpaths or creating a Shared Street environment.	▪ Challenging to widen footpaths within existing cross-section. ▪ Traffic reduction measures may enable more space to be given to pedestrians, either by widening footpaths or creating a Shared Street environment. ▪ May be challenging in the long-term as three out of five proposed bus routes travel through this street.	▪ Challenging to widen footpaths within existing cross-section. ▪ Traffic reduction measures may enable more space to be given to pedestrians, either by widening footpaths or creating a Shared Street environment. ▪ May be challenging in the long-term as three out of five proposed bus routes travel through this street.	▪ Existing footpaths are generally quite wide, with the pedestrian area on eastern side providing ample space. ▪ Scope to widen footpath by removing some on-street parking, particularly outside Castle Cabinets where there is a pinch-point on the footpath.
Traffic Reduction / Traffic Management	▪ One-way system could be introduced from The Parade to Parliament Street. A system like this already in place temporarily to facilitate social distancing.	▪ One-way system could be introduced from High Street to Dean Street. ▪ May be challenging as proposed bus routes travel through Bateman Quay and the Abbey Quarter to Parliament Street.	▪ One-way system could be introduced. ▪ Vehicular traffic could be diverted around the central core to other river crossings such as St. Francis Bridge, Green's Bridge or N10. ▪ May be challenging in the long-term as three out of five proposed bus routes travel through this street, including existing regional bus services.	▪ One-way system could be introduced from St. John's Bridge to The Parade. System like this already in place temporarily to facilitate social distancing. ▪ May be challenging in the long-term as three out of five proposed bus routes travel through this street, including existing regional bus services.	▪ May be challenging as runs north of Bennettsbridge Road which caters for a high demand of traffic connecting National road network to Kilkenny City.
Traffic Calming	▪ Speed limit is set at 30kph. ▪ Lower speeds could be achieved through design and place-making techniques.	▪ Speed limit is set at 30kph. ▪ Lower speeds could be achieved through design and place-making techniques.	▪ Speed limit is set at 30kph. ▪ Lower speeds could be achieved through design and place-making techniques.	▪ Speed limit is set at 30kph. ▪ Lower speeds could be achieved through design and place-making techniques.	▪ Speed limit is set at 30kph. ▪ Lower speeds could be achieved through design and place-making techniques.
Junction Treatment	▪ Junction with Rose Inn Street should be upgraded to improve legibility and prioritise pedestrian movement. ▪ Junction with Bateman Quay should be upgraded to prioritise the safe movement of pedestrians.	▪ Junctions with Bateman Quay and access points to the Abbey Quarter should prioritise the safe movement of pedestrians, e.g. tighten corner radii in line with DMURS.	▪ Junction with Dublin Road should be upgraded to improve legibility and safety for pedestrians. This would help improve connectivity between MacDonagh Station and City Centre.	▪ Junction with Rose Inn Street should be upgraded to improve legibility and prioritise pedestrian movement.	▪ Junction with Rose Inn Street should be upgraded to improve legibility and prioritise pedestrian movement

6.4 Proposed KLTP Walking Network

6.4.1 Route Categorisation

In the absence of official guidance on the categorisation of pedestrian routes, the following route categorisation has been proposed for the KLTP:

Table 6-6 KLTP Walking Network Route Categorisation.

Category	**Description**
Strategic	Strategic Routes comprise of the main radial corridors between the core City Centre, key employment and residential areas and outer neighbourhoods. The pedestrian environment along these routes should be characterised by high-quality wide footpaths and pedestrian-friendly junctions that ensure the safe and convenient movement of pedestrians. High-quality lighting, active frontage and building lines up to the footpath should be promoted to provide passive surveillance and enhance the perception of safety along these routes. Within the core City Centre area, Strategic Routes comprise of streets which cater for the highest level of footfall. Pedestrian movement should be prioritised as much as possible on these streets.
Feeder	In the outer neighbourhoods of the Study Area, Feeder Routes provide for internal pedestrian circulation, linking residential communities, employment areas, community facilities and amenity areas with Strategic Routes. Feeder Routes comprise more of a finer grain, often routing through residential streets and estates. These Routes should be characterised by a lot of street level interest and activity, with high-quality public realm and passive surveillance, to ensure pedestrian safety and security. The accessibility of paths connecting residential estates is an important consideration. Within the core City Centre area, Feeder Routes are characterised by traffic calmed streets.
Greenway/Amenity	Greenway Routes are predominantly development to cater for tourist, recreational and amenity purposes. However, they may also act as an alternative Quietway for pedestrians to the Strategic Routes.

6.4.2 Proposed KLTP Walking Network

Figure 6-4 illustrates the proposed KLTP Walking Network based on a comprehensive review and assessment of pedestrian desire lines and demand based on the walking mode share targets, and existing conditions has resulted in the emerging KLTP Walking Network Plan.

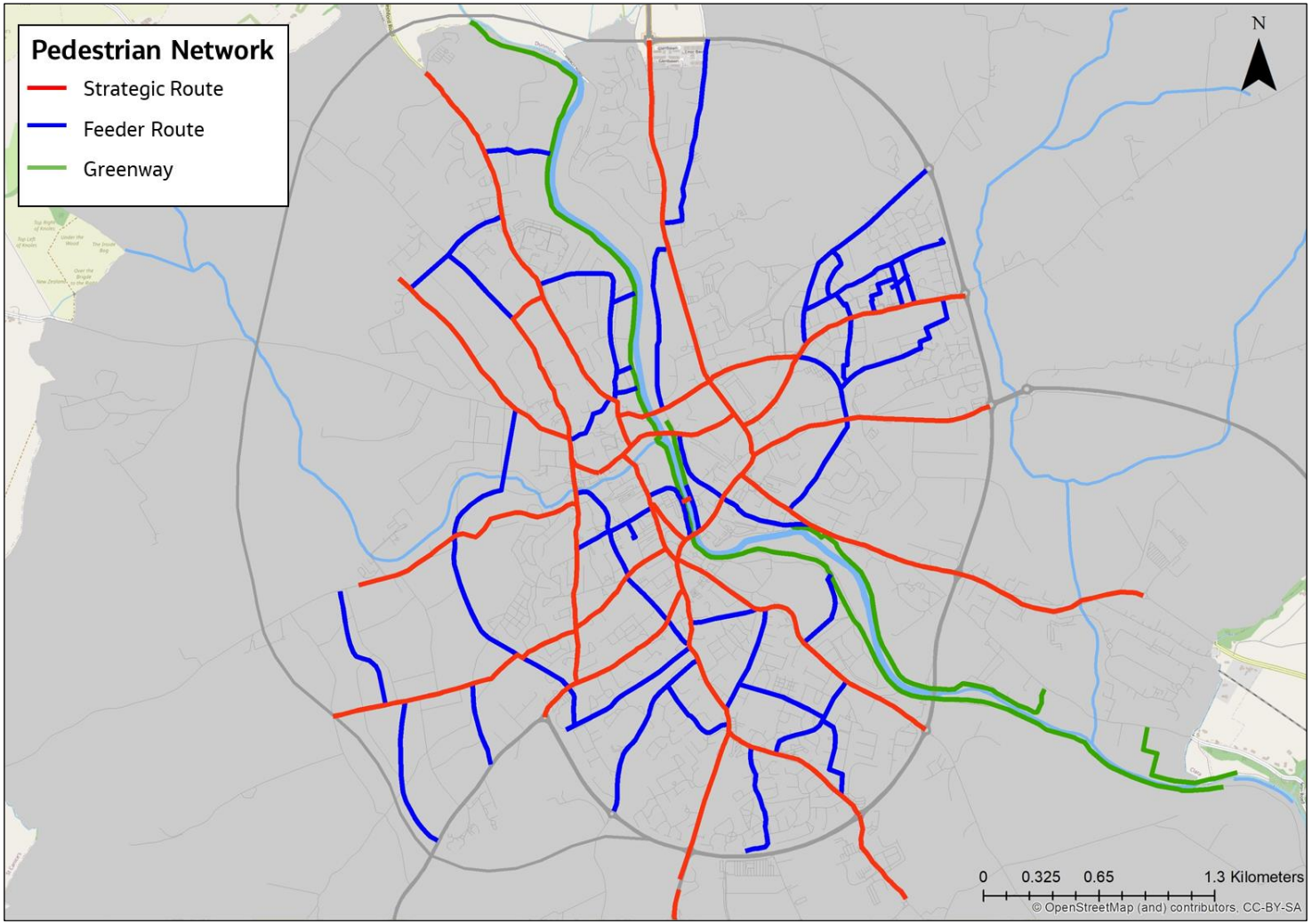


Figure 6-4 Proposed KLTP Walking Network.

6.5 Improvements to the Walking Network

6.5.1 Safe Routes to School

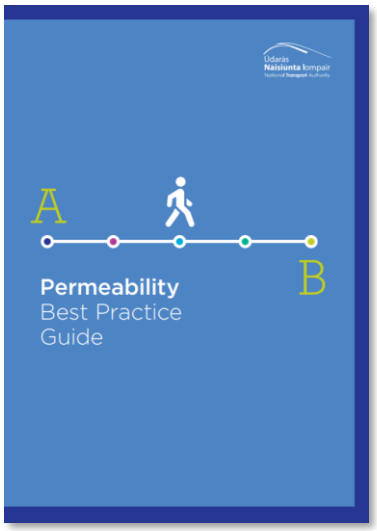
Travel to school is a significant contributor to peak time congestion. Given that 50% of trips to school in the Study Area are Car Passengers (CSO, 2016), the extent to which transport planning is considered in the context of schools is of critical importance to the achievement of modal shift as well as to the improvement of air quality around the school gate as well as public health.

Given the large number of primary and secondary schools located throughout Kilkenny (approximately 20) particularly within the urban centre, School Travel Plans (STPs) should be a requirement by each school to promote walking and cycling as the modes of choices to travel to and from school.

Further discussion on School Travel Planning is outlined in Section 10. Supporting Measures.

6.5.2 Permeability

Providing for permeability is an essential component of supporting more walkable and cycle friendly cities and neighbourhoods and facilitating better access to public transport. Good permeability is achieved through the availability of direct connections between origins and destinations that are accessible, safe and secure.



In many cases, this will involve the opening up of existing (or planned) cul-de-sacs or other barriers to pedestrian movement – particularly housing developments close to schools and supporting local shops and services. Permeability must be considered in relation to all developments on every scale.

At present, while there are good levels of permeability through some residential estates adjacent to Johnswell Road and Bohernatounish Road, there are still many estates surrounded by walls, fences and cul-de-sacs which are significant barriers to pedestrian movements. Furthermore, the accessibility of these paths for people of all ages and abilities varies. For example, the presence of a kerb between The Fairways or Beechlawns residential estates and the pedestrian path impedes access for those with a wheelchair, walking aid or a buggy.

Opportunities to improve permeability to existing developed areas should be actively sought in conjunction with the implementation of the public transport, pedestrian and cycle network enhancements provided for within the KLTP. Permeability measures could include:

- Direct, high-quality pedestrian connections matching desire lines to high capacity public transport corridors, bus stops and major walking destinations;
- Pedestrian and cycle crossings to link areas that are separated by roads or other physical barriers such as the River Nore;
- Planning and design of permeability measures that ensures accessibility for all, including persons with mobility challenges; and
- Low cost measures such as filtered permeability can be used to unlock access, reduce severance and rat-running and form direct connections to local services and longer distance dedicated walking and cycling routes. This could include the opening of a wall or cul-de-sac.

Regional Policy Objective (RPO) 152 of the *Regional Spatial and Economic Strategy* (RSES) outlines a number Local Planning objectives in relation to permeability:

- Deliver a high level of priority and permeability for walking, cycling and public transport modes, increasing with place context value as per the provisions of the *Design Manual for Urban Roads and Streets*, to create accessible, attractive, vibrant and safe, places to work, live, shop and engage in community life; and
- Where possible, developments will provide for filtered permeability. This will provide for walking, cycling, public transport and private vehicle access but at the same time will restrict or discourage private car through trips.

6.5.3 Wayfinding

Lack of awareness of routes and distances to destinations can be a barrier to walking, not only for tourists or visitors, but also for those with autism, dementia or other intellectual disabilities. Kilkenny County Council are currently preparing an Orientation Strategy to improve wayfinding through the urban core, with a focus on targeting tourists particularly along the Medieval Mile from Kilkenny Castle and Irishtown.

6.5.4 Age-Friendly County

Kilkenny is an Age-Friendly County, which is an initiative spearheaded by the World Health Organisation (WHO). Two of the key pillars of the Age-Friendly initiative are Transport and Outdoor Spaces and Buildings.

Some of the Goals identified in the *Kilkenny Age-Friendly Strategy 2017-2022* to achieve the outcomes of these pillars include:

- Develop a comprehensive city transport system, ensuring connectivity with areas of usage for older people hospital, shopping areas and residential areas. Location and quality of bus stops and timetables will form an important part of the service; and
- Kilkenny County Council will ensure that Age and Dementia-Friendly design and planning principles are embedded in local authority planning and development, e.g. design of public spaces, parking, signage and wayfinding.

These objectives will inform the implementation of the KLTP transport network.

6.5.5 Amenity Routes

Amenity routes provide a link between and improve access to areas of public open space and recreational amenities. Kilkenny's River Nore Linear Park is an asset for the City as a significant green-blue corridor running right through its central core, connecting with northern and southern environs. The River Nore Raised Wooden Walkway in the south-east is also an important amenity route. The benefits of green-blue corridors are multi-faceted including improved air quality, urban biodiversity, increased access to nature, contribution to flood management and the promotion of positive health and wellbeing.

Local amenity routes normally cater for both pedestrians and cyclists. Minimising conflict between pedestrians and cyclists will become a more pressing concern as the popularity of these routes increase. Where full segregation between pedestrian and cyclist movement is not possible, site-specific interventions including low level bicycle rumble strips and considerate walking and cycling campaigns to reduce conflict may be appropriate. Shared pavements for pedestrians and cyclists are often not an appropriate response and cause conflict between a range of users, particularly in a constrained environment.

6.5.6 Public Awareness Campaigns

Information and education campaigns are an important 'soft' supporting measure to raise awareness and improve understanding of the options and travel choices available to people. Information campaigns play an important role in helping the general public to overcome the barriers of switching from private car use to sustainable modes such as walking.

Similarly, raising awareness of the multitude of health, social, environmental and economic benefits of walking and creating people-friendly places is also an effective way of encouraging people to change habits, as well as securing buy-in from the general public and business owners.

The use of technology in the communication of information has evolved considerably over recent years and opportunities to take advantage of effective and efficient new methods of communication via mobile applications and social media should be explored.

In delivering sustainable transport improvements, consideration should be given to branding, marketing, and advertising and using smart, creative, cost-efficient campaigns targeted at increasing and maintaining sustainable transport demand. Information campaigns should be an integral part of the successful delivery of the KLTP.

7. Road Network

7.1 Overview

This section will outline the development of the proposed KLTP Road Network.

It will discuss the following:

- Completion of the Kilkenny Ring Road (Western Bypass) and the Central Access Scheme in the context of their relationship to one another;
- Principles for the provision of new roads;
- City Centre Traffic Management; and
- Urban Junction Improvements.

7.2 Kilkenny Ring Road and Central Access Scheme

This section reviews current proposals for new road infrastructure to the west of Kilkenny City Centre, and its function in the context of the KLTP and national guidance, *Spatial Planning and National Roads,* and makes recommendations as to their complementary needs and phasing. These roads include the completion of the Kilkenny Ring Road and the Central Access Scheme (CAS).

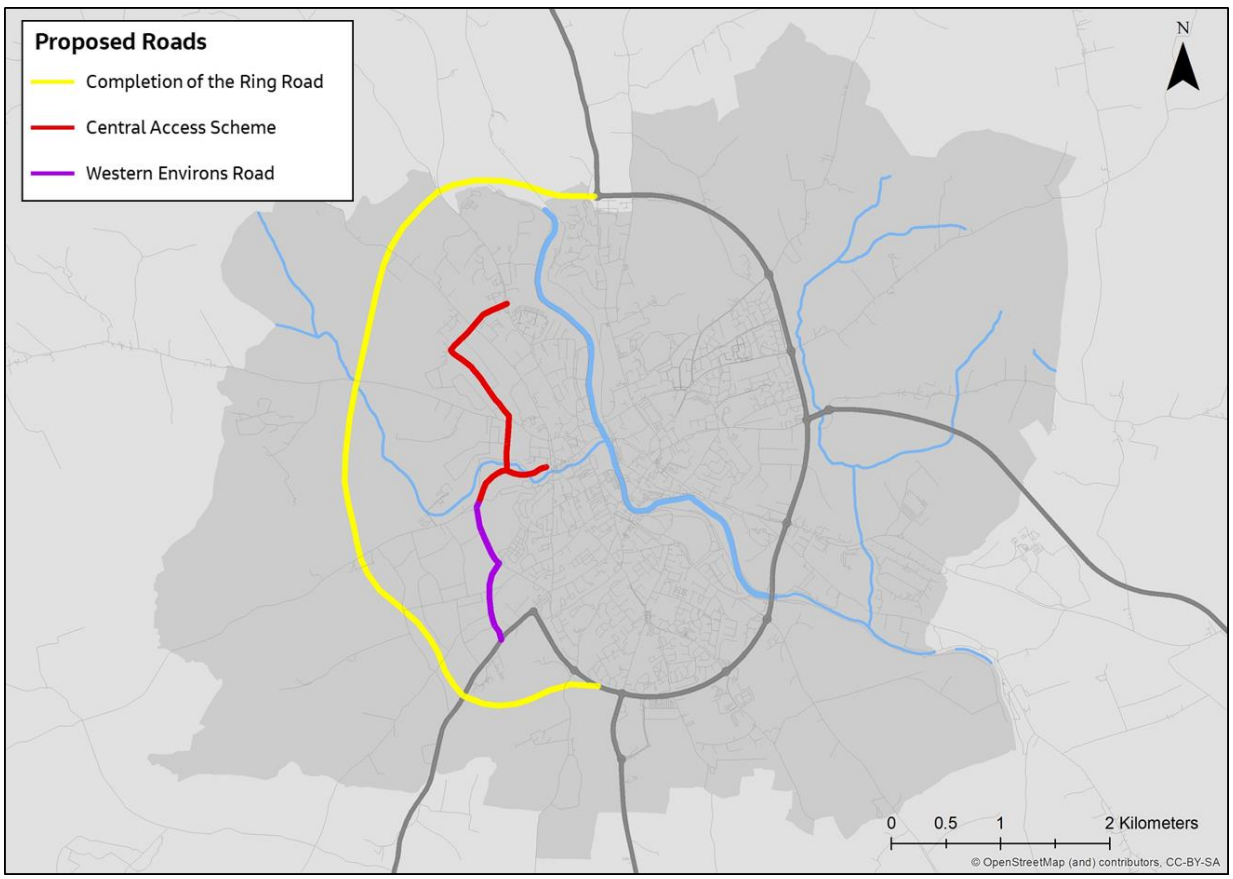


Figure 7-1 Indicative alignments of the completion of the Kilkenny Ring Road and the Central Access Scheme (CAS).

7.2.1 Review of Spatial Planning and National Roads

The *Spatial Planning and National Roads* guidelines set out planning policy considerations relating to development affecting National Primary and National Secondary Roads. The following key extracts from the guidelines are important considerations for determining the function of the Kilkenny Ring Road:

Function of National Roads

National roads play an integral role within Ireland's overall transport system and in the country's economic, physical and social development. The primary purpose of the National road network is to provide strategic connectivity between the main centres of population and employment, including key international gateways such as airports and ports, and to provide intra-regional connectivity.

In recent years, however, an increase in population and car ownership rates, changes in lifestyle and improvements in the quality of the road network have all contributed to the unsustainable sprawl of urban areas. New retail and employment developments tend to be attracted to motorways and National road corridors, particularly at junctions, and have led to dispersed and car dependent forms of development.

This pattern of development can make it difficult to provide public transport, walking and cycling networks, can have a detrimental impact on the viability and sustainability of urban centres and undermine the strategic function of the National road network. Government policy, therefore, no longer proposes to cater for this type of unlimited road traffic growth and development.

These guidelines state that "any local transport function of National road bypasses and relief roads in respect of the urban areas they pass through is, and must continue to be, secondary to the role of these roads in catering for strategic traffic" (p3).

Strategic Traffic

Strategic traffic in the context of National roads is defined as major inter-urban and inter-regional traffic, whether HGV, car, public transport bus services or other public service vehicles, which contributes to socio-economic development, the transportation of goods and products, especially traffic to/from the main ports and airports, both freight and passenger related.

Any local transport function of National road bypasses and relief roads in respect of the urban areas they pass through is, and must continue to be, secondary to the role of these roads in catering for strategic traffic. The planning system must therefore ensure that the strategic traffic function of National roads is maintained by limiting the extent of development that would give rise to the generation of short trip traffic on national roads or alternatively by ensuring that the trip demand from future development will primarily be catered for on the non-National network. These guidelines outline that new accesses to National roads and associated junctions must be avoided to safeguard and maintain the operating efficiency and carrying capacity of the National road network.

7.2.2 Principles for the Provision of New Roads

The development of new roads within Kilkenny City and environs should be undertaken in accordance with the following principles:

- New road schemes should be developed in accordance with the principles of Compact Growth as set out in NSO1 of the NPF;
- Road network should align with the objectives and mode share targets for the Study Area in terms of prioritising sustainable modes;

- New road schemes should demonstrate that alternative solutions, such as public transport provision, traffic management or demand management measures, cannot effectively and satisfactorily address the circumstances prompting the road proposal or are not applicable or appropriate;
- New road schemes should be designed to provide safe and appropriate arrangements to facilitate walking, cycling and public transport movement; and
- New non-National roads should ensure that strategic capacity and safety of National roads for strategic traffic is maintained in accordance with NSO2 Enhanced Regional Accessibility of the NPF by diverting local traffic to appropriate routes.

7.2.3 Completed Kilkenny Ring Road as a National Road

Taking into account the implications of the definitions of the function of National Roads and Strategic Traffic as outlined above, the following outlines the context of the completion of the Kilkenny Ring Road's role as a National road for the KLTP.

It is a long-standing objective of Kilkenny County Council to complete the Kilkenny Ring Road to form a Western Bypass. This was most recently supported by *the Regional Spatial and Economic Strategy for the Southern Region* (RSES) which set an objective to support the delivery of the infrastructural requirements identified for Kilkenny City including the delivery of the northern extension of the Ring Road from the N77 Castlecomer Road to the R693 Freshford Road from the N77 Castlecomer Road to the R910 Waterford Road.

As outlined above, the primary function of a National road is to provide strategic transport links between the main centres of population and employment, the main ports and airports and between all regions. Its secondary function is the provision of a local transport function, bypass and relief road in respect of urban areas. However, it is important to note that the role and function of a National road is not to support urban expansion or sprawl through the zoning of lands for residential or office based use. It is therefore critical that the number of access junctions is limited along the route and does not give rise to development.

At present, all National roads in the Study Area are connected by the existing Kilkenny Ring Road catering for the strategic function and removing through traffic from Kilkenny City. Congestion and delays are experienced on the existing Kilkenny Ring Road during the AM and PM peak periods. The completion of the Kilkenny Ring Road through the provision of a crossing over the River Nore, connecting with the R693 Freshford Road and the N76 would provide alternative routes between the National road connecting to the Kilkenny Ring Road. The necessity of the completion of the Kilkenny Ring Road should be considered in the context of future growth in wider strategic movements, and the available capacity on the existing Kilkenny Ring Road.

While the completion of the Kilkenny Ring Road would seem to provide a natural boundary to the edge of the development for Kilkenny City and potentially support compact growth, care needs to be taken with the introduction of this road due to the potential for development to spread beyond its boundaries, as has occurred and is proposed for Loughboy Business Park, Dublin Road and the zoned lands at Leggettsrath.

7.2.4 Central Access Scheme as a Regional / Distributor Route

This section outlines the Central Access Scheme (CAS) in the context of its role as a Regional Road, Distributor or Link Road.

Phase 1 of the CAS was completed in 2016, comprising the construction of St. Francis Bridge, a single-carriageway road providing east-west connectivity over the River Nore. Subsequent phases of the CAS will form an Inner Western Relief Road providing orbital movement for vehicles from the R693 to the R695 and the N76, as well as to the east-west link of the CAS through Kilkenny City. The Inner Western Relief Road element of the

CAS will provide vehicular access through the Breagagh Valley/ Loughmacask area to provide connectivity between the new development and surrounding areas.

Analysis in the Context Report highlighted that the CAS and St. Francis Bridge has led to increased traffic volumes travelling in and east-west direction through Kilkenny City, reducing traffic that previously would have used the Kilkenny Ring Road to the south. In this context the CAS is fulfilling some of the strategic function that the completion of the Kilkenny Ring Road and the potential River Nore crossing to the north.

The CAS as a Regional or Distributor type road was proposed to provide access to two new neighbourhoods at Western Environs and Loughmacask in the west and north-west of the Study Area that are planned to be developed over the coming years. New infrastructure may be required to ensure high-quality connectivity and permeability for walking, cycling and public transport within the neighbourhoods and with surrounding areas, with direct connections to the City Centre. The CAS may also provide the additional benefit of supporting the removal of traffic from the urban road and street network within Kilkenny City Centre, contributing further to the prioritisation of sustainable transport modes.

In this context, the CAS should provide a different function and play a more local role in the road network compared to the completion of the Kilkenny Ring Road outlined above. However, there is potential for duplication of function between the CAS and the completed Kilkenny Ring Road, in particular in terms of providing for orbital movements on the western side of Kilkenny, and providing a strategic function of linking the R639 with the wider National road network.

The need for infrastructure improvements to deliver the proposed Western Environs and Loughmacask development, however, and the necessity for the completion of the Central Access Scheme to cater for orbital movements should be considered independently and in the context of the completion of the Kilkenny Ring Road, and whether the orbital movements can be catered for by the provision of additional road infrastructure or through the provision of sustainable mode infrastructure.

7.2.5 Provision of both the Complete Kilkenny Ring Road and Central Access Scheme

The delivery of a combination of the completed Kilkenny Ring Road and the CAS may provide complementary functions, catering for both strategic and local needs, which aligns with the *Spatial Planning and National Roads* guidelines outlined above. In this instance, for example, the completion of the Ring Road would provide for strategic connectivity on the National road network whilst the CAS would act as a distributor road for the western area of Kilkenny City.

However, there is significant potential for duplication of function which would result in overprovision of road network to the west of Kilkenny City. This would likely result in an increase in car-based travel, increased length and number of journeys travelled by car, which would have the ultimate result of reducing the use of sustainable modes.

Where the completion of the CAS is to progress in advance of the completion of the Kilkenny Ring Road, it is unlikely that the Kilkenny Ring Road would be required within the lifetime of this Plan. Conversely, if the completion of the Kilkenny Ring Road was progressed in advance of the CAS, the need for the CAS to provide for orbital vehicular movements would be questionable.

It is recommended that the CAS be incorporated into the KLTP road network proposals to cater for the delivery of development land and to provide for multi-modal orbital function to the west of Kilkenny City and that the completion of the Kilkenny Ring Road be postponed beyond the life of this Plan, post 2040. The necessity of the completion of the Kilkenny Ring Road should be considered in the context of future growth in wider strategic movements and the available capacity on the existing Kilkenny Ring Road, beyond the provision of the substantive sustainable mode elements proposed as part of the KLTP.

7.3 City Centre Street Network

7.3.1 City Centre Traffic Management Options

Kilkenny's City Street Network plays an important role linking the City Centre Core with its inner neighbourhoods as well as strategic and amenity routes. The City is also a popular tourist destination with many attractions in the centre such as Kilkenny Castle and Park, and Medieval Mile, attracting thousands of visitors to the City each year.

Characterised by its medieval origins, the City Centre contains a street network of back lanes, or 'slips' as they are known locally. Some serve as short cuts for pedestrians offering good level of permeability and connectivity such as New Building Lane, or Pennyfeather Lane. However, the medieval fabric and street pattern of the City Centre also creates challenges in trying to cater for all modes and varying needs of the residents and visitors.

Section 3.1 outlines a movement strategy for the KLTP that actively discourages vehicular through-traffic, reduces dependency on the private car, and improves accessibility and permeability to and within the City Centre for pedestrians, cyclists and public transport users. Traffic management will be critical to achieve the principles of the Movement Strategy by supporting the prioritisation of sustainable modes, i.e. walking, cycling and public transport. City Centre Traffic Management Options for the KLTP are developed in line with the high-level movement strategy's aims and objectives. Public transport priority could take a number of forms such as bus lanes, time-restricted bus gates or traffic signalling priority at junctions proposed in Section 4.10.

This section sets out three Options for City Centre Traffic Management, followed by a Strengths, Weaknesses, Opportunities and Challenges (S.W.O.C.) analysis of each in Table 7-1.

7.3.2 Option 1: Covid-19 Mobility Measures

Option 1 was developed based on the temporary traffic management system currently in place within Kilkenny City Centre as part of the Council's Covid-19 response to facilitate social distancing. This Option presents a one-way system in a clockwise direction from St. John's Bridge along Rose Inn Street and northbound along High Street, thereby restricting some traffic movement. Traffic signalling priority is also proposed for junctions at Dublin Road, and Rose Inn Street / Patrick Street to support the efficient movement of the proposed bus routes as well as a number of regional bus services. This Option attempts to balance the needs of all modes in order to achieve the principles of the movement strategy.

Option 1 is illustrated in Figure 7-2. It would operate as follows:

- **High Street:** One-way northbound from Rose Inn Street to Parliament Street. No vehicular access from James Street;
- **Parliament Street:** No change from existing traffic operation. Junction with Bateman Quay would be improved;
- **Rose Inn Street:** One-way westbound from Bateman Quay to the junction with The Parade. Traffic signalling priority for buses at the junction between Patrick Street and The Parade would be in place;
- **Bateman Quay:** No change from existing traffic operation. Junction with Parliament Street would be improved to prioritise pedestrians, cyclists and public transport;
- **John Street Upper and Lower:** John Street Upper and Lower would remain two-way. Traffic signalling priority would be implemented at the junction with Dublin Road for buses;
- **St. John's Bridge:** St. John's Bridge would remain two-way; and
- **Gateway and Transition Zones:** Used to demarcate a point of arrival from one place to another. They are important placemaking tools as they form the 'first impression' of a place, as well as a traffic-calming tool as they can be used to slow traffic down.

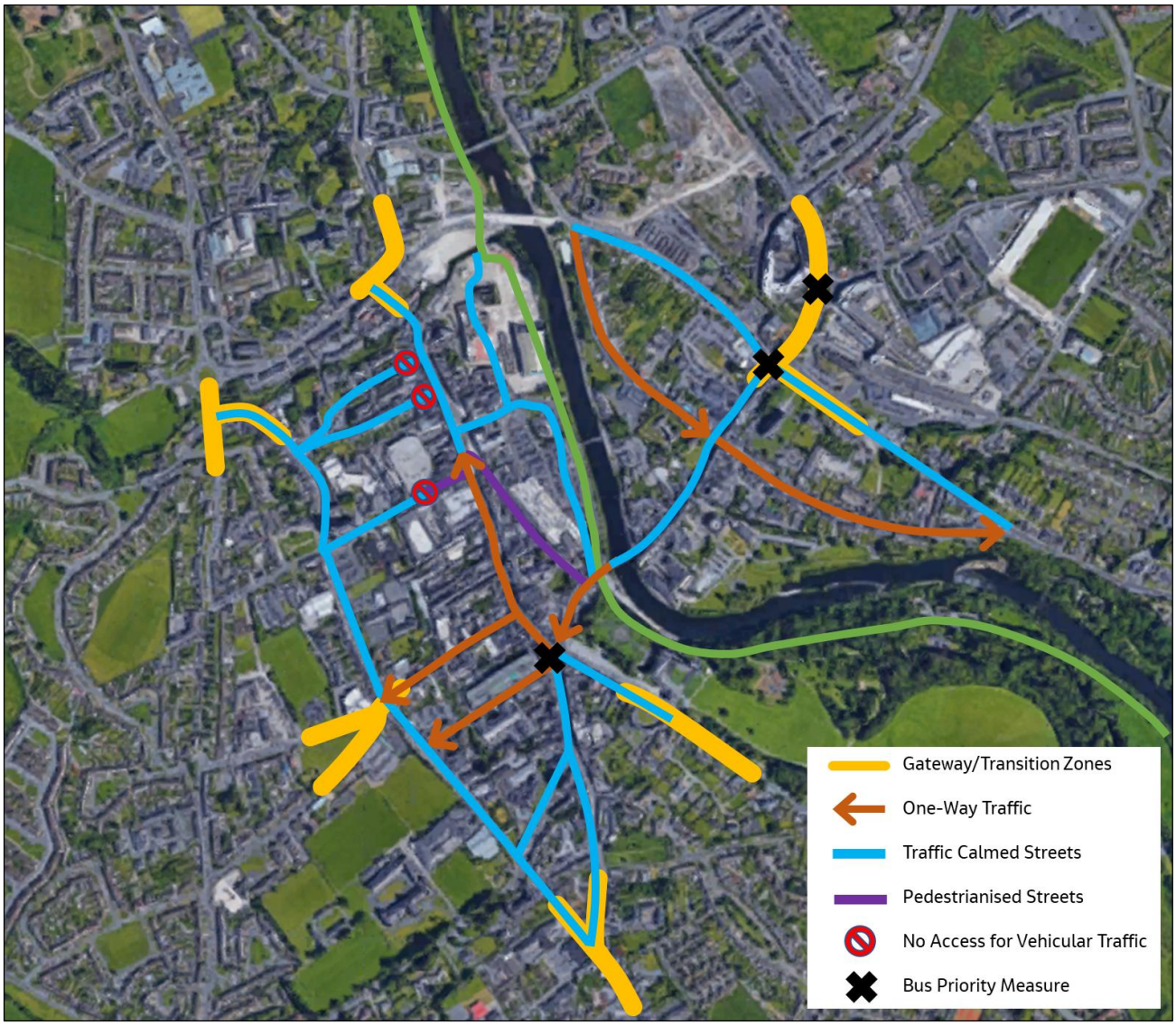


Figure 7-2 City Centre Traffic Management Option 1: Covid-19 Mobility Measures.

7.3.3 Option 2: One-Way System

Option 2 builds on Option 1, and proposes an extended one-way system. The one-way system operates westbound along John Street Upper to Rose Inn Street, northbound along High Street and Parliament Street, and eastbound along St. Francis Bridge.

Option 2 is illustrated in Figure 7-3 It would operate as follows:

- **High Street:** One-way northbound from Rose Inn Street to Parliament Street. No vehicular access from James Street;
- **Parliament Street:** One-way northbound from High Street to Dean Street. Junction with Bateman Quay would be improved;
- **Rose Inn Street:** One-way westbound from St. John's Bridge to the junction with The Parade. Traffic signalling priority for buses at the junction between Patrick Street and The Parade would be in place;
- **Bateman Quay:** No change from existing traffic operation. Junction with Parliament Street would be improved to prioritise pedestrians, cyclists and public transport;
- **John Street Upper and Lower:** One way westbound from Dublin Road to St. John's Bridge. Traffic signalling priority would be implemented at the junction with Dublin Road for buses;
- **St. John's Bridge:** One-way westbound from St. John's Bridge to Rose Inn Street; and
- **Gateway and Transition Zones:** Used to demarcate a point of arrival from one place to another. They are important placemaking tools as they form the 'first impression' of a place, as well as a traffic-calming tool as they can be used to slow traffic down.

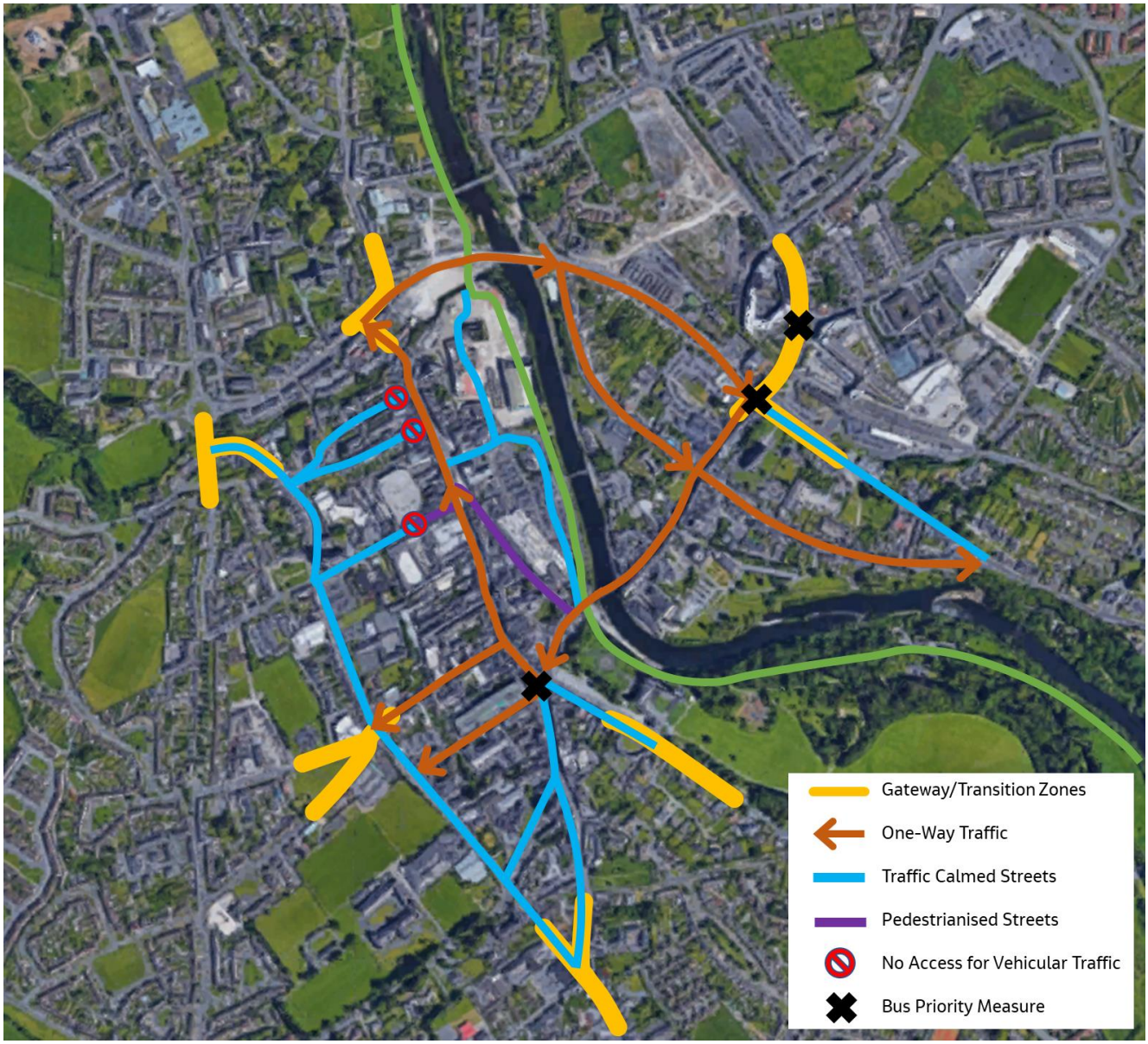


Figure 7-3 City Centre Traffic Management Option 2: One-Way System.

7.3.4 Option 3: Pedestrianisation of City Centre Core

Option 3 proposes the pedestrianisation of High Street and making St. John's Bridge and Rose Inn Street accessible to public transport, walking and cycling only. As shown in Figure 3-12 in the Public Transport Option Development section, John Street Lower, John Street Upper, St. John's Bridge, Bateman Quay, Parliament Street and Rose Inn Street cater for multiple bus route services. As the highest concentration of public transport services are within the Core City Centre, public transport priority measures would be focused in this area.

This Option attempts to achieve the principles of the KLTP movement strategy by prioritising sustainable modes, and actively discouraging through-traffic.

Option 3 is illustrated in Figure 7-4. It proposes the following:

- **High Street:** Pedestrianised from Rose Inn Street to Parliament Street. A retractable bollard would allow access for emergency services, and deliveries at certain times;
- **Parliament Street:** No change from existing traffic operation. Junction with Bateman Quay would be improved;
- **Rose Inn Street:** Access for walking, cycling and public transport only;
- **Bateman Quay:** Remain two-way. Access for vehicular traffic would be at Parliament Street only. Public transport only from junction with John Street and St. John's Bridge;
- **St. John's Bridge:** Sustainable transport bridge catering for public transport, walking and cycling only;
- **John Street Upper and Lower:** John Street Upper and Lower would remain two-way up to John's Bridge. A bus priority measure will be needed at the junction with Dublin Road;
- **Sráid na Mainistreach:** Pedestrian priority with local access from Walkin Street to Garden's Row; and
- **Gateway and Transition Zones:** Used to demarcate a point of arrival from one place to another. They are important placemaking tools as they form the 'first impression' of a place, as well as traffic-calming tools as they can be used to slow traffic down.

Figure 7-4 City Centre Traffic Management Option 3: Pedestrianisation of City Centre Core.

Table 7-1 SWOC Analysis of Option 2 City Centre Traffic Management.

	Option 1	Option 2	Option 3
Strengths	▪ Restricts some vehicular movement. ▪ Reduction in number of traffic lanes enables a reallocation of space for pedestrians and cyclists on Rose Inn Street and High Street. ▪ Traffic calming and place-making measures will further improve environment for pedestrians and cyclists. ▪ Improves the efficiency of public transport services by providing traffic signalling priority at key junctions along Castlecomer New Road and Dublin Road.	▪ Restricts some vehicular movement. ▪ Reduction in number of traffic lanes enables a reallocation of space for pedestrians and cyclists on Rose Inn Street and High Street. ▪ Traffic calming and place-making measures will further improve environment for pedestrians and cyclists.	▪ Restricts through-vehicular traffic. ▪ Supports the mode share targets for internal trips in Kilkenny City and environs. ▪ Reallocation of space, traffic calming, and place-making measures will improve environment for pedestrians and cyclists. ▪ Improve the vibrancy and vitality of the main retail street transforming High Street into a place where people can walk, shop, rest, play and socialise safely. ▪ Supports the proposed Public Transport Network by improving the efficiency of public transport services with traffic signalling priority at key junctions. ▪ Reduced vehicular through-traffic in Bateman Quay will improve public transport efficiency. ▪ Improves local air quality.
Weaknesses	▪ While it does restrict some traffic movements, it continues to facilitate some through traffic. ▪ Potential increase in turning movements at junction between Bateman Quay and Rose Inn Street / St. John's Bridge.	▪ While it does restrict some traffic movement, it continues to facilitate through traffic. ▪ In conflict with the proposed Public Transport Network as buses are restricted to one-way movement within the area with the highest concentration of public transport services. ▪ Width constraints in some areas impede the provision of more space for pedestrians and cyclists.	▪ Loss of disabled parking in the main retail street may pose challenges for some people with disabilities. However, this weakness can be overcome by providing spaces on adjacent streets. ▪ Width constraints in some locations impede the provision of more space for pedestrians and cyclists.
Opportunities	▪ Improve quality and accessibility of the public realm for pedestrians and cyclists. ▪ Improve City Centre junctions to prioritise the safe and convenient movement of pedestrians, cyclists and public transport users. ▪ Potential for public transport interchange between a number of radial routes on Bateman Quay.	▪ Improve quality and accessibility of the public realm for pedestrians and cyclists. ▪ Improve City Centre junctions to prioritise the safe and convenient movement of pedestrians, cyclists and public transport users.	▪ Improve the quality and accessibility of the public realm for pedestrians and cyclists. ▪ Improve City Centre junctions to prioritise the safe and convenient movement of pedestrians, cyclists and public transport users. ▪ Further improve connectivity between The Parade and High Street for pedestrians and cyclists along the Medieval Mile. ▪ Potential for public transport interchange between a number of radial routes on Bateman Quay and Rose Inn Street. ▪ May reduce vehicular traffic on John Street Upper and Lower.
Challenges	▪ A one-way system on Rose Inn Street may pose some challenges for the routing of existing and proposed bus routes. Public transport travelling eastbound will have to route through High Street and Bateman Quay to access St. John's Bridge which may impact on the directness of the route. ▪ Existing and proposed car parking areas in Bateman Quay and surrounding streets will continue to attract vehicular trips. ▪ One-way traffic systems may increase vehicle speeds and create hostile environments for pedestrians and cyclists. ▪ One-way traffic systems may cause difficulty for emergency vehicle access.	▪ A one-way system on St. John's Bridge poses challenges for the routing of existing and proposed bus routes. Public transport travelling eastbound will not be able to serve Rose Inn Street which may impact on the directness of the route. ▪ Existing and proposed car parking areas in Bateman Quay and surrounding streets will continue to attract vehicular trips. ▪ One-way traffic systems may increase vehicle speeds and create hostile environments for pedestrians and cyclists. ▪ One-way traffic systems may cause difficulty for emergency vehicle access.	▪ May cause the diversion of vehicular traffic to residential streets or other bridges. ▪ Existing and proposed car parking in the area, e.g. Bateman Quay, will continue to attract vehicular trips.
Summary	▪ This Option enables some reallocation of space for pedestrians and cyclists and the opportunity to improve public transport movement at junctions with traffic signalling priority in line with the proposed Public Transport Network. However, a one-way system would also pose a number of challenges for all modes and does not fully align with all aims of the movement strategy.	▪ This Option builds on Option 1 by proposing an extended one-way traffic system through the City Centre core in a clockwise direction. While this Option enables some reallocation of space for pedestrians and cyclists, it is in conflict with the proposed Public Transport Network as buses are restricted to one-way movement within the area with the highest concentration of public transport services.	▪ Option 3 restricts through-traffic north-south on High Street, and east-west on St. John's Bridge. This provides many opportunities to significantly improve the public realm, particularly that of the City's main retail street. It also provides priority for bus services at key junctions in the City Centre. This Option is most in line with the KLTP's objectives and movement strategy in comparison to Option 1 and 2.

7.3.5 Emerging Preferred City Centre Traffic Management Option

Following a S.W.O.C. analysis of both Options outlined above, Option 3 is the Emerging Preferred Option for the City Centre Traffic Management. This Option is most in line with the objectives and high-level movement strategy set out for the KLTP at the Context Stage, while supporting the emerging preferred sustainable mode proposals.

7.4 Junction Improvements

7.4.1 Junction Design

The design of junctions has traditionally prioritised motor vehicle movement and is largely determined by the volume of traffic. The *Design Manual for Urban Roads and Streets* (DMURS), however, states that a more balanced approach should be taken, and the following should be included in the design:

- Provide crossings on all arms of a junction;
- Reduce kerb radii, thereby reducing crossing distances for pedestrians and slowing turning vehicles;
- Omit left turn slips, which generally provide little extra effective vehicular capacity but are highly disruptive for pedestrians and cyclists;
- Omit staggered crossings in favour of direct/single phase crossings;
- Omit deceleration lanes. These are not required in low to moderate speed zones (i.e. up to 60km/h);
- Include pedestrian, cyclist and bus passenger delays in the optimisation of traffic signal phasing and timings. This will almost certainly lead to a reduction in cycle times;
- Minimise waiting with pedestrian cycle times of no more than 90 seconds at signalised junctions; and
- Designers should also have regard to Context and Function when selecting junction types. Junction design will also need to be considered in conjunction with crossing types and ratio of flow to capacities.

Figure 7-5 illustrates various types of junction control based on the optimising of movement of pedestrians and cyclists, whilst also balancing the needs of motor vehicle users. Junctions throughout the Study Area should be optimised to prioritise the safe and direct movement of sustainable modes, in line with the KLTP movement strategy.

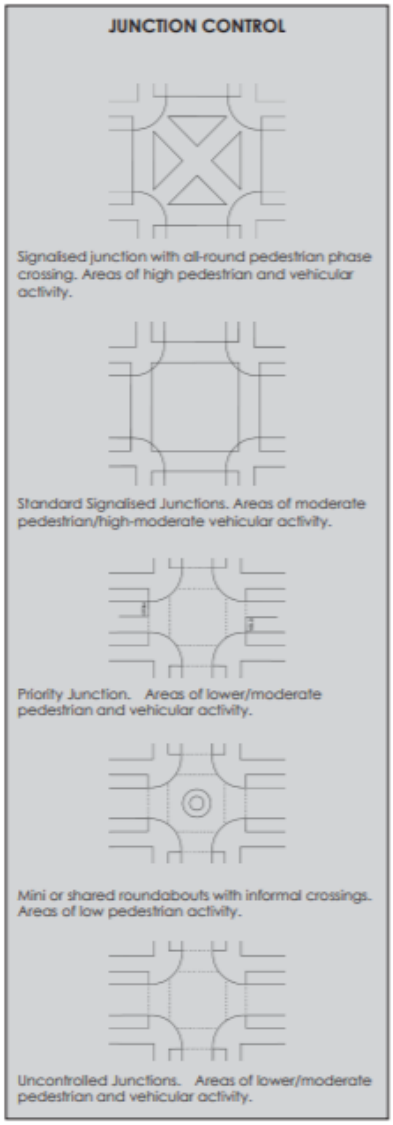


Figure 7-5 General junction selection based on the optimising pedestrian and cyclist movement whilst also balancing the needs of motor vehicle users. Source: Pg. 105, DMURS, 2019.

7.4.2 Pedestrian Crossings

Crossings are referred to as controlled (e.g. zebra or signalised crossings) or uncontrolled. Uncontrolled crossings include informal types such as courtesy crossings and/or those identified by a drop kerb. At junction locations the type of crossing used will generally be determined in conjunction with the form of junction control that is used to manage traffic. More generally, designers should be guided by pedestrian demands, safety and vehicle flows.

DMURS provides the following guidance on choosing the appropriate type of pedestrian crossing:

- Signalised crossings should be provided on busy Arterial and Link streets;
- Zebra crossings provide pedestrian priority and may be used where formal crossing facilities are desirable, however a fully signalised crossing is not needed. Examples may include on Arterial and Link streets within lower speed environments, such as Centres and/or where both levels of pedestrian and vehicular activity are more moderate;
- Courtesy crossings, which are generally defined by a change in material and/ or vertical deflection, such as raised tables, allow pedestrians to informally assert a degree of priority over drivers. They may be used in lower speed environments where formal crossing facilities are not required to assist in making such environments self-regulating; and
- Local streets, due to their lightly-trafficked/ low-speed nature, generally do not require the provision of controlled crossings. The provision of drop kerbs will generally suffice. However, zebra crossings or courtesy crossing should be considered where pedestrian demands are higher such as around Focal Points.

Crossings are one of the most important aspects of street design as it is at this location that most interactions between pedestrians, cyclists and vehicles occur. Well designed and frequently provided crossings are critical to the balancing of movement priorities. The design of crossings, and the frequency at which they are provided, will have a significant impact on pedestrian/cyclist mobility and comfort and the flow of vehicular traffic.

7.4.3 City Centre Junctions

Many of the existing key City Centre junctions are signalised. In general, the environment at these junctions for vulnerable road users can be hostile due to the dominance of vehicular traffic, multi-stage crossing and pedestrian guardrails. Improvements within the City Centre to junctions in response to the sustainable mode proposals in line with DMURS are required. These junctions include:

- Junction on Dublin Road to MacDonagh Station (further detail is set out in Section 4.11 above);
- Junction on Dublin Road with John Street Upper; and
- Junction at the intersection of The Parade, High Street, Rose Inn Street and Patrick Street.

DMURS recommends the following should be included in the design of signalised junctions to ensure the safety of pedestrians and cyclists:

- Longer pedestrian phases that ensure enough green time for pedestrians of all ages and abilities to safely cross the road;
- A direct single phase crossing for pedestrians. Research has found that pedestrians are less likely to comply with the detour/delay created by staggered crossings, leading to unsafe crossing behaviour; and
- Advanced Stop Lines (ASL) for cyclists.

As shown in Figure 3-12, John Street Lower, John Street Upper, St. John's Bridge, Bateman Quay, Parliament Street and Rose Inn Street cater for multiple bus route services. As the highest concentration of public transport services are within the Core City Centre, public transport priority measures must be focused in this area. Priority measures are essential to ensure the proposed public transport network is attractive relative to the private car in order to promote a change in mode share. The option development for the Public Transport Network proposes the following junction improvements to improve the movement of buses in line with DMURS principles:

- Junction on Dublin Road to MacDonagh Station;
- Upgrade of junction between St. John's Bridge and Bateman Quay; and
- Traffic signalling priority at the junction between Patrick Street and The Parade.

7.4.4 Roundabouts

Roundabouts can greatly reduce Level of Service for pedestrians and cyclists by creating hostile and unsafe environments. According to DMURS, roundabouts are generally not appropriate in urban areas. They require a greater land take and are difficult for pedestrians and cyclists to navigate, particularly where controlled crossings/cycle facilities are not provided, and as such, vehicles have continuous right of way.

DMURS recommends that where roundabouts currently exist, road authorities should replace them with signalised junctions or retrofit them so that are more compact and/or pedestrian and cycle friendly, as is appropriate.

Throughout Kilkenny City and environs, particularly in the suburban areas, there is a proliferation of multi-access roundabout junctions, including:

- Newpark Drive / Castlecomer Road;
- Newpark Drive / Johnswell Road;
- Hebron Road / O'Loughlin Road;
- Hebron Road / Castlecomer New Road;
- Bohernatounish Road / Waterford Road;
- Waterford Road / Nuncio Road;
- College Road / Callan Road / Circular Road / Old Callan Road;
- Dean Street / Dominic Street; and
- Granges Road / Lord Edward Street.

The KLTP therefore recommends that all roundabouts in an urban context should be reviewed and upgraded to signalised junctions in order to provide better facilities and priority for pedestrians, cyclists and public transport in the with DMURS.

7.4.5 Urban Traffic Control System

We recommend that an Urban Traffic Control (UTC) system to manage, monitor and control the operation of the traffic signals be implemented throughout Kilkenny City. UTC systems represent a form of traffic management which integrate and co-ordinate traffic signal control over a wide area in order to control traffic flows on the street network. Traffic signals can be linked and optimised to promote an efficient and safe environment for all road users. Some UTC systems can optimise and prioritise public transport through the junctions and the network. It is recommended that all existing and proposed traffic signals in Kilkenny City be brought under the control of a UTC.

8. Demand Management Measures

The existing and future road network will not cater for a continuation of a 'Business as Usual' approach to a growth in private vehicle traffic rising in line with the population and employment growth envisaged for Kilkenny City and environs over the next 20 years. The future network will therefore require a much greater transition from private car use to walking, cycling and public transport in keeping with the approaches outlined in the international case studies in the KLTP Context Report.

To facilitate a greater shift toward walking, cycling and public transport, a much greater application of supporting measures will be required to constrain private vehicular trips.

The following chapters outline some of the key demand management measures proposed to enable this shift to sustainable transport and the rationale for taking this approach. These chapters are structured as follows:

- **Chapter 9** outlines the rationale for providing parking constraint including recent policy changes; and
- **Chapter 10** looks at a number of other Supporting Measures that will complement the KLTP transport network.

9. Parking Management Measures

This section chapter provides a suite of options for parking management measures for the KLTP. The section will outline the following:

- The relationship between car parking levels and travel behaviour;
- A synopsis of relevant National policy in relation to parking management;
- A review of existing parking standards in the *Kilkenny City and Environs Development Plan 2014-2020* and recommendations of the *Parking Options Study 2017*;
- KLTP parking management options, including maximum parking standards, and how these align with the movement strategy; and
- Proposals for Electric Vehicle (EV) parking provision.

9.1 Overview

There is a long-established relationship between availability of car parking, public transport and travel behaviour. This is supported by a study carried out by Transport for London in 2012, *Residential Parking Provision in New Developments*, which analysed 800 new developments with varying levels of public transport accessibility and car parking levels. The study concluded that:

- Developments with more parking promote car usage thereby producing more car trips;
- As public transport accessibility increases, car ownership levels in new developments decreases; and
- The more parking provided by a new development, the higher the household car ownership levels.

The level of car parking provided in new developments therefore has a substantial impact on the level of car use generated by that development. In areas that are most accessible to high frequency public transport (and local employment, schools and services), a typical approach is to encourage higher densities within a typical 1km catchment of public transport and car-free or car light development to mitigate car trips, congestion and associated negative impacts on the liveability and quality of place associated with private car journeys.

Taking London as an example, maximum parking standards for new development has long been determined using a Public Transport Accessibility Level (PTALs) matrix. PTAL is a measure which rates locations by a number of factors.

- Walking time from the point-of interest to the public transport access points;
- Reliability of the service modes available;
- Number of services available within the catchment; and
- Level of service at the public transport access points - i.e. average waiting time.

PTAL values range from 1-6 where 6b offers the highest range of public transport connectivity and 1a is the lowest. A location will have a higher PTAL if:

- It is at a short walking distance to the nearest station or stop (960m/12 minutes – rail; 640m/8 minutes – bus);
- Waiting times at the nearest station or stop are short;
- More services pass at the nearest stations or stops;
- There is a major rail station nearby; and/or
- Any combination of all the above.

To encourage the use of public transport, the general principle is to provide less parking in places with good access to public transport. Typically, car-free and low-car developments been applied to locations with PTAL level 3 and above. New occupants of housing in these areas are restricted from applying for on-street car parking. Mandatory Residential Travel Plans are applied offering Mobility as a Service (MaaS) incentives including developer-funded membership of car clubs, public transport smart ticketing and increasingly, London Cycle Hire membership have been offered to off-set car parking. The approach is mirrored elsewhere on continental Europe with developers paying into an on-going Mobility Fund instead of providing expensive car parking solutions.

9.2 National Parking Policy

Recent changes to National policy in Ireland, such as the *National Planning Framework 2040* and *Sustainable Urban Housing: Design Standards for New Apartments*, support the application of low-car or car-free development in order to enable a shift toward sustainable transport and reduce dependency on the private car.

9.2.1 National Planning Framework

The *National Planning Framework's* (NPF) National Policy Objective (NPO) 13 recommends that in urban areas, planning and related standards, in particular car parking, will be based on performance criteria that seek to achieve well-designed high-quality outcomes in order to achieve targeted growth and sustainable mobility, with a preference for no-car and low-car developments.

9.2.2 Sustainable Urban Housing: Design Standards for New Apartments

In 2018, Section 28 ministerial guidelines *Sustainable Urban Housing: Design Standards for New Apartments* was published which contains several transport-related issues relevant to the development of car parking standards including the following:

- A default policy for car parking provision to be minimised, substantially reduced or wholly eliminated in highly accessible areas such as in or adjoining city cores or at a confluence of public transport systems such as rail and bus stations located in close proximity. Typically, these locations are within 15-minutes walking of city centres or within 10-minutes walking distance of commuter rail or bus stops or within 5-minutes walking distance of high-frequency bus services. This policy aligns with the 10-Minute City concept;
- A reduced overall parking standard and application of a maximum car parking standard of for housing schemes with more than 45 dwellings per hectare net in suburban/urban locations served by public transport or close to town centres or employment areas;
- A requirement that cycling is fully integrated into the design and operation of all new apartment schemes; and
- A significant uptake in the quantity and quality of cycle parking provision in relation to the location; quantity; design, and management of bicycle storage areas.

9.2.3 Regional Spatial and Economic Strategy for the Southern Region

The RSES sets out several Regional Policy Objectives (RPOs) in relation to parking within its Transport Vision for the Southern Region.

RPO 151: Integration of Land Use and Transport:

- All non-residential development proposals will be subject to maximum parking standards as a limitation to restrict parking provision to achieve greater modal shift; and
- In locations where the highest intensity of development occurs, an approach that caps car parking on an area-wide basis will be applied.

RPO 152: Local Planning:

- Measures to facilitate the complementary use of private car, through appropriate local traffic management including the siting of destination car-parking, is central to achieving the correct balance of modal use.

9.3 Current Parking Standards

9.3.1 Kilkenny City and Environs Development Plan 2014-2020

Minimum parking standards are set out in the *Kilkenny City and Environs Development Plan 2014-2020,* as shown in Table 9-1. These standards are applicable to the entire area of Kilkenny City and Environs, from the inner City Centre to outer neighbourhoods.

Table 9-1 Current Parking Standards. Source: Kilkenny City and Environs Development Plan 2014-2020.

Land Use	Car Parking Spaces Per Unit
Dwelling House	2 per unit / 0.25 per unit for visitor parking
Apartment	1.25 per unit / 0.25 per unit for visitor
School	1 for every classroom plus 4 additional spaces
Churches, Theatres, Public Halls	1 per 10 seats
Hotels, Hostels, Guesthouses	1 per bedroom
Public Houses and Hotel Function Rooms	1 per 10m^2 of bar and lounge floor area
Shopping Centres, Supermarkets	1 per 25m^2 GFA
Shops, Restaurant, Cafés	1 per 20m^2 GFA
Offices	1 per 15m^2 of GFA
Industry	1 for every 60m^2 of GFA
Retail Warehousing	1 for every 35m^2 of net retail floor space
Creche, Childcare	1 per 4 children plus 1 space per employee

9.3.2 Parking Options Study 2017

The KLTP Context Report summarised the results of the *Parking Options Study 2017* which made a set of recommendations in relation to parking provision capacity and type to serve the projected growth in the Abbey Quarter, the Medieval Mile and the City Centre more generally.

A total of 1,706 car parking spaces is recommended to provide for the Abbey Quarter, the Medieval Mile and the general City Centre area. While it was identified that 506 spaces could be accommodated within existing car parks and 100 spaces will be designated disabled parking and set-down areas within the Abbey Quarter, the Study identified a number of potential sites to serve the remaining requirement including: Bateman Quay, Green Street, County Hall, Kilkenny Mart and Wolfe Tone Street.

The Study undertook a high-level analysis of these sites which concluded that two new multi-storey car parks at Bateman Quay and Green Street would best serve the remaining requirements. The other sites were discounted for reasons such as land ownership and distance from the Abbey Quarter. Table 9-2 summarises the overall recommended locations of car parking spaces.

Table 9-2 Total Recommended Provision and Location of Car Parking. Source: Parking Study 2017.

Recommended Location	Total Spaces
Within the Abbey Quarter (disabled parking, set-down and deliveries)	**100**
Existing Car Parks (Market Cross and Ormonde St. MS Car Parks)	**506**
New MS Car Park (Bateman Quay)	**550**
New MS Car Park (Green Street)	**550**
	1,706

9.4 KLTP Parking Management Options

As outlined above, there is a long-established relationship between the availability of public transport and car parking and their impact on travel behaviours. Whilst the KLTP proposes significant improvements to the sustainable transport networks, car parking levels will also need to be carefully managed.

Parking management measures include pricing and supply controls that make car usage more expensive and less convenient, thereby increasing the relative attractiveness of non-car modes. Transport demand management through parking restraint can be targeted to locations where accessibility by alternative modes is high thereby encouraging a mode shift toward walking, cycling and public transport.

Parking Management Options in line with national policy and international best practice for the KLTP include:

1. Implementation of reduced maximum parking standards for new development;
2. Manage the availability of car parking in City Centre;
3. Consolidate parking provision;
4. Parking on the periphery of the City Centre;
5. Park and Ride (outside of the Kilkenny Ring Road);
6. Cap car parking levels on an area-wide basis for masterplan areas or areas of high-density development;
7. Workplace/private parking levies; and
8. Controlled Parking Zones.

9.4.1 Maximum Car Parking Standards

As outlined in the above sections, there has been a significant step-change in thinking regarding parking standards and overall parking provision since the *Kilkenny City and Environs Development Plan* was last reviewed. As cities begin to promote more walkable urban development and a type of city living that prioritises

sustainable travel, they are also reforming their approach to car parking. A 'Business as Usual' application of the *Kilkenny City and Environs Development Plan 2014-2020* parking standards, therefore, would be contrary to national and regional policy, and would hinder a modal shift towards sustainable modes. As noted above, the reduction in parking provision has been shown to reduce levels of car ownership and encourage a modal shift. This is line with the KLTP's mode share targets and its objective to reduce dependency on the private car.

Therefore, the KLTP recommends the implementation of reduced maximum parking standards for new development.

In relation to the proposed parking provision for the Abbey Quarter, the results of the *Parking Options Study 2017* were demand calculated and did partly account for a reduction in parking requirements as a result of assumed mobility management measures that would be adopted by future employers and multi-function/shared-use parking. However, the proposed locations will continue to attract car trips into the central core. It is worth noting that the *Parking Options Study* was undertaken prior to the recent national and regional policy changes outlined above.

In the context of new development areas - Loughmacask, Western Environs and Abbey Quarter - car parking provision should be capped on an area-wide basis with low-car or car-free developments being the norm, in line with the RSES and Section 28 guidelines *Sustainable Urban Housing: Design Standards for New Apartments*. The application of low-car or car-free development is an increasingly common tool to facilitate higher density development and prioritise sustainable transport. Furthermore, there are many benefits to both developers and home-buyers in reduced parking standards such as:

- Reduced land-take: Car parking areas are minimised which frees up land for more valuable uses including more housing, amenity areas or commercial space; and
- Reduced housing construction cost: A viability exercise carried out by the Department of Housing, Planning and Local Government in 2018 found the cost of individual parking space can range from €25,000 - €100,000 each to build. Reduced car-parking therefore implies reduced construction costs and improved viability.

Further analysis is required to determine the maximum car parking provision and maximum standards required for Kilkenny City and Environs to align with mode share targets and the requirements of the RSES.

9.4.2 Car Parking Location

The location of car parking is an important factor to consider. This section considers on-street, off-street and Park and Ride facilities.

On-Street Parking

The provision of on-street parking can support the economic functions of an urban centre, as well as support accessibility for those with disabilities. However, on-street parking can also lead to large amounts of traffic circulating looking for a parking space, contributing to congestion and pollution. Furthermore, on-street parking takes away valuable public space that could be used to widen footpaths, provide cycle lanes, plant street trees or accommodate street furniture or play areas.

The KLTP recommends a reduction in on-street parking in Kilkenny City Centre to accommodate this wide range of sustainable transport and public realm improvement measures.

Where on-street parking is provided, the emphasis will be on providing blue badge spaces and supporting a quick turnover of spaces to ensure that spaces are readily available. Innovative practices to better manage on-street parking spaces, Dynamic Parking Systems and Virtual Loading Bays, are outlined in Section 10.6

Performance-based smart parking pricing systems are useful to ensure that spaces are used efficiently but are readily available for non-commuting purposes including shoppers. In this instance, pricing should be set to reach a target maximum of 85% occupancy to reduce search traffic, congestion and emissions.

Off-Street Parking

There is a significant amount of off-street parking in the City Centre Core, in the form of both multi-storey and surface car parking.

The provision of off-street car parks in convenient central locations encourages more people to drive into the City Centre and therefore exacerbates congestion, and undermines modal shift attempts toward walking, cycling and public transport.

Furthermore, large surface car parks often represent an inefficient use of developable brownfield land within the city core. An example of this can be seen at Bateman Quay, where Market Yard and John's Bridge car parks dominate the space. This detracts from its riverside location in the heart of the medieval centre, where the extension of the River Nore Linear Park is proposed. There is an opportunity to rationalise this parking provision in a more efficient manner to free up space for more valuable uses such housing, employment, green space, community facilities and recreational areas.

The *Parking Options Study 2017* recommended two new multi-storey car parks to serve the Abbey Quarter. Both car parks are proposed within the Abbey Quarter site, one in Bateman Quay and another to the north of St. Francis Bridge. These locations will continue to attract car trips into the central core, and therefore fundamentally contravene the KLTP movement strategy. They also have the potential to undermine use of the public transport network.

The KLTP recommends that existing car parking should be rationalised and where required, to be provided in a more space efficient manner. If any additional parking is required, this should take the form of consolidated car parking on the periphery of the City Centre Core.

Park and Ride

The provision of Park and Ride facilities will be considered by the KLTP. Park and Ride facilities would be located outside of the Kilkenny Ring Road to capture external demand from trips originating from outside of the Study Area. Park and Rides must be aligned with public transport, cycling and walking networks, and should be delivered in tandem with the reduction of car parking in City Centre locations.

Park and Rides would provide the following benefits for the KLTP:

- Aligns with the KLTP Movement Strategy and 2040 mode share targets;
- Reduces car trips to the City Centre Core;
- Captures external demand from trips originating from outside the Study Area before entering the Centre;
- Aligns with national and regional policy;
- Aligns with approach taken in case studies such as Pontevedra and Winchester;
- Frees up valuable space in the City Centre for higher value uses, including street furniture, cycle lanes, green spaces, community facilities and housing; and
- Reduces the negative impacts (e.g. congestion, pollution) of drivers searching for parking spaces in Centre.

Further analysis is required to determine the location, size and function of Park and Ride facilities in the Study Area.

9.5 Electric Vehicle Parking Provision

The following outlines the process for determining Electric Vehicle Charging Point (EVCP) requirements for residential parking and for destination parking, which have different demands and requirements.

9.5.1 Residential EVCP Requirements

The Sustainable Energy Authority of Ireland (SEAI) estimates that 60% of the Irish car fleet will comprise Electric Vehicles (EVs) by 2050 in the medium scenario[1], and will increase further to 100% of the fleet beyond 2050. Residential parking is anticipated to be the main location for the charging of electric vehicles. On this basis, it is recommended that 60% of residential parking spaces be fully enacted for EVCPs initially, however, it is recommended that all parking spaces are fitted with passive ducting infrastructure in the construction phase that can be enabled as the demand for electric vehicles is realised.

9.5.2 Destination Based EVCP Requirements

As residential parking is anticipated to be the primary location for the charging of electric vehicles, it is anticipated that destination parking will still be required to provide EVCPs for those who may not have the ability to charge their electric vehicle overnight at their home.

It is assumed that the destination-based parking will be utilised by car-based travel from outside of Kilkenny City Centre. On this basis it is estimated that 85% of people can park their car in their own driveway or garage, with the remaining 15% parking their car on-street[2]. It is assumed that if someone can park their EV in their driveway or garage that it is very likely they will be able to charge the EV overnight and therefore not necessarily require EVCPs at their destination.

It is assumed that 80% of those with driveway or garage parking will be able to charge their EV overnight. The percentage of EVs that do not require destination EVCP is therefore 68% (85% x 80%) and that those that do require destination-based EVCP is 32%. As the percentage of car fleet is anticipated to grow to 60% by 2050 it is recommended that 20% of destination-based parking spaces be EVCPs (60% x 32%) initially, increasing to 32% beyond 2050 as the percentage of EVs increases to 100%.

It can be reasonably be expected that other forms of EVCP, such as 20-minute fast-charge facilities, will be available elsewhere including dedicated depots further reducing the need for destination-based provision.

Table 9-3 indicates the recommended EVCP standards for the Study Area.

Table 9-3: Proposed Electric Vehicle Charging Point parking provision

	Residential Based EVCP Provision	Destination Based EVCP Provision
Up to 2050	60%*	20%
Beyond 2050	100%	32%

*with remainder of spaces enacted for passive provision

[1] SEAI Electric Vehicle Roadmap
[2] 2012 NTA National Household Travel Survey

9.5.3 Benchmarking of EVCP Requirements

The above requirements for EVCP provision were developed based on Irish policy and benchmarked against UK policy. In 2019, the UK's Department for Transport published *Electric Vehicle Charging in Residential and Non-Residential Buildings* which sets out its policy provisions in relation to EVCP requirements for all building types. Table 9-4 provides an evaluation by comparison of the standards set out by the UK and the KLTP. It concludes that the KLTP's proposals align with the UK's policy position.

Table 9-4: Benchmarking of Proposed EVCP Provision

	UK Policy[3]	KLTP Proposed
Residential Based EVCP	100% of new residential parking spaces should be fitted with EVCP.	60% of spaces to be fitted with EVCP, and the remaining 40% to have passive ducting provision for future conversion to EVCP, beyond 2050 as required.
Destination Based EVCP	1 in 5 new non-residential parking spaces (20%) should be fitted with EVCP.	20% of destination based parking to be fitted with EVCP, with potential to increase to 32% beyond 2050 as required.

[3] UK Department of Transport Electric Vehicle Charging in Residential and Non-Residential Buildings

10. Supporting Measures

Supporting measures will be essential to the creation of physical, social and cultural environments where walking, cycling and public transport are attractive alternatives to the private car. One of the key objectives of the KLTP is to reduce car dependency whilst increasing the attractiveness of sustainable transport options.

It will take a wide breadth of supporting measures to:

- Create communities that prioritise sustainable transport as instinctive modes of choice;
- Improve public awareness and educate users on available options to help them make the best choices; and
- Improve end-to-end trip facilities and integration.

Supporting measures are primarily demand oriented rather than supply oriented, i.e. they attempt to influence and manage people's travel choices rather than provide more physical capacity for travel.

Supporting measures can, however, complement supply-oriented programmes that, for example, either reduce the capacity for private vehicles or provide priority in traffic for new or existing public transport services. An example of this would be where on-street parking availability is reduced as a supporting measure and the space is reallocated to provide for cycle facilities, improved pedestrian environment or public transport priority.

The full benefits of the proposals that will be delivered under the KLTP, including mode share targets, cannot be achieved through the provision of infrastructure alone and must be combined with the implementation of measures that support the best use of that infrastructure.

This section will outline some supporting measures that build upon the prioritisation of sustainable transport across the Study Area that could be included in the KLTP.

10.1 Healthy Streets Approach™

The Healthy Streets Approach™ was developed by Lucy Saunders based on research into the health impacts of public realm and urban planning. The approach is based upon the principle that the key elements necessary for public spaces to improve people's health are the same as those needed to make urban places socially and economically vibrant and environmentally sustainable.

Healthy Streets is a concept that supports liveable, high quality and people-friendly streets provides the framework for putting human health and experience at the heart of planning the City. It uses ten evidence-based indicators, shown in Figure 10-1, to assess the experience and quality of a street.

It also supports the concept of universal design and accessibility for all in the public realm.

The implementation of KLTP's transport network will prioritise active travel in a manner that is supported by the Healthy Streets Approach, i.e. a high-quality public realm.

Figure 10-1 Healthy Streets Indicators™. Source: Lucy Saunders.

10.2 Travel Planning

10.2.1 School Travel Planning

Travel to school is a significant contributor to peak time congestion. Given that 50% of trips to school are Car Passengers (CSO, 2016), the extent to which transport planning is considered in the context of schools is of critical importance to the achievement of modal shift, improvement of air quality around the school gate as well as public health. Given the large number of primary and secondary schools located throughout the Study Area, as illustrated in Figure 10-2, School Travel Plans (STPs) should be a requirement by each school.

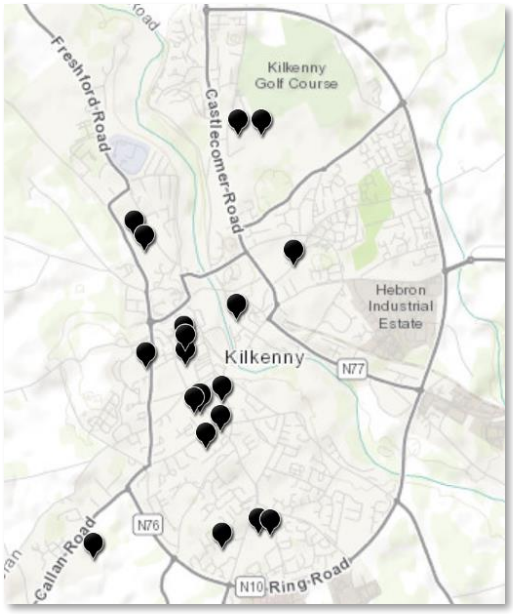


Figure 10-2 Location of Primary and Secondary Schools in the Study Area.

There are several land use planning and transport planning considerations relevant to the provision of new schools and the retrospective provision of walking and cycling infrastructure within the catchment of existing schools. The most significant include:

- The appropriate siting of schools. New schools must be better integrated into existing or planned new development areas to optimise walking and cycling catchments;
- A significant uplift in quality of pedestrian and cycle provision in primary and secondary schools;
- Identification of drop-off areas for parents and school buses within walking distance of the school to facilitate 'Park and Stride' or 'Safe Routes to School' campaigns or 'Walking Buses';
- Review of school opening and closing times including consideration of staggered times in areas where there is a concentration of schools (such as to the south-west of the City Centre); and
- Implementation of vehicle-restricted areas in the immediate vicinity of schools 'School Streets'.

Kilkenny County Council should engage with schools to facilitate and promote these measures. For example, the proposed relocation of the Kilkenny CBS Secondary School and Coláiste Pobail Osraí from their City Centre locations to the Western Environs provides an opportunity to ensure that the new schools are fully integrated and connected to surrounding areas by high-quality walking and cycling networks

The identification of drop-off areas for parents and school buses within walking distance of schools to facilitate 'Park and Strides' and 'Walking Buses' is a measure that should be easily achievable, particularly in the south-west and western areas of the Study Area where many schools are clustered together such as St. Kieran's College and City Vocational School; St. John of God National School and St. Patrick's de la Salle National School; and Gaelscoil Osraí and the Presentation Secondary School.

Permeability between surrounding residential estates and schools is also an important consideration to facilitate students walking and cycling to school. For example, the opening of a wall around Kilkenny Project National School would greatly increase its walking and cycling catchment to Hollybank Park, The Paddocks and beyond.

10.2.2 Workplace Travel Planning

All applications for large employment-based developments should be accompanied by a bespoke Workplace Travel Plan or Mobility Management Plan (MMP) to ensure actions are taken to promote sustainable commuting habits and discourage single-occupancy car trips. It is an existing development management standard of the *Kilkenny City and Environs Development Plan 2014-2020* to require Workplace Travel Plans for trip-intensive developments and is a practice that should be continued.

10.2.3 Residential Travel Planning

Residential Travel Plans (RTPs) should be applied to large development proposals that have a full or partial residential component. RTPs are concerned with a reducing car trips from a single origin (home) to multiple and changing destinations and are managed by a co-ordinator appointed by the development company. A planning legal agreement securing a RTPs will be required to ensure that all future residents are informed of the existence of the travel plan, its key objectives and incentives for sustainable travel, and any restrictions it implies (for example, restrictions preventing the purchase of residential on-street parking in controlled zones).

10.2.4 Event Travel Planning

Kilkenny City is host to a wide variety of events throughout the year such as the Kilkenny Arts Festival and The Kilkenny Cat Laughs Comedy Festival, which draw a significant number of people into the City. As streets in the City Centre may be closed to facilitate these events such as The Parade or High St., it is important to have robust Event Travel Plans in place to manage the additional inbound trips and parking demand in a sustainable manner. The provision of consolidated car parking on the periphery of the City Centre (i.e. Park and Ride) at locations aligned with the existing and proposed bus services should be considered to cater for these types of events.

10.3 Public Car Sharing Schemes

Public car sharing is a model of car rental where people rent cars for short periods of time, often by the hour. They are important in urban areas in facilitating car-free or low-car developments. They are particularly attractive to customers who make only occasional use of a vehicle.

Car sharing schemes can reduce the number of cars on the road and free up land traditionally used for parking spaces. By supporting people who choose not to own a car, car sharing can encourage use of public transport, walking and cycling. Membership of such a scheme can often be more cost effective than owning a private car

Research carried out by the car club charity CoMoUK estimates that a car club typically removes at least 10 private cars. Vehicles provided by car clubs are often greener and more environmentally friendly than private cars.

In 2017, GoCar, an Irish car sharing company, in partnership with Irish Rail, announced plans to launch its car sharing service in Kilkenny City at MacDonagh Junction. However, the service has yet to be delivered. The provision of a car sharing scheme at MacDonagh Station would greatly enhance the transport options available at the interchange hub.

10.4 Private Car Pooling Schemes

Carpooling for commuter trips to work and education can reduce traffic congestion and delivers benefits to the individual by way of travel savings. Commuter trips are often the most suitable to carpooling as they are undertaken most often and according to a routine pattern. Carpooling is most effective when it is undertaken on a company-wide or office-wide/specific location basis. The National Transport Authority (NTA) actively supports Car Sharing through the Smarter Travel Workplaces Programme.

Major employers can incentivise Lift Sharing through initiatives such as priority parking for Carpooling staff and Guaranteed Ride Home schemes. There are opportunities to encourage schemes such as this in employment centres such as the industrial and business parks in the Leggettsrath and Loughboy areas.

10.5 Cargo Bikes

In many European cities such as Utrecht, London and Gothenburg, cargo bikes are fast becoming a critical solution to reducing the impact of last-mile deliveries and reducing the impact of HGVs in urban areas. By limiting HGVs and LGVs from the urban area, cargo bikes also reduce air and noise pollution, congestion and create safer street environments for pedestrians and cyclists.

According to EU-funded project Cyclelogistics, 50% of motorised trips transporting goods in European cities could be shifted to cargo bikes or e-cargo bikes. The 2014 study[4] found that motorized delivery vehicles vastly underutilised their storage capacity, and that bikes are also better equipped to tackle denser urban road networks. In particular, the study found that e-cargo bikes are best for trips under 7km, with a focus on everyday food supplies and other household essentials.

UPS and DHL are two examples of private delivery companies who operate cargo bikes globally. In addition to this, many smaller companies around Ireland are choosing to deliver by cargo bike. UPS recently launched a pilot scheme in conjunction with Dublin City Centre where zero-emission Fernhay eWalkers and eQuads are used to distribute goods from "urban package eco hubs". The eco-hubs take in larger consignments of deliveries and redistribute them to walkers and cyclists using removable cube containers. There are currently two of these mini distribution centres running in Dublin with more planned.

Figure 10-4 Large companies such as DHL and UPS have made the move to electric cargo bikes in many European cities.

Figure 10-3 Smaller companies within Irish cities and towns are choosing to deliver their goods by cargo bike. Example shown is of Dukes Café in Cork City.

Consideration should be given to:

- Promoting the use of cargo bikes by businesses within the City Centre through grants, information campaigns, etc.;
- Examining the case for urban or micro-consolidation centres within the Study Area as a transfer point between HGVs/LGVs to cargo bikes to reduce the number of last-mile trips being made by motorised vehicles; and
- Minimising empty return trips by taking inspiration from innovative practices such as Gothenburg's Stadleveransen or Utrecht's Cargohopper.

10.6 Dynamic Parking Systems or Virtual Loading Bay Systems

Section 9 outlines a number of options for parking management measures. These measures could be further supported through the use of innovative smart technology. Some cities in Europe have begun trailing systems such as Dynamic Parking Systems or Virtual Loading Bay Systems to support a more efficient use of kerbside space.

Dynamic Parking Systems help users to find, purchase and book available parking spaces in the nearby area with the use of an app. This reduces congestion by eliminating the need to search for available spaces and in effect, acts as a demand management technique as spaces must be paid for.

[4] Cyclelogistics Ahead, Austrian Mobility Research, 2014.

In a similar vein, Virtual Loading Bay systems allow kerb space to be utilised in areas where other traffic restrictions are in place, typically off-peak times where impact on congestion is less pronounced and search traffic and emissions are reduced.

10.7 Marketing and Information Campaigns

Information, education, promotion and outreach measures, that are aimed at raising awareness and improving understanding of the options and travel choices available to people play an important role in overcoming barriers to switching from private car use to sustainable modes. The use of technology in the communication of information has evolved considerably over recent years and opportunities to take advantage of effective and efficient new methods of communication via mobile applications and social media should be explored.

In delivering sustainable transport improvements, consideration should be given to branding, marketing, and advertising and using smart, creative, cost-efficient campaigns targeted at increasing and maintaining sustainable transport demand. Information campaigns should be an integral part of the successful delivery of the KLTP.

11. Emerging Preferred Transport Plan

The above sections propose a set of options for the KLTP based on the movement strategy and a comprehensive review and analysis of existing demand and 2040 mode share targets for all modes. This assessment has developed an Emerging Preferred Option for each transport mode that delivers upon this preferred approach. The assessment also presented a series of demand management measures and the rationale behind these, that will be necessary to deliver the mode share targets set out in the Context Report.

Table 11-1 presents a high-level assessment of all the Emerging Preferred Options and their alignment with the Plan's objectives.

Table 11-1 Assessment of Emerging Preferred Proposals

	Proposed Public Transport Network			**Proposed Cycle Network**	**Proposed Walking Network**	**Proposed Road and Street Network**				**Proposed Parking Management**		**Proposed Supporting Measures**
	Proposed Bus Routes	Bus Priority Measures	Public Transport Interchange			Kilkenny Ring Road	Central Access Scheme	City Centre Traffic Management	Urban Junction Improvements	Maximum Parking Standards	Consolidate Parking on Periphery	(e.g. Workplace Travel Planning, Car Sharing Schemes)
Support the future growth of Kilkenny City and Environs through the provision of an integrated, safe, reliable and sustainable transport network.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Close integration of land use and transport planning.	✓			✓	✓	✓	✓					✓
Support the realisation of the 10-minute city.	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓
Improved safety, accessibility and permeability throughout the Study Area for pedestrians, cyclists and public transport users.	✓	✓	✓	✓	✓		✓	✓	✓		✓	✓
Actively discourage vehicular through-traffic.		✓		✓	✓	✓		✓	✓	✓	✓	✓
Reduce dependency on the private car.	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓
Increase public transport capacity and provision to maximise catchment.	✓	✓	✓									
Enhance the public realm through traffic management and transport interventions.	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓
Limit the impact of Kilkenny's transport network on the environment.	✓	✓	✓	✓	✓			✓		✓		✓

12. Conclusion

This Report presented the Option Development stage in the development of the Kilkenny Local Transport Plan, which built upon a set of strategic objectives and a high-level approach which were discussed and agreed through engagement with Kilkenny County Council during the Context stage.

This Report presented an Emerging Preferred Option for each transport mode that delivers upon this preferred approach. The Report also presented a series of demand management measures and the rationale behind these, that will be necessary to deliver the mode share targets set out in the Context Report.

The proposals outlined in the Report are preliminary and will require further analysis to understand the full impacts of their implementation. The outcomes of this stage will therefore be brought forward to inform and influence the next step, the Optimisation and Refinement stage. This next stage will carry out a more detailed analysis and will present a more robust reflection on the achievability or otherwise of the options and measures proposed within the Option Development Report.