Draft Carlow Graiguecullen Local Transport Plan

Carlow County Council
Laois County Council

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1. Introduction

1.1 Background to the ABTA

AECOM has been appointed by Carlow County Council (CCC) to prepare a Local Transport Plan (LTP) for the Carlow Graiguecullen area using the Area Based Transport Assessment (ABTA) methodology. Carlow is the main town in County Carlow, with the Graiguecullen area falling within the County Laois boundary. The LTP provides a multi-modal framework which assists in informing future transport infrastructure planning, investment, and delivery. Overall, the LTP aims to facilitate and inform the integration of land-use and transport planning in Carlow Graiguecullen and deliver transport improvements to ensure increased usage of sustainable transport modes.

The LTP presents a comprehensive analysis of the current transport situation in the study area, alongside outlining the impact of future proposed development on the transport network. Potential solutions to improve the transport conditions for active travellers, public transport users, and private motorised vehicles are then presented. The LTP has informed the development of the Draft Carlow Graiguecullen Local Area Plan (2023-2029), which has been produced by CCC and Laois County Council (LCC) to guide the future development of the area. The LTP is informed by relevant national, regional, and local policy as well as appropriate guidance documents.

LTPs are particularly focussed on increased sustainability; therefore, LTP proposals must support compact urban growth, encourage a modal-shift from private motorised vehicles towards sustainable transport and improve key destination accessibility via these sustainable modes. Additionally, promoting Carlow Town as a hub of economic activity and a place of vibrancy is an important aspect of the LTP. This LTP, and other policies and strategies, aim to make the Carlow Graiguecullen area a more attractive place to live, work, study, and visit. For this reason, a key goal of the LTP is providing linkages between residential areas, education, employment, major economic areas, the town centre, and public transport stop / stations. Establishing new links between such areas for sustainable travel modes is essential in promoting sustainable travel and multi-modal sustainable trips.

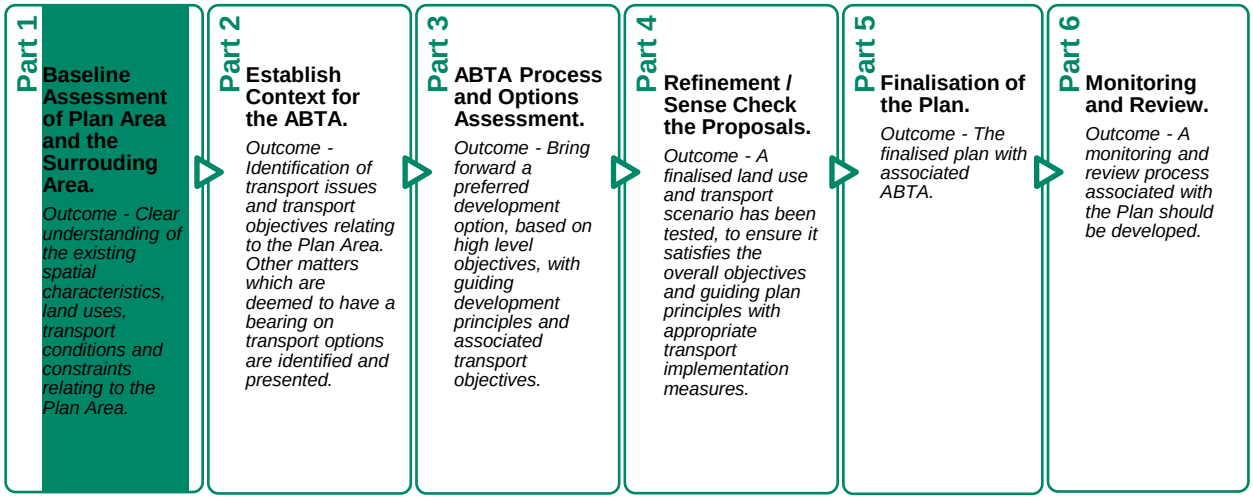
1.2 Area Based Transport Assessments

An ABTA is a structured transport assessment process which takes place to inform the development of a Local Transport Plan (LTP) and, in many cases, a Local Area Plan (LAP). Conducting an ABTA ensures that transport demand is sufficiently assessed and the transport measures in the LTP/LAP are evidence based, outlined as a requirement in the National Planning Framework (NPF), and informed by specialist transport analysis. The ABTA process is defined by the National Transport Authority (NTA) and Transport Infrastructure Ireland (TII) in the 2018 'ABTA Advice Note' and the TII and NTA 2021 'ABTA How to Guide'. The 2021 guidance describes the role of ABTA in the LAP process as follows:

"*An ABTA is recommended as the preferred form of technical assessment which can be used to appraise and guide the formulation of transport policies within the LAP and, more generally, the integration of land use and transport planning in the form of the LAP's accompanying Local Transport Plan (LTP). The ABTA will appraise transport demand and opportunities in a manner which typically results in firm proposals for transport infrastructure and accompanying transport demand management, including non-infrastructural measures to encourage sustainable travel behaviour that can be incorporated into the LAP. Applying the ABTA principles to LTPs and related studies will enable the identification and selection of transport measures that are compatible with the policy objectives set out in the relevant Development Plan and emerging as part of the LAP*".

An ABTA is a structured process which comprises six parts, from the Baseline Assessment in Part 1 to the Monitoring and Review in Part 6, as explained in **Figure 1**. The ABTA approach is structured to describe the process from evidence collection, through option creation, option assessment, refinement and finalisation of the transport strategy recommended for the LAP.

Figure 1. ABTA Process



1.3 Approach to LTP Development

1.3.1 Modal-Shift

A key concern of the LTP is promoting a modal shift away from private vehicles and towards more sustainable methods of travel. Individuals choose their preferred transport mode by weighing the benefits and costs of each mode for their trip purpose and requirements. Where a car is available, driving often has an advantage over sustainable modes of transport as it can provide door-to-door access to any location, whereas public transport is restricted by particular routes, and active travel is limited by a range of factors including trip distance and lack of dedicated infrastructure. However, policy and infrastructure interventions, such as enhanced permeability and increased bus stops can ensure that sustainable travel becomes faster, shorter, and more convenient. This can increase the attractiveness of sustainable modes of transport relative to the car and influence an individual's travel decisions.

The Carlow Graiguecullen LTP proposes a comprehensive network for active travel which will make walking and cycling safer and more convenient. For longer distance travel, the public transport strategy proposes improvements which would enhance the attractiveness of using bus and rail to travel further.

1.3.2 Delivering Sustainable Transport Policy

A sustainable travel focused LTP is in line with national transport policy which emphasises the importance of promoting sustainable travel and reducing the negative environmental, health, and social impacts of private motorised vehicles. The Department of Transport (DoT) published the National Investment Framework for Transport in Ireland (NIFTI) in 2021. This seeks to ensure that transport investment is aligned with four investment priorities:

- Protection and renewal
- Decarbonisation
- Mobility of people and goods in urban areas
- Enhanced regional and rural connectivity

The NIFTI investment priorities are supplemented by Modal and Intervention Hierarchies. Under the Modal Hierarchy, sustainable modes, starting with active travel (walking, cycling, and wheeling) and then public transport should be prioritised for investment before the private car. The intervention hierarchy outlines that protecting and renewing existing transport infrastructure should, where possible, be the first solution considered, followed by maximising the value of the transport network through optimising or improving it and investment in new infrastructure as a last option.

The DoT also published a National Sustainable Mobility Policy in April 2022, this sets out the strategic framework for active travel and public transport up to 2030. The policy aims to deliver at least 500,000 additional daily active travel and public transport journeys by 2030 alongside a 10% reduction in the number of kilometres driven by

fossil fuelled cars. The overall approach set out in the policy to achieving a more sustainable transport sector is based on the 'Avoid-Shift-Improve' principle and implementing measures to:

- Avoid – reduce the frequency and distance of trips
- Shift – move towards more environmentally friendly modes of transport, such as walking, cycling, or using public transport
- Improve – promoting efficient fuel and vehicle technologies

The ABTA seeks to meet the requirements of NIFTI and the National Sustainable Mobility Policy by achieving a modal shift through the creation of strategies which transform travel by sustainable modes within the Carlow Graiguecullen study area.

1.4 LTP Report Structure

The LTP is primarily based on the structure listed in the 2018 guidance, but has also been supplemented by elements of the 2021 ABTA *How To* pilot methodology where appropriate. This guidance is advisory, and the LTP for Carlow Graiguecullen seeks to balance meeting these requirements whilst also facilitating the creation of the joint LAP. In accordance with the guidance, the LTP report is divided into six main parts as outlined below:

- **Part 1**: Baseline Assessment – the Baseline Assessment examines the policy context and local characteristics of the study area in additional to existing travel patterns, transport infrastructure and transport services and environmental conditions. Due to the length of Part 1, it is provided as a separate standalone document contained in **Appendix A**.
- **Part 2a**: Establish the Context for the ABTA – identifies principles and objectives for the ABTA and provides high-level information on the future land-use scenario.
- **Part 2b**: Option Development – outlines the option development process and describes the options.
- **Part 3**: Option Assessment – outlines the option assessment methodology, the assessment of the options and the proposed measures (strategies) for active modes, public transport, roads, and parking.
- **Part 4**: Refinement and Sense Check Proposals – this section contains a sense check of the LTP measures and proposals to check it fulfils the requirements of the 2017/8 ABTA Guidance. It will be updated once consultation has taken place.
- **Part 5**: Finalisation of the ABTA – this chapter will present the final strategies for each mode once consultation has taken place.
- **Part 6**: Monitoring and Review – outlines proposals for future monitoring of mode share, LTP implementation and a proposed review process for the LTP in the future.

2. Part 1 – Baseline Assessment of the Study Area

2.1 Study Area

The study area boundary for the Carlow Graiguecullen ABTA is shown in Error! Reference source not found.. The study core is Carlow town centre, but also includes Graiguecullen and suburban sections of Carlow. The River Barrow runs north-south through the town and creates severance between Carlow and Graiguecullen. Additionally, the River Burrin runs east-west to the south of Carlow town centre. Within the area there is a railway

station, served by the Dublin-Waterford rail line, the Carlow Coach Park, major employers, and educational facilities as well as other key amenities.

2.2 Baseline Assessment

An initial first step in undertaking the ABTA is a baseline assessment of the study area. Any transport schemes that are developed need to be based on a solid evidence base so that there are clear linkages between the development of the option and the objective it will meet. The baseline assessment is outlined in detail in **Appendix A**, with key elements summarised in the following sections.

2.2.1 Socio-Economic Context

Transport is demand derived from other activity. The activity relates to the economic and social drivers of the area and impacts upon the environment; Carlow Town is considered a regional centre for education, shopping and the arts, and this means there is a volume of movement to, from and within the study area. It is therefore clear that an understanding of the study area's economy and society is critical to understanding how transport demands are derived and how they can be influenced by investment.

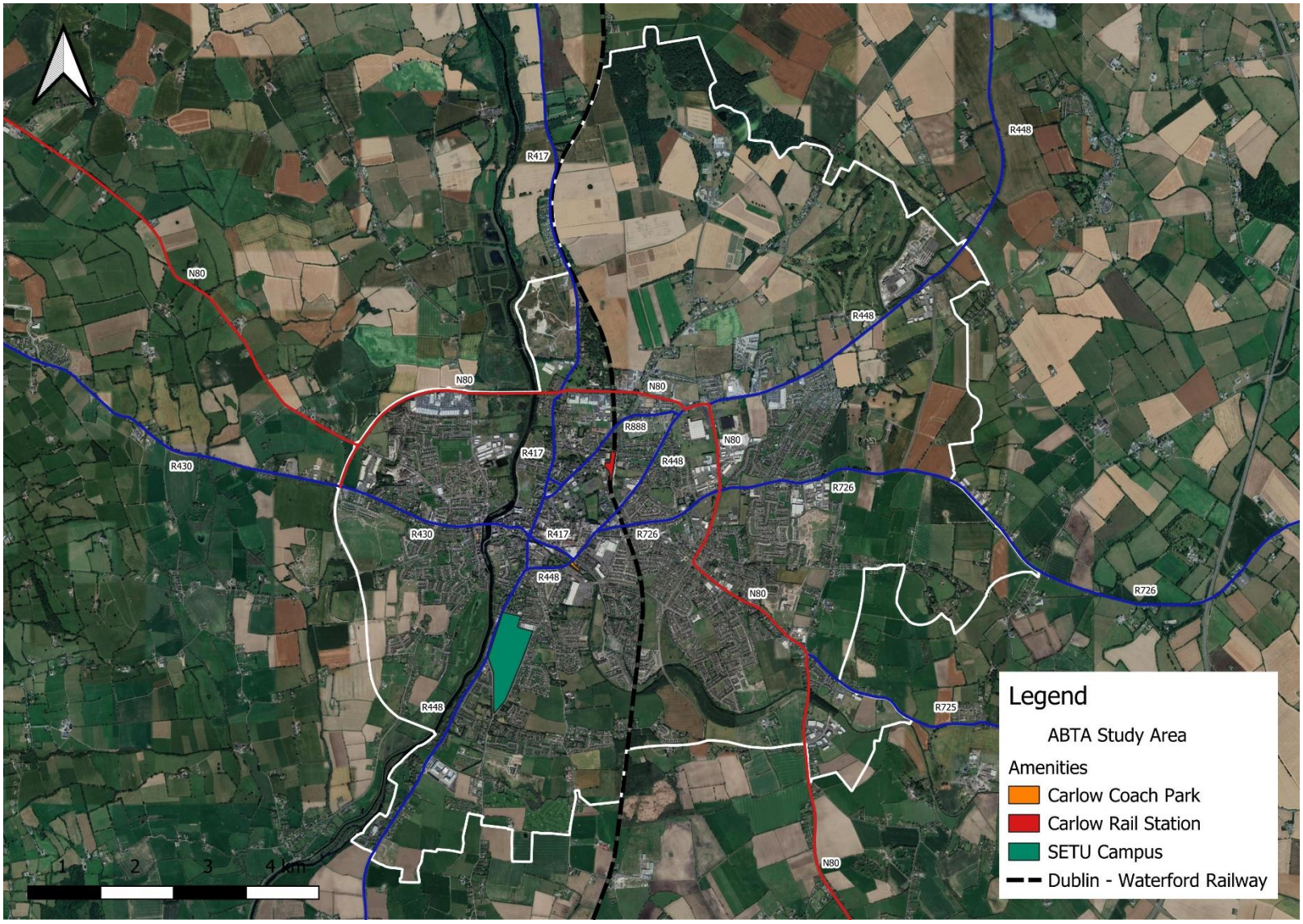
The population of the study area is 24,272 according to 2016 Census data, making Carlow the 13th largest town in Ireland. The 2022 Census is now complete; however, only county level population data was available at the time of reporting. The County Carlow population has increased 9% between 2016 and 2022, this is above the population growth seen across Ireland. This demonstrates that Carlow is a growing area and travel demand is likely to continue to rise; the transport network must be able to accommodate this.

Evidence has shown that the majority of new homes in Carlow have been constructed further out of the town centre and suburbanisation has occurred; this is outlined in greater detail in Appendix A. People residing further away from the town centre is likely to increase trip distances between homes, the town centre, and key services. The provision of sustainable connections to these areas is important to prevent severance and increased private vehicle kilometres.

Central to the development of Carlow is the presence of the South East Technological University (SETU). With 11,000 students and 850 staff, it is a key employer in the town and a generator of much transport demand. With further plans for expansion of the university, there is a real opportunity to attract and retain students within Carlow and improve the economic prosperity of the town. It is essential that the right infrastructure is put in place to make Carlow a place that these students want to stay.

Evidence has shown that there is deprivation with the study area, this is highest in Carlow and Graigue Urban (small census areas). Investment in infrastructure, and the potential wider benefits that could occur due to transport improvements, can assist in alleviating deprivation and improving the livelihoods of the Carlow population.

Figure 2. Carlow Graiguecullen ABTA Study Area



2.2.2 Transport Context

Analysis of 2016 census data shows that the majority of people who live in the Carlow County area remain in this area for work. Despite a high proportion of the population remaining within the Carlow area for work, there is a high dependency on the private car, with 76% of journeys to work in Carlow County, and 72% in Carlow Town, undertaken using this mode of transport. This is higher than the national average. The baseline report in Appendix A provides further information on travel movements within the study area, illustrating key movement patterns.

The fact that many people choose to stay and work within the study area means that sustainable modes of transport should be a real alternative option to the private car given that local trips are likely to be shorter in distance. However, to ensure that people can travel sustainably, the transport infrastructure needs to be in place. The existing transport infrastructure that is present within the Carlow Graiguecullen study area is summarised below.

Active Travel – Walking and Cycling

There is an existing walking and cycling network in Carlow. The cycling network has received investment in recent years but remains disjointed and low-quality in places, meaning infrastructure improvements and investment are required to enhance its attractiveness. Similarly, providing or upgrading walking links, to deliver improved permeability, is an important consideration to reduce active travel trip distances and make these modes more convenient. Permeability is concerned with how well people can move through spaces; key permeability barriers include the rail line, the rivers, and large residential estates.

Public Transport

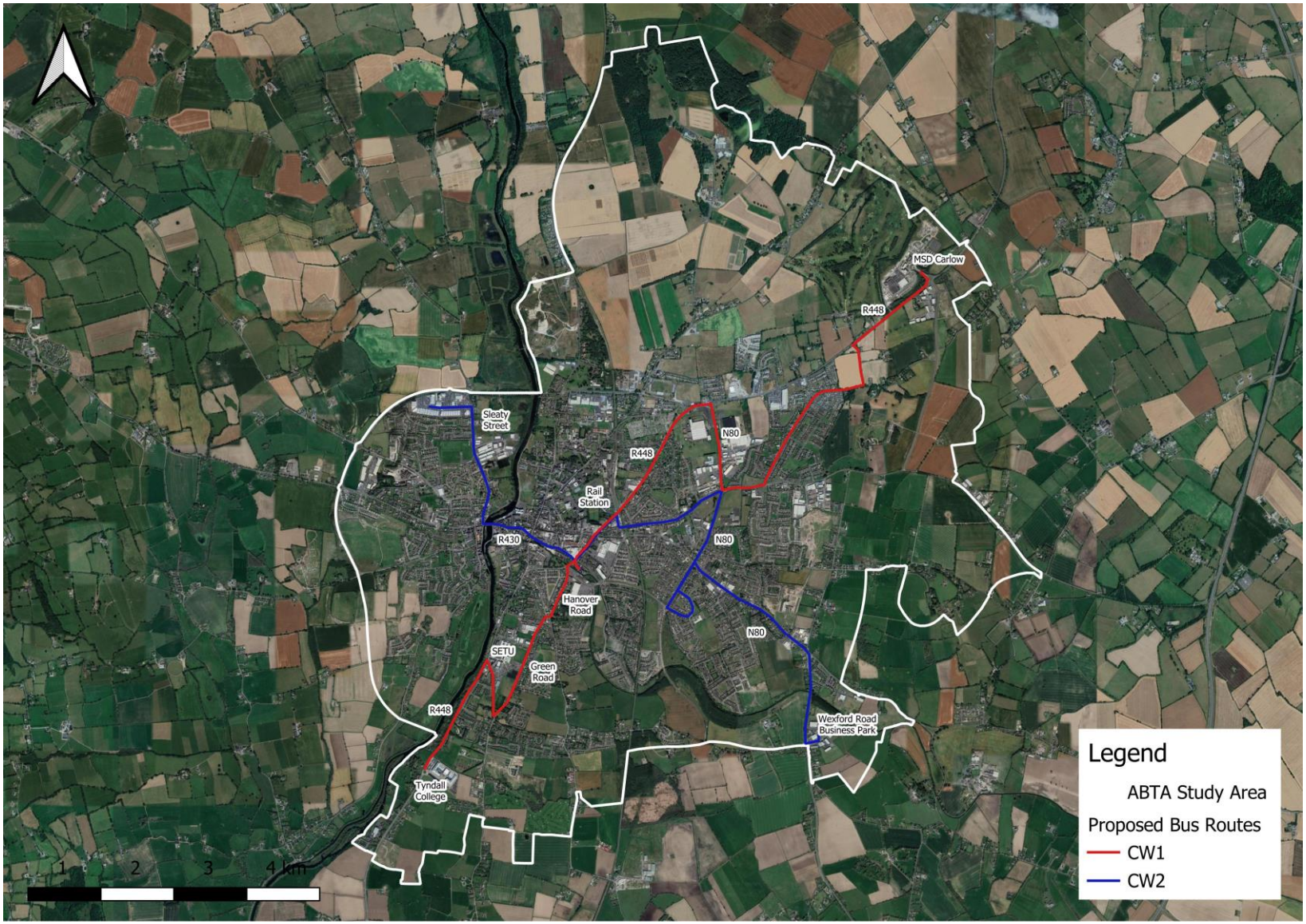
Numerous bus services run through Carlow, with both local and national destinations. However, these services are often infrequent and mean that journeys need to be planned in advance.

Many of the bus services that run through Carlow can be accessed at the Carlow Coach Park. Whilst the Carlow Coach Park has been improved in recent months, there are still limited waiting facilities for passengers, particularly when weather conditions are bad.

A number of other bus stops are located within the Carlow Graiguecullen study area, but these do not adequately serve key residential and employment locations.

Improvements to the provision of public transport within Carlow has been a longstanding aspiration, with the identification of two new bus routes. The new services have been developed by the NTA and CCC and were implemented in summer 2023. The routes are shown in **Figure 3**

Figure 3. New Bus Services



Where journeys are further afield, Carlow is on the Dublin to Waterford rail line, with the train station approximately 1km from the town centre. However, whilst there is currently a rail connection, services are infrequent, with only an hourly frequency at peak times and gaps of up to three hours throughout the day. This often means that the private car or bus services are the only real mode of transport when travelling outside of the local area, with the area being well connected to the rest of the country by road. Where rail could be considered a viable means of transport, better connections between residential settlements and the railway station, through active modes or improvements to the bus network, would provide an integrated sustainable transport offer.

Road

The N80 is the only National Secondary Road within the study area and is a high-capacity road allowing for strategic connections across Ireland; as such, there is a high proportion of freight traffic using this route. However, whilst the N80 is an important strategic connection, the road also serves local traffic, particularly for people commuting to employment located to the north of Carlow. In any option development work, the dual functionality of the road needs to be taken into consideration and must observe *Spatial Planning and National Roads Guidelines for Planning Authorities (DoECLG, 2012).*

There are also regional roads within the study area, including the R430, R417, R726, and the R44. These roads provide important connections to the national road network and linkages in the town. Congestion can be seen in the morning peak period at the River Barrow bridge, along Burrin Street, and sections of Kilkenny Road, and in the evening peak period westbound over the River Barrow bridge, Burrin Street, and the N80 Tullow Road junction.

When considering road safety, data shows that collision hotspots include some of the N80 junctions, the River Barrow bridge, and near St. Joseph's Road. The cause of these accidents needs to be taken into consideration when options identified in this LTP are taken forward for development.

Parking

There are numerous car parking facilities within Carlow town centre. Approximately 62% of parking provision is on-street pay and display, and 26% of parking is comprised of larger off-street car parks. There is also other parking available, this includes short-stay or set down only, found near many shops, amenities, and schools, as well as private car parks at retail spaces. The high availability, and affordability, of parking in Carlow reinforces the high car usage.

2.3 Relevant Policy

Relevant National, Regional, and Local Policy has been considered as part of the Baseline Assessment alongside relevant guidance documents. A summary of the relevant policy documents and their relation to the Carlow Graiguecullen LTP is contained within the Baseline Assessment (**Appendix A**). This section highlights key messages from the policies which have influenced the strategy principles as well as the option development process. **Figure 4** shows the different policies considered with the LTP.

Figure 4. National, Regional, and Local Policy

Key Policy Messages

Each policy has its own influence on the Carlow Graiguecullen LTP, the key takeaways are below.

- The main NPF transport goals are reduced car dependency, compact growth, regional accessibility, sustainable mobility. Therefore, the LTP options must try to deliver these.
- Ireland has commitments to reduce carbon emissions and has strategies on securing these. Carlow and the LTP must support this by promoting an active mode uptake and lower private vehicle usage.
- National investment priorities dictate that active modes are the top priority, and that new infrastructure should be a last resort, LTP recommendations have to be aligned with this national investment plan.
- There are goals to increase physical activity by incorporating physical activity into everyday routines – therefore options should help individuals complete pre-existing trips using active travel.
- Create 'safe, accessible, comfortable, and affordable' journeys from homes to services.
- Make the transport network safer to help achieve zero road deaths/serious injuries by 2050.
- Improve permeability by linking destinations direction, giving active travellers priority, and improving link and junction design. This needs to be referred back to when proposing active travel options.
- Try and support Carlow achieving 10-minute towns by linking services and people more directly.
- Support the RSES in promoting Carlow as a key town and making it an attractive place to live, work, and visit. There is a focus on sustainable development which travel options can assist with.
- Support the County Development Plan of Carlow. In particular aim to deliver integration of land-use and transport, a modal shift, prioritised and promoted sustainable travel, keeping car parking controlled, and retaining road capacity whilst not promoting additional car trips.
- Deliver a person-centred town which has a good public realm.
- Assist in making mobility more sustainable to help achieved Carlow environmental goals.
- Provide infrastructure suggestions which could help Carlow thrive and develop economically through further investment in the area but also by better connecting people with jobs and the town centre.

2.3.1 SWOT Analysis

Following the development of the baseline assessment, a summary of the strengths, weaknesses, opportunities, and threats (SWOT) analysis was undertaken for the Carlow Graiguecullen ABTA study. This SWOT analysis has been used to inform the development of the options for each mode.

Table 2-1: SWOT Analysis

Strengths	Weaknesses
• Carlow's geographical location is beneficial, there is relatively easy access to Dublin, other neighbouring counties, and the remainder of the South East region. • SETU presence and potential to provide further education to current Carlow school leavers. • SETU's ability to attract students from other areas who will spend in the Carlow economy. • Residents of Carlow being higher educated can provide businesses with a better labour pool. • Quality of life for Carlow is deemed excellent and it is seen as a great area for those wanting to 'settle down'. • Cost of living is respectable, especially compared to major nearby cities. • The town is reasonably affordable for the student population. • There are strong transport links to areas external to Carlow via the road and rail. • There is a strong presence of businesses, mainly located in the business parks or town centre. • There is presence of some major multi-national companies who are large employers. • Many people who live in Carlow also work here. • Within the town most residential areas are within close proximity of the town centre and amenities. • There is natural beauty and a rich history which can promote tourism. • There is a good agricultural industry which could promote agri-tourism. • There are various shopping areas in Carlow, including high streets, shopping centres, and out-of-town retail parks. • There are bus services between Carlow and other places, in particular Dublin Airport and Dublin. • There is a growing population. • There is a young population with many of the population aged 34 or under.	• Lack of sustainable transport links between residential areas and employment / education opportunities. • High-level of congestion across the town during peak hours. • Parking availability and drop-off opportunities surrounding educational facilities promotes unsustainable travel trips. • Lack of alternative routes leading to high through traffic in the town centre. • A surplus of low-cost town centre parking opportunities. • Lack of safe crossing opportunities for active travellers. • Lack of dedicated cycle infrastructure. • Permeability constraints due to physical barriers (Rivers, Railway, and Developments). • Lack of accessible and high-quality bus stops. • Infrequent public transport services. • Poor perception of public transport acting as a barrier to use. • Limited public realm provision prevents an attractive town centre. • High vacancy rate for retail and employment buildings in the town centre. • Carlow needs greater external market presence to attract more large businesses. • The retail and evening market in Carlow can often struggle and this contributes to a lack of vibrancy. • Often students who graduate SETU do not remain in the area meaning talent and potential employees are lost. • Lack of investment from large eternal sources. • Lack of preparation to accommodate remote and hybrid working lifestyles. • High levels of car dependency.
Opportunities	**Threats**
• Expand the largely untapped tourism industry. • Create 'remote hubs' for new style of working. • Build upon Carlow's excellent quality of life. • Increase links between SETU and businesses to provide graduates with potential jobs and employers with improve labour pool. • Providing more accommodation for town centre living. • Improve the outward brand of Carlow to attract new investment, residents, and visitors. • Improve the skill level of the population. • Improve active travel safety. • Improve public transport frequency and connectivity to other towns. • Increase the number of bus stops to provide greater accessibility. • Provision of two new bus services linking residential areas and amenities. • Create a thriving evening market and café culture for those living, working, and visiting Carlow. • Improved rail services due to Carlow being identified as a key commuter town of Dublin. • Deliver compact growth in town centre. • Reduction of on-street parking to deliver space back to people and improvement the environment. • Improved permeability in the town, especially across River Barrow for residents in Graiguecullen to access the town centre. • Promotion of electric vehicles. • Park and stride for education-related trips to promote active travel and reduce congestion. • Provision of apprenticeships to give Carlow school leavers greater opportunities.	• Objection to the reallocation of space to active modes. • Objection of changes in the town centre, particularly parking and one-way systems or pedestrianisation suggestions which will have a large impact on general traffic. • Continuing vacancy issue if new businesses cannot be attracted. • Lack of demand for town centre living is not seen as vibrant and attractive. • Unwillingness to undertake a modal shift. • Southern Relief Road Phase 3 not being delivered meaning many journeys still route through the town. • High level of car commuting to the university. • Increased travel demands due to population growth and further development of SETU. • Negative impact of COVID-19 and unwillingness to use public transport services. • Broadband provisions need to be improved to allow for better technology in relation to businesses, homes, and education.

3. Part 2 – Establish the Context & Option Development

3.1 Part 2A – Establish the Context for the ABTA

3.1.1 ABTA Principles

Following on from the completion of the Baseline Assessment and SWOT analysis, a set of ABTA principles were development and agreed with Carlow County Council, Laois County Council, and the National Transport Authority to help inform the option development process and as a future monitoring tool once implementation begins. The agreed set of principles encompasses six overall strategy principles alongside mode specific principles for walking, cycling, public transport, roads, and parking.

Later in the LTP (Part 6) recommendations for ongoing monitoring of the delivery and impact of the LTP measures are outlined. A wide range of suggested indicators are put forward which will help CCC, LCC, and key stakeholders to understand the extent to which the principles set out during this section are being met.

3.1.1.1 Overall Strategy Principles

The following principles have been used to guide the overall development of the LTP:

- Promote Carlow Town Centre as the core of activity and improve the transport system to make the town centre a more attractive place in which to live, work, visit and recreate.
- Seek to reduce the number of car-based trips through a shift to sustainable modes.
- Prioritise providing for walking, cycling, and public transport accessibility.
- Ensure sustainable development and compact growth through integrated land-use transport planning.
- Provide sufficient transport infrastructure to accommodate population and employment growth.
- Improve public health and well-being by promoting active travel.

3.1.1.2 Walking Principles

In respect to walking, the guiding principles of the LTP are:

- Create an integrated walking network for Carlow Town which allows convenient, safe, and efficient travel across the town and also facilitating recreational walking.
- Improve permeability to enhance access to homes, schools, jobs, shops, SETU, and the public transport network
- Improve the safety for pedestrians, especially those in vulnerable groups, through the provision of high-quality footpaths and crossing points.
- Provide walking links between transport hubs, workplaces, and homes.
- Promote a modal shift from private car towards walking, especially for trips that are short or medium distances.

3.1.1.3 Cycling Principles

In respect to cycling, the guiding principles of the LTP are:

- Provide an integrated and inclusive network for Carlow Town.
- Improve the safety and security of those cycling in Carlow Town.
- Improve connections for cyclists between homes and key trip attractors, i.e., the town centre, train station, educational facilities, and supermarkets.
- Provide safe and convenient crossing points at major junctions for both new and existing cycle infrastructure.
- Promote a modal-shift from the private car to cycling, particularly for short and medium trip distances.
- Provide satisfactory cycle parking at key destinations and mobility hubs which allow for the safe storage of cycles.

3.1.1.4 Public Transport Principles

In respect to public transport, the guiding LTP principles are:

- Improve access from residential, employment, education, healthcare, and retail facilities to public transport stops.
- Improve the coverage, frequency, and capacity of public transport.
- Provide bus priority infrastructure where it is necessary to improve journey times and reliability.
- Improve public transport stops/stations in respect to location, information, accessibility, infrastructure, and visibility.
- Improve interchange experience for passengers changing between different modes of public transport or routes.
- Promote modal shift from the private car to bus or rail, particularly for medium/long distance trips.
- Ensure interchanges are convenient and allow for access to various key destinations to enhance the attractiveness of public transport.

3.1.1.5 Road Principles

Furthermore, the guiding principles in relation to road are:

- Reduce car dependency by promoting mode transfer to walking, cycling, and public transport.
- Reduce options vehicular trips through Carlow Town Centre through road layout and access changes as well as parking and policy.
- Improve road safety and eliminate collision hot spots.
- Overcome issues relating to pinch points which threaten capacity and network reliability.
- Ensure that junctions are suitably improved to provide for those trips which cannot be converted to sustainable modes, particularly important for rural parts of Carlow.
- Restrict certain car movements to try and ensure that infrastructure commitments to active modes and public transport do create a modal-shift.

3.1.1.6 Parking Principles

Additionally, the guiding principles in relation to parking are:

- Manage the provision of car parking to support and improve the economic vitality of the town centre.
- To ensure car park provision encourages sustainable travel, particularly around railway station.
- To reduce on-street parking, where appropriate, in the town centre to facilitate public realm and walking, cycling, and public transport infrastructure improvements.
- Improve the quality of parking information with new parking signage and technology.
- Introduce parking demand management measures to reduce car dependency and enhance the attractiveness of sustainable travel.
- Make high-level recommendations regarding suitable locations for electric charging hubs.
- Ensure parking pricing and availability are suited to helping secure a modal-shift and promoting sustainable travel.

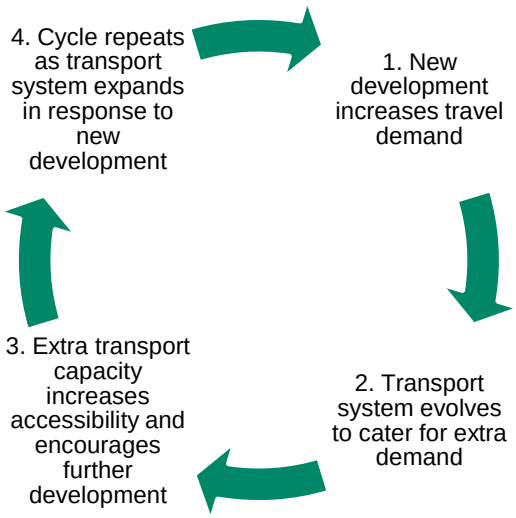
3.1.2 Future Population and Job Growth in Carlow Town

The integration of land-use and transport planning is key to promoting compact growth and travel by sustainable modes. This section summarises the land-use assumptions, which have been included in the LTP to identify the required transport infrastructure for the future.

3.1.2.1 Integrated Land-Use Transport Planning

Land-use and transport are closely related. They feed into each other through the process of the land-use-transport feedback cycle, shown in **Figure 5**. This cycle means when transport improvements are delivered, growth is promoted. This growth results in the need for further transport improvements to cater for the additional travel demand; when these improvements are delivered further transport capacity is created promoting further growth.

Figure 5. National, Regional, and Local Policy



Appreciating the importance of the land-use-transport feedback cycle is vital in understanding the need for an integrated approach to land-use-transport planning during the ABTA process. Local Area Plans with an associated LTP process can be successfully used to strategically locate new transport infrastructure and services in areas where development will be promoted. This ensures the best chance of encouraging a modal shift and increased usage of sustainable transport modes. The Carlow Graiguecullen population is likely to continue to grow in the coming years, as is SETU. Such growth will apply further pressure to the existing transport network and therefore future land-use-transport planning is important to prevent this and ensure that transport network can accommodate future growth.

3.1.2.2 Land-Use Assumptions

The Join Urban Local Area Plan (JULAP) for the Carlow Graiguecullen area will replace the existing Joint Spatial Plan and will set out proposed land uses for the town between 2023 and 2029. Previous land use zones were

identified and adopted in July 2022 as part of the Carlow County Development Plan 2022-2028; these land use zoning will be brought forward as part of the JULAP. The aim of the land use zones is to promote compact urban growth in a phased and sequential way from the centre of Carlow Town, and with a focus on potential brownfield sites. The location of development zones is illustrated in Figure 6.

The key growth sites illustrated by the plan represent approximately 1255 new dwellings across the study area, as well as the regeneration of a number of sites for employment use, including the Braun site off O'Brien Road.

In addition to development aspirations which are set out as part of the JULAP, consideration has also been given to developments that are currently under construction or where live planning applications are in place. Significant sites include:

- SETU campus upgrades.
- IDA Advance Factory - Dublin Road.
- MSD – Dublin Road.
- Residential Development (Cois Dara) – completed section and area under construction– Tullow Road.
- Braun site – site is to be reoccupied soon; however, it has been identified as a key regeneration site as part of the JULAP.

Sites which are currently under construction, or are live within the planning system, are illustrated in Figure 7. Consideration will be given to any additional sites, which have come forward before this LTP is finalised.

Figure 6. Location of Development Sites

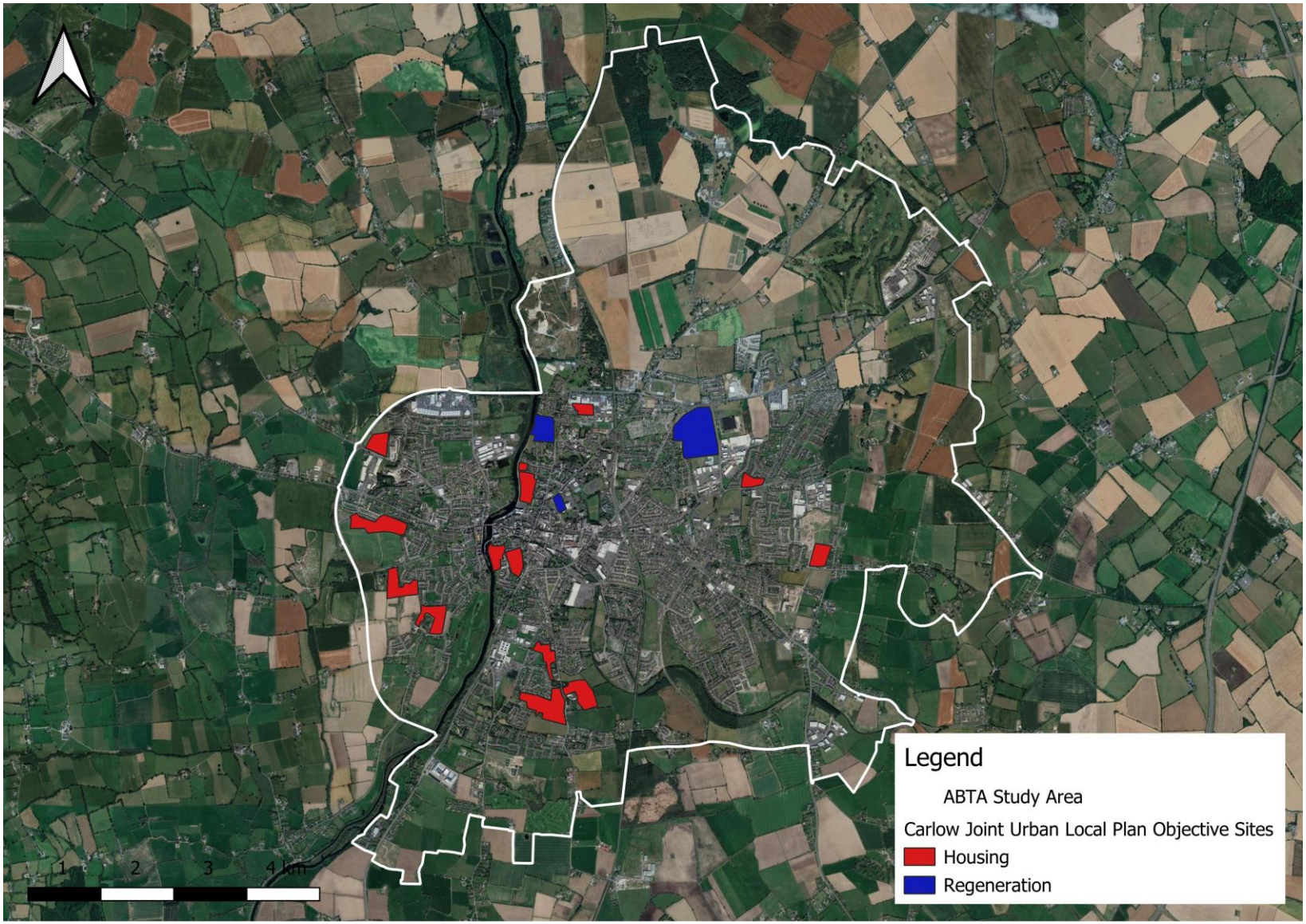


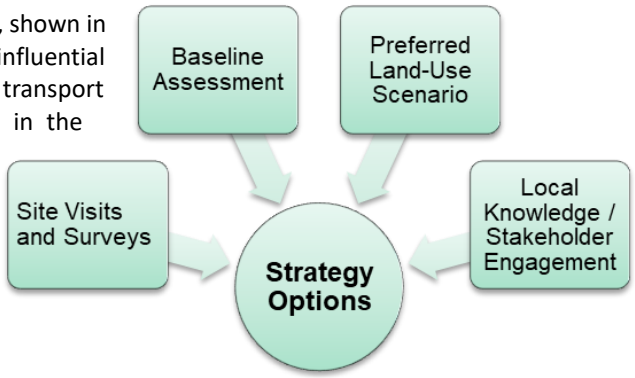
Figure 7. Sites Under Construction and Live Planning Applications

The information outlined in the following sections has been used to develop future demand scenarios, which can be used to assess the impact of the measures outlined in the LTP. Further information is outlined in subsequent sections of the LTP.

3.2 Part 2B – Option Development

3.2.1 Option Development Process

Figure 8. Option Development Inputs



The LTP strategy options were developed based on the inputs, shown in Figure 8. The baseline assessment and site visits were highly influential in providing an in-depth understanding of the current transport network in Carlow Graiguecullen. The analysis completed in the baseline assessment provided the focus to create options which solved existing transport issues in the study area. In relation to future growth, the land designated for development in the land-use scenario was the guide for creating the expanded sustainable transport network. Local knowledge and input were sought through engagement with CCC and LCC, as well as key stakeholders.

3.2.2 Options Description

The following section describes the options for each transport mode: walking, cycling, public transport, roads, and parking. Within each section, brief descriptions of the option development process, mode principles, and the proposed options are outlined.

3.2.3 Active Modes

The walking and cycling strategies have separate objectives and options, but the two strategies are linked, with options set out in one strategy influencing the other mode.

3.2.3.1 Walking

The walking strategy options mainly comprise new or upgraded walking links to improve permeability. The principles for this strategy are summarised below (**Figure 9**) and contained fully within **3.1.1.2**.

Figure 9. Walking Principles

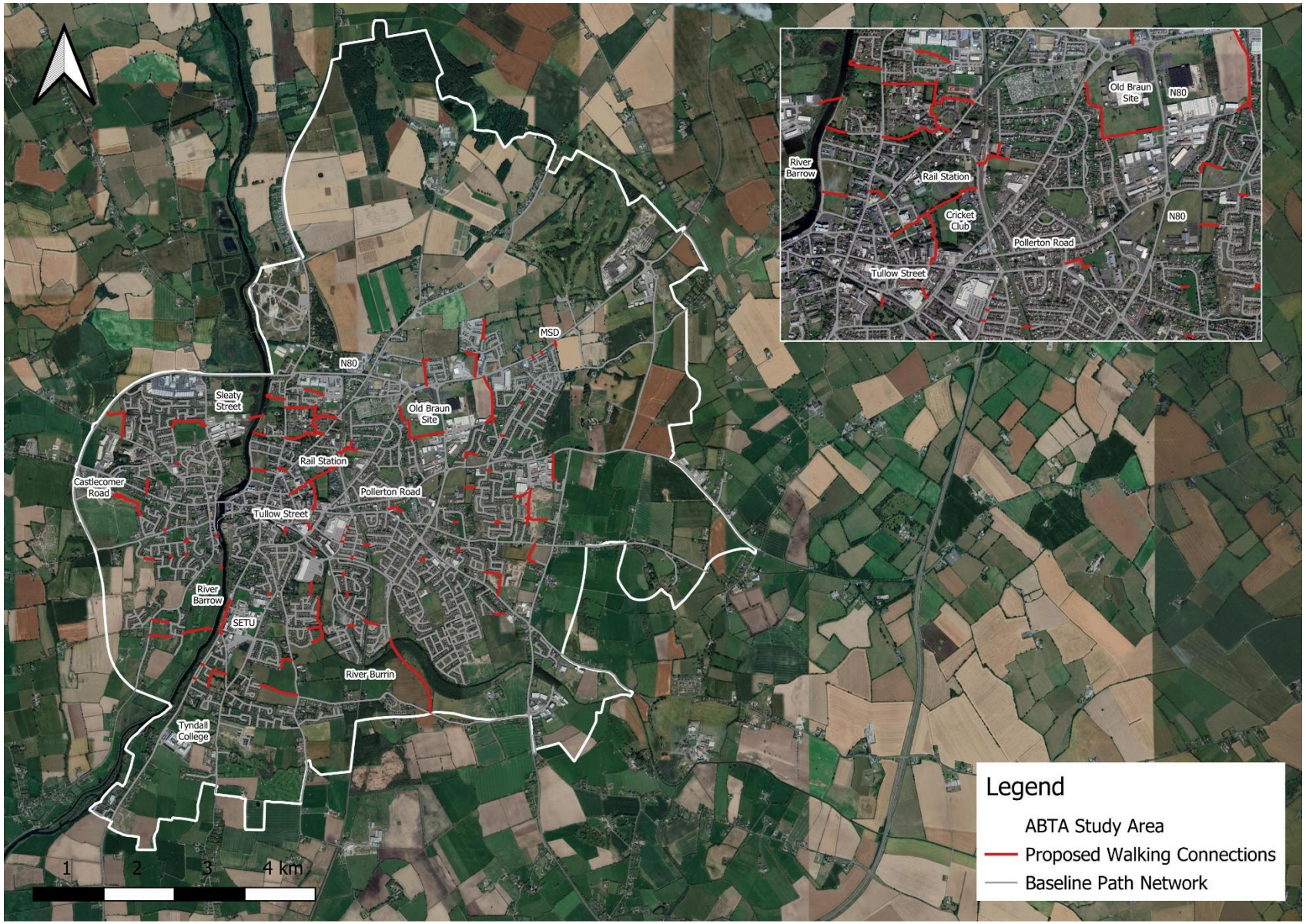
As mentioned, the walking strategy seeks to create convenient and efficient routes between homes and key trip attractors and reduce walking distances through enhanced permeability. This would give active modes of travel a competitive advantage over private cars. The strategy seeks to also facilitate recreational walking through the delivery of routes which are attractive.

To develop the options, an in-depth desktop study, which explored satellite imagery, on-street views, baseline path network, and OS map, was completed. This firstly established where paths already existed in Carlow Graiguecullen before suggesting high-level link options to better connect parts of the study area to each other.

In developing the options, consideration was given to the existing transport network in the area of the proposed new links. This was particularly important where proposing new links, which would connect to high-speed strategic roads, with it being essential that new links connected into an existing pedestrian network and safe crossing points. Consideration was also given to potential objections to proposed walking links where this may raise security concerns.

The preferred option for the walking mode is an improved walking network, which delivers permeability enhancements to improve active travellers' connectivity. Although these options are contained within the walking strategy, it is thought that cyclists could also benefit from the new links, albeit on some routes cyclists would be expected to dismount. The proposed permeability connections across the study area are shown in **Figure 10**; new or upgraded paths are shown in green. These permeability connections are recommended as a network and therefore an individual breakdown of each link is not provided.

Figure 10. Proposed Walking Network



The improved permeability connections will be delivered as follows:

- Cut-Throughs – removing a small permeability barrier, such as fencing or a wall, to allow for the easy flow of pedestrians between two areas.
- New Paths –provision of an entirely new connection, for example through a field or along the edge of residential estates.

Figure 11. Visualisation of Bridge over River Barrow.

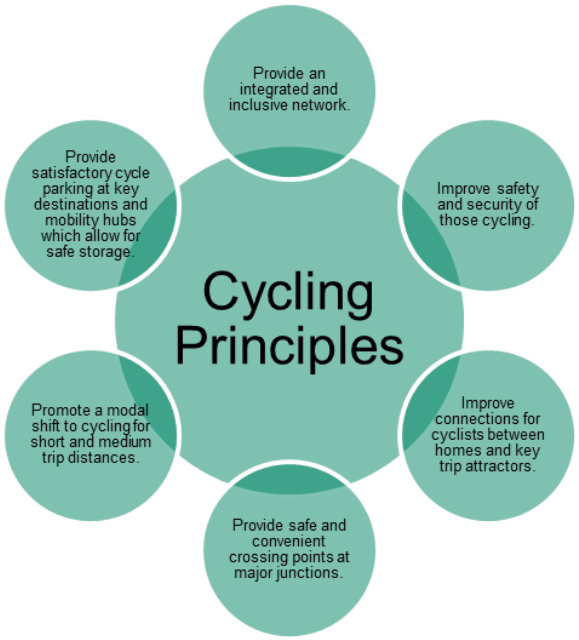
As demonstrated in the walking network map above, the new permeability proposals include a new active travel bridge crossing the River Barrow. Provision of this bridge to the south of the study area could remove a major permeability barrier and allow easier movement, for pedestrians and cyclists, between the two sections of the LTP study area currently severed by the River Barrow.

Additional measures are proposed to further enhance the attractiveness and likelihood of walking in Carlow Graiguecullen. These include the promotion of walking in Carlow Graiguecullen, as well as a pedestrian wayfinding strategy for the town. Promotion of walking as a mode of transport will focus on the benefits of increased physical activity, such as improved mental and physical wellbeing, reduced carbon emissions, and a nicer environment. The wayfinding strategy will highlight walking paths and routes that can be used around the town, for example signage from the town centre to SETU to provide both route direction and information on how long the walk may take. Providing information on routes and possible walking times can show that walking can be a quick and convenient method of travel around Carlow Graiguecullen and again increase the likelihood of walking.

3.2.3.2 Cycling

The cycling strategy seeks to provide a well-connected and high-quality cycle network across the study area. The principles for the cycling network are briefly outlined below.

Figure 12. Cycling Principles



New and upgraded cycling routes are intended to be used for strategic and recreational trips. The provision of higher-quality infrastructure which is safe, well-connected, and accessible aims to encourage people to choose cycling over the private vehicle for their transport.

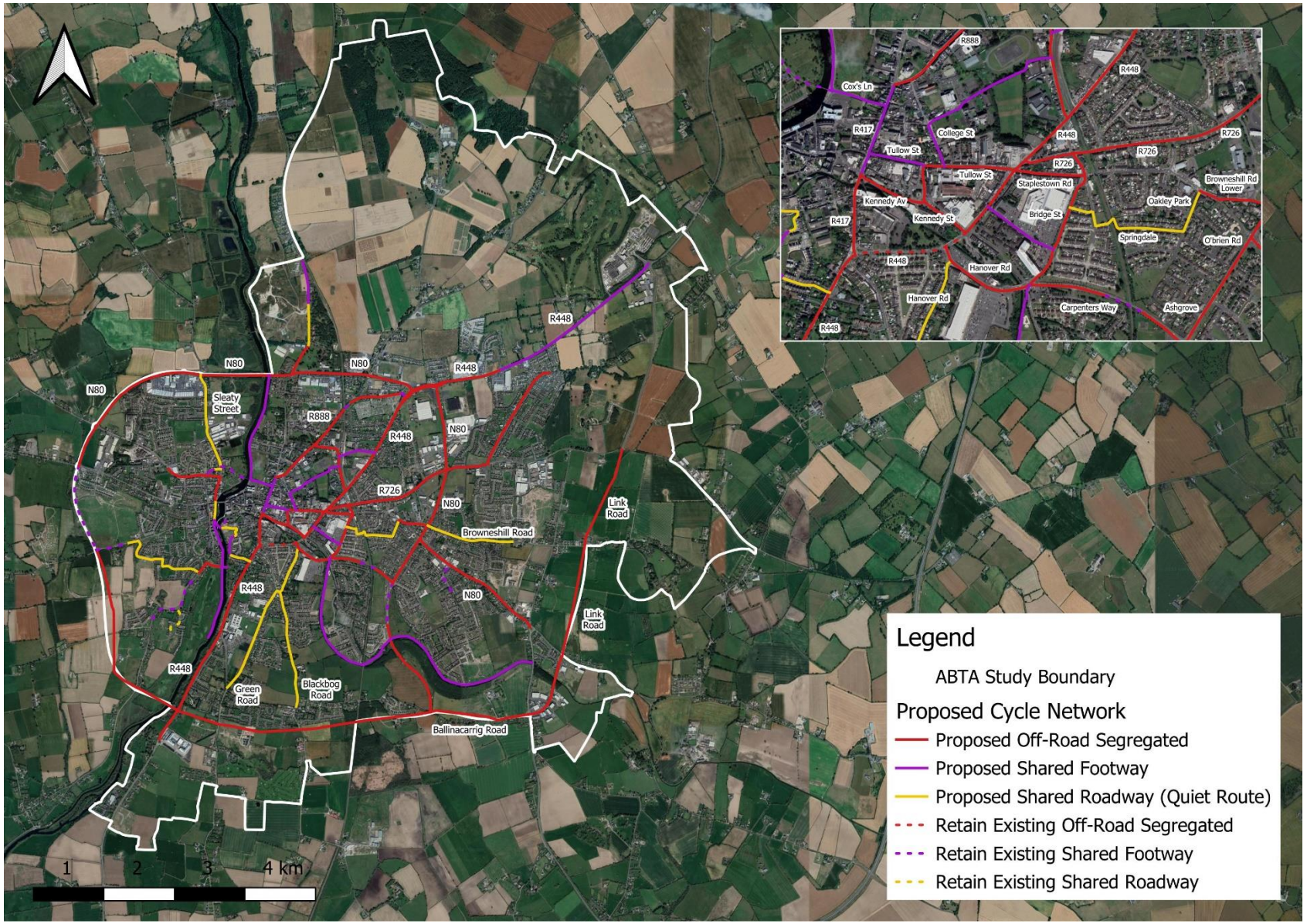
Options have been developed building upon the existing cycle connections in Carlow Graiguecullen and also to provide cycling connections between residential areas and key amenities. The starting point for the option development proposals was the national Cycle Connects strategy, which was a desktop study to identify extensive cycling proposals across key towns in Ireland, including Carlow.

There are varying levels of cycle infrastructure proposed, depending on the constraints that are encountered on each route. In some cases, there is a requirement for road or parking alterations, such as one-way road system or parking removal, in order to provide high-quality cycling infrastructure.

The main option of the cycling strategy is the creation of a cycle network providing connectivity and accessibility through high-quality cycle infrastructure for Carlow Graiguecullen. The provision of high-quality cycle infrastructure can make this method of travel safer, quicker, easier, and more attractive.

Figure 13 outlines the cycle proposals, which will provide a network of connected routes across the Carlow Graiguecullen area.

Figure 13. Proposed Cycle Network



There are varying levels of cycle infrastructure proposed across Carlow Graiguecullen. The different levels of infrastructure provision, are defined as follows:

Off-Road Segregated: cyclists are segregated from pedestrians and road traffic, meaning each mode has their own designated space. This is the optimal level of infrastructure provision and has been proposed in as many places as possible in the study area.

Shared Footway: cyclists and pedestrians share the footpath, which is indicated through markings on the pavement and appropriate signage. This option does not allow for segregated space between all modes; however, it still ensures segregation between active modes and road traffic.

Shared Roadway (Quiet Route): cyclists and traffic share the road. In terms of the LTP, shared roadway is only suggested for a quiet route, for example through a residential street which is quieter generally or where traffic calming measures (e.g., speed bumps or chicanes) could be implemented.

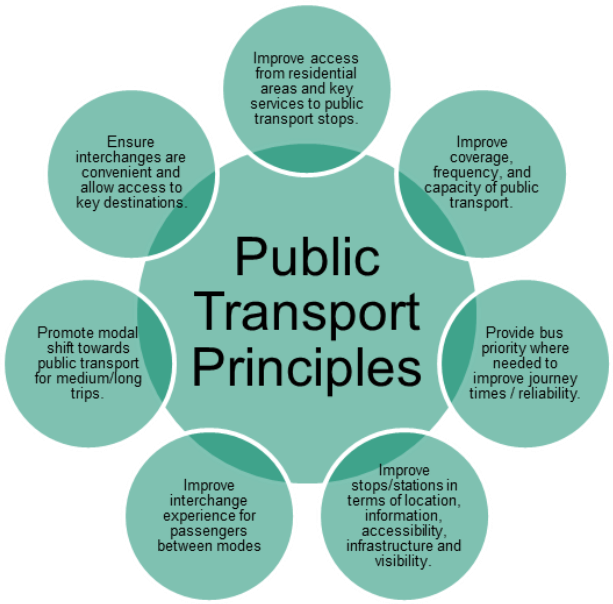
Further measures have also been identified to complement the proposed cycle network in Carlow Graiguecullen. These measures aim to improve the attractiveness of cycling as a mode of transport and are summarised below:

- Cycle Parking – the provision of secure cycle parking at key destinations across the study area. It is important that individuals can store their bikes in safe, covered, and convenient locations once they reach their destination. Without the provision of cycle parking, barriers to cycling still remain.
- Bike Maintenance Stands – provision of bike maintenance stands at key locations. Bike maintenance stands provide the tools to handle quick-fix bike issues, such as pumping a flat tyre. Some maintenance stands can also be used to re-inflate the tyre of a pushchair or wheelchair, therefore stands could benefit more than just cyclists. This again is important to boost the convenience of cycling.
- Cycle Hire Scheme – explore the option of implementing a cycle hire scheme in Carlow. This will improve cycling accessibility for those who do not own a bike.
- Advertising – Advertise, with appropriate signage, the new cycling links and use adverts to promote cycling and sustainable travel. The demonstration of benefits of active travel, for the individual and environment, can encourage people to choose this mode. This could be especially true for children who could be educated at school.
- Cycle Training – explore the option of providing cycle training for both children and adults so people can become competent riders and be more confident in using cycle infrastructure.

3.2.4 Public Transport

The provision of public transport options within the Carlow Graiguecullen area is limited but has recently been improved with the implementation of two new town bus services in 2023. Draft public transport options have been developed to complement the existing provision, with a recognition that CCC and LCC will work with the NTA and public transport providers to further enhance the public transport offer as part of an on-going process of bus network design to respond to changing demand patterns. The improvements to public transport aim to make public transport travel more accessible, convenient, and attractive so that this mode can become a more viable transport option for Carlow Graiguecullen.

Figure 14. Public Transport Principles



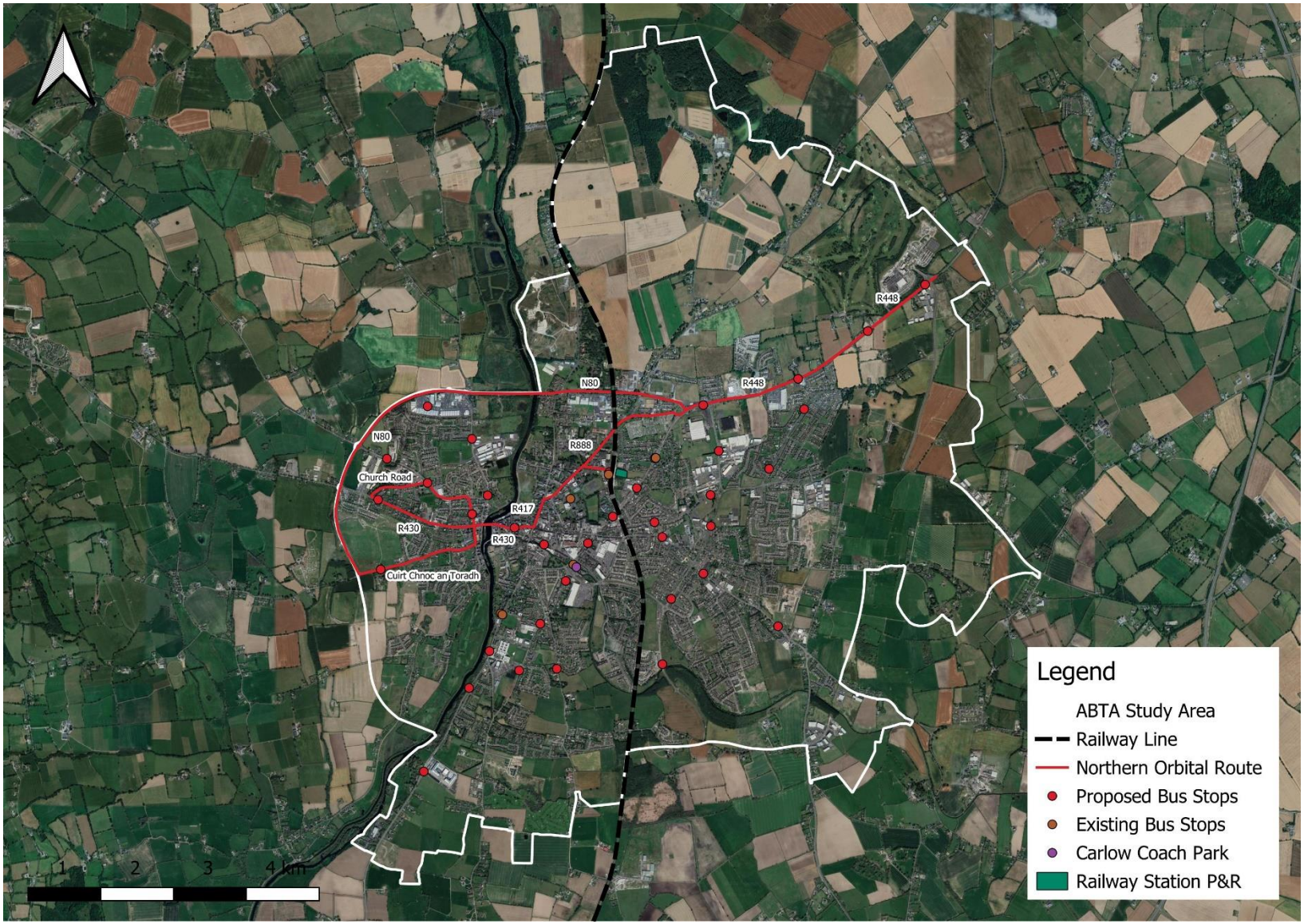
The public transport option development is different for bus and rail.

The bus options build upon the commitments made by CCC and NTA in terms of the new bus services. Therefore, LTP options were developed to cover routing gaps or bus stops not provided in the CCC/NTA plans. In terms of bus stops, the ideal benchmark is that all areas of urban Carlow Graiguecullen will be within 500 metres of a bus stop.

For rail, there is recognition that improvements to the frequency of services between Carlow and Dublin would improve the attractiveness of rail as a mode of transport. However, such large-scale rail improvements lie outside the scope of this LTP and are being addressed in the All-Island Strategic Rail Review, but CCC and LCC will continue to work with partner organisations to develop options for improvements to the rail network.

Central to the public transport strategy is the ongoing review of the two new bus services and the potential extension of existing routes, or provision of new routes to support changing demand patterns; a potential new route has been identified along the N80, but this will be subject to ongoing review depending on the uptake of new services. The provision of the N80 orbital bus route would ensure that the national secondary road and the northern section of the study area, including the north west of Carlow Town, is covered by a bus route. It has been outlined in policy that an N80 bus route is desirable to provide connections along this strategic route. This route would call near key destinations such as homes in Graiguecullen, at retail spaces along the N80 and R448, Carlow Train Station, and MSD, a major employer. The provision of a new route, or extension to existing routes, would improve the viability of public transport as a mode of transport. The potential N80 route is shown in **Figure 15**.

Figure 15. Proposed N80 Orbital Route



With the implementation of new bus services, there will need to be improvements to the existing public transport infrastructure, with the installation of new bus stops and upgrades to public transport interchanges. The proposed location of new bus stops can be seen in **Figure 15,** although this would be subject to a detailed review following agreement on extension to any bus routes.

A significant increase in the number of bus stops in Carlow Graiguecullen is essential to ensure that bus routes are accessible. Reducing the distance between stops and homes/destinations can make bus travel more attractive as bus journey times can become more competitive with the car. Additionally, the improvement to infrastructure so that it is higher quality, for example lighting, shelter, better information regarding public transport (fares, ticketing, timetables) can make wait times and necessary transfer easier. Such improvements will improve the overall attractiveness of public transport and could encourage increased usage.

Alongside extensions to the bus network and provision of bus stops, it is proposed that major public transport stations (Carlow Coach Park) will become mobility hubs. This will create stations which can act as a seamless transfer point for all modes as well as an enjoyable place to wait for public transport services, buy tickets and seek out information. An example visualisation of what Carlow Coach Park could look like is provided below. NB: This is indicative only.

Figure 16. Carlow Coach Park Visualisation

There is a recognition that the provision of additional measures, outlined below, could further enhance the quality and attractiveness of the public transport services for Carlow Graiguecullen.

- **Real-time passenger information (for buses) –** Once sufficient bus services are established within Carlow, CCC and LCC will work with operators regarding the need for, and benefits of, real-time information. Real-time information will allow individuals to have better live tracking of buses and allow them to be better informed about travelling by public transport. This information could be available at the bus stop or through a mobile phone application.

- **Flexible and affordable ticketing** – CCC and LCC will endeavour to work with the necessary parties to provide tickets for public transport services which are flexible and affordable. Improving flexibility could allow individuals to buy a single ticket that would cover multiple bus routes or multiple public transport modes. Ensuring ticketing is flexible and affordable is important to making public transport more accessible to all. If ticketing is complex or unaffordable, it can make public transport services unattractive.

- **Marketing campaign** – To improve awareness of the public transport offer within Carlow Graiguecullen, CCC will run a marketing campaign. This would outline the improvements made to bus services and other key information e.g., prices, running times, journey times between key destinations. Providing travellers with information on the public transport options that are available to them ensures that they can make informed choices about their mode of transport.

3.2.5 Road

Due to the hierarchy of different transport modes, it will not be appropriate within this LTP to make the case for significant road construction in isolation. Instead, future road construction, or improvements, will be linked to improvements for sustainable transport as part of multi-modal solutions. As such, many of the road options are based around changes necessary to facilitate segregated cycling infrastructure. That said, there is recognition that given the rural nature of the study area, there will still be a need for many people to drive; the N80 also provides a strategic connection for freight which must be protected through the option development process. Options have therefore been included within this LTP, which ensure the safe and efficient operation of the road network for the movement of people and goods.

Figure 17. Road Principles

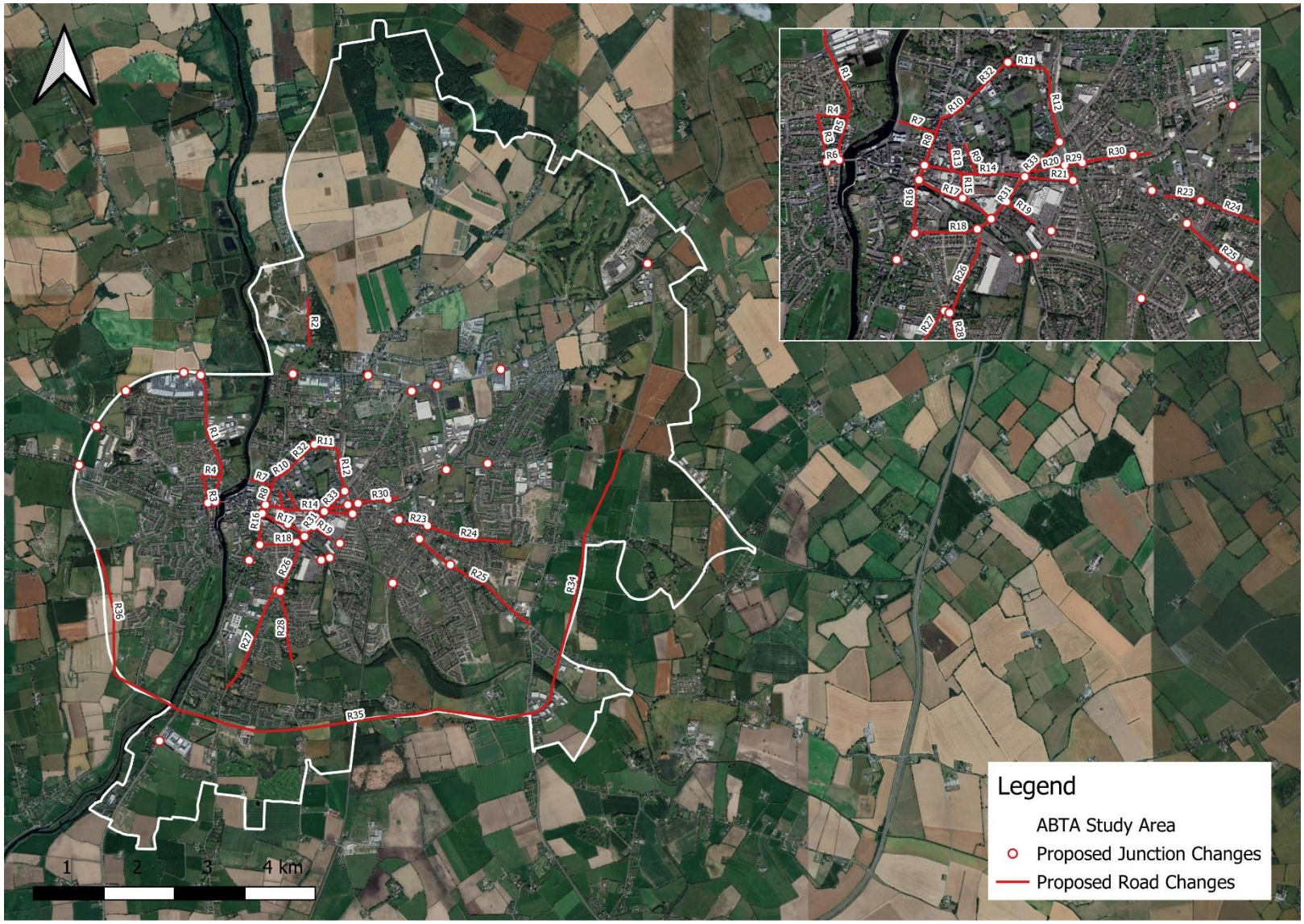
Road options have been split into two categories; changes to the road layout or changes to junctions. In a number of locations, there are a subset of options, whereby a number of different measures could be implemented to achieve the same outcome.

Whilst many of the options proposed are around provision for active travel infrastructure, CCC is committed to measures, which will better manage the existing network, such as the optimisation and control of traffic signals.

Given some of the measures, which are proposed to reallocate road space to sustainable modes of transport, in the longer term, CCC is promoting the construction of a Southern Relief Road. This will provide alternative routes for those that need to drive, removing traffic from the town centre and ensuring measures which reallocate road space to sustainable modes of transport are more palatable. Funding for this road scheme is currently being sought.

The following map shows the location of potential changes to roads and junctions across the Carlow Graiguecullen study area.

Figure 18. Proposed Road and Junction Changes



Details of each option are outlined in the below table, the reference number from the table correlates with the map seen in **Figure 18**.

Table 3-1: Road and Junction Options

Reference	Option Name	Option Description
	Junctions	Upgrades are required to junctions to provide improved facilities for pedestrians and cyclists. Whilst at this stage, options at each individual junction have not been identified, design principles set out in the Design Manual for Urban Roads (DMURS) and the NTA's Cycle Design Manual (CDM) has been used to identify where junction upgrades are considered necessary. Where junction upgrades are proposed, these will be subject to a detailed design and option assessment process, to ensure the junction provides the necessary infrastructure for pedestrians and cyclists whist maintaining the function of the road network. It is envisaged that junction upgrades will include the installation of traffic signals and the reduced footprint of larger junctions.
	Traffic Signal Management	Linked traffic signals to provide a green wave through key areas. This will reduce traffic congestion and improve journey time reliability.
R1	Sleaty Street	Traffic calming (such as chicanes, speed limit reduction or speed bumps) to make cyclists and pedestrians feel safer.
R2	Athy Road	Traffic calming (such as chicanes, speed limit reduction or speed bumps) to make cyclists and pedestrians feel safer.
R3	Chapel Street	Proposed one-way loop with Ninety-Eight Street, Maryborough Street, and Bridge Street to facilitate active travel improvements.
R4	Ninety-Eight Street	Proposed one-way loop with Chapel Street, Maryborough Street, and Bridge Street to facilitate active travel improvements
R5	Maryborough Street	Proposed one-way loop with Chapel Street, Ninety-Eight Street, and Bridge Street to facilitate active travel improvements
R6	Bridge Street	Proposed one-way loop with Chapel Street, Ninety-Eight Street, and Maryborough Street to facilitate active travel improvements
R7	Cox's Lane	Proposed closure to Cox's Lane for general traffic so that the space can become a place solely for pedestrians and cyclists.
R8	Dublin Street	There are potential options for Dublin Street which are interlinked with cycling; - Convert Dublin Street to one-way; this would allow for off-road segregated cycle paths (optimum infrastructure) to be accommodated with no change to the footway. - Removal of parking along Dublin Street to widen footpaths and allow cyclists and pedestrians to have shared space on the footway.
R9	College Street	Closure of the lower section of College Street (between Tullow Street and Brown Street) to general traffic to provide a nicer space for pedestrians and cyclists. The section from Brown Street northwards towards Dublin Road would remain open.
R10	Dublin Road	On the one-way stretch of Dublin Road, near to the courthouse, it is proposed that one of the lanes is removed to accommodate cycle infrastructure.
R11	Railway Road	There are potential options for Railway Road which are interlinked with cycling: - Railway Road becomes one-way to accommodate off-road segregated cycle infrastructure and make the area nicer for active travel. - The drop off zones / parking on Railway Road are removed to allow for increased space for pedestrians and cyclists and again off-road segregated cycle infrastructure can be provided.
R12	St. Joseph's Road	There are potential options for St. Joseph's Road which are interlinked with cycling: - St. Joseph's Road becomes one-way to accommodate off-road segregated cycle infrastructure and make the area nicer for active travel. - The parking on St. Joseph's Road is removed to allow for increased space for pedestrians and cyclists and again off-road segregated cycle infrastructure can be provided.

Reference	Option Name	Option Description
R13	Charlotte Street	There is no direct proposed change to Charlotte Street however, if Tullow Street is pedestrianised then access from Tullow Street will no longer be available. No changes are proposed to the exit from the car park onto Charlotte Street.
R14	Tullow Street	Tullow Street has been broken down into three sections, with proposals for each section outlined below: - It is proposed that Tullow Street, between Barrack Street junction and Carlow Shopping Centre entrance remains open as it is currently, and parking is removed to provide off-road segregated cycling infrastructure. - It is proposed that Tullow Street between Carlow Shopping Centre entrance and Potato Market becomes one-way to provide off-road segregated cycling infrastructure. - It is proposed that Tullow Street from Potato Market to Dublin Street is closed to general traffic and becomes pedestrianised.
R15	Potato Market	It is proposed that Potato Market will become one-way, and more street space will be given to pedestrians and cyclists. This is an important option in making Carlow town centre a nicer place to spend time.
R16	Burrin Street	It is proposed that Burrin Street becomes one-way to accommodate off-road segregated cycle infrastructure.
R17	Kennedy Avenue	There are two options for Kennedy Avenue: - Proposed one-way movement on Kennedy Avenue (to form a loop with Burrin Street and Kilkenny Road). - Alternatively, if one-way is not provided, parking could be removed to provide off-road segregated cycle infrastructure.
R18	Kilkenny Road	Proposed one-way movement on Kilkenny Road (to form a loop with Burrin Street and Kennedy Avenue) and provide active travel infrastructure.
R19	Fairgreen Retail Access	Access to Fairgreen Retail Park from Barrack Street is closed to make the space safer for pedestrians and cyclists.
R20	Pollerton Road	There are two proposed options at Pollerton Road, this is in reference to the lower section between Green Lane and Bridge Street. Options are dependent on proposals for Staplestown Road and Bridge Street. - Proposed that the one-way movement on Pollerton Road is reversed and parking removed. The one-way movement would tie in with Staplestown Road. - Proposed that the parking is removed with no change to the road.
R21	Staplestown Road	There are two proposed options at Staplestown Road, this is in reference to the lower section between the Barrack Street junction and Bridge Street. Options are dependent on proposals for Pollerton Road and Bridge Street. - Proposed that the one-way movement on Staplestown Road is reversed, this would tie in with Pollerton Road. - Proposed that the parking is removed with no change to the road.
R22	Bridge Street (Carlow)	Road to become one-way to accommodate the one-way loop of Pollerton Road and Staplestown Road (if implemented).
R23	Browneshill Road Lower	Proposed one-way of Browneshill Road Lower and removal of parking to gain extra space for pedestrians and cyclists and provide off-road segregated cycle infrastructure.
R24	Browneshill Road	Traffic calming (such as chicanes, speed limit reduction or speed bumps) to make cyclists and pedestrians feel safer.
R25	Tullow Road	Proposed removal of turning pockets and hatched lines to allow for narrowing of general traffic lanes and providing off-road segregated cycle infrastructure.
R26	Hanover Road	There are two proposed options for Hanover Road to provide the desired level of cycling infrastructure: - Proposed one-way system (along with Green Road) to allow for off-road segregated cycle infrastructure to be implemented.

Reference	Option Name	Option Description
		- Proposed traffic calming (such as chicanes, speed limit reduction or speed bumps) to make cyclists and pedestrians feel safer and cyclists would share road space.
R27	Green Road	There are two proposed options for Green Road to provide the desired level of cycling infrastructure: - Proposed one-way system (along with Hanover Road) to allow for off-road segregated cycle infrastructure to be implemented. - Proposed traffic calming (such as chicanes, speed limit reduction or speed bumps) to make cyclists and pedestrians feel safer and cyclists would share road space.
R28	Blackbog Road	Traffic calming (such as chicanes, speed limit reduction or speed bumps) to make cyclists and pedestrians feel safer.
R29	Pollerton Road (under railway bridge)	It is proposed that the section under the railway bridge becomes signalised allowing for movement in one direction only at each time. The narrowing of the road will allow for off-road segregated cycle infrastructure.
R30	Pollerton Road (railway bridge to St. Mary's Park)	Parking to be removed accommodate off-road segregated cycle infrastructure.
R31	Barrack Street	Parking is removed to improve the public realm space.
R32	Dublin Road (Greenbank Road to Railway Road)	Proposed removal of parking to accommodate cycle infrastructure along this stretch of Dublin Road (between Greenbank Road and Railway Road).
R33	Green Lane	Proposed removal of parking on Green Lane (between Staplestown Road and St. Joseph's Road) to accommodate cycle infrastructure.
R34	Southern Relief Road	Southern Relief Road Phase 1 - support the construction of this section of the Southern Relief Road to provide an entire ring road for Carlow.
R35	Southern Relief Road	Southern Relief Road Phase 2 - support the construction of this section of the Southern Relief Road to provide an entire ring road for Carlow.
R36	Southern Relief Road	Southern Relief Road Phase 3 - support the construction of this section of the Southern Relief Road to provide an entire ring road for Carlow.

3.2.6 Parking

Figure 19. Parking Principles

Options for parking have also been proposed as part of the LTP. CCC and LCC recognise that parking restrictions can only be successful if they are suitably enforced. The Councils will continue to review available resources and look at opportunities to increase parking enforcement across the town. The parking options are outlined below, some of these options would be necessary to provide improved infrastructure for other modes or a nicer street environment in the Carlow Graiguecullen study area.

Please note, some of the road section covers the removal of on-street parking – these options will not be repeated in this section. The below table (**Table 3-2**) outlines the parking options put forward in the parking strategy.

Table 3-2: Parking Options

Option	Description
Parking Pricing	Review of pricing for car parking across Carlow town centre.
Parking for Blue Badge Holders	Ensure provision for blue badge holders is maintained and improved where possible.
New Railway Station Car Park	New car park to the east of the railway line, accessed from Glendale Avenue.
Current Railway Station Car Park	Convert the current railway station car park into a place for cycle parking, a drop-off zone for those trying to access the station, as well as an upgraded bus stop and waiting area
Carlow Retail Park	Make use of some of the spaces in the Carlow Retail Park to provide parking for SETU students and workers who could then walk to campus.
School Drop-Off Restrictions	Remove set down or drop-off zones immediately outside schools Resident permits on streets near to schools.
Electric Vehicle Charging	Provision of electric vehicle charging at convenient locations
SETU	Provide a new car park near to SETU
Parking App	Consider benefits of a parking app to make sure parking in Carlow can be easily located and paid for.
Parking Enforcement	Ensure adequate enforcement of parking restrictions to ensure benefits of the other parking options are captured.
Vehicle Wayfinding	Provision of signage which can identify where car parking is located and number of spaces available.

4. Part 3 – Options Assessment

4.1 Options Assessment Methodology

This section summarises the Multi-Criteria Analysis (MCA) approach used to appraise options identified in the Carlow Graiguecullen LTP.

4.1.1 Multi-Criteria Analysis (MCA) Use in Option Assessment

The MCA assessment is used to provide scores for public transport, road, and parking options. The standard MCA approach is to compare similar options in the same table, in order to identify a preferred option. However, in this LTP, the options are significantly different and not directly comparable. Therefore, options will be grouped into a combined table only when there are comparable options, e.g., two different options for the same road, otherwise individual MCAs will be used to assess each option on its own merit.

4.1.1.1 MCA Assessment Criteria

The criteria for the MCA assessment are displayed below in **Table 4-1**. This is based on the principles of the LTP, outlined in **3.1.1**. The use of the principles to score options will ensure that the best options are taken forward to address the overall objectives of the LTP. Under each criterion, a number of elements will be considered, as outlined in the table below, based on evidence collected during the study, project analysis, consultation feedback and CCC/LCC direction. It should be noted that the MCA analysis has not been undertaken for active travel proposals, as it is assumed that all active travel proposals will be taken forward as and when funding becomes available and following a detailed design and assessment process.

Table 4-1: MCA Criteria

	Criteria (Principles)
Public Transport	Improve access from residential areas and key services to public transport stops.
	Improve coverage, frequency, and capacity of public transport.
	Provide bus priority where needed to improve journey times/reliability.
	Improve stations in terms of location, information, accessibility, infrastructure, and visibility.
	Improve interchange experience for passengers between modes.
	Promote a modal shift towards public transport for medium/long trips.
	Ensure interchanges are convenient to allow access to key destinations.
Roads	Reduce car dependency by promoting sustainable modes.
	Reduce optional vehicular trips through Carlow Town.
	Improve road safety and eliminate collision hotspots.
	Overcome pinch points which threaten network capacity.
	Ensure junctions are improved to provide for trips which cannot be shifted to sustainable modes.
	Restrict certain movements to ensure infrastructure commitments to active modes.
Parking	Manage provision of parking to support economic vitality of town.
	Ensure parking provision encourages sustainable travel.
	Reduce on-street parking in centre to facilitate public realm and sustainable travel upgrades.
	Improve quality of parking information.
	Introduce parking demand management to reduce car dependency and promote sustainable travel.
	Provide high-level recommendations for locations for electric vehicle charging.
	Ensure parking pricing and availability secure a modal shift.

4.1.1.2 MCA Assessment Scale

In the MCA assessment, a seven-point scale is used. This scale is outlined in **Table 4-2**. Given that most impacts are qualitative at this stage, each criterion is scored on the extent to which the option offers a positive or negative impact. For illustrative purposes, this seven-point scale is colour coded with advantageous options graded varying shades of green and disadvantageous options graded in shades of red/orange. It should be noted that principles not addressed by a specific option will be given a neutral score in that MCA.

Table 4-2: MCA Colour Coded Scoring Scale

Colour	Description
	Major Benefit – proposal is expected to have a clear and considerable benefit or positive impact.
	Moderate Benefit – proposal is expected to have a moderate benefit or positive impact.
	Minor Benefit – proposal is expected to only have a minor benefit or positive impact.
	Neutral – overall the proposal is expected to have neither a positive nor negative impact.
	Minor Disbenefit – proposal is only expected to result in a minor negative impact.
	Moderate Disbenefit – proposal is expected to result in a moderate disbenefit or negative impact.
	Major Disbenefit – proposal is expected to result in a clear and considerable disbenefit or negative impact.

4.2 Walking Measures Assessment

The walking options are outlined in section **3.2.3.1**. The main walking option is to provide new or upgraded links to provide an improved walking path network and greater permeability across the Carlow Graiguecullen LTP study area. These links are not outlined individually as it is the delivery of them in combination which will help deliver an improved path network which can provide connections to key trip attractors. As a result, the network as a whole is assessed to quantify the number of key destinations which will now be accessible within a walking distance. The paragraph below outlines the ATOS assessment undertaken, prior to results been contained further down in the section.

4.2.1 ArcGIS ATOS Use in Options Assessment

Walking accessibility was examined using the NTA's Access To Opportunities and Services (ATOS) tool. This tool is maintained by the NTA to investigate accessibility to a range of different services and opportunities by active modes including employment, education, GPs, food outlets, and open spaces. The tool is based on a methodology originally developed by Transport for London (TfL), but some minor adjustments have been made by the NTA to make it more suitable for use outside of large metropolitan areas in Ireland. The baseline assessment, contained with Appendix A, describes the full methodology of ATOS assessments.

Table 4-5 presents the change in the ATOS assessment outcomes between the baseline path network and the proposed future path network, following the development of the walking strategy. The score ranges for the ATOS assessment are shown in the tables below. It should be noted that the ATOS assessment was undertaken prior to a change to the study area boundary for the LTP; the ATOS assessment will be updated following public consultation to reflect the agreed study area and any changes to the proposed options.

Table 4-3: ATOS Score Ranges (All Destinations – excluding employment)

ATOS Score	Score Range	Map Colour
A	More than one standard deviation below the average	
B	Below the average, but not by more than one standard deviation	
C	Average or above, but not by more than one standard deviation	
D	Between one and two standard deviations above the average	
E	More than two standard deviations above the average	
NULL	More than specified maximum travel time	

Table 4-4: ATOS Score Ranges (Number of Accessible Jobs)

ATOS Score	Score Range	Map Colour
A	More than one standard deviation above the average	
B	Above the average, but not by more than one standard deviation	
C	Average or below, but not by more than one standard deviation	
D	Between one and two standard deviations below the average	
E	More than two standard deviations below the average	

4.2.1 Assessment Outcomes

The following table summarises the outcomes of the ATOS assessment, in terms of how many key services are available within a 20-minute walking distance of where people live (the table first shows what percentage of grid squares have 2 facilities within a 20-minute walking distance, with the next column showing the percentage of grid squares with 1 facility within a 20-minute walking distance) . Please note, due to the slightly different way of scoring employment, it is not included in the table and is summarised in section **0**.

Table 4-5: Expansion of Walking to Key Service Areas

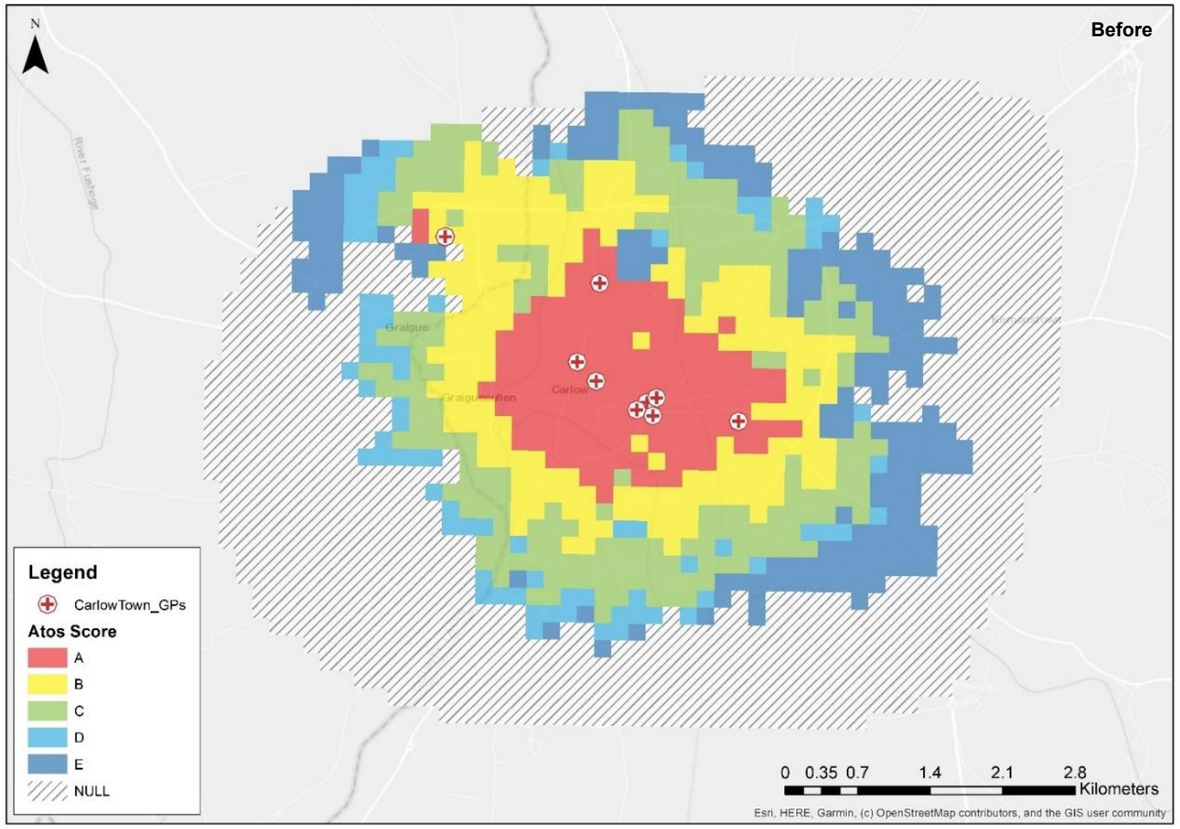
	Existing Path Network		Future Path Network		Difference	
	% with 2 within 20-minute walk	% with 1 within 20-minute walk	% with 2 within 20-minute walk	% with 1 within 20-minute walk	% with 2 within 20-minute walk	% with 1 within 20-minute walk
GP	39	52	41	54	2	2
Parks	N/A	69	N/A	74	N/A	5
Post-Primary	42	50	49	57	7	7
Primary School	34	60	38	68	4	8
Supermarket	N/A	88	N/A	93	N/A	5

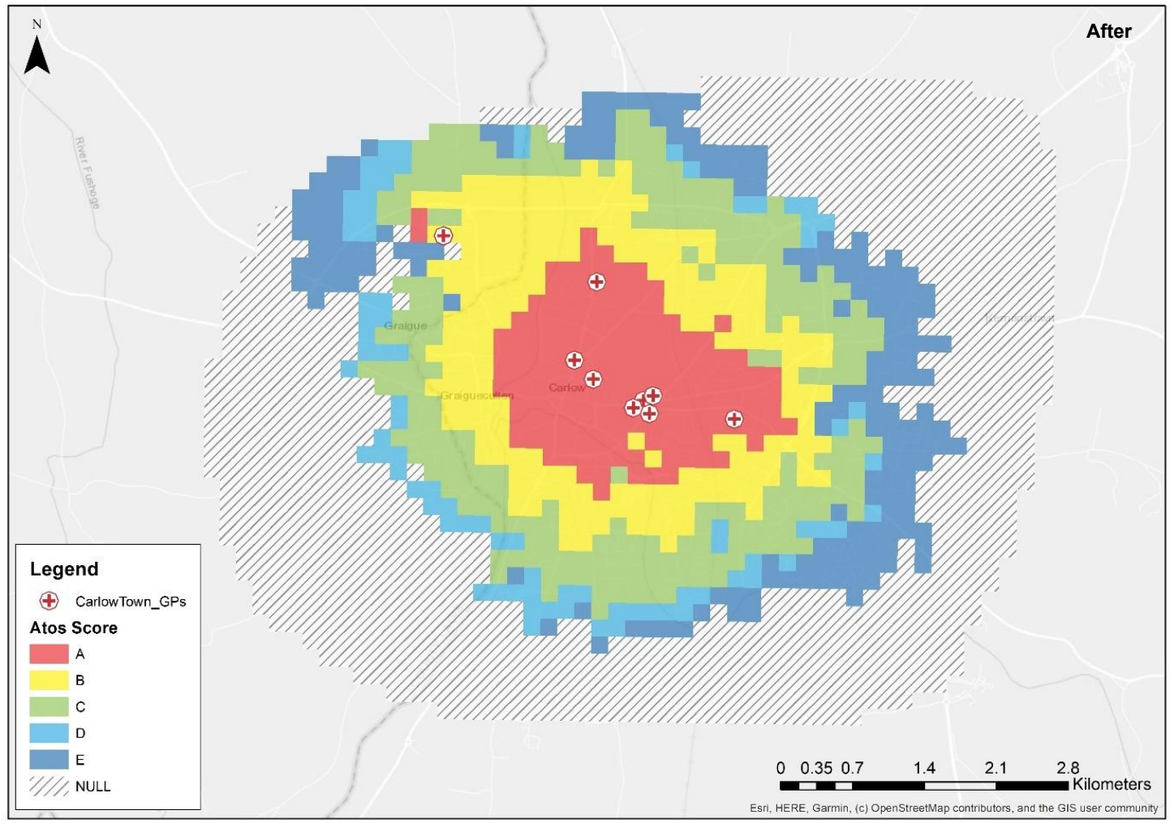
Overall, the implementation of the walking strategy will improve access to key services and facilities across Carlow Graiguecullen. This is summarised in more detail in the following text.

4.2.1.1 Impact on GPs

The following figure presents the accessibility to GPs based on the proposed future path network. The majority of the GP surgeries are located in close proximity to the town centre, with the exception of one sitting just off Sleaty Street. Outputs from the ATOS assessment show that access to GP surgeries increases by 2% with the proposed changes to the future path network. The proposed path network is not as beneficial in improving GP service accessibility, when compared to other key services, however, this is likely due to the location of services.

Figure 20. GPs Accessibility Based on Future Path Network

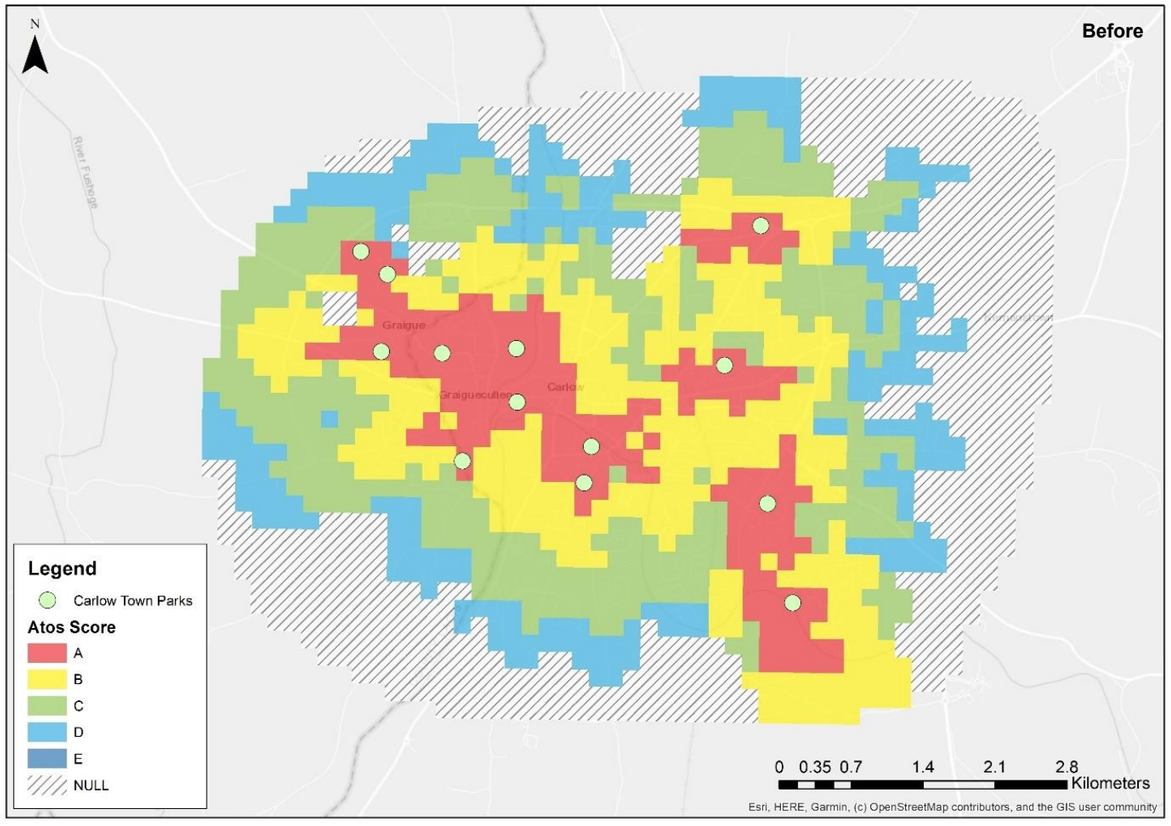


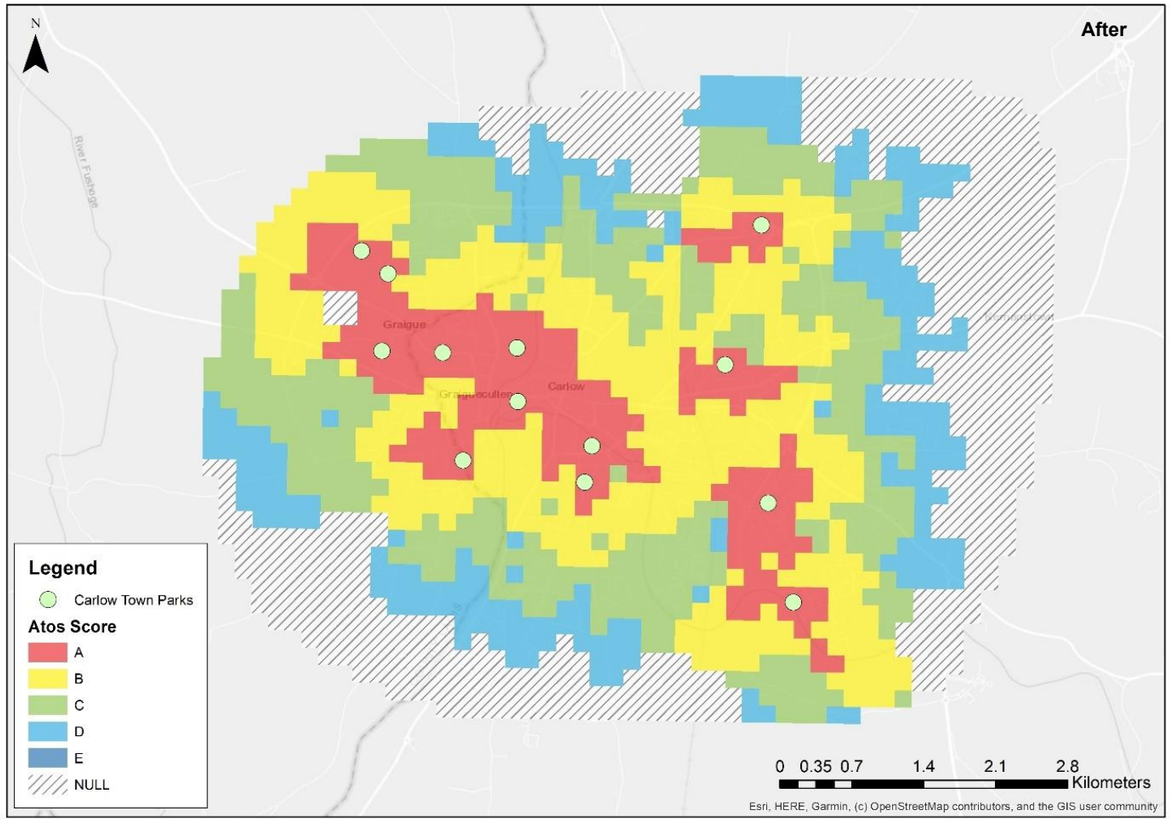


4.2.1.2 Impact on Parks and Open Spaces

Figure 21 shows the accessibility to parks and open spaces based on the proposed future path network. It should be noted that the points represent either the centre point of the open space or the park/space entranceway. A comparison of the accessibility based on the baseline path network and the proposed future path network highlights that a few areas have seen notable improvements in park and open space accessibility. These areas include the area between Athy Road and Dublin Road, near the Hospital and Delta Sensory Gardens, west of Sleaty Street, below Barrow Valley Retail Park, as well as west (including Graiguecullen) and east of Kilkenny Road to the south of SETU. Data analysis supports the improvement of park and open space accessibility based on the future proposed path network. 74% of grid squares fall within a 20-minute walk of one park or open space, compared to 69% with the baseline path network.

Figure 21. Park and Open Space Accessibility Based on Future Path Network



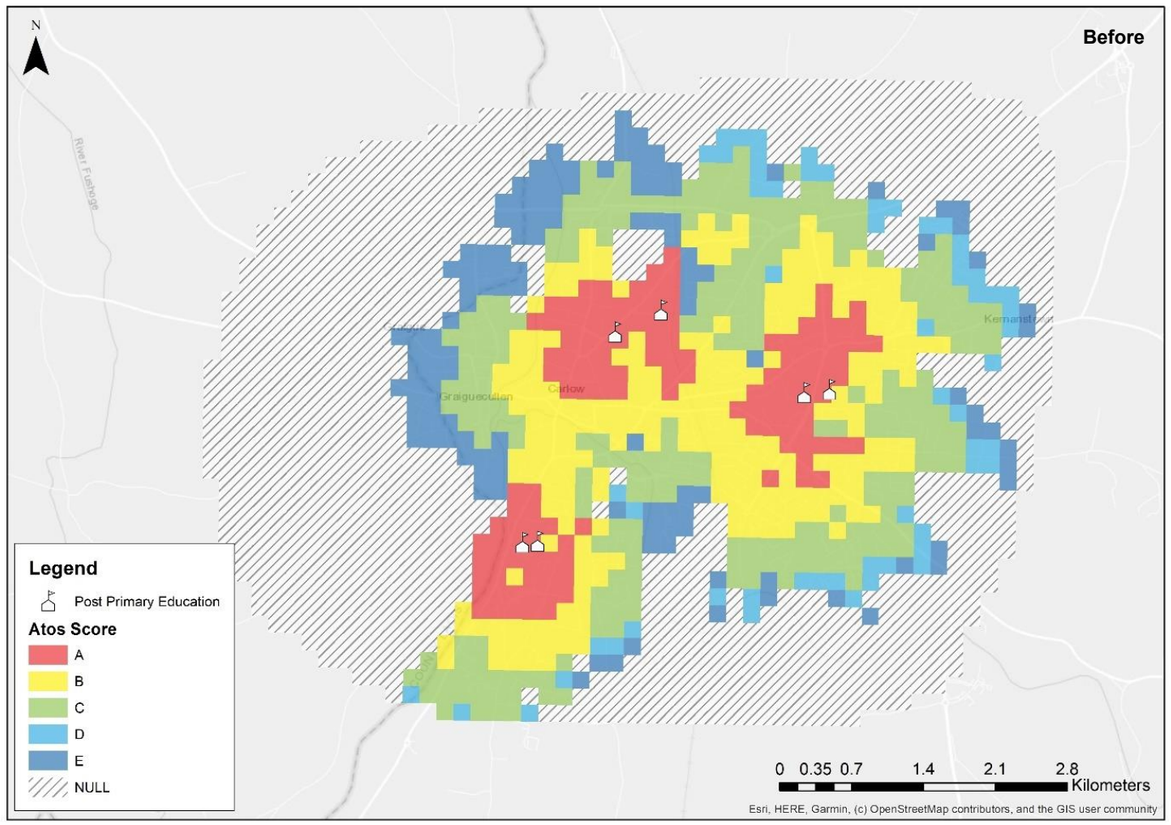


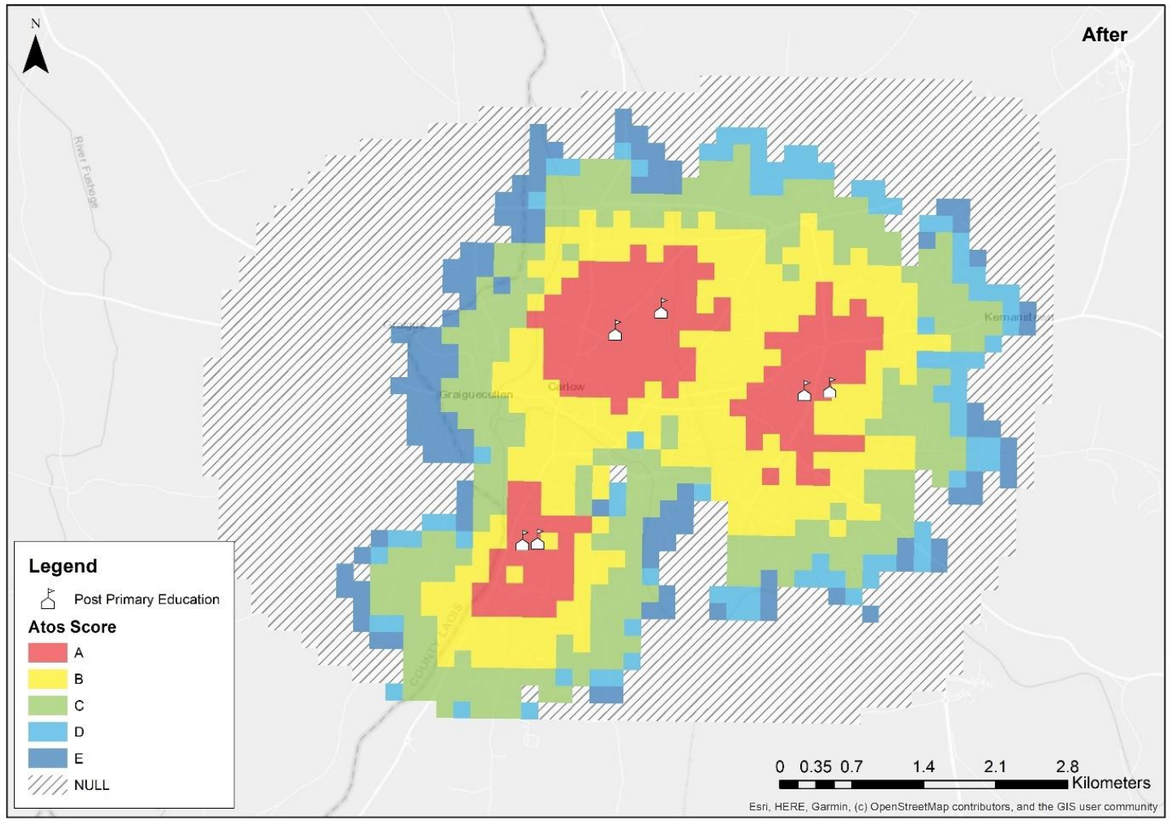
4.2.1.3 Impact on Post-Primary Education Facilities

Figure 22 highlights the accessibility of post-primary educational facilities based on the proposed future walking network. The implementation of the proposed walking network is shown to have a beneficial impact on improving accessibility to post-primary educational facilities. It should be noted that walking accessibility to these locations is limited based on the spread of them across Carlow Graiguecullen.

Data analysis demonstrates that the number of grid squares which have two post-primary educational facilities within a 20-mintue walk is 49%, compared to 42% based on the baseline path network. Similarly, the number of grid squares within a 20-minute walk of one of these facilities also improves, from 50% to 57%, with the implementation of the proposed walking links. Key locations which experience the greatest improvements, include between Athy Road and Dublin Road, west of the River Barrow towards the southern end of the study area due to better connections across the river, and a small section of north west Graiguecullen.

Figure 22. Post-Primary Education Accessibility Based on Future Path Network

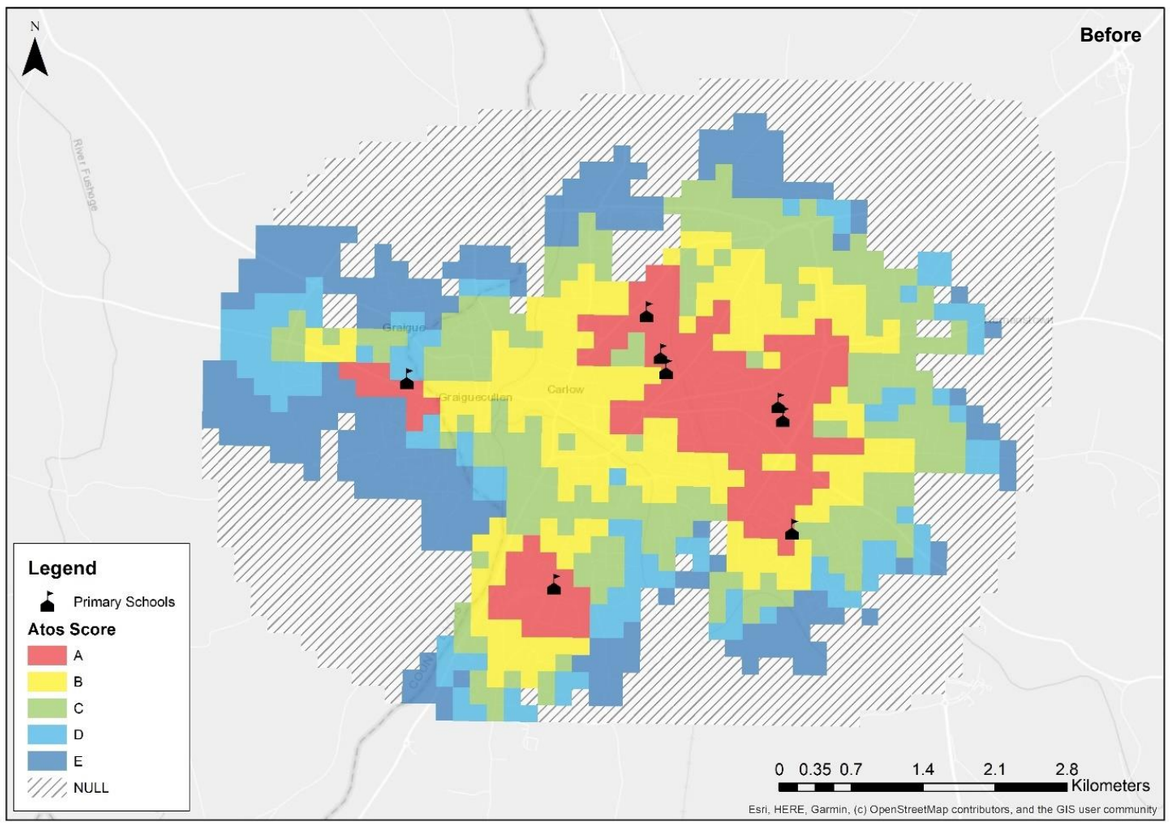


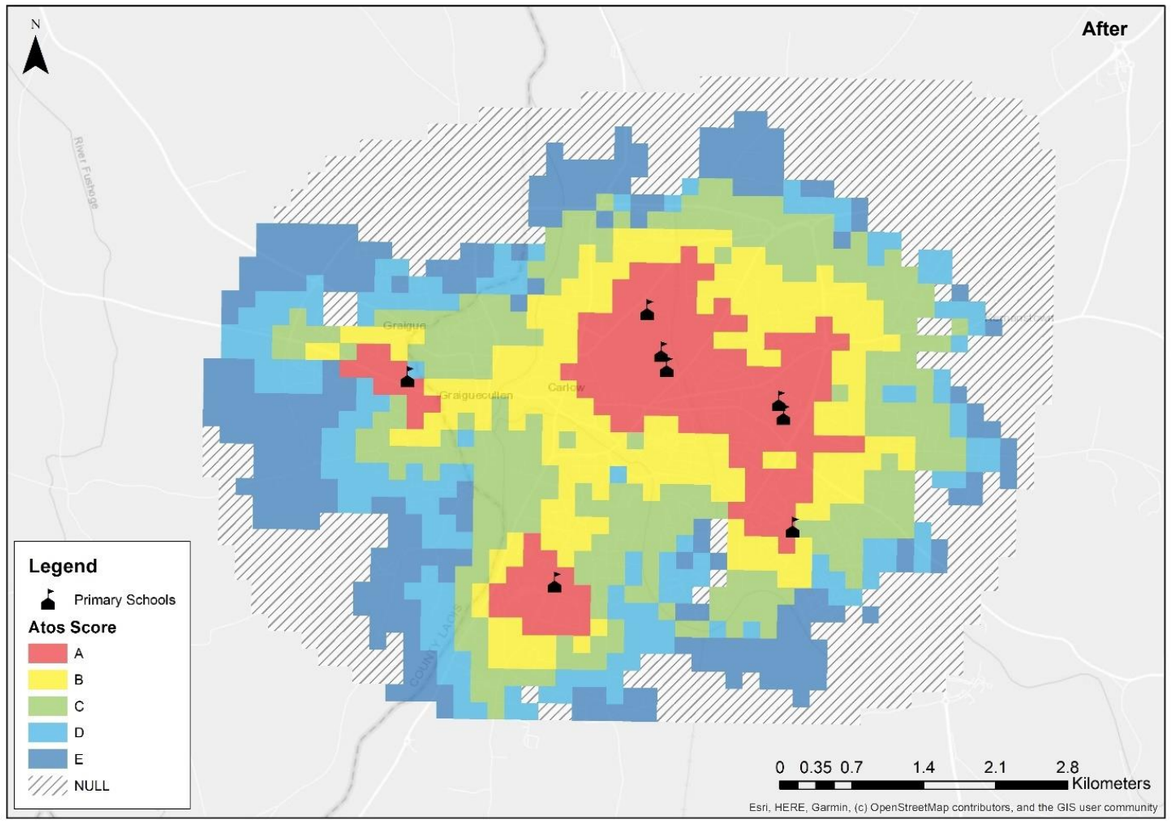


4.2.1.4 Impact on Primary Schools

Figure 23 presents the ATOS assessment outcomes showing primary school accessibility based on the proposed future walking network. Again, the improvement of accessibility through walking is somewhat limited by the location of the schools. The data shows that there is a 4% increase in the number of grid squares that are within a 20-minute walk of two primary schools, whereas the number of grid squares within a 20-minute walk of one primary school increases by 8%. With this future walking network in place, 68% of grid squares would be within a 20-minute walking distance of one primary school. Specific locations that notably benefit from the proposed future walking network, in terms of primary school accessibility, are areas in the southern sections of Graiguecullen, near Leighlin Road and Springhill Road, surrounding the three primary schools located near the railway station, and in the northern sections of the town near the N80.

Figure 23. Primary School Accessibility Based on Future Path Network

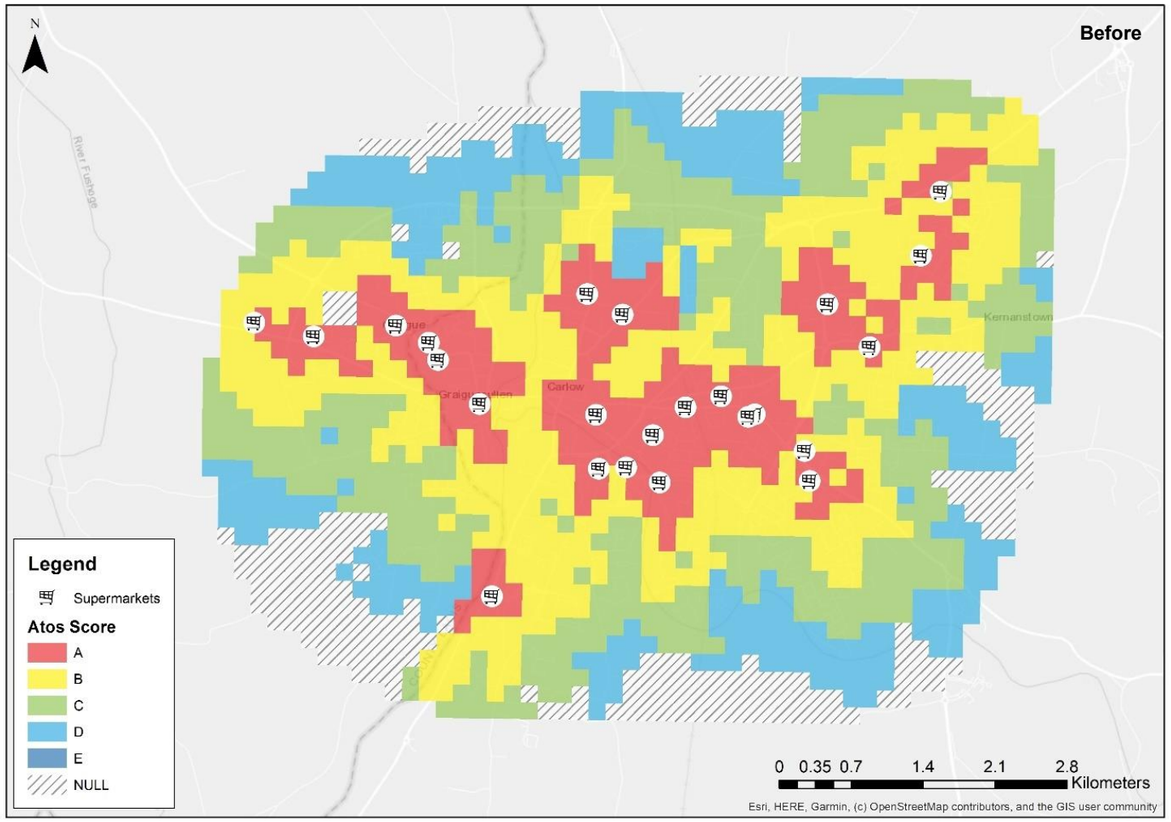


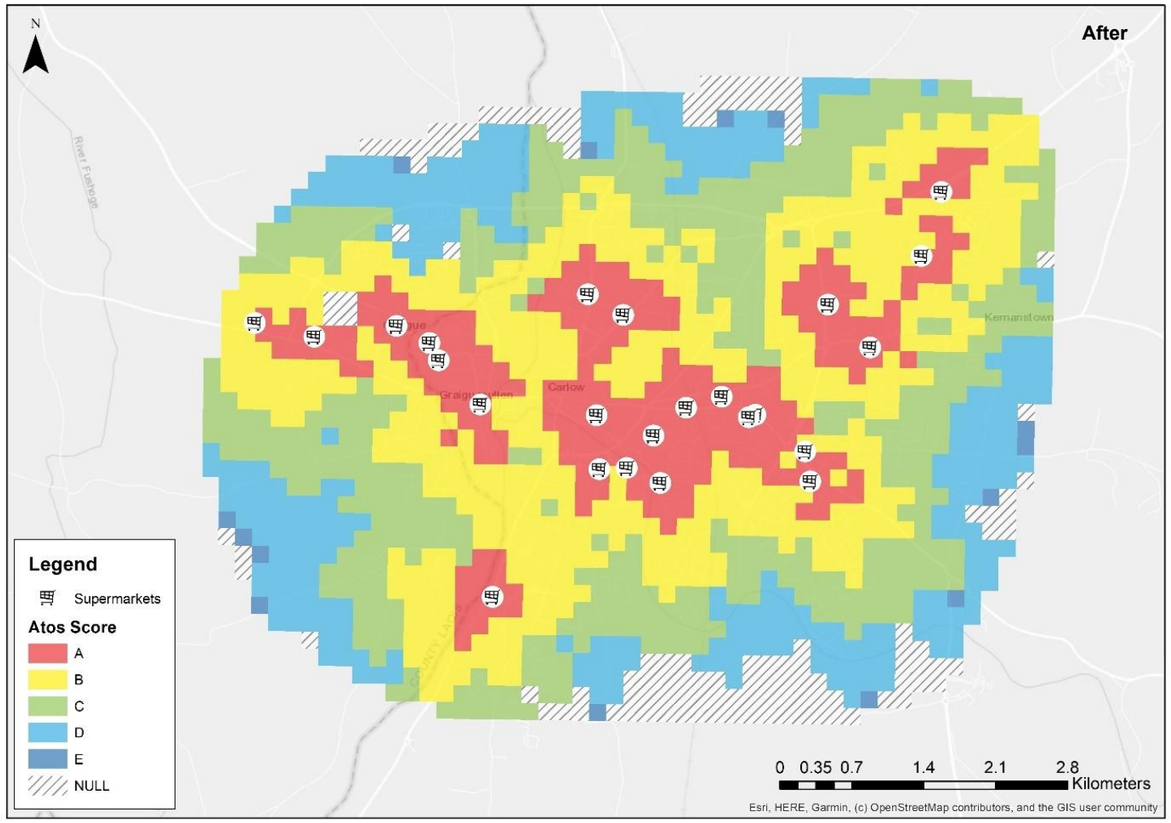


4.2.1.5 Impact on Supermarkets

Figure 24 presents the supermarket accessibility based on the proposed future path network. The figure demonstrates that supermarkets are vastly spread across the Carlow Graiguecullen area. Areas directly surrounding the supermarkets score favourably for accessibility, as expected, and due to the good spread of supermarkets this means that many homes in the urban and sub-urban areas of Carlow and Graiguecullen can access supermarkets within a reasonable walking time. Detailed data analysis demonstrates that the provision of the new walking links would reduce the number of grid squares not able to access any supermarket within a 20-minute walk from 12% to 7%. This shows the walking connections are providing improved connections to this key service for some areas.

Figure 24. Supermarket Accessibility Based on Future Path Network

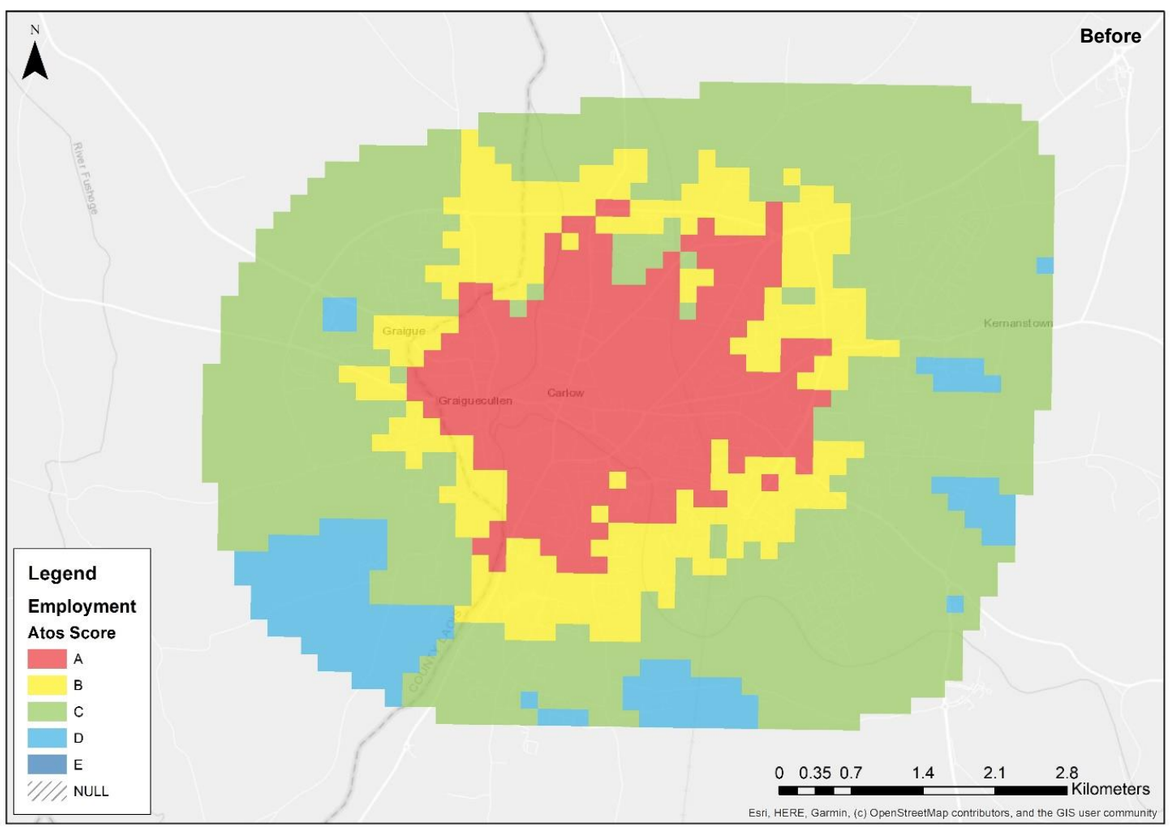


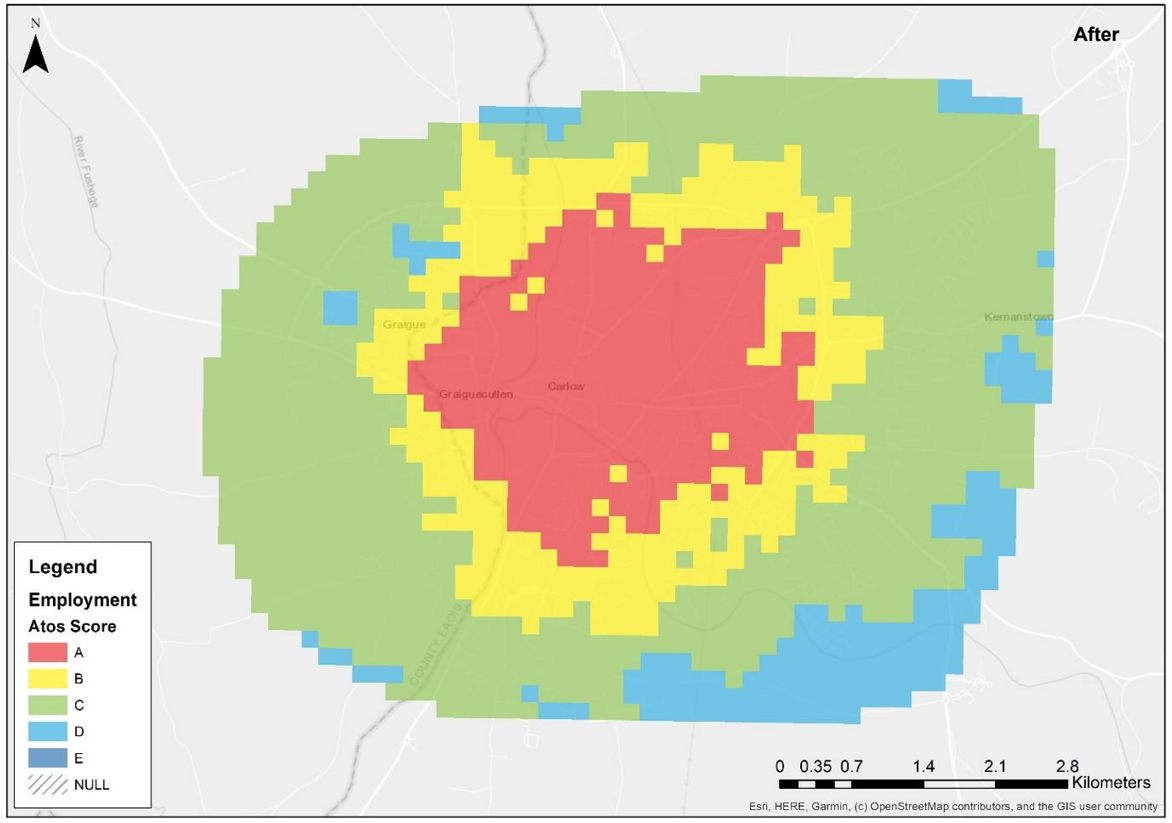


4.2.1.6 Impact on Employment

Figure 25 shows the ATOS assessment outcomes based on the proposed future path network. The figure demonstrates that the number of accessible jobs is higher in the centre of the study area, which is to be expected given this is where a number of employment opportunities are located. The number of accessible jobs remains above average just outside of Carlow Town, likely due to the existence of major employers on the town peripheries, such as business and retail parks as well as SETU. The number of accessible jobs reduces with increasing distance from the town centre, more towards suburban and rural parts of Carlow. Detailed analysis of results demonstrates that the number of grid squares falling in the top two scores has increased by 12%, showing the implementation of the permeability links would have a beneficial impact on employment accessibility.

Figure 25. Employment Accessibility Based on Future Path Network





4.2.2 Summary of Benefits of Walking (Permeability) Options

Overall, the above sections have highlighted the benefit of introducing the walking strategy in the Carlow Graiguecullen LTP study area.

4.3 Cycling Measures Assessment

Cycling options are split into the provision of a cycling network for the study area as well as complementary measures. Further details on the cycling options are outlined in section **3.1.1.3**. Given the benefits that the cycling measures will deliver, at this stage it is assumed that improvements will be made across all routes identified, although the level of infrastructure in some places is still to be confirmed. As each measure is taken forward, proposals will be subject to a detailed design and assessment process and the impact of the proposals on the operation of the rest of the transport network understood.

4.4 Public Transport Measures Assessment

The impact of the proposed public transport options is assessed through the completion of an MCA. The following table outlines the scoring of these options against the public transport principles. Full details of the public transport options can be found in **3.2.4**, and are summarised below.

- Ongoing review of bus services within Carlow Graiguecullen with potential extension of existing routes, or new route, to serve the N80.
- Increased bus stop numbers: New bus stops along public transport routes
- Station and stop upgrades: Better bus stops across the Carlow Graiguecullen study area, which provide improved shelter and facilities for passengers; improved waiting facilities at Carlow Coach Park
- Real time passenger information: Real time information to be provided at bus stops and interchanges, or via an app, to allow people to make informed choices about travel
- Flexible and affordable ticketing: A review of pricing and ticketing structure to ensure public transport is accessible to all, and it is easy to transfer between different modes of transport
- Public transport marketing campaign: Ensure people are aware of the services that are available, particularly with the introduction of new services

Table 4-6: Public Transport MCA

Principles (Scoring Criteria)	N80	Increased Bus Stop Numbers	Station and Stop Upgrades	Real Time Passenger Information	Flexible and Affordable Ticketing	Public Transport Marketing Campaign
Improve access from residential, employment, education, healthcare, and retail facilities to public transport stops						
Improve the coverage, frequency and capacity of public transport services						
Provide bus priority infrastructure where it is necessary to improve journey times and reliability						
Improve public transport stops/stations in respect to location, information, accessibility, infrastructure, and visibility						
Improve interchange experience for passengers changing between different modes of public transport or routes						
Promote modal shift from the private car to bus or rail, particularly for medium/long distance trips						
Ensure interchanges are convenient and allow for access to various key destinations to enhance the attractiveness of public transport						

The public transport options could all be delivered and would offer some benefit to transport provision within the Carlow Graiguecullen study area and help achieve the overall strategy objectives. All options should therefore be taken forward and included within the strategy.

It is noticeable that the proposed N80 bus route would go some way to meeting the majority of the public transport principals. The introduction of the N80 orbital bus route will have a positive impact on public transport accessibility to key services if the demand is there to use it. This is because the route will provide a service in some areas currently not served by a bus route and new bus stops will be provided. A new route, or extension to existing route, should result in a modal shift from private car to bus, but is unlikely to significantly impact on longer distance trips. A public transport marketing campaign will complement the new bus routes being proposed and will contribute to the modal shift from private car.

Bus priority has been considered within the development of the LTP, but there are currently no roadspace reallocation proposals for bus services. However, it is proposed that smarter traffic signals are implemented across the study area, which would provide an opportunity to prioritise public transport movements through a junction. The need for bus priority will be reviewed throughout the lifetime of the plan, to see if further bus priority should be identified, as and when new public transport services are implemented.

4.5 Road Measures Assessment

The assessment for the road options is presented in this section of the LTP. Road options have been grouped into three different categories as follows

- Options which are required to deliver active travel infrastructure and only one option has been identified
- Options which are required to deliver active travel infrastructure and several options have been identified
- Options which have been identified to improve the operation of the highway network.

No MCA has been undertaken for group 1, but the options are again summarised in this section. Assessments have been undertaken for groups 2 and 3.

4.5.1 Road Options Required for Active Travel Infrastructure (only one option proposed)

Road options necessary to enable provision of active travel infrastructure are outlined in the following table.

Table 4-7: Road Options for Active Travel Infrastructure

Option	Description	Assessment
R1 Sleaty Street R2 Athy Road R24 Brownshill Road R28 Blackbog Road	Traffic calming provided to make it safer and more attractive for cyclists and pedestrians to use road	The physical constraints in these locations mean that it is not considered feasible to implement segregated cycling infrastructure without causing significant impact to the operation of the road network and long detours for those people who need to drive.
R3, R4, R5 and R6 Laois Loop	It is proposed that a one-way loop is provided near to the River Barrow bridge. This one-way loop would involve one-way restrictions on Chapel Street, Ninety-Eight Street, Maryborough Street, and Bridge Street. Creating this one-way loop would allow for the provision of off-road segregated cycle infrastructure.	This option is the only option to provide optimal cycle infrastructure here and connect this area up to the wider cycle network. The option would also remove conflict at key junctions, reducing highway delay and contributing to the roads' principles.
R10 Dublin Street	Convert small one-way section of Dublin Road, passing Carlow Courthouse, to one lane to allow the provision of off-road segregated cycle infrastructure.	Enables the provision of segregated active travel infrastructure, whilst minimising the impact on the operation of the highway network. It therefore contributes to the overall objectives of the LTP strategy.
R19 and R31 Fairgreen Retail Access and Barrack Street	Removal of on-street parking on Barrack Street to accommodate public realm improvements and active travel infrastructure. Restrict access to Fairgreen Retail Park from Barrack Street to continue the improvements.	Measure promotes walking and cycling as a mode of transport, as well as improving the environment of Carlow. The measure will therefore meet several principles across the different modes of transport.
R23 Browneshill Road Lower	Convert to one-way and remove on-street parking to enable off-road segregated cycle infrastructure to be provided.	Only reasonable measure identified to enable high quality active travel infrastructure to be delivered in this location.
R25 Tullow Road	Removal of turning pockets and hatching to provide off-road segregated cycling infrastructure.	Enables the provision of segregated active travel infrastructure, whilst minimising the impact on the operation of the highway network. It therefore contributes to the overall objectives of the LTP strategy.

R29 Pollerton Road (under railway bridge)	Reduced to one lane under railway bridge to be managed through signalisation. This will enable provision of segregated cycling facilities.	Measure is necessary to provide segregated cycling facilities; does not restrict highway movements and therefore caters for all modes.
R30 Pollerton Road (railway bridge to St Mary's Park)	Removal of on-street parking to provide segregated cycling infrastructure as part of the overall cycling network.	Only reasonable measure identified to enable high quality active travel infrastructure to be delivered in this location.
R32 Dublin Road (Greenbank Road to Railway Road)	Removal of on-street parking to provide segregated cycling infrastructure as part of the overall cycling network.	Only reasonable measure identified to enable high quality active travel infrastructure to be delivered in this location.
R33 Green Lane	Removal of on-street parking to provide segregated cycling infrastructure as part of the overall cycling network.	Only reasonable measure identified to enable high quality active travel infrastructure to be delivered in this location.

4.5.2 Road Options Required for Active Travel Infrastructure (several options proposed)

In a number of locations, several options have been identified, which require modifications to the road network to enable the provision of active travel infrastructure. An MCA assessment has been undertaken on each of these options to identify the preferred option; options have been scored against the roads' principles and parking principles, where considered necessary. The outcomes of the MCA will be reviewed following the consultation exercise.

Town Centre North (R7, R8, R9, R13)

There are multiple options for the Town Centre North (TCN), which include options R7, R8, R9, and R13 shown in **Figure 18.** The options are outlined below.

- TCN01: pedestrianisation of Cox's Lane, pedestrianisation of College Street between Tullow Street and Brown Street, pedestrianisation of Charlotte Street up to car park exit (cars exiting the Hotel car park will have to turn left), Dublin Street is one-way southbound and shared footway provided for active travellers.
- TCN02: pedestrianisation of Cox's Lane, pedestrianisation of College Street between Tullow Street and Brown Street, pedestrianisation of Charlotte Street up to car park exit (cars exiting the Hotel car park will have to turn left), Dublin Street is one-way northbound and shared footway provided for active travellers.
- TCN03: pedestrianisation of Cox's Lane, pedestrianisation of College Street between Tullow Street and Brown Street, pedestrianisation of Charlotte Street up to car park exit (cars exiting the Hotel car park will have to turn left), Dublin Street is one-way southbound and off-road segregated cycle infrastructure is provided.
- TCN04: pedestrianisation of Cox's Lane, pedestrianisation of College Street between Tullow Street and Brown Street, pedestrianisation of Charlotte Street up to car park exit (cars exiting the Hotel car park will have to turn left), Dublin Street is one-way northbound and off-road segregated cycle infrastructure is provided.
- TCN05: pedestrianisation of Cox's Lane, pedestrianisation of College Street between Tullow Street and Brown Street, pedestrianisation of Charlotte Street up to car park exit (cars exiting the Hotel car park will have to turn left), Dublin Street remains two-way with on-street parking removed to allow for shared footway infrastructure for active travellers.

Table 4-8: Town Centre North MCA

	Principles (Scoring Criteria)	TCN01	TCN02	TCN03	TCN04	TCN05
Road Principles	Reduce car dependency by promoting mode transfer to walking, cycling, and public transport					
	Reduce optional vehicular trips through Carlow Town centre through road layout and access changes as well as parking and policy					

	Improve road safety and eliminate collision hot spots	
	Overcome issues relating to pinch points which threaten capacity and network reliability	
	Ensure that junctions are suitably improved to provide for those trips which cannot be converted to sustainable modes, particularly important for rural parts of Carlow	
	Restrict certain car movements to try and ensure that infrastructure commitments to active modes and public transport do create a modal-shift	
Parking Principles	Manage the provision of car parking to support and improve the economic vitality of the town centre	
	To ensure car parking provision encourages sustainable travel, particularly around railway station	
	To reduce on-street parking, where appropriate, in the town centre to facilitate public realm and walking, cycling and public transport infrastructure improvements	
	Improve the quality of parking information with new parking signage and technology	
	Introduce parking demand management measures to reduce car dependency and enhance the attractiveness of sustainable travel	
	Make high-level recommendations regarding suitable locations for electric charging hubs	

The outputs from the assessment show that options TCN01 and TCN02 have the highest score. They score identical to each other as the only difference is the direction of the one-way system through the town centre. The options score higher than TCN03 and TCN04 as Dublin Street is recognised to be constrained, and converting the road to one-way, but also providing segregated cycling infrastructure along the route is likely to still result in conflict points. Having shared footway within the town centre is considered appropriate, to make best use of available space and ensure cyclists are still segregated from car. Whilst it is recognised that this does not accord with guidance within the Cycle Design Manual, space constraints mean that the benefits of alternative measures would not be proportional to the impacts on other transport users.

TCN05 is the only option to score a negative, which is against one of the parking principles. It is expected that in this location, the removal of some of the on-street parking bays, would come under objection from businesses located in this area.

Railway Station (R11, R12)

Several options have been identified for the road network around the railway station to ensure that the station can be accessed safety by pedestrians and cyclists. These options are outlined below. NB: Under the parking strategy, additional options are identified with regard to car parking at the railway station.

- RS01: removal of parking along St. Joseph's Road and Railway Road to provide off-road segregated cycle infrastructure. Shared footway provided along Glendale Avenue and over rail bridge to allow access to station from eastern side.
- RS02: one-way southbound implemented on St. Joseph's Road and set-down areas removed on Railway Road to provide off-road segregated cycle infrastructure. Shared footway provided along Glendale Avenue and over rail bridge to allow access to station from eastern side.

- RS03: one-way southbound implemented on St. Joseph's Road and Railway Road to provide off-road segregated cycle infrastructure. Shared footway provided along Glendale Avenue and over rail bridge to allow access to station from eastern side.
- RS04: one-way northbound implemented on St. Joseph's Road and set-down areas removed on Railway Road to provide off-road segregated cycle infrastructure. Shared footway provided along Glendale Avenue and over rail bridge to allow access to station from eastern side.
- RS05: one-way northbound implemented on St. Joseph's Road and Railway Road to provide off-road segregated cycle infrastructure. Shared footway provided along Glendale Avenue and over rail bridge to allow access to station from eastern side.

Table 4-9: Railway Station MCA

Principles (Scoring Criteria)	RS01	RS02	RS03	RS04	RS05
Reduce car dependency by promoting mode transfer to walking, cycling, and public transport					
Reduce optional vehicular trips through Carlow Town centre through road layout and access changes as well as parking and policy					
Improve road safety and eliminate collision hot spots					
Overcome issues relating to pinch points which threaten capacity and network reliability					
Ensure that junctions are suitably improved to provide for those trips which cannot be converted to sustainable modes, particularly important for rural parts of Carlow					
Restrict certain car movements to try and ensure that infrastructure commitments to active modes and public transport do create a modal-shift					

The options which are expected to have the greatest modal shift and improve safety for pedestrians and cyclists are options RS03 and RS05, which will see a one-way system implemented around Joseph Street and Railway Road; the direction of the one-way system would only be determined following more detailed optioneering. It is however noted that the one-way system could increase the number of vehicular trips through some sections of the town centre network, if a modal shift to more sustainable modes of transport is not achieved; this would therefore need to be managed. Options for a one-way system in this location score higher than options whereby on-street parking or set-down areas are removed. The removal of on-street parking in this location is expected to be controversial given that it is the only available parking for some residents. Allowing for vehicles to park outside the school will also create more conflict between vehicles and pedestrians and cyclists.

Town Centre South (R14, R15)

Two options have been identified for the town centre south area, which relates to Tullow Street and Potato Market. These options are summarised as follows:

- TCS01: pedestrianisation of Tullow Street from shopping centre entrance point to Dublin Street, the early section (between shopping centre entrance and Barrack Street) remains open-two way with off-road segregated cycle infrastructure provided. In this option Potato Market is also pedestrianised.
- TCS02: pedestrianisation of Tullow Street from Potato Market to Dublin Street, one-way westbound of Tullow Street between shopping centre entrance and Potato Market, and two-way remains on Tullow Street between shopping centre entrance and Barrack Street, both the two-way and one-way section of Tullow Street will have off-road segregated cycle infrastructure. Potato Market is one-way and off-road segregated cycle infrastructure provided.

Table 4-10: Town Centre South MCA

Principles (Scoring Criteria)	TCS01	TCS02
Reduce car dependency by promoting mode transfer to walking, cycling, and public transport		
Reduce optional vehicular trips through Carlow Town centre through road layout and access changes as well as parking and policy		
Improve road safety and eliminate collision hot spots		
Overcome issues relating to pinch points which threaten capacity and network reliability		
Ensure that junctions are suitably improved to provide for those trips which cannot be converted to sustainable modes, particularly important for rural parts of Carlow		
Restrict certain car movements to try and ensure that infrastructure commitments to active modes and public transport do create a modal-shift		

Both options are likely to reduce car dependency and promote a modal shift to walking, cycling and public transport; the options will also mean that additional public realm measures can be delivered in the town centre, improving the environment of Carlow. Whilst both options are considered beneficial to the overall objectives of the LTP, option TCS01 results in greater access restrictions for private vehicles and will therefore likely have the biggest impact in terms of reducing car dependency.

Town Centre Loop (R16, R17, R18)

Two options have been identified for the town centre loop, which includes Burrin Street, Kilkenny Road, and Kennedy Avenue.

- TCL01: one-way loop across all roads, this would mean one-way northbound on Burrin Street, one-way eastbound on Kennedy Avenue, and one-way southbound on Kilkenny Road. All major junctions would be upgraded to signalised and off-road segregated cycle infrastructure provided on all roads.
- TCL02: Kennedy Avenue and Kilkenny Road remain two-way, and Burrin Street is one-way. All major junctions upgraded to signals, and if on-street parking is removed on Kennedy Avenue then off-road segregated cycle infrastructure can be provided on all roads.

Table 4-11: Town Centre Loop MCA

Principles (Scoring Criteria)	TCL01	TCL02
Reduce car dependency by promoting mode transfer to walking, cycling, and public transport		
Reduce optional vehicular trips through Carlow Town centre through road layout and access changes as well as parking and policy		
Improve road safety and eliminate collision hot spots		
Overcome issues relating to pinch points which threaten capacity and network reliability		
Ensure that junctions are suitably improved to provide for those trips which cannot be converted to sustainable modes, particularly important for rural parts of Carlow		

Restrict certain car movements to try and ensure that infrastructure commitments to active modes and public transport do create a modal-shift	

Both options identified will have a positive impact on promoting a modal shift to sustainable modes of transport given the restrictions that are imposed on cars. Whilst restrictions are proposed for cars to enable active travel infrastructure to be provided, highway access is retained to all areas, with reliability issues at some junctions removed through the one-way system. Option TCL01 is expected to have the greatest benefit given this will provide a full one-way loop; the increase in distance drivers need to travel could be a deterrent to using the car. The removal of on-street parking identified in option TCL02 is likely to be controversial.

Pollerton Road / Staplestown Road (R20, R21, R22)

Two options are identified for Pollerton Road and Staplestown Road area to enable provision of active travel infrastructure.

- PRSR01: one-way is reversed on Pollerton Road and on-street parking removed, one-way restrictions implemented on Bridge Street and Staplestown Road. Such restrictions allow for off-road segregated cycle infrastructure on all roads. All major junctions to be signalised.
- PRSR02: on-street parking removed on Pollerton Road and Staplestown Road. Such restrictions allow for off-road segregated cycle infrastructure on all roads. All major junctions to be signalised.

Table 4-12: Pollerton Road / Staplestown Road MCA

Principles (Scoring Criteria)	PRSR01	PRSR02
Reduce car dependency by promoting mode transfer to walking, cycling, and public transport		
Reduce optional vehicular trips through Carlow Town centre through road layout and access changes as well as parking and policy		
Improve road safety and eliminate collision hot spots		
Overcome issues relating to pinch points which threaten capacity and network reliability		
Ensure that junctions are suitably improved to provide for those trips which cannot be converted to sustainable modes, particularly important for rural parts of Carlow		
Restrict certain car movements to try and ensure that infrastructure commitments to active modes and public transport do create a modal-shift		

Both options are considered feasible to enable provision of active travel infrastructure in this area. The one-way system identified in PRSR01 is likely to have a greater impact than PRSR02 on promoting a mode transfer to walking, cycling and public transport, as the reduction in vehicular traffic in this area will give the perception that it is more suitable for sustainable modes of transport.

SETU (R26, R27)

Three options have been identified for the road network around SETU.

- SETU01: one-way of Green Road and Hanover Road southbound, with off-road segregated cycle infrastructure provided. The mini roundabouts at the junction of these two roads are to be upgraded.
- SETU02: traffic calming measures provided on Green Road and Hanover Road with shared roadway cycle infrastructure. The mini roundabouts at the junction of these two roads are to be upgraded.
- SETU03: one-way of Green Road and Hanover Road northbound, with off-road segregated cycle infrastructure provided. The mini roundabouts at the junction of these two roads are to be upgraded.

Table 4-13: SETU MCA

Principles (Scoring Criteria)	SETU01	SETU02	SETU03
Reduce car dependency by promoting mode transfer to walking, cycling, and public transport			
Reduce optional vehicular trips through Carlow Town centre through road layout and access changes as well as parking and policy			
Improve road safety and eliminate collision hot spots			
Overcome issues relating to pinch points which threaten capacity and network reliability			
Ensure that junctions are suitably improved to provide for those trips which cannot be converted to sustainable modes, particularly important for rural parts of Carlow			
Restrict certain car movements to try and ensure that infrastructure commitments to active modes and public transport do create a modal-shift			

Options SETU01 and SETU03 score identically as there only difference is the direction of the one-way system. These options score higher than option SETU02 against the roads principals as they allow for better quality active travel infrastructure to be provided; this will result in a greater mode shift from private car to sustainable modes. Whilst option SETU01 and SETU03 score more favourably than SETU02, they are likely to be more controversial. Given that Green Road serves few vehicles than the parallel Kilkenny Road, and that cyclists are already using this route, implementing traffic calming in this location has been identified as an alternative measure to improve cycling infrastructure, whilst ensuring necessary capacity on the highway network remains.

The assessment of the proposals at this stage is qualitative. Where there is roadpace reallocation, it is recognised that this could cause increased traffic congestion on the road network until there is a mode shift towards more sustainable modes of transport. As each scheme is taken forward for implementation, more detailed traffic modelling and assessment will be undertaken to ensure the impact of each option is understood and any necessary mitigation measures put in place.

Junctions

Upgrades are required to a number of junctions across the study area to provide improved facilities for pedestrians and cyclists. Whilst at this stage, options at each individual junction have not been identified, options will include the installation of traffic signals and reduced footprint of the junction. The following table shows how the option scores against each of the roads' principles.

Table 4-14: Junctions MCA

Principles (Scoring Criteria)	
Reduce car dependency by promoting mode transfer to walking, cycling, and public transport	
Reduce optional vehicular trips through Carlow Town centre through road layout and access changes as well as parking and policy	
Improve road safety and eliminate collision hot spots	
Overcome issues relating to pinch points which threaten capacity and network reliability	
Ensure that junctions are suitably improved to provide for those trips which cannot be converted to sustainable modes, particularly important for rural parts of Carlow	
Restrict certain car movements to try and ensure that infrastructure commitments to active modes and public transport do create a modal-shift	

The improvement of junctions will have a positive benefit on safety for all modes of transport. Safety will be improved by the method of control implemented at each junction and the removal of conflict. The improvement to safety should mean that active modes of transport are seen as more attractive options, thus reducing the dependency on the private car. It is recognised that the installation of traffic signals at a number of junctions across Carlow could increase delay to motorised traffic.

4.5.1 Road Options Identified to Improve Operation of Highway Network

Given the overall strategy objectives, few roads options have been identified. However, there is recognition that given the rural nature of County Carlow, for many people travelling by sustainable modes of transport will not be an option. The transport network therefore still needs to be able to cater for these trips. A number of roads options are therefore proposed as part of this overall strategy.

Traffic Signal Management

An option has been identified to link traffic signals across Carlow Graiguecullen to ensure vehicles receive a green wave through key areas. This will help reduce traffic congestion in these locations. Traffic signals will need to be effectively managed, to ensure timings and plans are optimised for changing traffic conditions. Improving the signal infrastructure, or the installation of new infrastructure, will mean that provision for active travel at these junctions can be improved. It will also mean that further consideration can be given to bus priority, such as hurry calls, in the future once new bus services are operational. The following table shows how this option scores against the roads' principles.

Table 4-15: Traffic Signal Management MCA

Principles (Scoring Criteria)	
Reduce car dependency by promoting mode transfer to walking, cycling, and public transport	
Reduce optional vehicular trips through Carlow Town centre through road layout and access changes as well as parking and policy	
Improve road safety and eliminate collision hot spots	
Overcome issues relating to pinch points which threaten capacity and network reliability	
Ensure that junctions are suitably improved to provide for those trips which cannot be converted to sustainable modes, particularly important for rural parts of Carlow	
Restrict certain car movements to try and ensure that infrastructure commitments to active modes and public transport do create a modal-shift	

Whilst this option is unlikely to have a significant impact on promoting a mode transfer to walking, cycling or public transport, the option will help to overcome capacity and network reliability issues on the transport network. This will help improve the overall environment of Carlow and surrounding areas and ensure that the transport network caters for all travellers.

Southern Relief Road (R34, R35, R36)

An option has been identified to provide a Southern Relief Road in Carlow. The overall objective of the road is to remove vehicular trips from the town centre, which will allow further reallocation to sustainable modes of transport. The road will also help facilitate development sites identified in the local plan.

Given cost and deliverability constraints of the Southern Relief Road option, the road has been split into phases, as identified below. However, it is only if the road is delivered in its entirety, that the benefits of the road to the town centre will be felt.

- Phase 1: from N80 northwards to Carlow Eastern Relief Road
- Phase 2: from Kilkenny Road to N80
- Phase 3: from Carlow Northern Inner Relief Road Extension to Kilkenny Road (inc bridge).

The following table shows how the option scores against the roads principles identified in this strategy.

Table 4-16: Southern Relief Road MCA

Principles (Scoring Criteria)	
Reduce car dependency by promoting mode transfer to walking, cycling, and public transport	
Reduce optional vehicular trips through Carlow Town centre through road layout and access changes as well as parking and policy	
Improve road safety and eliminate collision hot spots	
Overcome issues relating to pinch points which threaten capacity and network reliability	
Ensure that junctions are suitably improved to provide for those trips which cannot be converted to sustainable modes, particularly important for rural parts of Carlow	
Restrict certain car movements to try and ensure that infrastructure commitments to active modes and public transport do create a modal-shift	

The provision of the Southern Relief Road is likely to have a major positive impact on reducing optional vehicular trips in Carlow town centre and overcoming network pinch points. This is because the relief road provides an alternative route for vehicles travelling through the town; the additional crossing point of the River Barrow is seen as a particular benefit. The option is also likely to have a positive impact on improving road safety through the reduction in traffic from the town centre.

Whilst it could be argued that the provision of the Southern Relief Road will do nothing to reduce car dependency and promote a mode transfer to more sustainable modes of transport, by removing traffic from the town centre, it offers more opportunity for road reallocation to active travel to provide more direct and safer segregated routes for pedestrians and cyclists. This will increase the attractiveness of active travel as a mode of transport and, alongside complementary measures to promote new facilities, should result in mode shift for shorter distance trips. Without the southern relief road, it is unlikely that support would be given for some of the roadspace reallocation measures identified in this LTP, given the impact that this would have on traffic congestion, with people travelling longer distances not being able to change their mode of travel.

The Carlow SATURN model has been used to look at the impact of the Southern Relief Road on traffic conditions in the study area. Traffic has been forecast to a year of 2029, using the development assumptions informing the LAP. Key network statistics to show the benefit of the relief road are outlined in the following table. It should be noted that this is a higher assignment model only, and therefore any demand responses, such as modal shift, are not reflected in the modelled outputs.

Table 4-17: SATURN Model Outputs 2029

Metric	AM Peak		PM Peak	
	Without relief road	With relief road	Without relief road	With relief road
Total Network Trips (passenger car units (pcus))	12913	12913	11247	11247
Total Travel Time (pcu hrs)	1346	1137	1046	930
Total Distance Travelled (pcu kms)	51576	53224	43834	44340
Average Speed (kph)	38	47	42	48

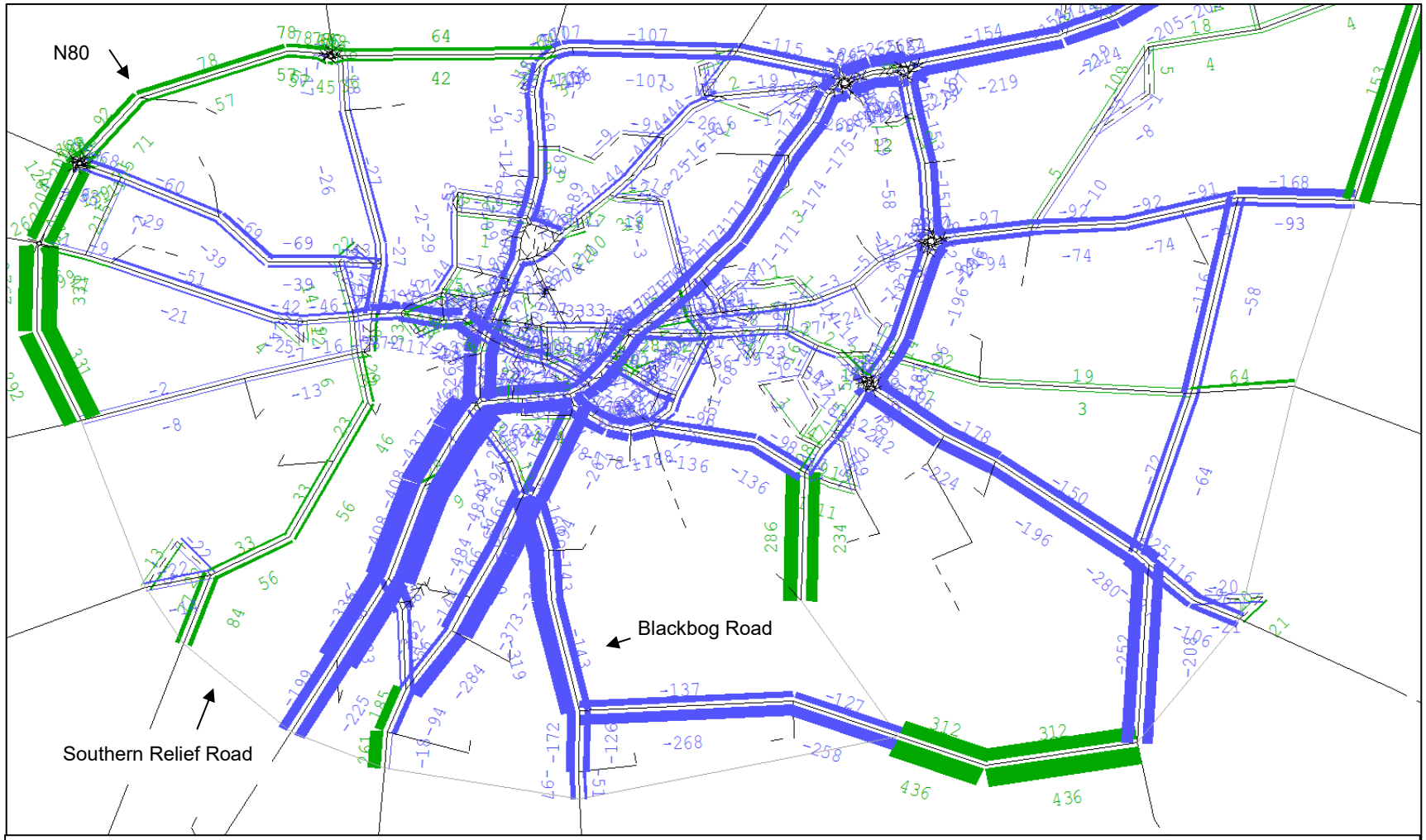
The outputs from the traffic model show that with the proposed Southern Relief Road, there is an increase in vehicle kilometres travelled across the highway network. This is due to drivers being willing to travel longer distances to benefit from the increase in highway capacity that the relief road offers. This trend is consistent in both the AM and PM peaks.

Whilst there is an increase in the total distance travelled, there is a noticeable reduction in total travel time due to reductions in delay across the network. This also results in an overall increase in the average speed travelled across the highway network.

The traffic model shows clear benefits in terms of the Southern Relief Road when looking at network performance statistics from the traffic model. The key benefit however in terms of the Southern Relief Road, will be the removal of traffic from the town centre, which will mitigate the impacts of reallocation of road space to sustainable transport modes in terms of highway delay. This is illustrated in the following figures. Blue indicates a reduction in traffic compared to the without relief road scenario; as the relief road is one of the modelled scenarios, traffic flows on the relief road are not shown.

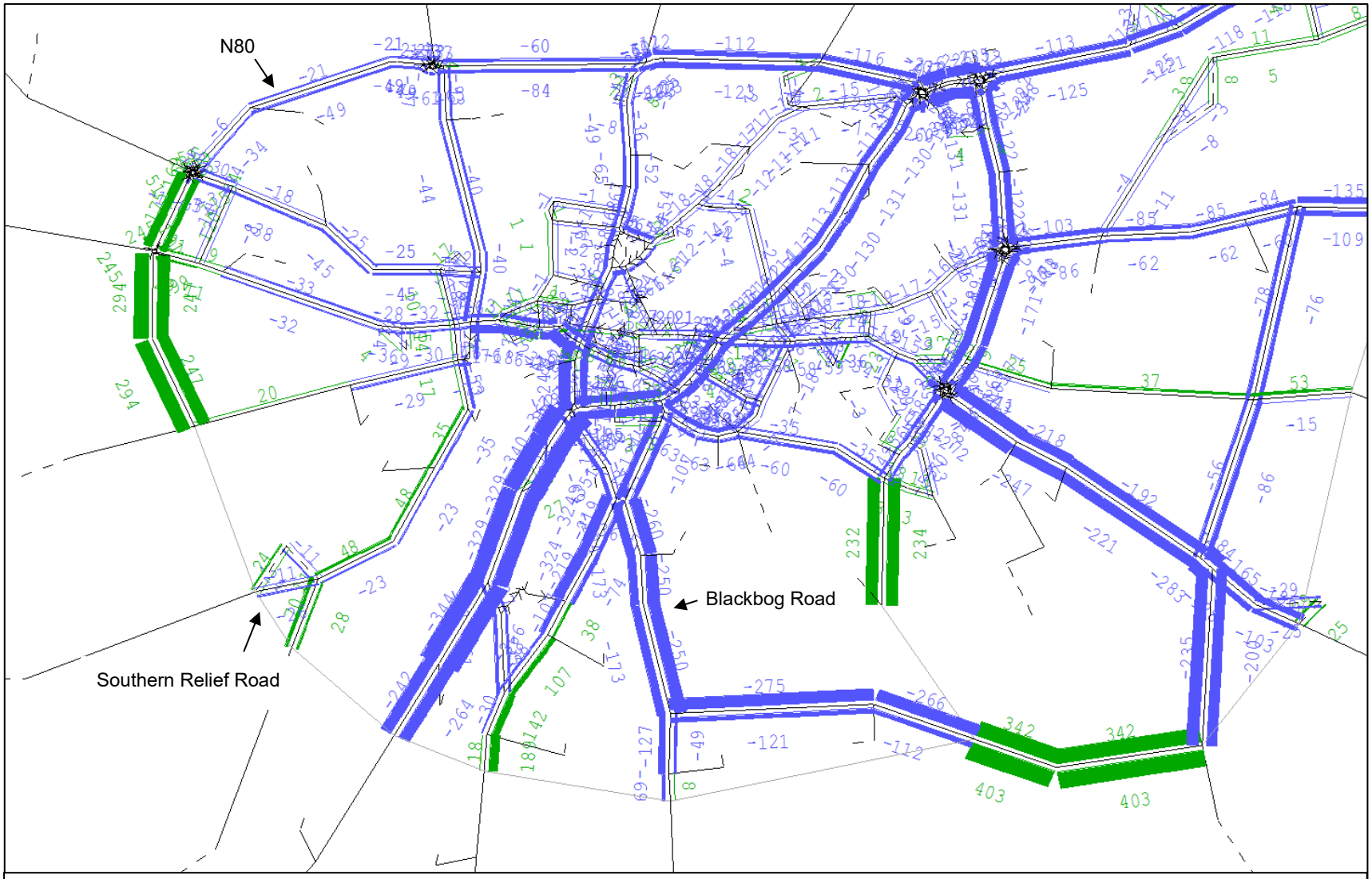
Although the traffic model shows overall benefits to highway users from the relief road, this is across the network as a whole, with trips into/out of the town centre taking longer than currently due to the new road layouts proposed within this LTP.

Figure 26. Traffic Flow Changes in AM 2029 in Passenger Car Units (with relief road minus without relief road)



Noticeable reduction in traffic flows through Carlow town centre, with largest reduction on Kilkenny Road at over 400 pcu's in both directions

Figure 27. Traffic Flow Changes in PM 2029 in Passenger Car Units (with relief road minus without relief road)



Noticeable reduction in traffic flows through Carlow town centre, with largest reduction on Kilkenny Road at over 300 pcu's in both directions

4.6 Parking Measures Assessment

A number of options have been identified to improve the parking offer in Carlow town centre. The impact of the proposed parking options is assessed through the completion of an MCA, scoring against the parking principles. Full details of the parking options can be found in **3.2.6**.

Table 4-18: Parking Options MCA

Principles (Scoring Criteria)	Parking Pricing	Rail Car Park (New)	Rail Car Park (Existing)	Carlow Retail Park	School Drop-Off Restrictions	Electric Vehicle Charging	SETU	Parking App	Parking Enforcement	Vehicle Wayfinding
Manage the provision of car parking to support and improve the economic vitality of the town centre										
To ensure car parking provision encourages sustainable travel, particularly around railway station										
To reduce on-street parking, where appropriate, in the town centre to facilitate public realm and walking, cycling and public transport infrastructure improvements										
Improve the quality of parking information with new parking signage and technology										
Introduce parking demand management measures to reduce the attractiveness of the car relative to sustainable transport alternatives										
Make high-level recommendations regarding suitable locations for electric charging hubs										

All of the parking options could be delivered and should help to achieve the objectives of this LTP. In locations where it is proposed to remove on-street car parking, the impact that this might have on local businesses needs to be considered through the consultation process. However, the removal of parking has only been proposed in locations where it will improve overall accessibility to the town and provide a cleaner and more attractive environment. This, in turn, could increase the attractiveness of Carlow as a place to visit and could have a positive impact on businesses.

A review of the parking pricing across Carlow and increasing parking charges in some areas, could deliver real benefits in terms of creating a modal shift and will therefore be investigated further. Whilst it is recognised that this would need to be implemented carefully to ensure access to the town centre is retained for all people, including those living in the rural hinterlands where alternative transport options might not be available, pricing can be set such that it encourages people to park on the outskirts of town and walk into the town centre. Provision for blue badge holders would still be provided in accessible locations.

Providing better information and signing on parking will help better direct people to available car parking; which would be beneficial in terms of reducing the travel within the town centre when looking for a parking space.

Parking has been identified as an issue around SETU, and provision of a new car park could help address this. However, it is felt that this option would score negatively against the objectives of this LTP, and more should be done to enforce parking restrictions around SETU and promote the sustainable transport options. The option has therefore been removed at this stage.

5. Part 4 - Refinement and Sense Check Proposals

5.1 Introduction

Part 4 of the ABTA guidance requires that the proposals outlined in previous sections are refined and that a sense check is undertaken to ensure proposals meet the requirements of the ABTA process. Whilst this section of the LTP will ultimately be completed following public consultation exercises that are undertaken, a review of the proposals has been undertaken, with timeframes for possible implementation identified.

5.2 Sense Check of Proposals Based on ABTA Guidance

The 2018 ABTA guidance contains a checklist to ensure the transport measures associated with the preferred development scenario in the LTP cover certain key areas. The checklist and content check in the Carlow Graiguecullen LTP is summarised in the following table.

Table 5-1: Sense Check of Proposals

ABTA Guidance Checklist	Check	Carlow Graiguecullen LTP Content
Connectivity and accessibility to public transport services, walking, and cycling networks are safeguarded and provided for.	√	The Carlow Graiguecullen LTP contains a number of options to improve public transport, walking, and cycling networks, in respect to both quality of infrastructure and accessible destinations.
Development phasing and the mechanism for transport infrastructure / services delivery, including the financial requirements, are fully considered.	√	Options have been phased and feasibility of them assessed where appropriate.
Road proposals and associated junctions can meet the anticipated level of trip demand pertaining to each mode.	√	Traffic modelling shows that the implementation of new road infrastructure will improve the capacity available for vehicular trips.
Where applicable, the strategic national road network will be protected from local car trip generation.	√	There is recognition that the N80 serves a dual function of catering for both strategic and local traffic. Measures have been proposed, which will promote a modal shift, thus reducing the level of local traffic using the N80. Prior to implementation of any option which impacts on the national road network, a detailed option assessment exercise will be undertaken.
DMURS (Design Manual for Urban Roads & Streets) is reflected in the design process.	√	The LTP is a strategy, rather than a design document, so DMURS will be referred to in future by designers when it comes to implementing the options. However, the design philosophy within DMURS has been reflected in the identification of options within this LTP.
National Cycle Manual (NCM) is reflected in the design process	√	The LTP is a strategy, rather than a design document, so NCM will be referred to in future by designers when it comes to implementing the options. However, the design philosophy within the NCM has been reflected in the identification of options within this LTP.
The land-use planning process, and transport planning, has been integrated in identifying the most appropriate land-use and transport solutions.	√	Engagement with the LAP team has occurred regularly throughout development of the LTP. Measures have been identified to serve existing and proposed development. Where development has been identified in a location, which would be difficult to serve by sustainable modes of transport, this has been fed back to the planning team.
Proposed transportation options will ultimately ensure that appropriate levels of service will be provided across all modes of transport.	√	Additional bus services will cater for additional demand and create a modal shift from car to public transport, and transport modelling has shown that the provision of a southern relief road will provide alternative routes away from the town centre., which presents an opportunity to reallocate roadspace to sustainable modes of transport.
An appropriate level of contingency has been considered for each mode to allow for development-related growth in transport demand external to the Plan area.	√	The strategy is based on development proposals set out in the LAP with an iterative approach adopted to identifying development sites which could be served by sustainable transport options. However, there is recognition that Carlow is a regional centre for employment, education and leisure. As such, trips within Carlow will originate outside of the

		study area. This has been considered within the option development process.
Due to the proposed transport options, excess capacity in relation to road and public transport networks will arise, notwithstanding the development objectives relating to the wider area.	√	Given the promotion of sustainable modes of transport, increased capacity of the road network has not been central to the option development process. Additional road capacity has been proposed where it allows for further reallocation of roadspace to sustainable modes of transport, resulting in a reduction in vehicular capacity within the town centre. If targets for mode shift to sustainable modes of transport are achieved, this could result in an overall reduction in vehicular trips.

5.3 Implementation of Options and Timeframes

Potential timeframes for the implementation of options identified in this LTP are outlined in the following section. Timescales are defined as follows:

- Short-term – measure intended for implementation within 1-2 years
- Medium-term – measures intended for implementation within 3-5 years
- Long-term – measures intended for implementation within 6-10 years
- Ongoing – measure could commence in the short-term, but will span a number of years

The further development of these options will require corresponding planning and design work to be undertaken on each of the relevant transport measures. As such, these timescales are indicative only and subject to funding and resource availability. Timeframes will be revisited following consultation on the LTP and any changes to the measures identified.

5.3.1 Timeframes of Active Travel Options

Table 5-2 and **Table 5-3** below indicates the proposed timeframes for the active travel options.

Table 5-2: Proposed Timeframes for Walking Options

Option	Description	Timeframe
Walking Network	Provision of new or upgraded permeability links to provide an improved walking network in Carlow	Medium
Walking Advertisement	Promotion of the walking connections and the benefits of walking	Short
Wayfinding Strategy	Provision of signage to highlight clear pedestrian routes	Short

Table 5-3: Proposed Timeframes for Cycling Options

Option	Description	Timeframe
Athy Road (between Irish Sugar Factory and Carlow Educate Together)	Proposed Shared Footway Cycle Infrastructure	Short
Athy Road (Irish Sugar Factory)	Proposed Shared Roadway (Quiet Route) Cycle Infrastructure with traffic calming	Short
Athy Road (between N80 and Irish Sugar Factory)	Proposed Off-Road Segregated Cycle Infrastructure	Medium
N80 (between R924 and Barrow Valley Retail Park)	Proposed Off-Road Segregated Cycle Infrastructure	Medium
N80 (between Barrow Valley Retail Park and Sleaty Street)	Proposed Off-Road Segregated Cycle Infrastructure	Medium
N80 (between Castlecomer Road and R924)	Proposed Off-Road Segregated Cycle Infrastructure	Medium
Sleaty Street	Proposed Shared Roadway (Quiet Route) Cycle Infrastructure	Short

Option	Description	Timeframe
N80 (William Dargan Road)	Proposed Off-Road Segregated Cycle Infrastructure	Medium
N80 (Cannery Road and Dr. Cullen Road)	Proposed Off-Road Segregated Cycle Infrastructure	Medium
Dublin Road (south of O'Hanrahan's GFC)	Proposed Off-Road Segregated Cycle Infrastructure	Medium
Dublin Road (north of old Braun Factory)	Proposed Off-Road Segregated Cycle Infrastructure	Medium
N80 (O'Brien Road – between R448 and R726)	Proposed Off-Road Segregated Cycle Infrastructure	Medium
N80 (O'Brien Road – between R726 and Carpenter Way)	Proposed Off-Road Segregated Cycle Infrastructure	Medium
Eire Og Road	Proposed Off-Road Segregated Cycle Infrastructure	Long
N80 Tullow Road	Proposed Off-Road Segregated Cycle Infrastructure	Medium
River Burrin	Proposed Shared Footway Cycle Infrastructure	Short
Carpenter Way (west)	Proposed Off-Road Segregated Cycle Infrastructure	Medium
Carpenter Way (east)	Proposed Off-Road Segregated Cycle Infrastructure	Medium
Browneshill Road	Proposed Shared Roadway (Quiet Route) Cycle Infrastructure	Short
R726 (between N80 and Palatine Road)	Proposed Off-Road Segregated Cycle Infrastructure	Medium
Palatine Road	Proposed Off-Road Segregated Cycle Infrastructure	Medium
R448 (between N80 and Four Lakes Retail Park)	Proposed Off-Road Segregated Cycle Infrastructure	Medium
R448 (between Four Lakes Retail Park and MSD)	Proposed Shared Footway Cycle Infrastructure	Short
R448 (approach to N80 roundabout)	Proposed Off-Road Segregated Cycle Infrastructure	Medium
Green Lane	Proposed Off-Road Segregated Cycle Infrastructure	Medium
Dublin Road (north of St. Mary's Graveyard)	Proposed Off-Road Segregated Cycle Infrastructure	Medium
Dublin Road (east of Hospital)	Proposed Off-Road Segregated Cycle Infrastructure	Medium
Dublin Road (between Greenbank Road and Railway Road)	Proposed Off-Road Segregated Cycle Infrastructure	Medium
Dublin Road (between Greenbank Road and Athy Road)	Proposed Off-Road Segregated Cycle Infrastructure	Medium
Railway Road and St. Joseph's Road	Proposed Off-Road Segregated Cycle Infrastructure	Medium
Railway Bridge (at station)	Proposed Shared Footway Cycle Infrastructure	Short
Link through Carlow College and Cricket Club	Proposed Shared Footway Cycle Infrastructure	Short
College Street (between Tullow Street and Brown Street)	Proposed Shared Footway Cycle Infrastructure	Medium
Tullow Street (Barrack Street to Potato Market)	Proposed Off-Road Segregated Cycle Infrastructure	Medium
Tullow Street (Potato Market to Dublin Street)	Proposed Shared Footway Cycle Infrastructure	Medium

Option	Description	Timeframe
Potato Market	Proposed Off-Road Segregated Cycle Infrastructure	Medium
Dublin Street	Proposed Shared Footway Cycle Infrastructure	Medium
Cox's Lane	Proposed Shared Footway Cycle Infrastructure	Short
River Barrow (north)	Proposed Shared Footway Cycle Infrastructure	Short
Barrack Street	Proposed Off-Road Segregated Cycle Infrastructure	Medium
Fair Green Retail Park Access	Proposed Shared Footway Cycle Infrastructure	Short
Staplestown Road	Proposed Off-Road Segregated Cycle Infrastructure	Medium
Pollerton Road (between Green Lane and Bridge Street)	Proposed Off-Road Segregated Cycle Infrastructure	Medium
Bridge Street (between Pollerton Road and Staplestown Road)	Proposed Off-Road Segregated Cycle Infrastructure	Medium
Kennedy Avenue	Proposed Off-Road Segregated Cycle Infrastructure	Medium
Burrin Street (North)	Proposed Shared Footway Cycle Infrastructure	Short
Burrin Street	Proposed Off-Road Segregated Cycle Infrastructure	Medium
Hanover Street / Bridge Street	Proposed Off-Road Segregated Cycle Infrastructure	Medium
Green View	Proposed Shared Roadway (Quiet Route) Cycle Infrastructure	Short
Connection between Green View and Oakley Park	Proposed Shared Roadway (Quiet Route) Cycle Infrastructure	Short
Oakley Park	Proposed Shared Roadway (Quiet Route) Cycle Infrastructure	Short
Staplestown Road and Browneshill Road Lower	Proposed Off-Road Segregated Cycle Infrastructure	Medium
Pollerton Road (between Bridge Street and N80)	Proposed Off-Road Segregated Cycle Infrastructure	Medium
Hanover Road	Proposed Shared Roadway (Quiet Route) Cycle Infrastructure	Short
Green Road	Proposed Shared Roadway (Quiet Route) Cycle Infrastructure	Short
Blackbog Road	Proposed Shared Roadway (Quiet Route) Cycle Infrastructure	Short
Kilkenny Road	Proposed Off-Road Segregated Cycle Infrastructure	Medium
Southern Relief Road	Proposed Off-Road Segregated Cycle Infrastructure	Long
R924, Ninety-Eight Street, and Maryborough Road	Proposed Off-Road Segregated Cycle Infrastructure	Medium
Governey Park	Proposed Shared Footway Cycle Infrastructure	Short
Croppy Place	Proposed Shared Roadway (Quiet Route) Cycle Infrastructure	Short
River Burrin Bridge (near Millbrook)	Proposed Shared Footway Cycle Infrastructure	Medium
River Barrow Bridge (between Mill View and Pembroke)	Proposed Shared Footway Cycle Infrastructure	Medium
Barrowville Court	Proposed Shared Roadway (Quiet Route) Cycle Infrastructure	Short
Green land west of Barrowville	Proposed Shared Footway Cycle Infrastructure	Short

Option	Description	Timeframe
Barrowville	Proposed Shared Roadway (Quiet Route) Cycle Infrastructure	Short
Castleview	Proposed Shared Roadway (Quiet Route) Cycle Infrastructure	Short
River Barrow (South)	Proposed Shared Footway Cycle Infrastructure	Short
The Moorings Entrance	Proposed Off-Road Segregated Cycle Infrastructure	Medium
The Moorings link to Barrow towpath	Proposed Shared Footway Cycle Infrastructure	Medium
Bridge over River Barrow near Moorings	Proposed Shared Footway Cycle Infrastructure	Medium
L7917, Meadows Way, Rochfort Manor	Proposed Shared Roadway (Quiet Route) Cycle Infrastructure	Short
Leighlin Road (between Rochfort Manor and The Moorings)	Proposed Off-Road Segregated Cycle Infrastructure	Medium
Crossing of Leighlin Road at The Moorings	Proposed Off-Road Segregated Cycle Infrastructure	Medium
Cycle Parking	Provision of secure cycle parking at key destinations across the town.	Short
Bike Maintenance Stands	Provision of bike maintenance stands at key locations	Short
Cycle Hire Scheme	Explore the option of implementing a cycle hire scheme in Carlow Graiguecullen.	Ongoing
Advertising	Advertise, with appropriate signage, the new cycling links and use adverts to promote cycling and sustainable travel.	Short
Cycle Training	Explore the option of providing cycle riding training for both children and adults.	Ongoing

5.3.2 Timeframes of Public Transport Options

The following table shows the proposed timeframes for the public transport options. As noted earlier in the strategy document, some public transport options require coordination and collaboration with other parties and for these options the timeframe of "ongoing" will be used to show CCC's and LCC's continuous commitment to supporting these options.

Table 5-4: Proposed Timeframes for Public Transport Options

Option	Description	Timeframe
N80 Bus Route	Provision of an N80 orbital bus route to serve the National Road and the northern section of the Carlow Graiguecullen study area (subject to a review of existing services and demand).	Medium
Increased Bus Stop Numbers	Providing increased bus stop numbers in the study area along new, existing, and proposed bus routes to allow better access to bus services.	Short-Medium
Real-Time Passenger Information	Council to collaborate with necessary parties to encourage the provision real-time passenger information which can provide accurate information about bus arrival times to assist with journey planning.	Ongoing
Support Flexible and Affordable Ticketing	Council to collaborate with necessary parties to encourage the provision of a simple ticketing system which allows passengers flexibility and is affordable.	Ongoing
Station Upgrades	Upgrade stops and stations in the Carlow Graiguecullen study area to allow for easier transfer between modes and improved waiting areas.	Medium
Marketing Campaign	Run a marketing campaign to show the new and improved public transport services and encourage uptake.	Short

5.3.3 Phasing of Road Options

The table below shows the proposed timeframes of the road options.

Table 5-5: Proposed Timeframes for Road Options

Option	Description	Timeframe
Junctions	Upgrades to provide improved facilities for pedestrians and cyclists. Options at each individual junction have not been identified but will include the installation of traffic signals and reduced junction footprint.	Medium
Traffic Signal Management	Linked traffic signals to provide a green waive through key areas. This will reduce traffic congestion and improve journey time reliability.	Short
R1 – Sleaty Street	Traffic calming (such as chicanes, speed limit reduction or speed bumps) to make cyclists and pedestrians feel safer.	Short
R2 – Athy Road	Traffic calming (such as chicanes, speed limit reduction or speed bumps) to make cyclists and pedestrians feel safer.	Short
R3, R4, R5, R6 – Laois Loop	One-way system across 4 roads in Laois, roads include Chapel Street, Ninety-Eight Street, Maryborough Street, and Bridge Street	Medium
R7, R8, R9, R13 – Town Centre North	Options for Town Centre North, including Cox's Lane, Dublin Street, College Street, and Charlotte Street.	Medium
R10 – Dublin Road	On the one-way stretch of Dublin Road, near courthouse, proposed that one of the lanes is removed to accommodate cycle infrastructure.	Medium
R11, R12 – Railway Station	Option for Railway Station, this would impact on Railway Road as well as St. Joseph's Road.	Medium
R14, R15 – Town Centre South	Option for Town Centre South, alterations to Tullow Street and Potato Market are considered in this option.	Medium
R17, R18, R19 – Town Centre Loop	Option for Town Centre Loop, roads involved include Burrin Street, Kilkenny Road, and Kennedy Avenue.	Medium

Option	Description	Timeframe
R19 – Fairgreen Retail Access	Access to Fairgreen Retail Park from Barrack Street is closed to make space safer for active travellers.	Medium
R20, R21, R22 – Pollerton / Staplestown Loop	Options to improve area to the east of the Town Centre. This option includes impacts on Pollerton Road, Staplestown Road, and Bridge Street.	Medium
R23 – Browneshill Road Lower	Proposed one-way of Browneshill Road Lower and removal of parking to gain extra space for pedestrians and cyclists and provide off-road segregated cycle infrastructure.	Medium
R24 – Browneshill Road	Traffic calming (such as chicanes, speed limit reduction or speed bumps) to make cyclists and pedestrians feel safer.	Short
R25 – Tullow Road	Proposed removal of turning pockets and hatched lines to allow for narrowing of general traffic lanes and providing off-road segregated cycle infrastructure.	Medium
R26, R27 – SETU Area	Provision of option near to SETU to better accommodate active travellers, this impacts on Hanover Road and Green Road.	Medium
R28 – Blackbog Road	Traffic calming (such as chicanes, speed limit reduction or speed bumps) to make cyclists and pedestrians feel safer.	Short
R29 – Pollerton Road (under rail bridge)	It is proposed that the section under the railway bridge becomes signalised allowing for movement in one direction only at each time. The narrowing of the road will allow for off-road segregated cycle infrastructure.	Medium
R30 – Pollerton Road (rail bridge to St. Mary's Park)	Parking to be removed accommodate off-road segregated cycle infrastructure.	Medium
R31 – Barrack Street	Parking is removed to improve the public realm space.	Medium
R32 – Dublin Road (Greenbank Road to Railway Road)	Proposed removal of parking to accommodate cycle infrastructure along this stretch of Dublin Road (between Greenbank Road and Railway Road).	Medium
R33 – Green Lane	Proposed removal of parking on Green Lane (between Staplestown Road and St. Joseph's Road) to accommodate cycle infrastructure.	Medium
R34 – Southern Relief Road Phase 1	Southern Relief Road Phase 1 - support the construction of this section of the Southern Relief Road to provide an entire ring road for Carlow.	Long
R35 – Southern Relief Road Phase 2	Southern Relief Road Phase 2 - support the construction of this section of the Southern Relief Road to provide an entire ring road for Carlow.	Long
R36 – Southern Relief Road Phase 3	Southern Relief Road Phase 3 - support the construction of this section of the Southern Relief Road to provide an entire ring road for Carlow.	Long

5.3.4 Phasing of Parking Options

The table below shows the proposed timeframes of the parking options.

Table 5-6: Proposed Timeframes for Parking Options

Option	Description	Timeframe
Parking Pricing	Review of pricing for car parking across Carlow Town centre.	Short
Railway Station Parking	New car park to the east of the railway line, accessed from Glendale Avenue.	Medium
Current Railway Station Parking	Convert current car park into an area for cycle parking, drop-off zone, bus stop, and waiting area.	Medium
Carlow Retail Park	Make use of spaces in the Carlow Retail Park to provide parking for SETU students/staff who could walk to campus.	Short
School Drop-Off Restrictions	Remove set down or drop-off zones immediately outside schools. Resident permits on streets near to schools.	Short
Electric Vehicle Charging	Provision of electric vehicle charging at convenient locations.	Short-Medium
Parking App	Consider benefits of a parking app to make sure parking in Carlow can be easily located and paid for.	Ongoing
Parking Enforcement	Ensure adequate enforcement of parking restrictions to ensure benefits of other parking options are captured.	Ongoing
Vehicle Wayfinding	Provision of signage which can identify where car parking is located and the number of stops available.	Short

Indicative timeframes have been identified for the measures identified in the LTP, which will inform the preparation of the LAP. It must be remembered that individual projects will need to be examined on their own merits and will need to undergo a detailed development process. Projects will need to be designed in accordance with relevant guidance and will be subjected to public consultation, environmental studies, relevant statutory procedures, as well as consultation with relevant statutory stakeholders.

6. Part 5 - Finalisation of the ABTA

6.1 Final Strategies for Each Mode

Consultation on the LTP will take place as part of the consultation for the Carlow Graiguecullen JULAP. Once consultation has taken place, any comments relating to transport will be reflected in the LTP, with amendments made to options as necessary. Changes to the measures will be outlined in this section of the LTP and the final strategies for each mode of transport identified.

7. Part 6 - Monitoring and Review

7.1 Monitoring ABTA Progress

Regular monitoring will be required over the lifetime of the LTP to establish the following:

- Progress on implementation of selected measures for each mode of transport (e.g., changes to transport infrastructure and services); and
- Observed travel patterns and associated transport impacts and how these compare with the LTP's transport principles, development assumptions, and intended outcomes.

Monitoring of the LTP implementation and impacts can also inform any review processes related to the Joint LAP as well as the development of future LAPs.

It is recommended that a report should be compiled annually summarising progress with regard to the implementation of the LTP measures and documenting any other relevant changes to transport infrastructure or services which may impact travel behaviour. This report should also include measures which are not within the remit of CCC/LCC to deliver, but which will nevertheless impact future travel behaviour within the Carlow Graiguecullen ABTA study area. In addition to details regarding the implementation of specific infrastructure measures contained within the LTP for each mode, the report could also include further items such as:

- Details of improvements to public transport frequencies, operating hours and/or geographic coverage;
- Details of significant changes to the number of car parking spaces provided at locations throughout the town (either public or privately managed) and any relevant changes to parking charges or permits;
- Details of advertising or marketing campaigns that have been ran to promote the use of sustainable modes of transport.

The impacts of the LTP measures implemented, or any other relevant measures / changes implemented, within the study area as well as growth within the study should be monitored on a regular basis to support the understanding of how actual outcomes compare with intended outcomes. This will allow an assessment of the extent to which the LTP's transport principles are being met. Some of the key performance indicators which should be monitored are outlined below:

- Primary source of data on mode share (usual mode of travel) for commuting to work and education is the Census. The 2022 Census data will provide a more up to date baseline than the 2016 data contained with the baseline assessment. Future Censuses will take place in 2026, 2031, and 2036.
- In 2022, a Census question was introduced aimed at collecting data on the usual number of days respondents work from home. This will be an important trend to monitor over time as remote working can have a significant impact on travel demand, particularly at peak times.
- Changes in car ownership (e.g., cars per adult (18+) and car per household) should be monitored following each Census to assess the extent to which car dependency is reducing within the study area.
- Travel surveys conducted in workplaces and educational institutions can provide information on mode share for commuting purposes at more regular intervals than the Census and to specific destinations, as well as valuable information on the factors which influence travel choices. It is recommended that CCC/LCC encourage major employers, schools, and SETU to undertake travel surveys at least once every two years at the same time of year to assist with travel planning.
- Residents and visitors to Carlow could also be asked for feedback on travel within the study area through other means. For example, an online survey could be undertaken every few years to assess how attitudes on using the different modes are changing and to help identify any significant remaining barriers to modal shift.
- An annual traffic count could be undertaken at the same time of year each year to provide further information on mode shift and the extent to which sustainable mode usage is increasing.
- Automatic pedestrian and cycle counters which can continuously monitor the use of specific links should be installed on key links throughout the study area, particularly on significant new/upgraded routes. This allows for analysis of trends in overall use as well as fluctuations by day, time of day, and time of year. Cycle counters are now available which can also count and classify e-scooters.

- Cycle parking occupancy surveys should be undertaken regularly (e.g., quarterly, or bi-annually) at key destinations such as the train station, schools, SETU, supermarkets, and leisure destinations. In addition to counting the total number of parked cycles, cycle parking surveys can also monitor the presence of non-standard cycles which can provide information on how Carlow is becoming more inclusive or accessible to a more diverse group of people (e.g., cycles with child seats or trailers).
- Data on the use of public transport for travel to and from the study area, as well as within the study area, should be requested from the NTA on an annual basis, if possible, in order to monitor the increase in passenger numbers over time.
- Car parking occupancy and duration data should be analysed to understand the impact of the measures contained within the LTP. Initially, data may be obtained from manual surveys but over time more data may be collected automatically as additional technologies are deployed to manage parking availability and information.
- Collision statistics should be monitored as they become available to identify road safety issues which could potentially be remedied through the delivery of measures in the LTP or other measures not included in the LTP and assess whether there are any collision trends which could be observed.

7.2 Review Process for the ABTA

It is proposed that the LTP is reviewed every 5 years as part of the revision and update of the Carlow Graiguecullen Joint Local Area Plan. If the LAP is not reviewed every five years, then the LTP can be reviewed independently, considering the progress reports mentioned in the previous section and the changing policy or infrastructure context. The review should amend and update the LTP as required to ensure it is still a relevant document which can inform Carlow Graiguecullen transport and development decisions.

Appendix A Baseline Report