Appendix IV
Local Transport Plan

Carlow Graiguecullen Local Transport Plan

Carlow County Council

May 2024

Delivering a better world
Delivering a better world

Prepared for:

Carlow County Council and 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.

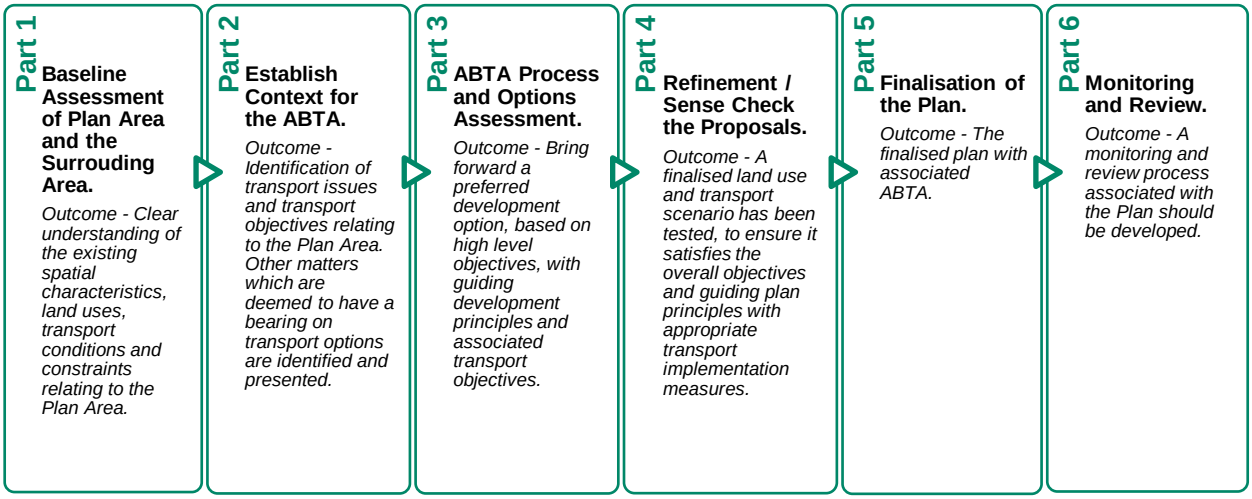
1.2 Area Based Transport Assessments

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.
- **Part 5**: Finalisation of the ABTA – this chapter presents the final strategies for each mode of transport.
- **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 s tudy 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.

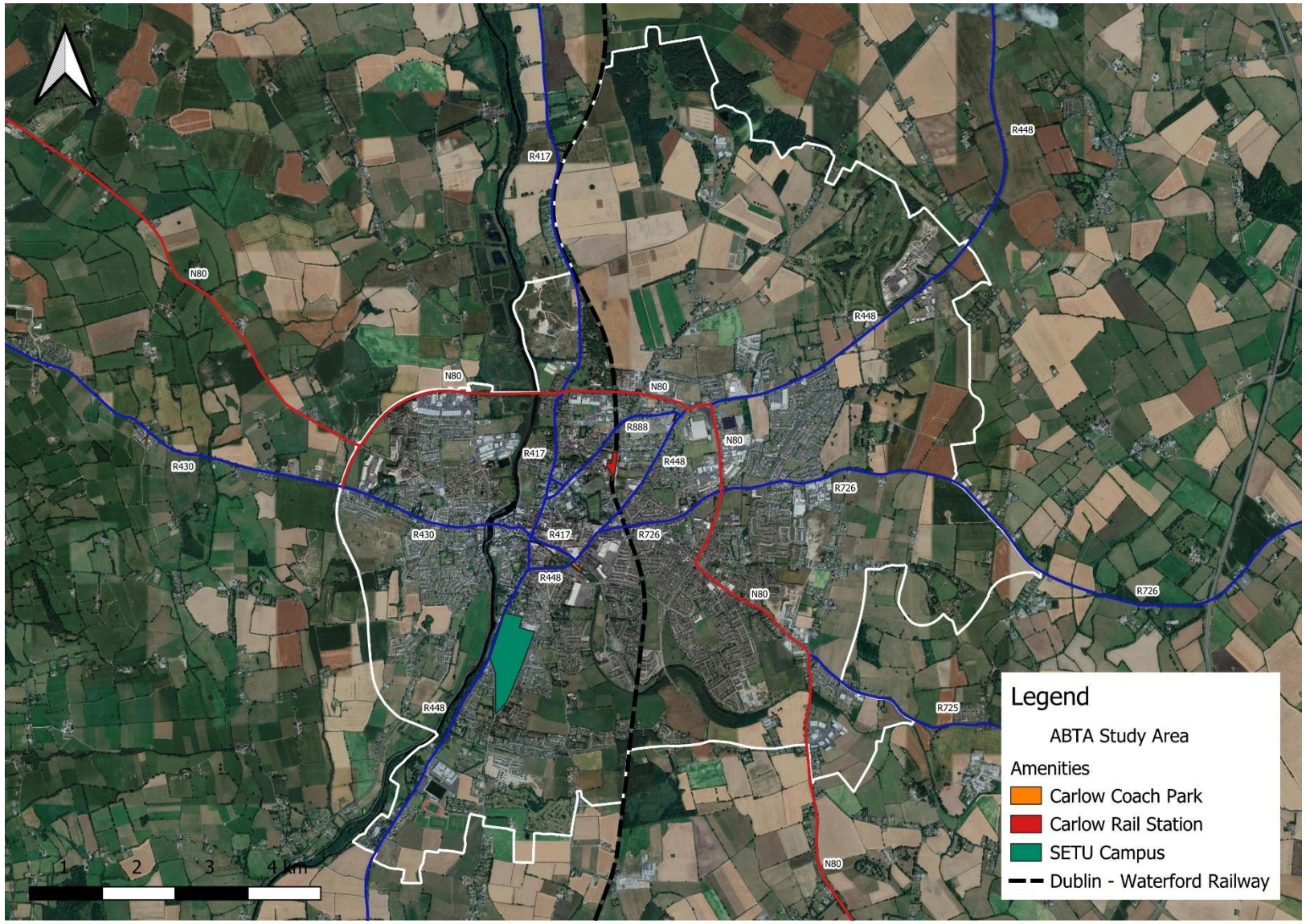
The population of the study area is 24,272 according to 2016 Census data, making Carlow the 13th largest town in Ireland. The 2022 Census is now complete; however, only county level population data was available at the time of reporting. The County Carlow population has increased 9% between 2016 and 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

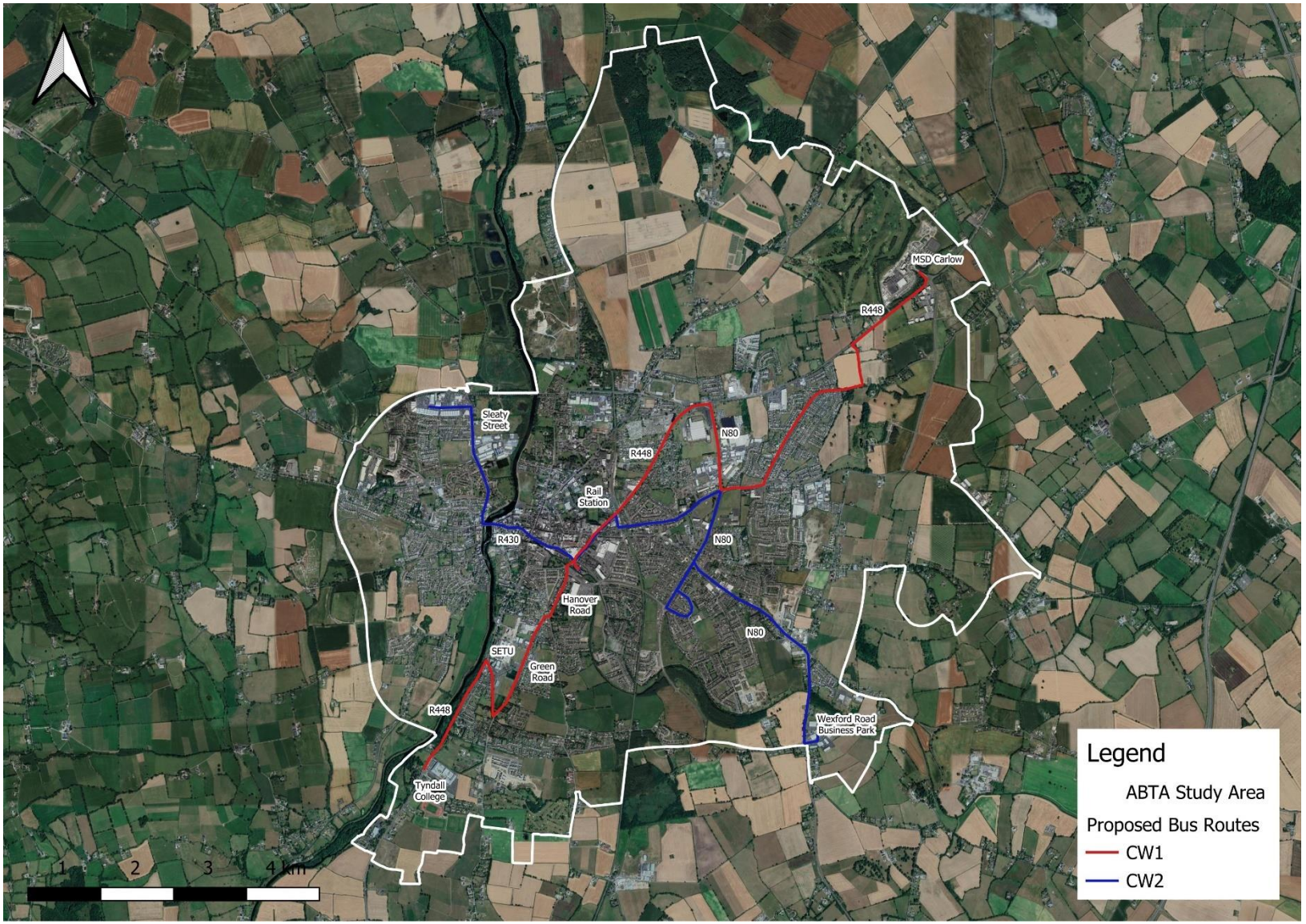
Numerous bus services run through Carlow, with both local and national destinations. However, these services are often infrequent and mean that journeys need to be planned in advance.

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 points are summarised 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.
- Ensure the needs of mobility-impaired and disabled drivers are considered in the design and implementation of transport schemes.

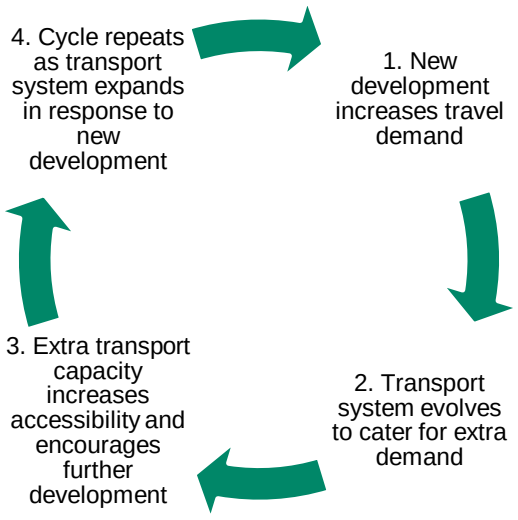
3.1.2 Future Population and Job Growth in Carlow Town

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

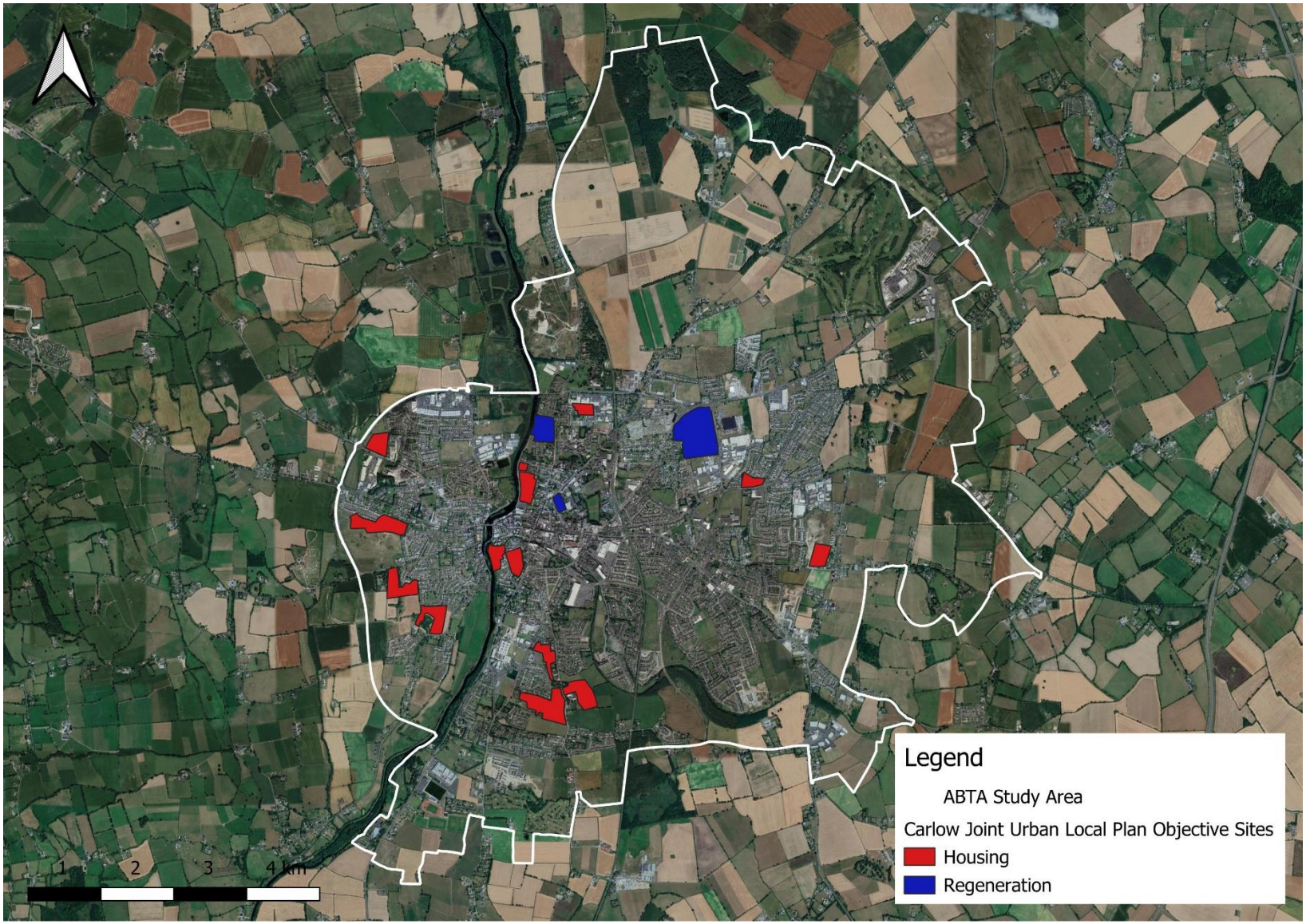


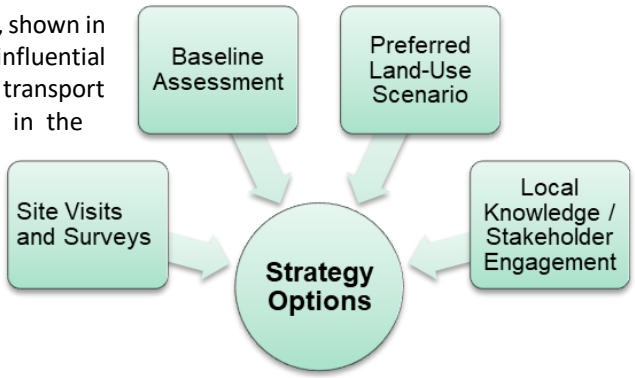
Figure 7. Sites Under Construction and Live Planning Applications

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

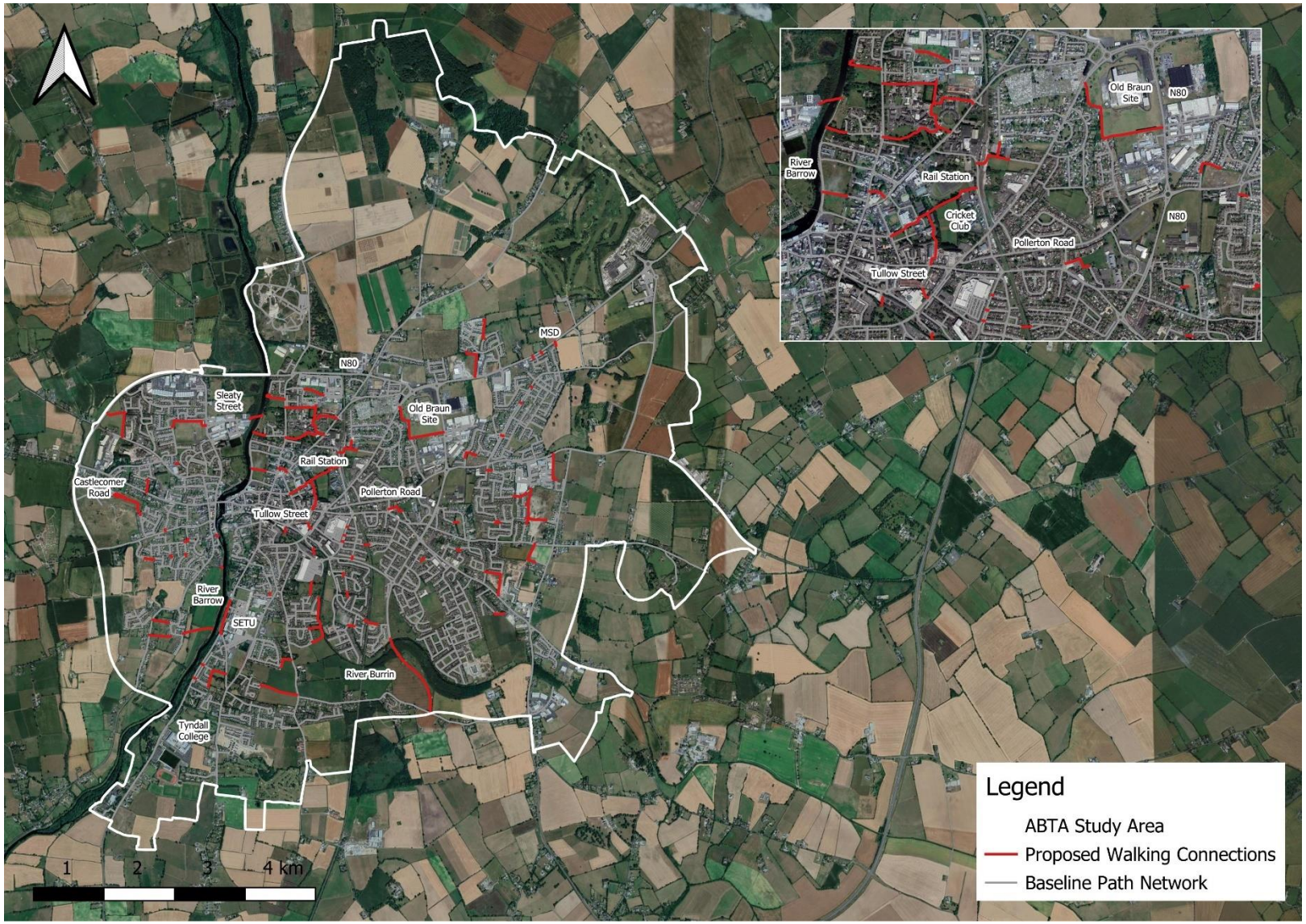
As mentioned, the walking strategy seeks to create convenient and efficient routes between homes and key trip attractors and reduce walking distances through enhanced permeability. This would give active modes of travel a competitive advantage over private cars. The strategy seeks to also facilitate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

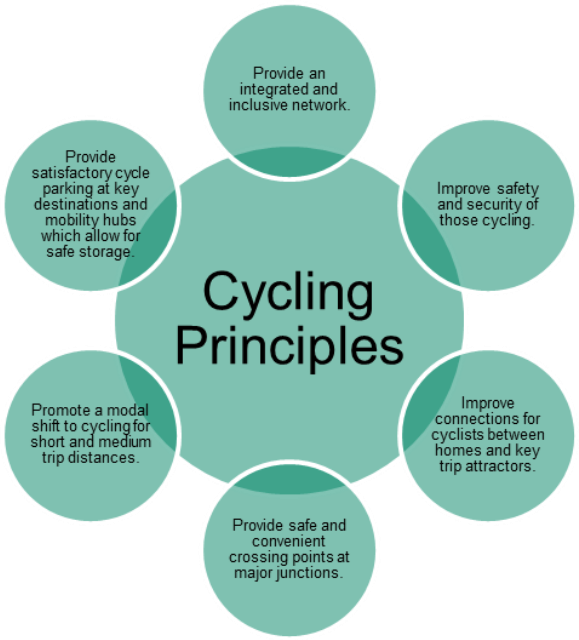
As demonstrated in the walking network map above, the new permeability proposals include a new active travel bridge crossing the River Barrow. Provision of this bridge to the south of the study area could remove a major permeability barrier and allow easier movement, for pedestrians and cyclists, between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

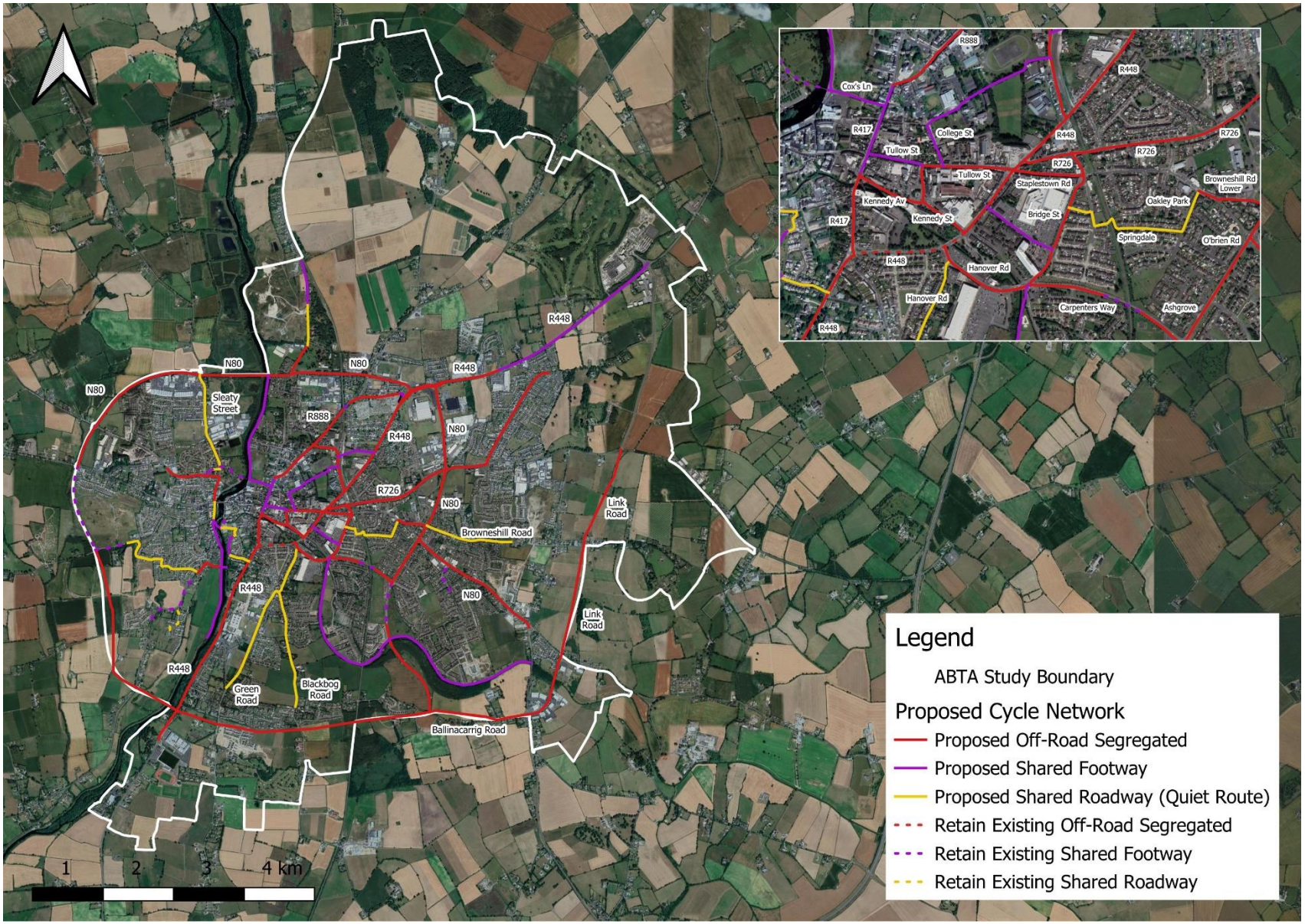
Options have been developed building upon the existing cycle connections in Carlow Graiguecullen and also to provide cycling connections between residential areas and key amenities. The starting point for the option development proposals was the national Cycle Connects strategy, which was a desktop study 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. A map of proposed cycling parking locations is included in the figure overleaf.
- 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. Cycle Parking Locations

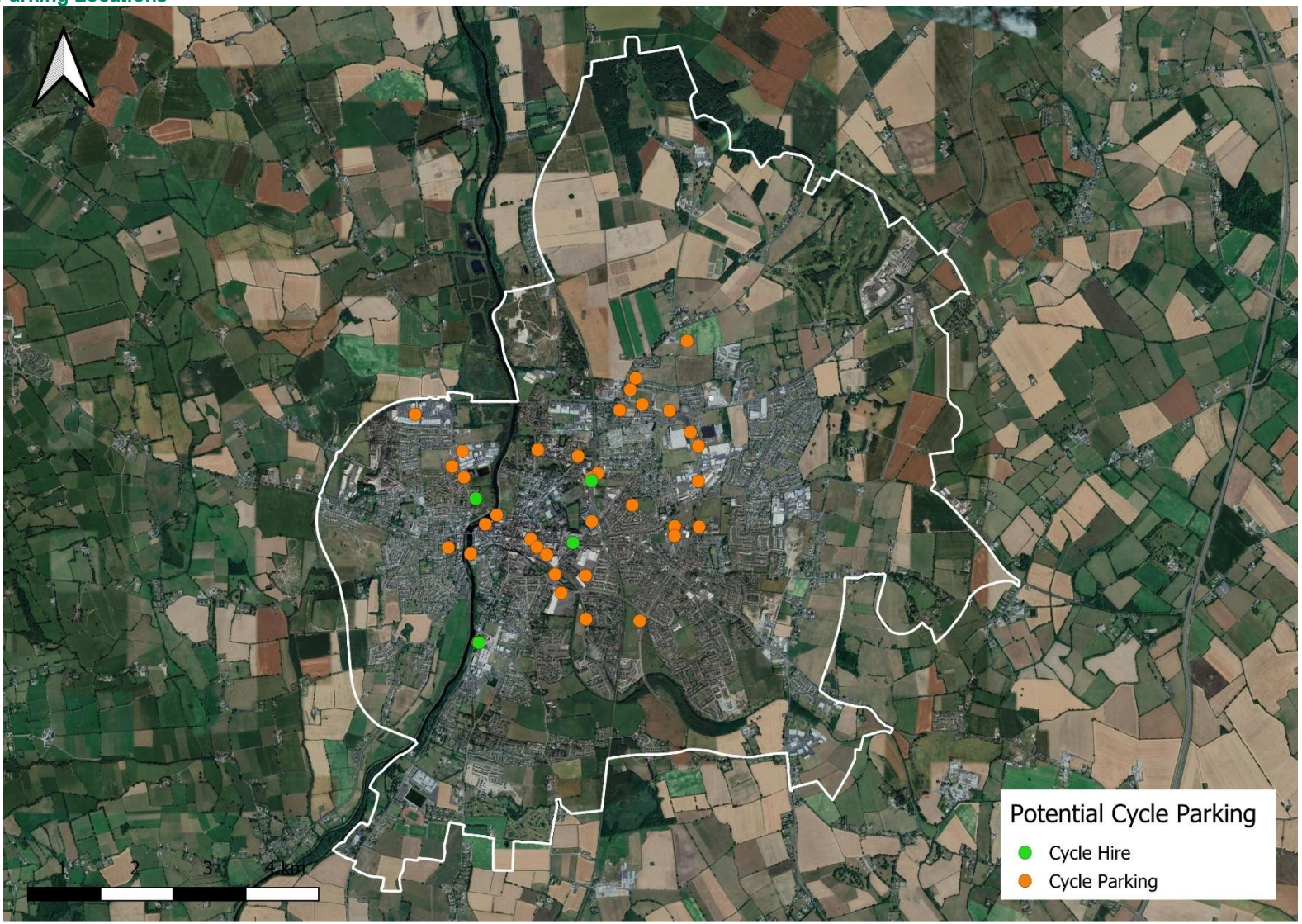
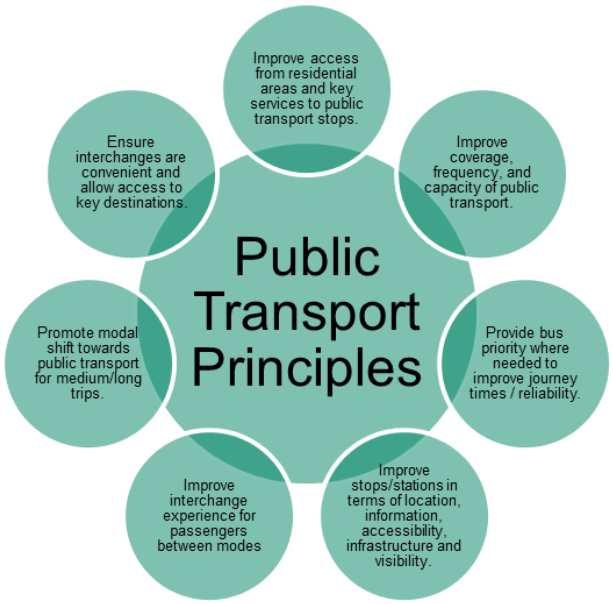


Figure 15. Public Transport Principles



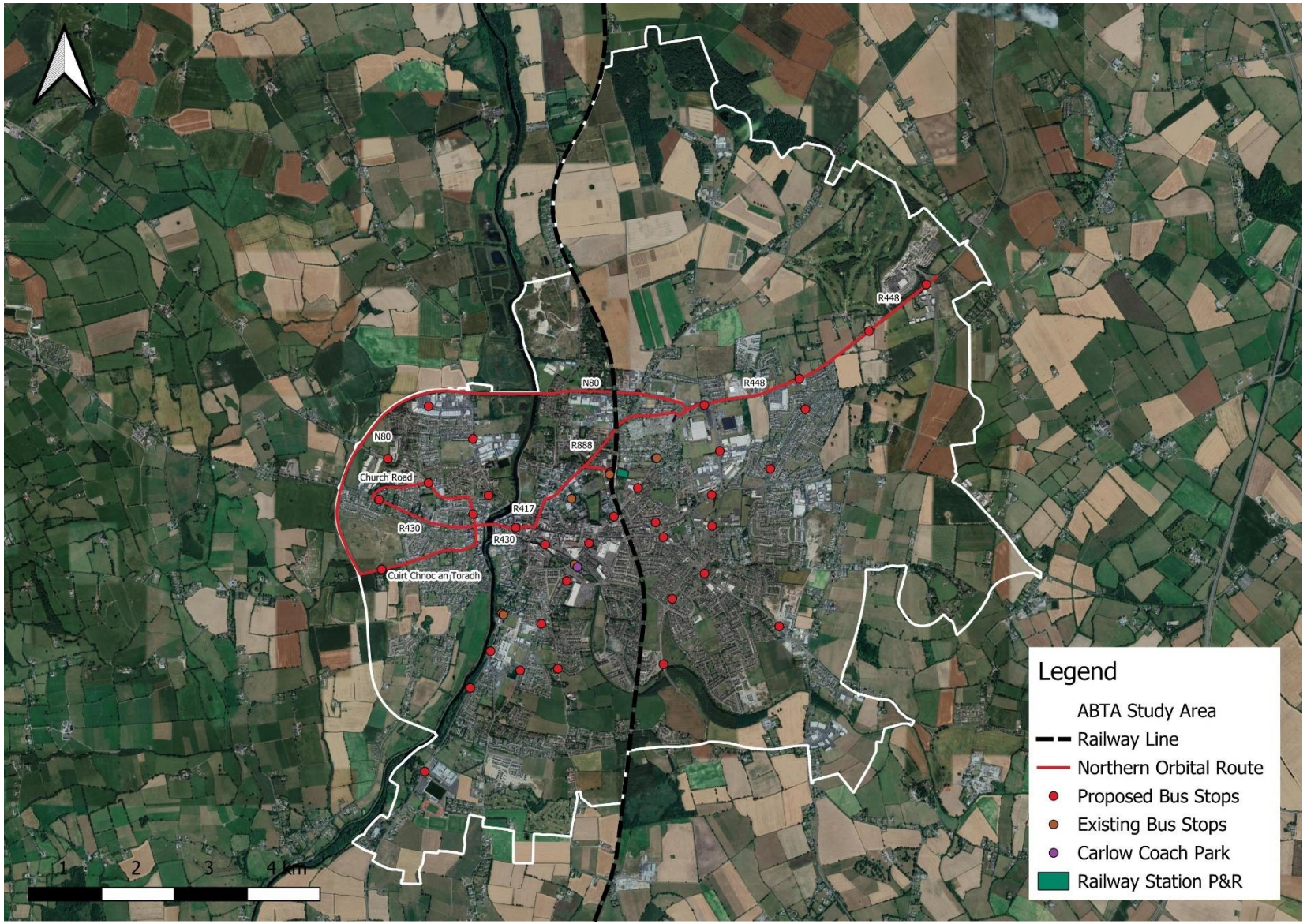
The public transport option development is different for bus and rail.

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 16. 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 17. 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.

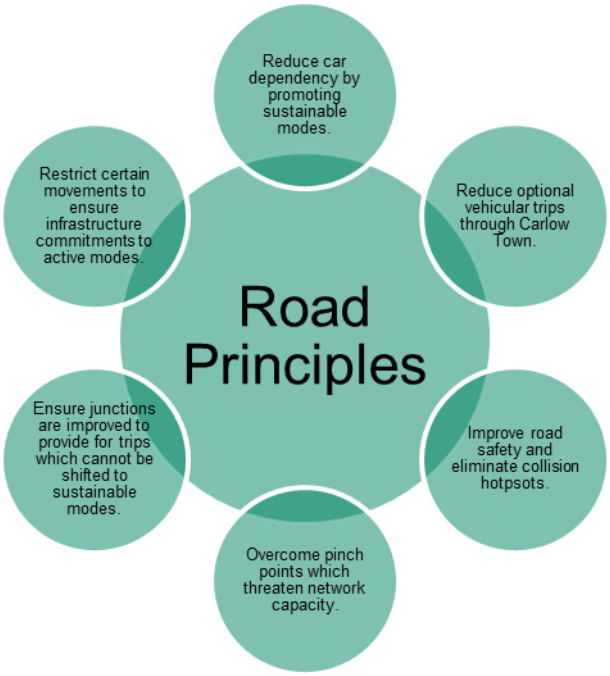
- **Flexible and affordable ticketing** – CCC and LCC will endeavour to work with the necessary parties to provide tickets for public transport services which are flexible and affordable. Improving flexibility could allow individuals to buy a single ticket that would cover multiple bus routes or multiple 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 and any changes which impact on the operation of the N80 must be developed in full collaboration with TII. 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 18. Road Principles



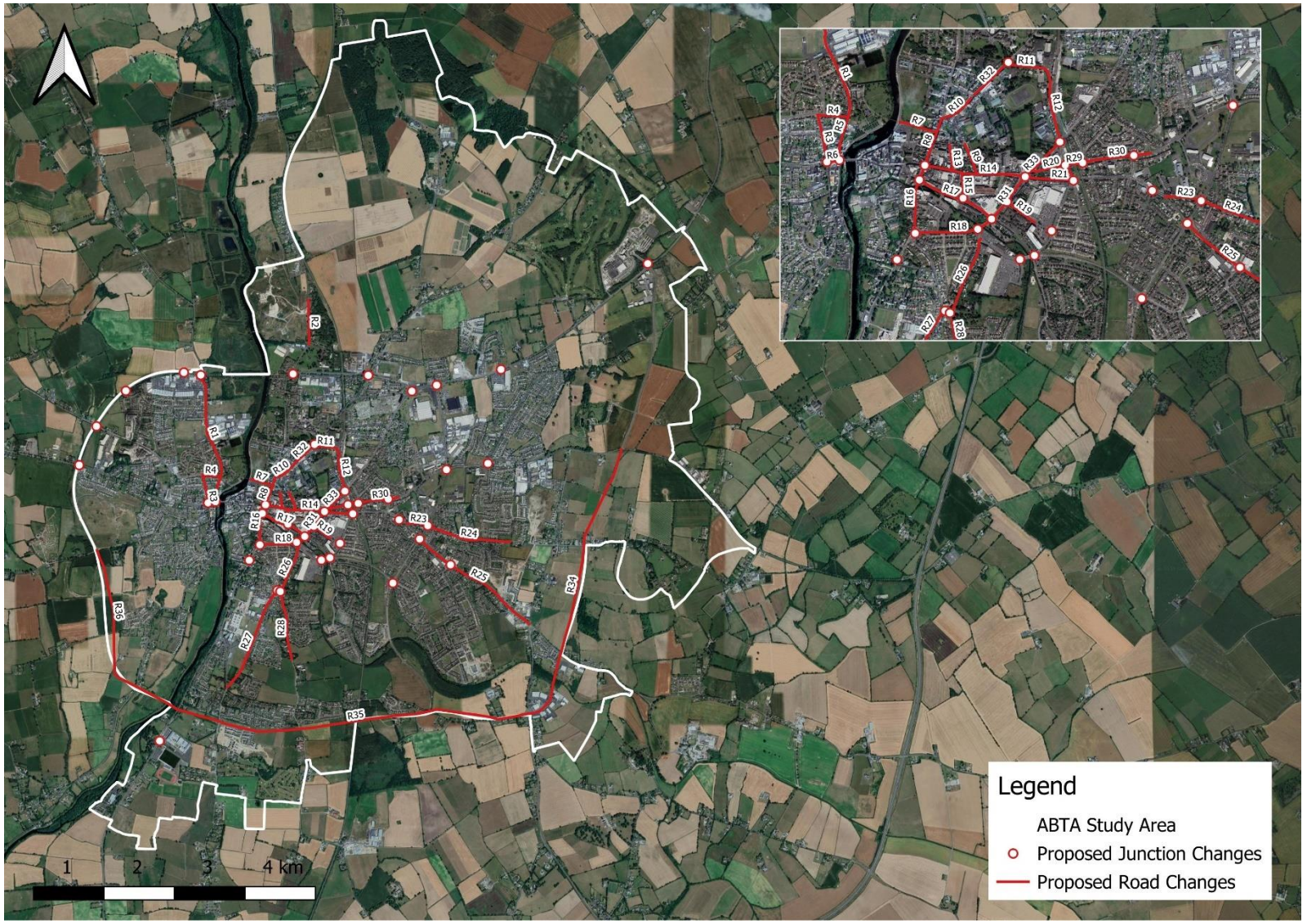
Road options have been split into two categories; changes to the road layout or changes to junctions. In a number of locations, there are a subset of options, whereby a number of different measures could be implemented to achieve the same outcome.

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 19. 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 19**.

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) have 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 20. 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 study area boundary change is small and is not expected to have any significant impact on the ATOS assessment conclusions.

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

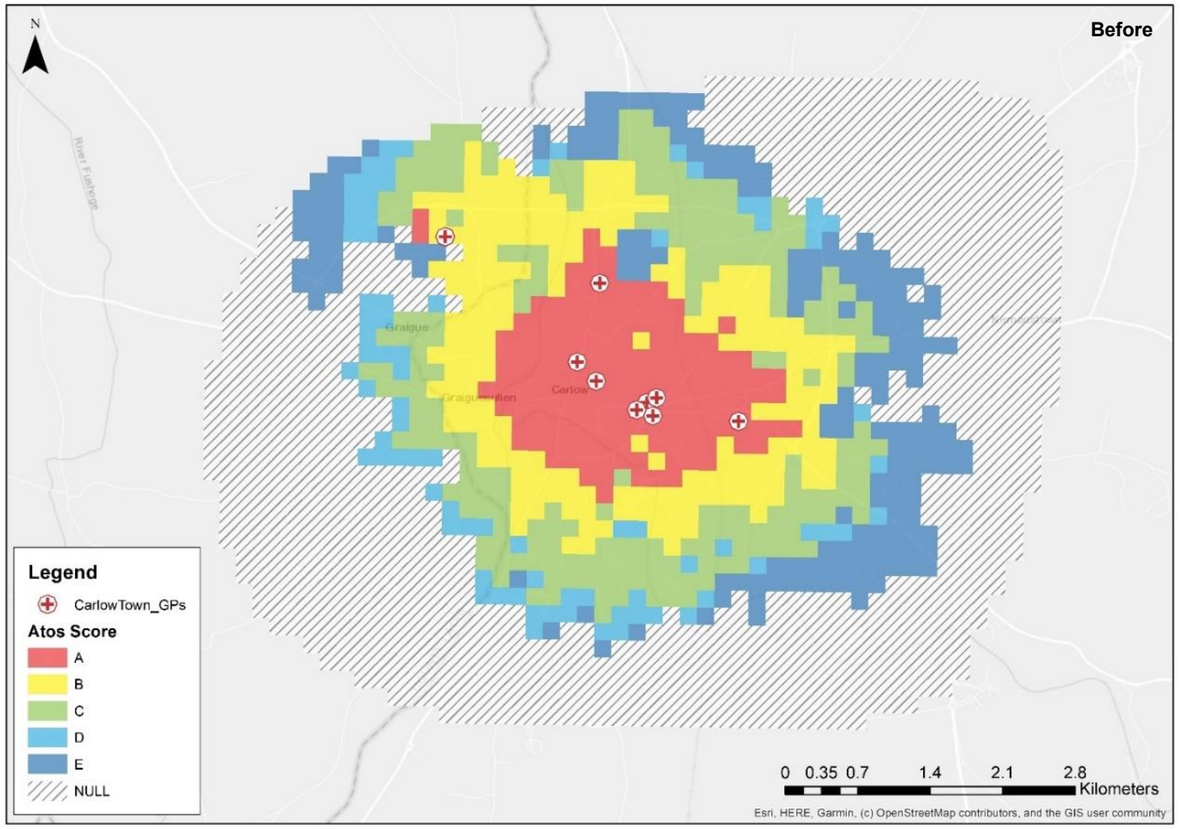
	Existing Path Network		Future Path Network		Difference	
	% with 2 within 20-minute walk	% with 1 within 20-minute walk	% with 2 within 20-minute walk	% with 1 within 20-minute walk	% with 2 within 20-minute walk	% with 1 within 20-minute walk
GP	39	52	41	54	2	2
Parks	N/A	69	N/A	74	N/A	5
Post-Primary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

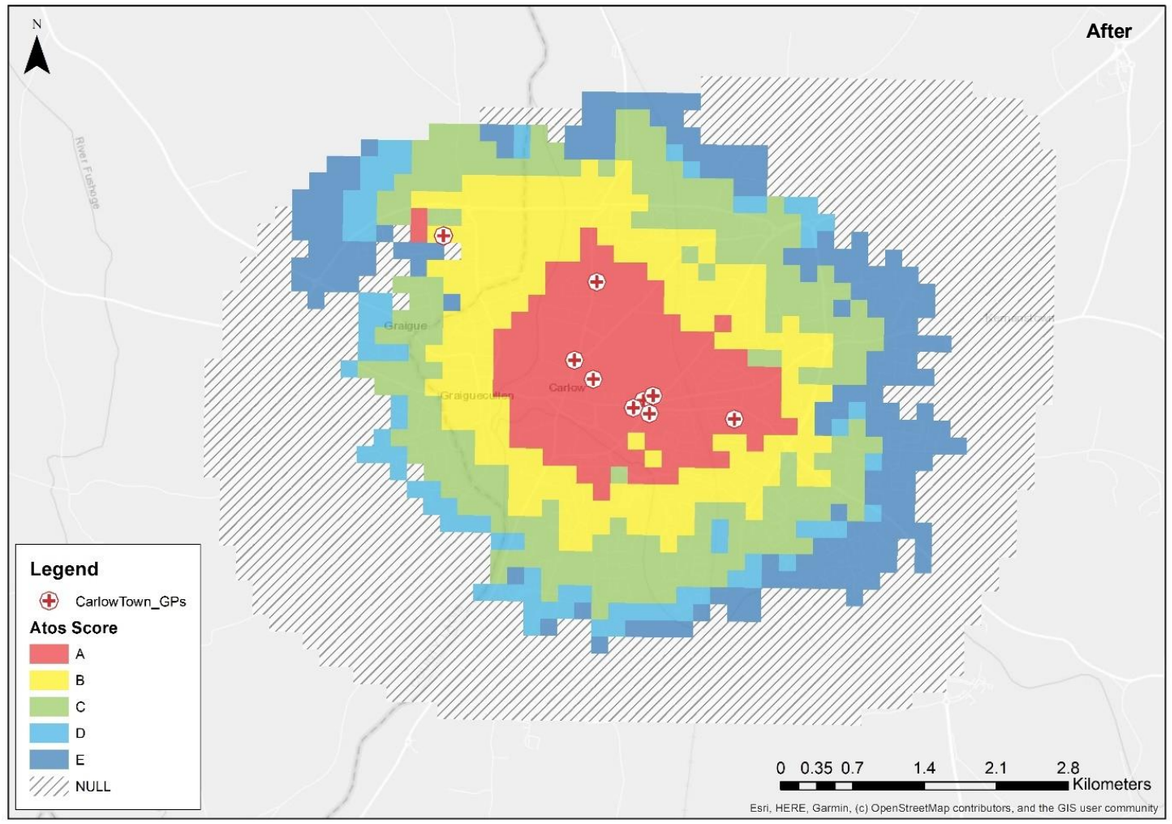
Overall, the implementation of the walking strategy will improve access to key services and facilities across Carlow Graiguecullen. This is summarised in more detail in the following text.

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 21. GPs Accessibility Based on Future Path Network

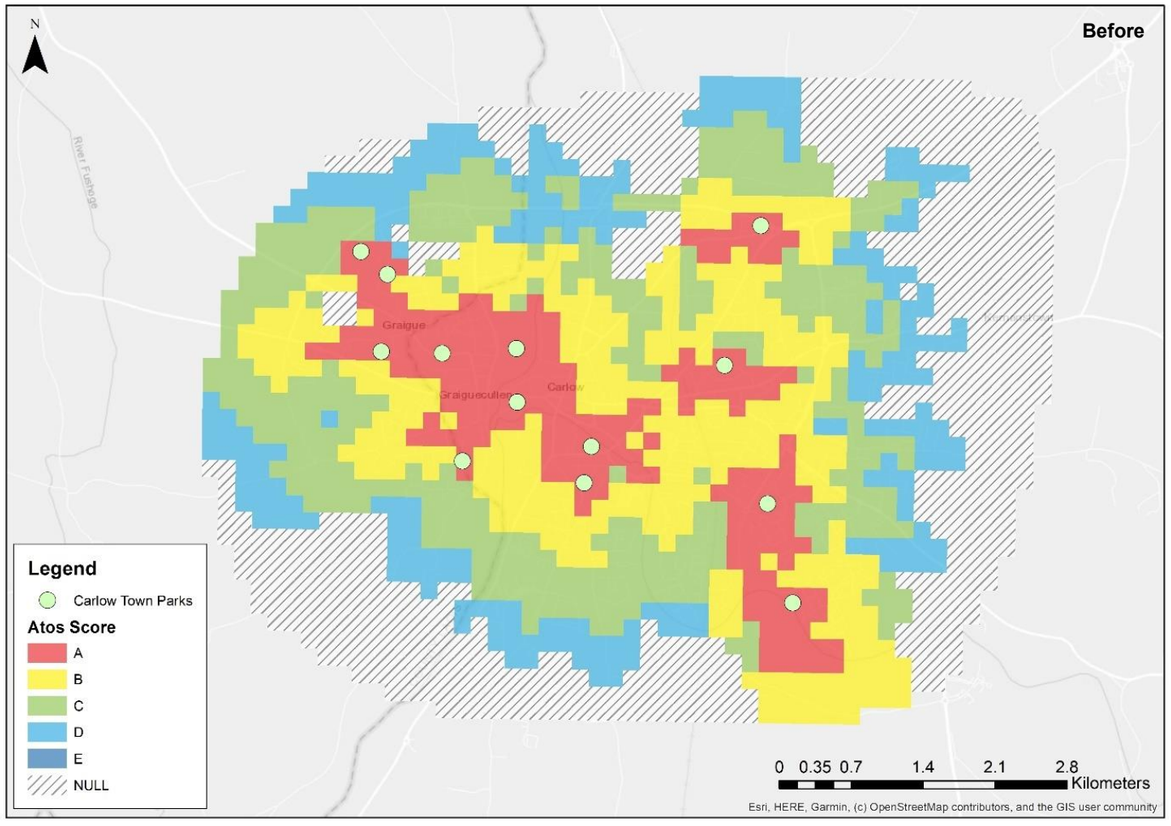


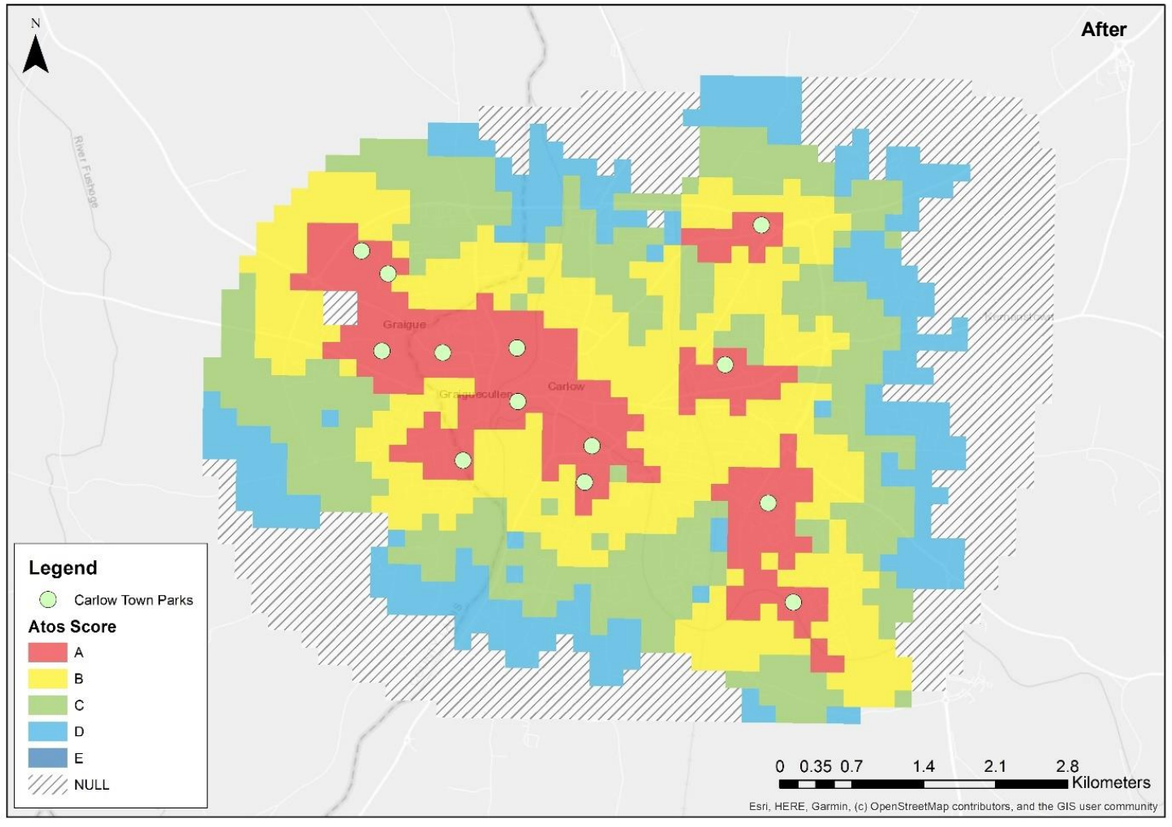


4.2.1.2 Impact on Parks and Open Spaces

Figure 22 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 22. Park and Open Space Accessibility Based on Future Path Network



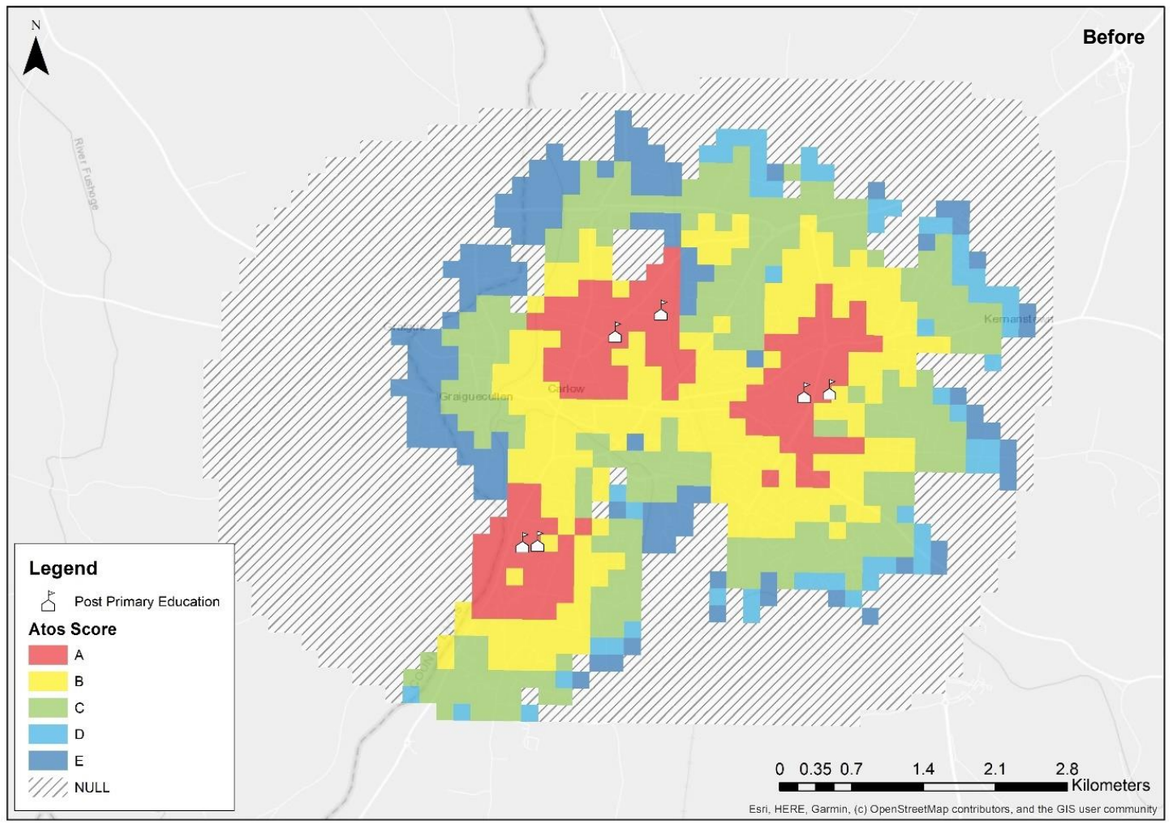


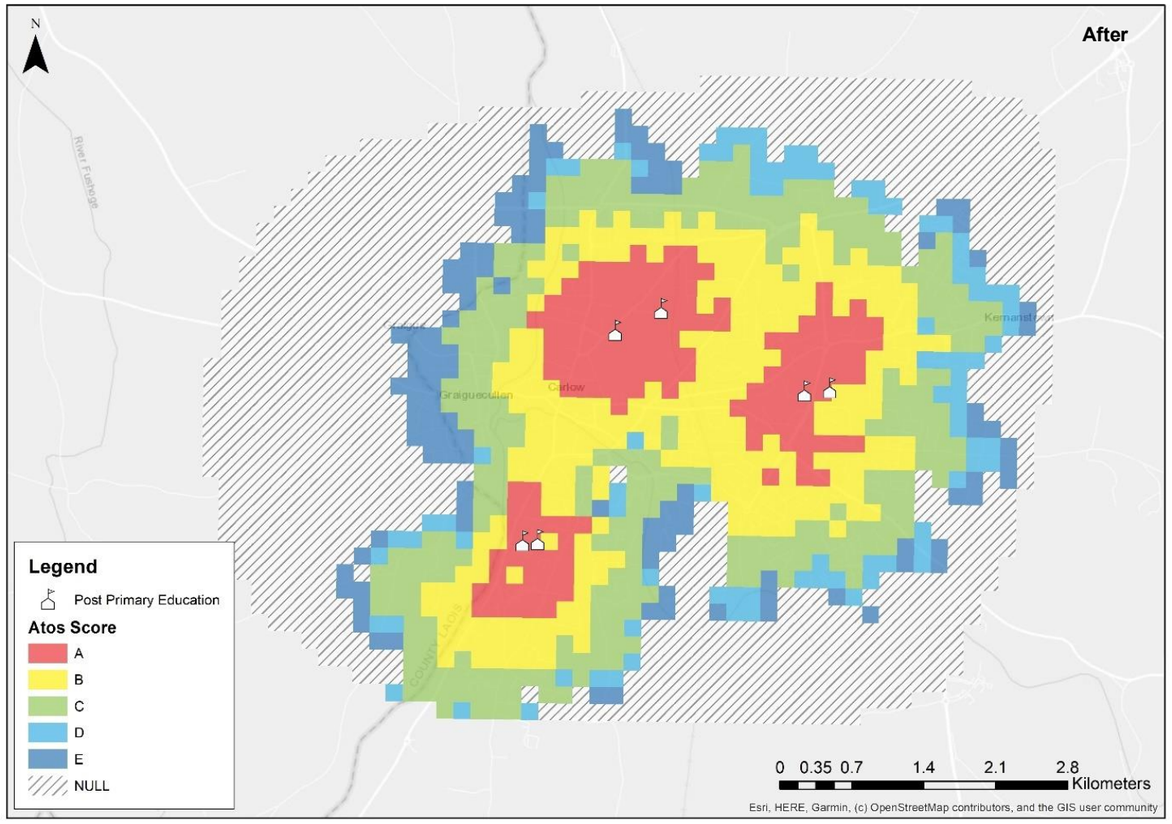
4.2.1.3 Impact on Post-Primary Education Facilities

Figure 23 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 23. Post-Primary Education Accessibility Based on Future Path Network

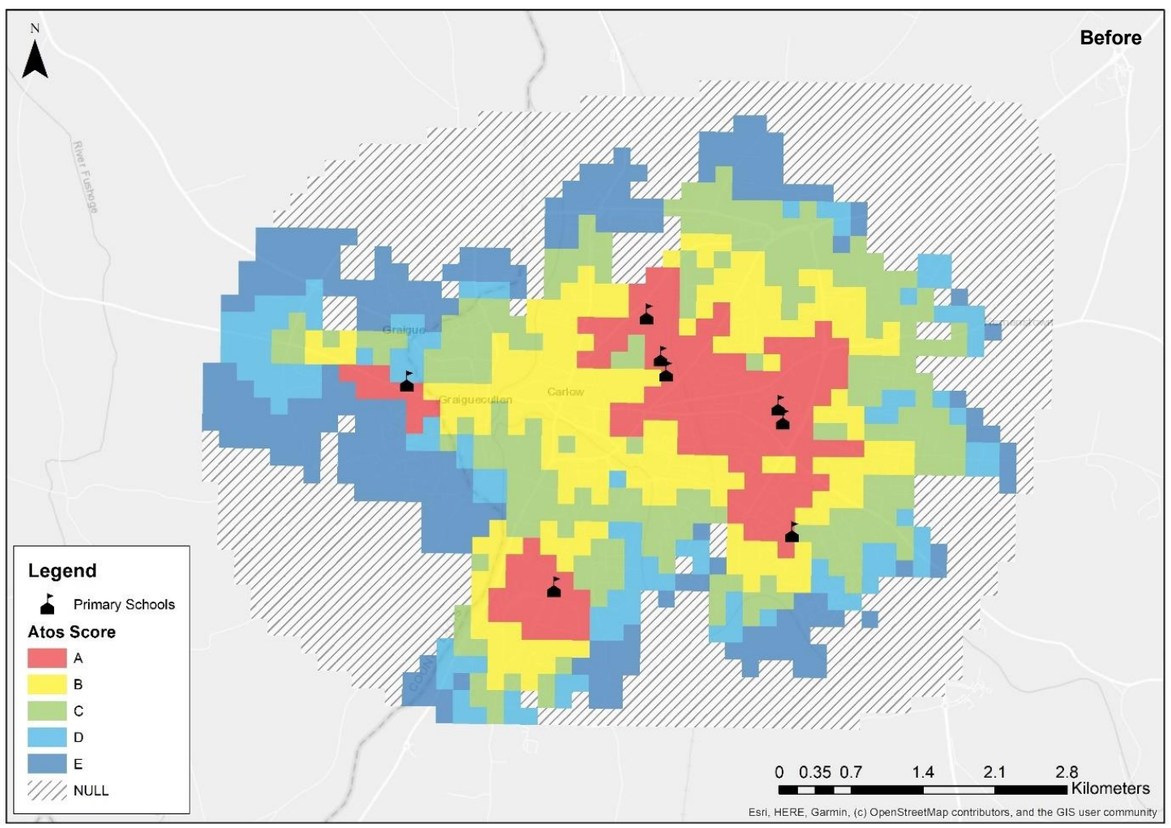


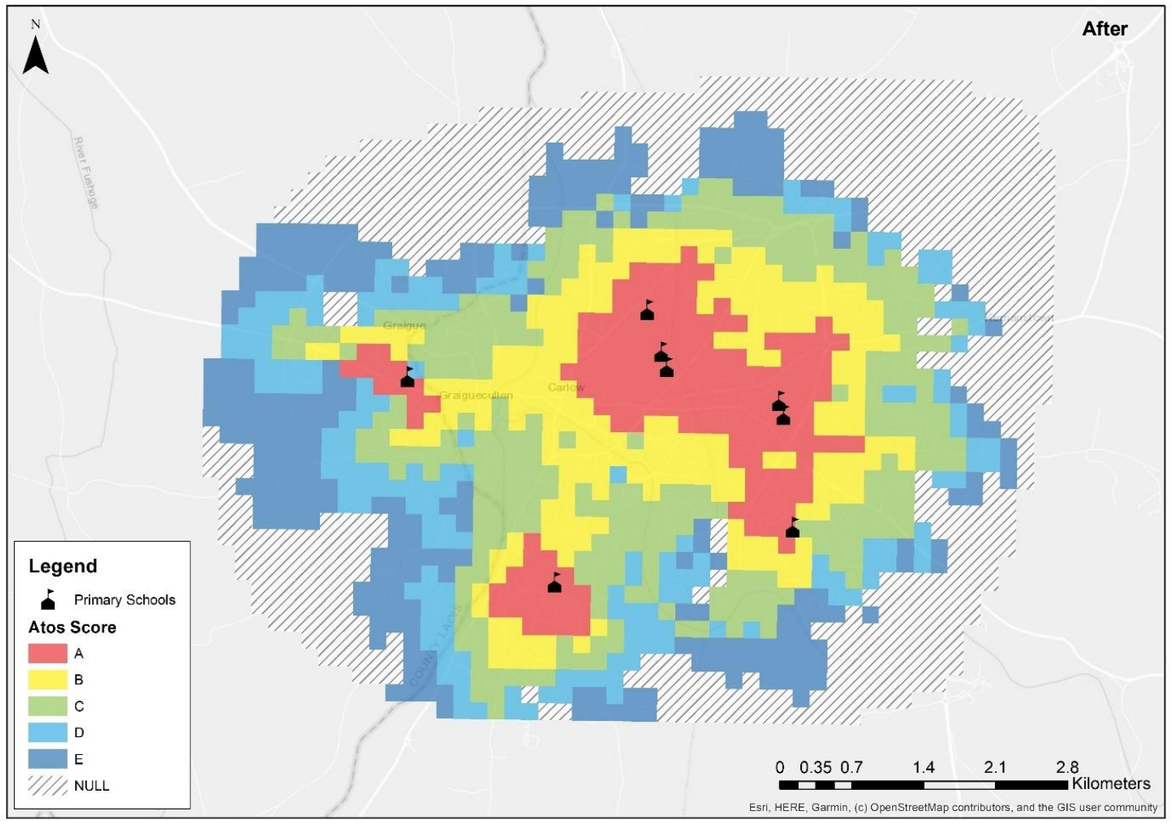


4.2.1.4 Impact on Primary Schools

Figure 24 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 24. Primary School Accessibility Based on Future Path Network

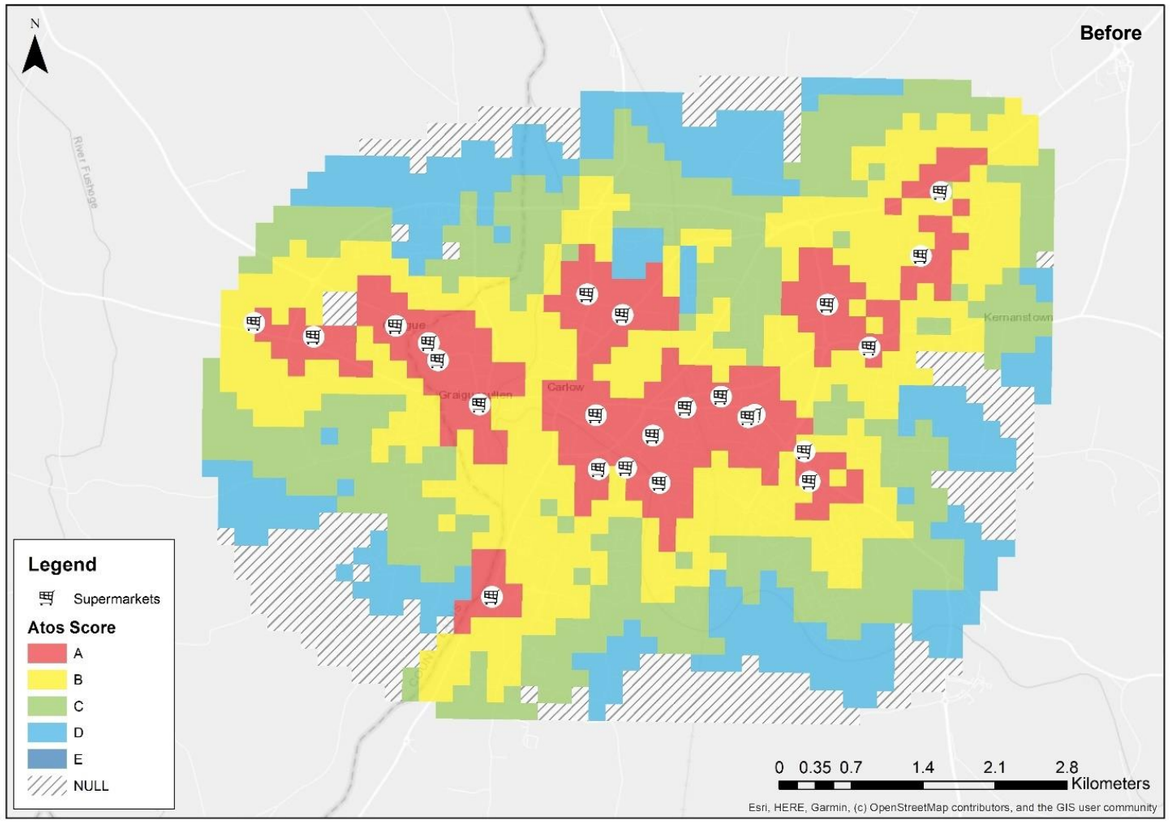


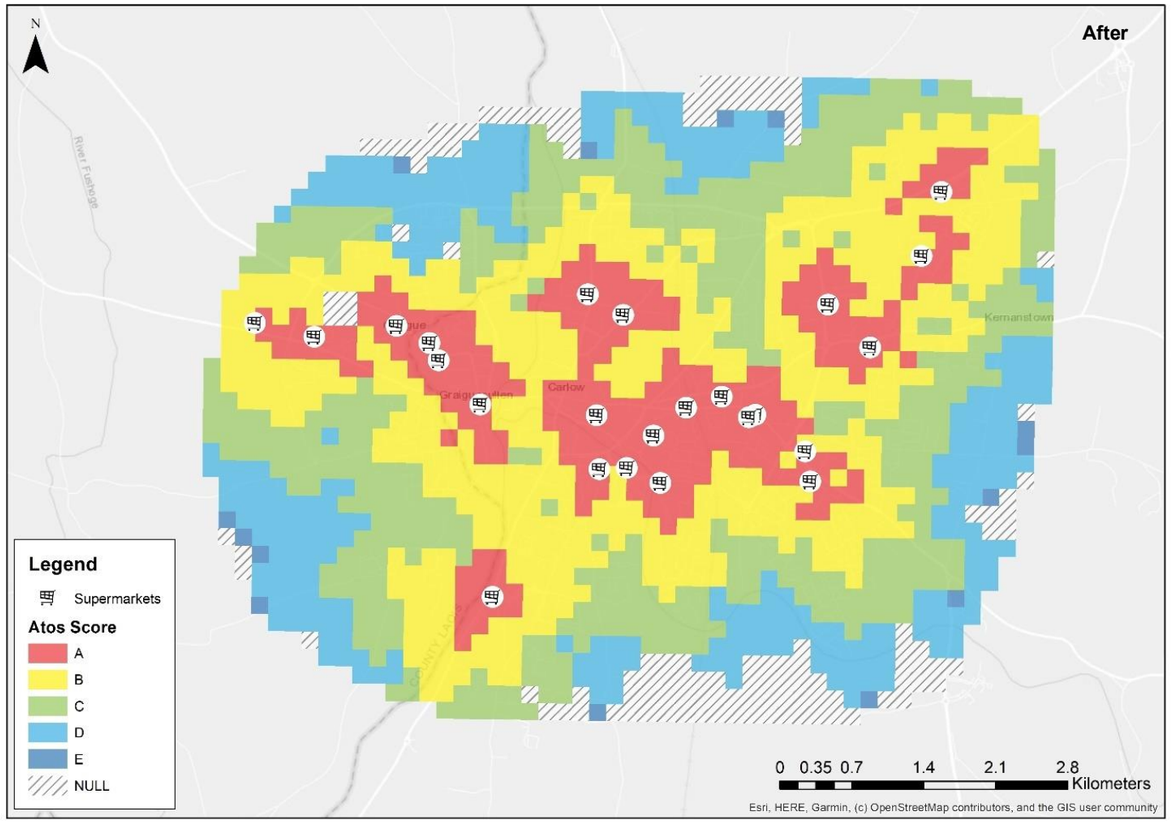


4.2.1.5 Impact on Supermarkets

Figure 25 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 25. Supermarket Accessibility Based on Future Path Network

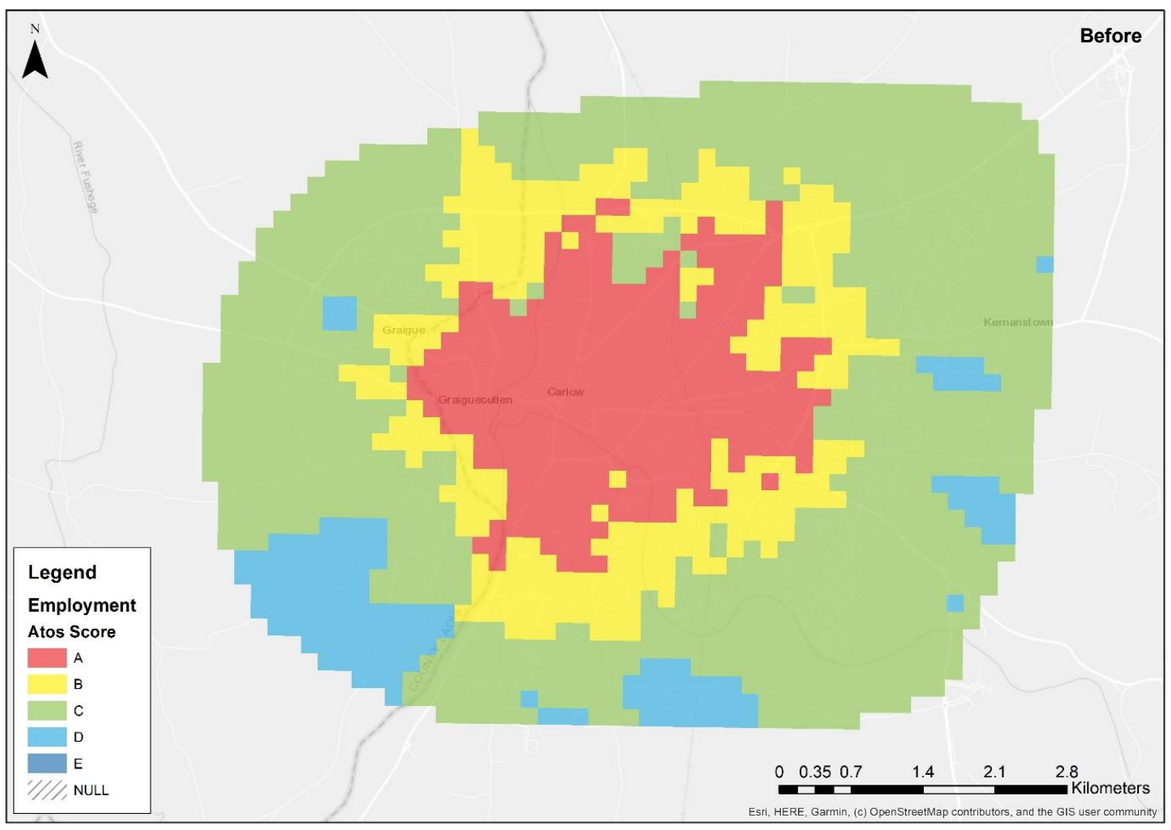


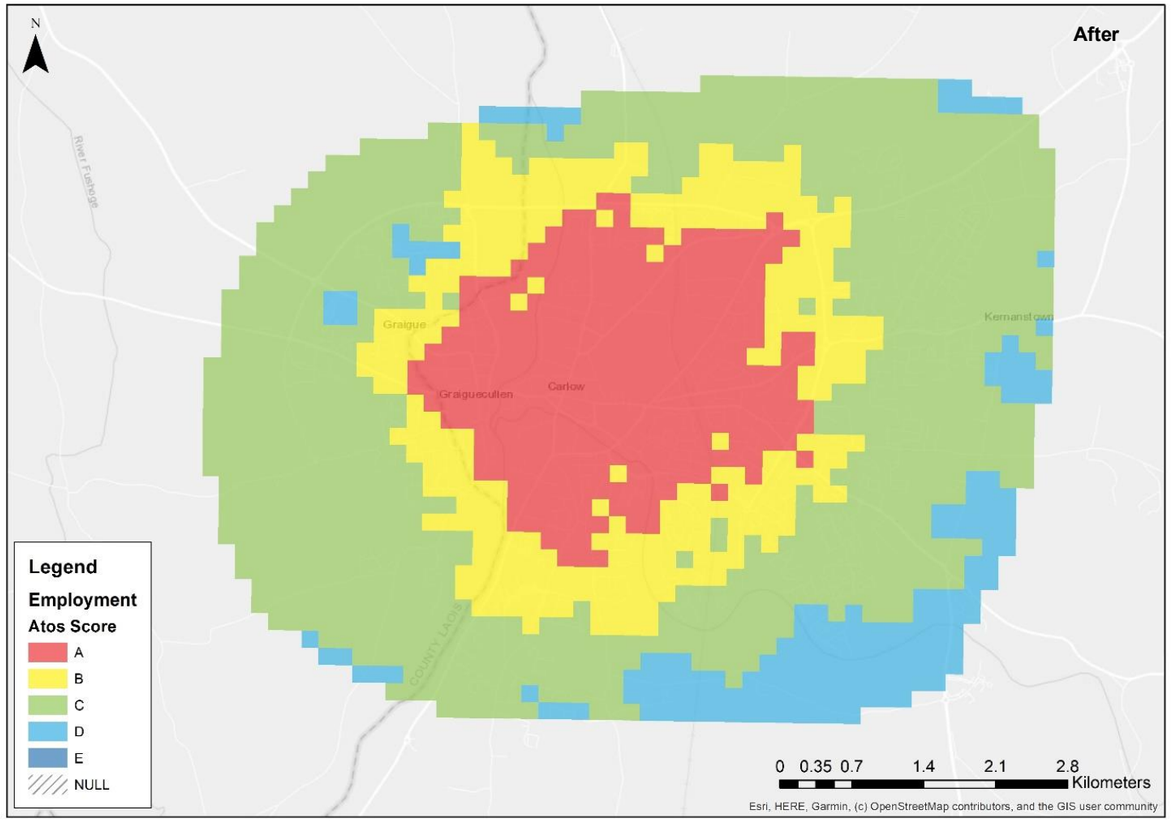


4.2.1.6 Impact on Employment

Figure 26 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 26. 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.

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 19.** 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. As designs for each junction improvement are taken forward, a full assessment of the impact of the changes will be undertaken and consultation and engagement with key stakeholders will be carried out. Where junction changes are proposed along the N80, these proposals will be developed in full collaboration with TII to ensure the function of the N80 is protected.

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. Active travel infrastructure will also be incorporated into the design of the Southern Relief Road.

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

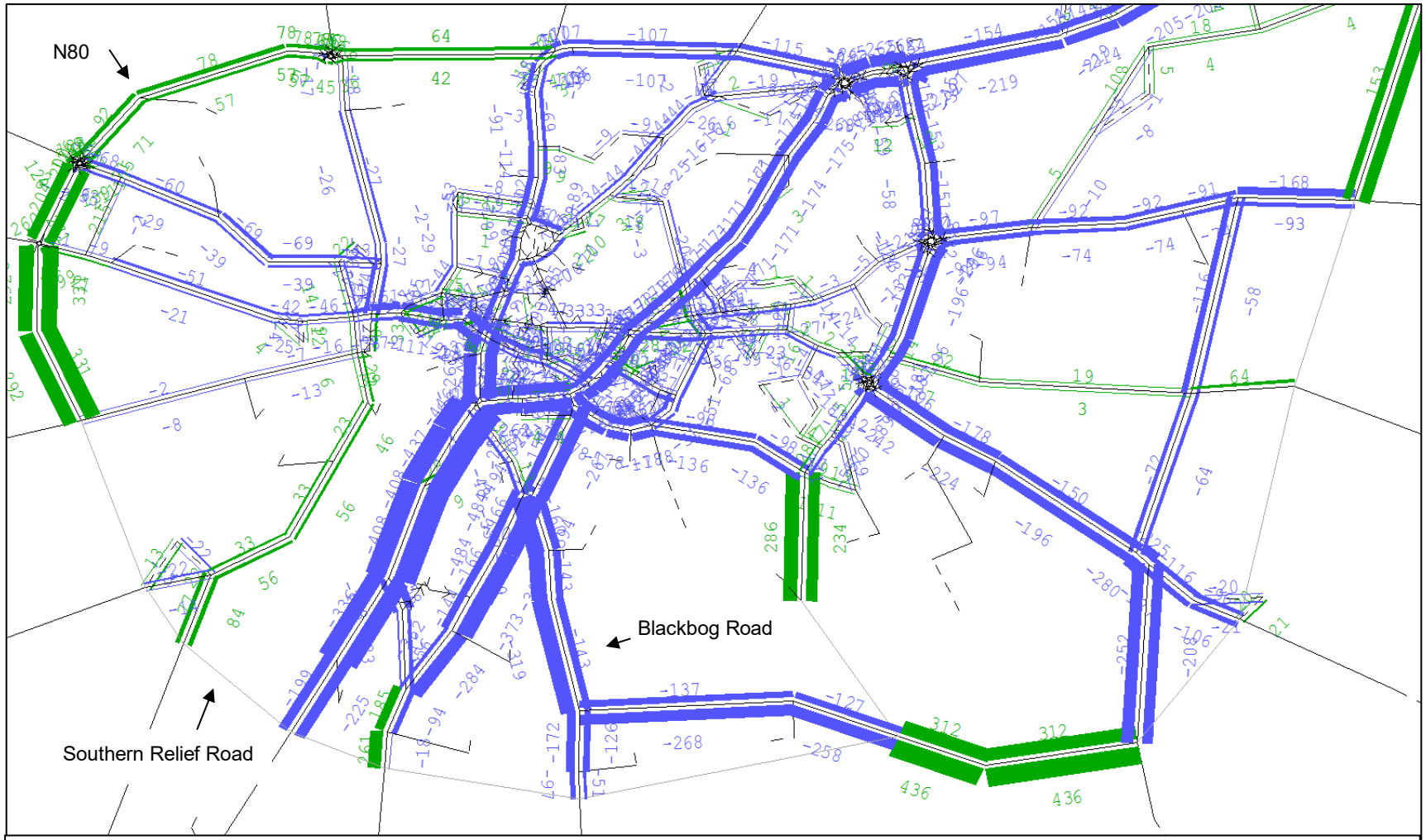
The outputs from the traffic model show that with the proposed Southern Relief Road, there is an increase in vehicle kilometres travelled across the highway network. This is due to drivers being willing to travel longer distances to benefit from the increase in highway capacity that the relief road offers.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

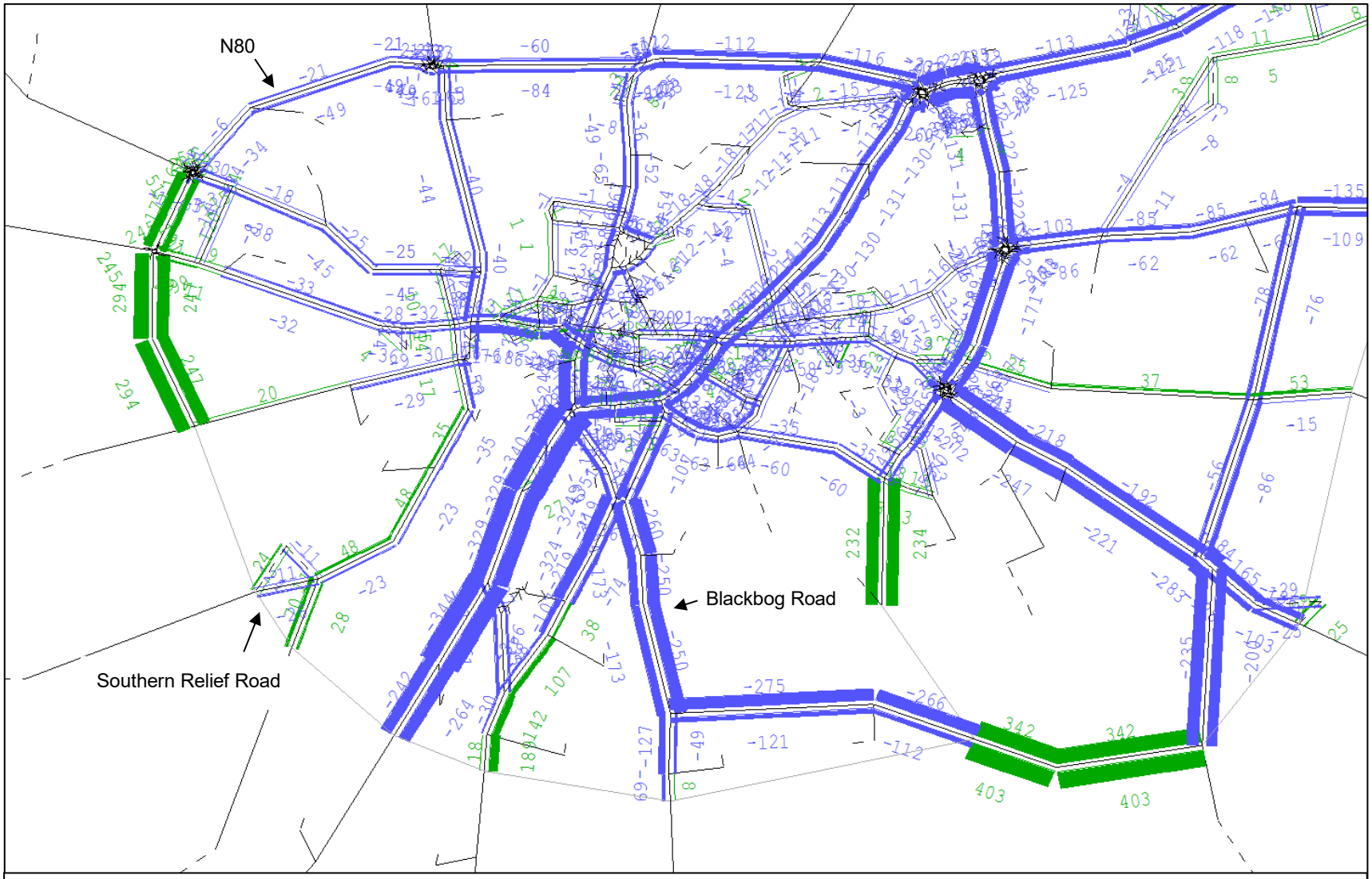
Although the traffic model shows overall benefits to highway users from the relief road, this is across the network as a whole, with trips into/out of the town centre taking longer than currently due to the new road layouts proposed within this LTP.

Figure 27. 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 28. 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										
Ensure the needs of Mobility-Impaired and Disabled drivers are considered in the design and implementation of transport schemes.										

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, although Carlow County Council will continue to engage with SETU to ensure a mobility management plan for the campus is developed. Any further development of the campus will be contingent on this being available and accepted.

To improve on parking across the town, and to ensure the provision of parking encourages the use of sustainable transport options where it is appropriate to do so, a comprehensive parking strategy will be developed for Carlow town centre in consultation with local stakeholders.

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. The proposals outlined in the previous section were updated following public consultation with the removal of three permeability links to address public and stakeholder concerns; there was general agreement with other proposals outlined in the strategy provided that sufficient engagement takes place during design and implementation. A review of the proposals has therefore been undertaken, with timeframes for possible implementation identified, subject to funding being available.

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. Any proposals which impact on the N80 will be developed in full collaboration with TII.
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-	√	The strategy is based on development proposals set out in the LAP with an iterative approach adopted to identifying development sites which

related growth in transport demand external to the Plan area.		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.

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

Option	Description	Timeframe
Sleaty Street	Proposed Shared Roadway (Quiet Route) Cycle Infrastructure	Short
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

Option	Description	Timeframe
Tullow Street (Potato Market to Dublin Street)	Proposed Shared Footway Cycle Infrastructure	Medium
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

Option	Description	Timeframe
Green land west of Barrowville	Proposed Shared Footway Cycle Infrastructure	Short
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 of the LTP has now taken place. There was general agreement to the proposals outlined in the LTP, provided that sufficient engagement takes place during the design and implementation phases. There were three material amendments in terms of transport options, which all related to permeability links identified as part of the walking strategy. These permeability links, at Highfield/Oak Park Drive, Sandhills and Kearney's Lane have all been removed to address resident concerns.

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

Draft Carlow Graiguecullen Local Transport Plan

Part 1 - Baseline Assessment

Carlow County Council
Laois County Council

November 2022

Delivering a better world

Quality information

Prepared by	Checked by	Verified by	Approved by
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Revision History

Revision	Revision date	Details	Authorized	Name	Position
1	November 2023	Update to boundary and policy	G Paget	G Paget	Associate Director

Distribution List

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Prepared for:

Carlow County Council

Prepared by:

AECOM Limited

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1. Introduction

1.1 Context

AECOM has been appointed by Carlow County Council (CCC), in partnership with Laois County Council, to prepare an Area Based Transport Assessment (ABTA) for the Carlow-Graiguecullen area. This area includes Carlow Town, which lies within County Carlow, as well as Graiguecullen, considered part of the urban footprint of Carlow, but sitting within the County Laois boundary. The Carlow-Graiguecullen ABTA aims to provide long-term transport improvement plans for the study area and ensure there is increased sustainable travel for trips to work and education as well as on business, for social purposes, shopping, and visitor travel. This Baseline Assessment will review relevant policy/strategy, the local urban area, current transport infrastructure and usage, survey data and initial public and stakeholder consultation results. The Assessment will then consider the implications of this data to identify issues across all transport modes; road, parking, rail, bus, cycling and walking. Numerous options for each mode will then be developed based on the conclusions of the Baseline Assessment. These options will then be brought forward for further assessment and to be used in the creation of the draft ABTA.

1.2 Project Background

Carlow Town is the largest urban centre in County Carlow, and the 13th largest town in Ireland, sitting within the South East region of Ireland. Carlow Town is made up of Carlow, which is part of County Carlow as aforementioned, as well as Graiguecullen, which falls into the County Laois boundary. Unlike County Carlow, County Laois is part of the Eastern and Midland region in Ireland.

Carlow sits on the Dublin to Waterford railway line, with the station sitting approximately 1km north-east of the centre. There has been investment in cycling infrastructure in recent years, but provision is currently disjointed and connectivity and general improvements are required in order to reduce barriers to use. In terms of the strategic road network (SRN), the N80 runs around the northern and eastern part of the study area, which then connects to the M9 (Carlow Bypass). Additionally, there are four regional roads which run into/through Carlow town centre. The study area is served by through bus services providing connections to Dublin and major towns around the regions, and a limited local link service. However, bus stops appear infrequent, and the bus/coach station comprises of one bus stand.

There is evidence that many people work relatively close to their residence in the area; however, commuting using private vehicle is still the preferred option in Carlow and Graiguecullen. Across County Carlow, 76% of people use private vehicles for accessing the workplace and for Carlow Town this is 72%, demonstrating the high reliance on the private car.

The population of the town stands at 19,994 according to 2016 Census, meaning roughly 35% of the county population reside in the urban area. With the inclusion of Graiguecullen in the Carlow Town population, the total count is 24,272 according to the 2016 Census. The population has grown consistently since 1996, with County Carlow having the highest percentage of population growth in the entire South East region between 2011 and 2016. However, it should be noted that population growth is not uniform across the county, and population growth has been highest in neighbourhoods nearer to the town centre, whilst the town centre population has shrunk. These factors suggest a process of suburbanisation is occurring.

Traditionally, the economy of Carlow and Graiguecullen was characterised by manufacturing and food manufacturing, utilising the commodities produced in the agricultural hinterland, with a poorly developed service sector. However, like many places in Ireland, when the national economic conditions deteriorated there was growth in unemployment and the loss of major companies like Braun, Lapple and the Irish Sugar Company from the area. A review of the economic performance of the South East region of Ireland, in which County Carlow sits, acknowledged that deficits in skillsets and infrastructure were the main reasoning behind economic underperformance, and many efforts have taken place to correct such deficits and reorientate the economy. Carlow and Graiguecullen now have a diverse economy with many different industries; businesses include multi-national corporations employing hundreds of people as well as small local enterprises tailored to local markets.

Carlow Town is home to the South East Technological University (SETU). This is likely to encourage new prospective students to the area, as well as encouraging school leavers to remain in the town for further study. Overall, there are nearly 11,000 students at SETU, with over 58,000 students graduating since the Institute began in 1970, providing 850 jobs. Carlow Town is identified as the designated regional centre for education, healthcare, shopping, and arts; and therefore, it is a hub for people living across the region and into other regions. In addition to this, there are further attractions in Carlow that provide for residents and generate visitors including VISUAL which hosts a contemporary gallery and performance spaces, the George Bernard Shaw Theatre, County Carlow Museum, Oak Park Forest Park and Barrow Track.

The ABTA aims to provide a multi-modal framework to inform future transport infrastructure planning, investment, and delivery. The ABTA is to be developed alongside the Local Area Plan and reflect the suggestions included. The ABTA is focussed on sustainability, which in practice means it will need to support compact urban growth, encourage a modal shift from car usage to sustainable transport modes, improve access to essential services, workplaces, and education and promote Carlow Town as a core economic and social pillar in the County strengthening Carlow and Graiguecullen position as a 'self-sustaining regional and inter-regional economic driver'.

1.3 Preliminary Aims of the Carlow Graiguecullen Area Based Transport Assessment

The preliminary aims of the ABTA are to achieve the following:

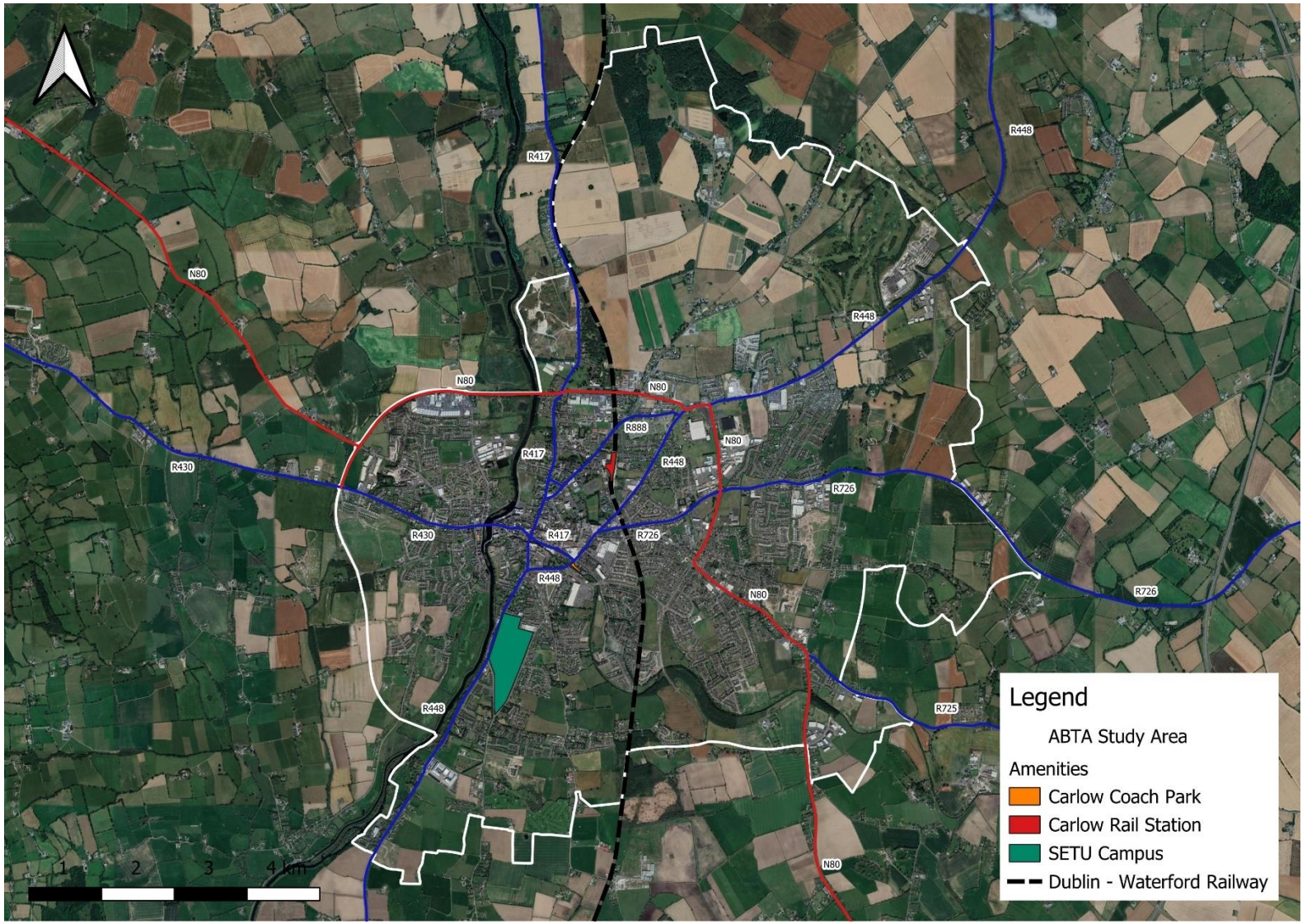
- The ABTA will focus on sustainability by encouraging compact growth and a modal shift away from car transport.
- The ABTA will promote Carlow Town Centre as the core of activity and improve its transport system, making the town centre a more attractive place to live, work, visit, and recreate in.
- The ABTA will examine all transport modes and how they interact in both the town centre and its environs. Focus will be placed on links between residential and employment areas, as well as the town centre, coach park and railway station.
- The ABTA will seek to reduce the number of car-based trips to 45% through a shift to sustainable modes.
- The ABTA will prioritise walking, cycling, and public transport accessibility.
- The ABTA will examine and provide recommendations for: walking, cycling, public transport, parking, and road traffic.

This Baseline Assessment will inform the development of ABTA objectives which will be group by transport mode, including public transport, walking, cycling, road, and parking. The ABTA objectives will be used to assess the options created in the next stage of the ABTA process to resolve the transport issues identified in the Baseline Assessment.

1.4 Study Area

The study area boundary for the Carlow Graiguecullen ABTA is shown in **Figure 1-1**. The study area encompasses Carlow Town, including Graiguecullen.

Figure 1-1: Carlow Graiguecullen ABTA Study Area



1.5 Report Structure

Following this introductory chapter, the ABTA Baseline Assessment is structured as follows:

- **Policy Context** – this section reviews the relevant national, regional, and local planning policy.
- **Study Area Characteristics** – this section reviews key demographic data regarding population change, land-use composition, job density, housing density, deprivation index, environmental constraints, and education facilities to assess the implications for transport and identify issues to resolve in option development.
- **Existing Travel Demand** – this section reviews key transport information regarding the public transport provision, the road network, collisions, modal split, origin-destination of trips, trip length, traffic growth, Strava walking and cycling data and permeability.
- **Transport Infrastructure and Services** – this section outlines the transport infrastructure, which currently serves Carlow and Graiguecullen.
- **Physical Constraints**– this section summarises some of the physical constraints within the study area, which will impact on land use and transport planning.
- **Future Context** – this section outlines some of the future developments proposed, which will have consequences for transport provision.
- **Conclusion and Next Steps** – this section concludes on the key outcomes of the Baseline Assessment in a Strengths, Weaknesses, Opportunities, Threats (SWOT) diagram and outlines the next steps in the ABTA process.

2. Policy Context

This section reviews relevant national, regional, and local policy documents to highlight transport proposals or planned infrastructure which will affect the Carlow-Graiguecullen ABTA study area.

2.1 National Policy

2.1.1 'Project Ireland 2040' – National Planning Framework

Project Ireland 2040 is the National Planning Framework (NPF) for Ireland and provides high-level strategic plans to shape planning policy as well as future growth and development which occurs in Ireland up to 2040. The NPF states it aims to avoid the 'mistakes' of previous planning policy, policy which led to urban sprawl, unbalanced regional development, and increasing car dependency, by ensuring investment is very closely aligned with the overarching principles outlined in the NPF.

The NPF is based on ten 'National Strategic Outcomes' (NSO), which are an expression of the shared national goals/benefits the NPF aims to strive towards. These NSOs are listed below:

- Compact growth
- Enhanced Regional Accessibility
- Strengthened Rural Economies and Communities
- Sustainable Mobility
- A Strong Economy supported by Enterprise, Innovation, and Skills
- High-Quality International Connectivity
- Enhanced Amenity and Heritage
- Transition to a Low Carbon and Climate Resilient Society
- Sustainable Management of Water, Waste, and other Environmental Resources
- Access to Quality Childcare, Education, and Health Services

The NPF also outlines 'National Policy Objectives', which provide more specific details on the actions and investments necessary to achieve the NSO. Several of these objectives are highly relevant to this work, these include:

- ***Objective 4*** - "Ensure the creation of attractive, liveable, well designed, high quality urban places that are home to diverse and integrated communities that enjoy a high quality of life and well-being."
- ***Objective 5*** - "Develop cities and towns of sufficient scale and quality to compete internationally and to be drivers of national and regional growth, investment, and prosperity."
- ***Objective 27*** - "Ensure the integration of safe and convenient alternatives to the car into the design of our communities, by prioritising walking and cycling accessibility to both existing and proposed developments and integrating physical activity facilities for all ages."
- ***Objective 54*** - "Reduce our carbon footprint by integrating climate action into the planning system in support of national targets for climate policy mitigation and adaptation objectives."
- ***Objective 52*** - "The planning system will be responsive to our national environmental challenges and ensure that development occurs within environmental limits, having regard to the requirement of all relevant environmental legislation and the sustainable management of our nature capital."

Relevance to Carlow Graiguecullen ABTA
NPF is created to shape the future growth and development of Ireland and ensure the country has learnt from past 'mistakes'. Therefore, when producing the Carlow Graiguecullen ABTA, it is important to consider the strategic outcomes and policy objectives outlined in this framework and make sure Carlow assists in achieving these national goals. In particular, Carlow Graiguecullen ABTA, although it deals with all traffic, can help promote sustainable mobility options.

2.1.2 National Development Plan 2021-2030

The National Development Plan (NDP) covers the years 2021-2030. It sets out the investment priorities which underpin the successful implementation of the NPF, as outlined above. The NDP is designed to guide national, regional, and local planning and investment decisions in Ireland throughout the next decade. Generally, the NDP demonstrates a commitment by the Government to meeting Ireland's infrastructure and investment needs during the plan period. In total, there is an expected investment of €165 billion over the lifetime of the plan.

The NDP notes that Carlow Southern Relief Road is one of the projects in the plan period and in September 2021, when the plan was published, it was outlined that the project was in its earlier stages of planning and design. Additionally, the plan also outlines support for minor regional and local roads projects which can demonstrate "significant benefit in areas such as support for the local economy and the Town Centre First policy, improved accessibility (including areas remote from the major road network), protection of lifeline routes, and traffic management" or those which will have a "significant and quantifiable economic impact".

Relevance to Carlow Graiguecullen ABTA
The NDP outlines support for minor, regional, and local roads projects. This shows there is willingness to improve the road network in order to support local economies and protect lifeline routes which are less accessible by public transport. In terms of the Carlow Graiguecullen ABTA, this shows the importance of also considering road usage and ensuring that everyone has accessibility, not just those in the built-up areas.

2.1.3 Climate Action Plan 2023

The Climate Action Plan 2023 is the second annual update to Ireland's Climate Action Plan 2019. This plan is the first to be prepared under the Climate Action and Low Carbon Development (Amendment) Act 2021, and following the introduction, in 2022, of economy-wide carbon budgets and sectoral emissions ceilings.

The plan sets out a roadmap for taking decisive action to halve emissions by 2030 and reach net zero no later than 2050, as committed to in the Programme for Government. Climate Action Plan 2023 sets out how Ireland can accelerate the actions that are required to respond to the climate crisis, putting climate solutions at the centre of Ireland's social and economic development.

The aspiration for transport is a fully decarbonised transport network. Key actions for transport include:

- developing services, communities, and infrastructure in such a manner as to avoid the need to travel as much as is done today
- improving the relative attractiveness of sustainable travel modes such as public transport, cycling and walking, to shift away from car use; this will facilitate increased use of lower-carbon modes and reduce the percentage of total journeys that are made by private car (modal share) from over to 70% (today) to just over 50% in 2030; and
- complement these measures by increasing the proportion of electric vehicles in the car fleet to 30% by 2030, which will improve the efficiency of the national car fleet; electrification of the freight and public transport sector will also be key.

Relevance to Carlow Graiguecullen ABTA
Climate Action and the Low Carbon Development Act outlines the legally binding carbon reduction targets. The Climate Action Plan discusses how these reductions are to occur and emphasises the importance of modal-shift, increased sustainable mode use and public transport investment. This shows the importance of understanding and improving sustainable modes provision in the Carlow Graiguecullen ABTA.

2.1.4 National Investment Framework for Transport Investment in Ireland (NIFTI)

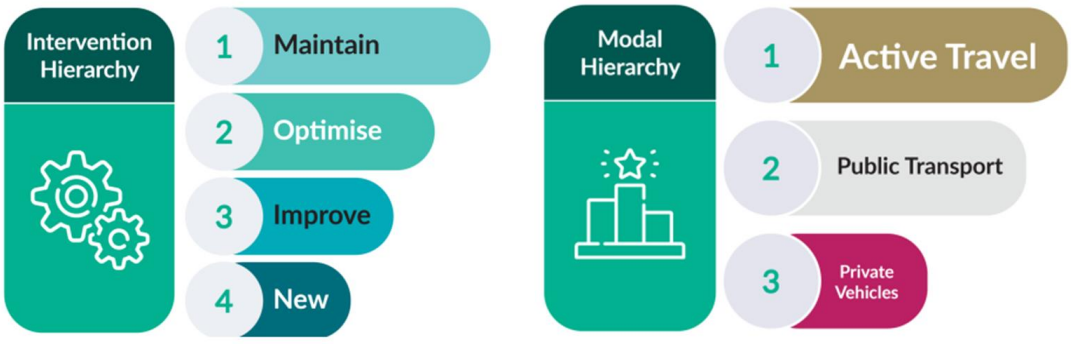
The Department of Transport recently published a draft framework for prioritising future investment in the land transport network to support the delivery of National Strategic Outcomes. The aims are to target investment to:

- "Cater for rising travel demand, while decarbonising the transport sector;
- Invest significantly in sustainable mobility including public transport schemes in cities and major investment in cycling and walking throughout the country;
- Deploying sustainable solutions wherever feasible; and
- Decarbonising the sector through electrifying public transport and providing electric vehicle infrastructure."

The draft framework includes two hierarchies, which specify the order in which transport investment should be prioritised. There is an intervention hierarchy as well as a modal hierarchy, as shown in **Figure 2-1** below.

The intervention hierarchy differentiates between the level of intervention proposed. It states that investment should firstly seek to 'maintain' the existing infrastructure; then to 'optimise' or 'improve' existing infrastructure, before finally, if there is no other possible way to achieve objectives, invest in 'new' infrastructure. The aim of the investment hierarchy is to maximise value for money provided by previous investment and to ensure that more affordable and efficient options for achieving an objective are considered prior to investment in large-scale transport projects. The modal hierarchy differentiates between the modes of travel, and states that active travel (walking and cycling) should be prioritised first, followed by public transport and lastly private vehicles.

Figure 2-1: NIFTI Intervention and Modal Hierarchies



The document also sets out proposals about how the investment framework will be implemented going forward. One of the relevant aspects within this section is the fact that at each Decision Gate in future appraisal and funding process decisions, a project's strategic fit with the framework's investment priorities will need to be assessed. Sponsoring agencies will be required to demonstrate that the development and appraisal of options adhere to the principles of the modal and intervention hierarchies. Specific guidance on how to meet these requirements is set out in the Common Appraisal Framework for Transport Projects and Programmes (CAF).

Relevance to Carlow Graiguecullen ABTA
NIFTI is the framework for prioritising investment. It outlines aims to decarbonise transport, increase sustainable mobility, and support sustainable infrastructure. As well, the intervention and modal hierarchy show the priority consideration for schemes. This will guide the suggestions put forward in Carlow Graiguecullen ABTA, with a particular focus on active modes and building upon existing infrastructure.

2.1.5 National Physical Activity Plan for Ireland 2017

The aim of the Department of Health's National Physical Activity Plan is to increase physical activity levels across the whole population. The Plan sets separate targets for adults, children, and older people to reach the recommended levels of physical activity. Recognising that there are many reasons that people are unable to meet recommended levels of physical activity, the Plan contains some guiding principles to promote and increase physical activity; namely by "creating increased opportunities for people to be active in ways which fit into everyday life's and which suit individual needs, circumstances and interests [and] removing the barriers which people face to being active and encouraging people to recognise how to overcome these barriers".

The Plan highlights walking and cycling as a way to easily incorporate physical activity in everyday life and includes several actions aimed at promoting active travel and recreating, including:

- Ensure that the planning, development and design of towns, cities, and schools promotes cycling and walking with the aim of delivering a network of cycle routes and footpaths;
- Ensure that the planning, development and design of towns and cities promotes the development of local and regional parks and recreational spaces that encourage physical activity;
- Prioritise the planning and development of walking and cycling general recreation / physical activity infrastructure; and
- Explore opportunities to maximise physical activity and recreational amenities in the natural environment.

Relevance to Carlow Graiguecullen ABTA
The National Physical Activity Plan is focussed on increasing physical activity across the entire population. This is to be done via the promotion of active modes in developments and ensuring places are suited to support active travel. This demonstrates the desire Ireland has to encourage active modes of travel, and making them convenient, to bring about health benefits. Therefore, the Carlow Graiguecullen ABTA should be committed to providing infrastructure improvements or provisions that support this goal of increase physical activity.

2.1.6 Sustainable Mobility Policy Review

The Department of Transport's National Sustainable Mobility Policy, published in April 2022, sets out a strategic framework for the year up to 2030 for active travel and public transport in order to assist in achieving Ireland's climate targets, outlined above. It seeks to deliver at least 500,000 daily active travel and public transport journeys, and also generate a 10% reduction in kilometres driven by fossil fuel cars by 2030. It includes a vision for sustainable mobility in Ireland by 2030 to 'connect people and places with sustainable mobility that is safe, green, accessible, and efficient'. The policy builds on and replaces previous active travel and public transport policy as set out in the 2009 policy documents – Smarter Travel: A Sustainable Transport Future and National Cycle Policy Framework.

Supporting mobility is defined in the policy as 'connecting people and places in a sustainable way by supporting:

- Safe, accessible, comfortable, and affordable journeys to and from home, work, education, shops, and leisure;
- Travel by cleaner and greener public transport; and
- A shift away from the private car to greater use of active travel and public transport.'

The policy approach sets out to achieve a more sustainable transport sector based on the 'Avoid-Shift-Improve' principle. This encompasses measures to reduce the frequency and distance of trips, create

a move towards more environmentally friendly modes of transport, and promote efficient fuel and vehicle technologies.

The policy is guided by three key principles which are underpinned by ten high-level goals. There are five goals under the 'Safe and Green Mobility' principle, including:

- Improve safety;
- Decarbonise public transport;
- Expand availability of sustainable mobility in metropolitan areas
- Expand availability of sustainable mobility in regional and rural areas; and
- Encourage people to choose sustainable mobility over the private car.

There are three goals under the 'People Focused Mobility' principle, including

- Take a whole journey approach to mobility, promoting inclusive access for all;
- Design infrastructure according to Universal Design Principles and the Hierarchy of Road Users model; and
- Promote sustainable mobility through research and citizen engagement.

There are two goals under the 'Better Integrated Mobility' principle, including:

- Better integrate land use and transport planning at all levels; and
- Promote smart and integrated mobility through innovative technologies and development of appropriate regulation.

Almost all the above goals are highly relevant to the Carlow Graiguecullen ABTA. Goal 9, which aims to 'support compact growth and transport-orientated development through integrated land use and transport planning' is of particular relevance. Under the heading of Goal 9, the benefits of a transport-orientated development approach and the importance of local transport plans prepared using ABTA guidance are highlighted. Alongside metropolitan area transport strategies, local transport plans are stated to be key for 'coordinating the delivery of multi-modal transport infrastructure and the integration of land use and transport planning at metropolitan and local level'. Related to this, the policy also notes that the Department of Housing, Local Government and Heritage intend to publish 'Sustainable Compact Settlement Guidelines' which will supersede existing 2009 Sustainable Residential in Urban Area Guidelines for Planning Authorities. The new guidance will place a renewed emphasis on compact growth to achieve a greater intensity of uses in central locations, and in close proximity to high quality public transport services.

Relevance to Carlow Graiguecullen ABTA
The 'Safe and Green', 'People Focussed', and 'Better Integrated' mobility principles need to be considered when producing the Carlow Graiguecullen ABTA, to ensure that the proposals work in cohesion with other plans to achieve the wider goals of both Carlow and Ireland.

2.1.7 Programme for Government: 'Our Shared Future' (2020)

The Programme for Government commits to a 'fundamental change in the nature of transport in Ireland' and 'unprecedented modal shift in all areas' by a reorientation of investment to walking, cycling, and public transport. It states the Government needs to make every effort to make active travel and public transport better and more accessible in order to achieve necessary improvements to climate, quality of life, air quality, and physical and mental health.

The Government is committed to a 2:1 ratio of expenditure between new public transport infrastructure and new roads over the lifetime of the Government, while maintain funding for essential road and public transport maintenance and upkeep. The Government will also prioritise plans for the delivery of Metrolink, Luas and other light rail expansions, DART expansion and interconnector and BusConnect in Dublin, Cork, Galway, and Limerick.

In addition to these funding commitments, the Programme also commits to a number of other measures which are relevant to the ABTA including:

- Enhance suburban and commuter rail across the country;
- Mandate that every local authority adopts a high-quality cycling policy, carries out an assessment of their road network and develops cycle network plans; and
- Dramatically increase the number of children walking and cycling to primary and secondary school.

Relevance to Carlow Graiguecullen ABTA
Our Shared Future notes there is need for a fundamental change in the transport sector in Ireland, and active modes and public transport need to be prioritised unlike previously. This supports the focus of the Carlow Graiguecullen ABTA on sustainable transport.

2.1.8 Road Safety Strategy 2021-2030

A new Government Road Safety Strategy was published at the end of 2021. The development of the strategy was led by the Road Safety Authority (RSA) and involved extensive engagement with key stakeholders, as well as an open public consultation. Underpinning the strategy is Ireland's long-term goal of achieving Vision Zero (i.e., zero road deaths or serious injuries) by 2050. The strategy notes that Ireland has also set a target to reduce road deaths and serious injuries by 50% by 2030, in line with the EU. In the 2021-2030 strategy, seven 'Safe System' priority intervention areas have been identified. Of these, the four listed below are particularly relevant to the ABTA for Carlow Graiguecullen.

- Safe roads and roadsides: to improve the protective quality of our road and infrastructure.
- Safe speeds: to reduce speeds to safe, appropriate levels for the roads being used, and the road users using them.
- Safe road use: to improve road user standards and behaviours in line with traffic legislation, supported by enforcement.
- Safe and healthy modes of travel: to promote and protect road users engaging in public or active transport.

The 2021-2030 strategy will feature three phases of action plans. The first action plan (2021-2024) contains 186 different actions, the first fifty of which are describe as 'high impact actions'. Some of the actions which may have particular relevance to the Carlow Graiguecullen ABTA are listed below:

- Action 5: over the period 2021 to 2025, 1000km of segregated walking and cycling facilities will be constructed or under construction on the national, local, and regional road network.
- Action 6: a working group will be established to examine and review the framework for setting of speed limits and as part of this review, specific consideration will be given to the introduction of a 30kmh default speed limit in urban areas.
- Action 8: expand speed management measures on National, Regional and Local roads (including the use the average speed cameras).
- Action 40: continue to implement an active travel infrastructure scheme.
- Action 41: encourage a modal shift to support environmental, safety and health objectives by promoting the use of sustainable and active modes of travel.
- Action 68: each local authority to publish/renew their prioritised plan on road building construction and maintenance (including footpaths and cycle lanes) on an annual basis.
- Action 78: extend the number of 30kmh speed limit zones in high-risk locations (urban city/town centres) for vulnerable road users in line with best practice models.
- Action 79: examine the feasibility of 30kmh speed limit or lower in school vicinities and report on progress.
- Action 134: the Department of Transport will introduce necessary legislation for the safe use of e-scooters on Irish roads in Q1 of 2022.
- Action 177: roll-out the Safe Routes to Schools programme and provide 'front-of-school' treatment to a minimum of 500 schools.

Relevance to Carlow Graiguecullen ABTA
It is essential future proposals to the transport network adhere to the road safety strategy outlined above. As mentioned, there are 4 priority areas relevant to this ABTA. These include providing safe roads and roadsides, safe traffic speeds, safe road behaviour and safe active mode travel. This demonstrates there is commitment to the various transport modes, and such measures should be particularly helpful in supporting and making active travel safer which is essential to increasing active mode usage in Carlow.

2.1.9 Iarnród Éireann Strategy 2027

Iarnród Éireann are the national railway provider in Ireland and state that the rail network throughout Ireland is "an invaluable national asset, providing the backbone for an integrated public transport system". The strategy which Iarnród Éireann outlines for the future is aligned with the National Development Plan and supports committing their investment to assisting in achieving sustainable and compact growth. They key deliverables of the strategy are listed below:

- Playing a central role in Ireland's Climate Action Plan
- Strengthening regional connectivity
- Creating sustainable mobility hubs
- Working in partnership with stakeholders
- Supporting compact growth
- Embracing new technology
- Moving goods as well as people
- Driving efficiency and delivering value for money

Within the strategy there are numerous infrastructure commitments outlined. The most impactful to the Carlow Graiguecullen study area is likely to be the Outer GDA Commuter service. This service will serve the areas just outside of Dublin, where there is potential for daily commutes into the Dublin area. Areas that will be connected to Dublin via this service are Dundalk, Longford, Athlone, Portlaoise, Carlow and Gorey, which will all have access to services running into Dublin every 20-minutes in the peak hours and half hourly in the off-peak hours. This service benefits from enhanced intercity timetabling and the redeployment of rolling stock from DART+. However, improved services like this open up greater opportunities for movement between Dublin and Carlow in a more sustainable way and promote its usage to workers, residents, and visitors.

Relevance to Carlow Graiguecullen ABTA
The rail strategy demonstrates the commitments which have been made to railways across Ireland. It is important to consider the impact such upgrades may have on people travelling to/from Carlow via train. It is also important to consider whether changes to the Outer GDA Commuter service will make people more likely to travel to Dublin from Carlow for work purposes and whether this would alter where people may choose to reside or work, and especially their method of travel to work.

2.1.10 Fáilte Ireland Investment Strategy 2016-2022

Fáilte Ireland's 'Tourism Development & Innovation – A Strategy for Investment 2016-2022' was launched to provide a framework for tourism investment in Ireland and identify as well as prioritise tourism investment proposals. The strategy is based on four strategic outcomes and nine more specific outcomes that Fáilte Ireland aims to achieve with its investments. The four strategic outcomes are:

- "Increasing the number of overnights spent by overseas visitors and increasing their spend;
- Creating employment opportunities;
- Leveraging public or private sector investment into the tourism experience; and

- Stimulating international awareness and demand."

Relevance to Carlow Graiguecullen ABTA
This strategy is related to promoting tourism. It is important to Carlow's economy that the town is attractive to visitors. This is already partially possible due to the tourist attractions and the potential for Agri-tourism, however it must be capitalised upon to reap economic rewards. Ensuring that there are good external connections to Carlow as well as sound connections within the town is important to promoting both tourism and sustainable travel by tourists.

2.2 National Guidance

2.2.1 Design Manual for Urban Roads and Streets

The Design Manual for Urban Roads and Streets (DMURS) provides guidance relating to the design of urban roads and streets, placing a strong emphasis on designs that prioritise the needs of pedestrians, cyclists and public transport users and reduce the private car dominance in our urban landscapes. The Manual presents an integrated design approach, which means the design must be:

A. Influenced by the type of place in which the street is located; and

B. Balance the needs of all users.

The Manual is applicable in the design of urban roads and streets with a speed limit of 60kmh of less.

2.2.2 Traffic Management Guidelines 2019

The Traffic Management Guidelines (TMG) provide guidance on traffic planning, traffic calming and management, incorporation of speed restraint measures in new residential designs and the provision of suitably designed facilities for public transport users and for vulnerable road users. The TMG also focuses on how issues must be examined and implemented in the context of overall transportation and land use policies. The function of the TMG is to provide guidance on the appropriateness and scale of interventions in the public realm on a mode specific basis, helping to coordinate the design approach of these interventions.

Relevance to Carlow Graiguecullen ABTA
Carlow Graiguecullen ABTA proposals must follow the design manual to ensure they are safe and satisfactory, and also ensure that certain road users and quality of space are not compromised.

2.2.3 Spatial Planning and National Roads Guidelines for Planning Authorities (DoECLG 2012)

The Spatial Planning and National Roads Guidelines set out planning considerations relating to development which would affect national roads outside the 50/60 kmh speed limit zones for cities towns and villages. Key principles within the guidance document include:

- Land-use and transportation policies are highly interdependent and integrated development and implementation of planning and land-use policies is vital in minimising the need for travel;
- Proper planning is central to ensuring road safety;
- Development must be plan-led;
- Planning Authorities, the National Roads Authority and other public transport bodies must work closely together.

The guidelines recognise the function that national roads play in terms of Ireland's overall transport system and in the country's economic, social and physical development. The guidance emphasises the need to deliver development in a manner in which a satisfactory level of service is achieved for road users and to protect and maintain that level of service with any future development.

Relevance to Carlow Graiguecullen ABTA
The N80 is a key route through the study area. Any development, or changes to the transport network, must protect the function of the N80 and ensure a reasonable level of service is maintained.

2.2.4 Permeability in Existing Urban Areas: Best Practice Guide (2015)

The National Transport Authority (NTA) funds transport infrastructure which assists in facilitating a shift towards sustainable modes. Particularly, they work alongside local authorities to identify and address 'gaps' in the current network. Often such gaps "comprise situations where demand for walking and cycling in towns and cities is not being met by the transport network". It is stated that these gaps can often occur due to 'built-in' severance in which people cannot pass, for example cul-de-sacs or high walls. Therefore, NTA encourages moving towards permeable neighbourhoods so people can easily and safely pass-through areas making active modes more convenient and more attractive against the private car.

The NTA, AECOM and South Dublin County Council worked collaboratively to produce this policy guidance on how best to facilitate walking and cycling demand through built-up areas. Within the policy best practice principles for both the provision and maintenance of permeability have been provided and are summarised below:

- Link origins to destinations directly
    - People should be able to walk and cycle directly to their local neighbourhood centre as well as district centre from their own homes.
    - Children should be able to walk and cycle safely to their schools.
    - Public transport stops should also be accessible via active modes from residential areas.
- Priority for both pedestrians and cyclists
    - Time given to pedestrians in signal phasing should allow for efficient and convenient movement.
    - In urban areas, needs of pedestrian should always be the primary consideration.
    - Use of on-demand pedestrian crossings to allow for seamless permeability.
    - Similar considerations to above for cyclists.
- Improved design of links
    - It needs to be deemed what link is suitable, e.g., segregated cycleway and footpath or combined usage, for the expected levels of usage and types of users.
    - Then, the ability for clear passage, link width, surface quality, lighting as well as overlooking or passive supervision needs to be considered and provided to best suit the links users.
- Improvements to the design of junctions
    - To ensure permeability it is essential junctions do not cause severance.
    - The following principles are best practice to provide convenient movement to pedestrians and cyclists and alleviate severance, these are: avoiding wide-flared junction, only use large multi-lane roundabouts where necessary and provide full segregation for cyclists/pedestrians, side roads should be single lane entry and footpaths should be carried through minor road junctions at grade.

Relevance to Carlow Graiguecullen ABTA
Providing permeability is important to allow for those travelling on foot or by bicycle to have short, convenient, and accessible routes. Towns and spaces need to ensure that they provide for these network users and allow for safe passing points to reduce trip lengths. Therefore, future junctions and network should ensure that permeability is not comprised and that old barriers to permeability are overcome.

2.2.5 10 Minute Towns 2020

Arup was commissioned by the Southern Regional Assembly, the region in which County Carlow sits, to undertake a 10-minute town concept to help inform the Regional Action Plan. The concept of 10-minute town is to create better connected communities, and therefore Arup were tasked with understanding how neighbourhoods work presently, and what needs to be done to transform areas into 10-minute towns in order to provide a best practice guide.

Within the report, the baseline conditions for Carlow Town were discussed and are listed below.

Healthcare: It was noted that all healthcare services for Carlow Town are located predominantly in the town centre and the three hospitals within the county are located in the Northern part of the town.

Educational Facilities: Arup highlighted a trend that the primary and secondary schools in Carlow Town tend to be located in the Northern section of town, North of Tullow Street, whereas the third-level institute are located in the town centre or to the South. Additionally, it was mentioned that those who reside in the north-east of the town are slightly further distance from the school and generally the schools fall outside the 10-minute walking catchment.

Retail: As expected, many of the shops, especially chain stores and supermarkets, are located in the town centre and residential areas in the southern and north-east parts of Carlow do not have retail services located nearby.

Leisure Facilities: Indoor leisure facilities, such as theatres and museums, are located in the town centre but sports and recreation facilities, like playing fields, are distributed throughout Carlow Town.

Public Transport: Carlow railway station is to the north-east of the town centre, along St. Joseph's Road, and here the Dublin-Waterford line services can be accessed. Bus stops tend to be located on the north-south corridor through the town.

Based off this investigation, Arup produced a constraints and opportunities plan for Carlow in regard to the 10-minute town concept. These are briefly summarised below:

- Lack of direct accessibility from residential estates to main roads – opportunity to provide a connection to the North Relief Road, connection to Dublin Road from residential area which is currently fenced off and the provision of walking/cycling connections to Eire Og Road from the residential area.
- Lack of accessibility from residential area to River Burrin (North) – opportunity to provide a connection between residential streets along River Burrin Walk.
- Lack of formal pedestrian and cycling crossings – opportunity to provide formal pedestrian crossing on Dublin Road so pedestrians can access the retail precinct, provide formal pedestrian and cyclist crossing on Hanover Street which includes a formalised active modes path through Hanover Park and also to provide a formal crossing and signage to guide pedestrians to the eastern side of College Street.
- Lack of direct accessibility NE and SW of Carlow Rail Station – opportunity to provide walking and cycling connection between Green Lane and the station via Glendale Avenue, to provide walk/cycle bridge over the line between Glendale Avenue and St. Joseph's Road and also provide accessibility between St. Joseph's Road and Carlow College via north of the cricket club.

- Lack of accessibility on Feltham Road and Monacurragh – opportunity to provide a walking and cycling path along River Burrin between Feltham Road and Monacurragh and also an active mode bridge to connect to the Green Recreational Route.
- Lack of access between residential estates and other services – opportunity to provide a connection for walking and cycling between:
    - SuperValu from residential area
    - Riverside and Kennedy Avenue (near Hanover Park)
    - Presentation College and Sand Hill and Green Hills Estate
    - Browneshill Wood and Sand Hills
    - The Orchards residential estates
- Lack of connectivity south of Kilkenny Road to the town centre – opportunity to extend cycle lanes between Burger King and to the immediate south of Carraig Abhainn as well as walking and cycling access points from Southern Gardens to Kilkenny Road.
- Lack of cycling connectivity to the outskirts of Carlow – opportunity to provide walking and cycling facilities if the proposals for Southern Relief Road and Eire Og Road progress.
- Lack of local bus services within the town – investigate potential local bus routes that would connect residents and businesses, particularly where there are limited services e.g., healthcare and education.
- Lack of small retail services in parts of the area – opportunity to provide small retail facilities in areas where they are currently unavailable.
- Lack of cycle usage in the town – opportunity to improve current and future cycling facilities throughout the town, promote cycling use as many services are within 10-minute cycle and also provide secure cycle parking where there is a cluster of services and near to bus stops.

Relevance to Carlow Graiguecullen ABTA
This concept is concerned with locating people close to services and amenities. Therefore, transport routes need to ensure these connections are viable to allow people to be able to easily access things they may need and have a better quality of life.

Regional Policy

2.2.6 Regional Spatial and Economic Strategy for the Eastern and Midland Region 2019-2031

The Regional Spatial and Economic Strategy (RSES) for the Eastern and Midland Region 2019-2031 is relevant as this covers Laois County and Graiguecullen. The RSES sets out a framework to direct future growth of the Region over the medium to long-term. The RSES will help implement the strategic planning framework set out in NPF.

There are specific regional policy objectives included in the RSES for Graiguecullen – Carlow Town which is listed as a key town.

- RPO 4.75: A cross-boundary Joint Local Area Plan (LAP) shall be prepared for Carlow by CCC and LCC having regard to its location within the combined functional area of both local authorities. The joint LAP shall provide a coordinated planning framework to identify and deliver strategic sites and regeneration areas for the future physical, economic, and social development of Carlow/Graiguecullen to ensure it achieves targeted compact growth of a minimum of 30%. It also proposes to ensure a coordinated approach is taken to the future growth and development of the combined urban area, ensuring that it has the capacity to grow sustainably and secure investment as a key town. The joint LAP shall identify a boundary for the plan area, strategic housing and employment development areas and infrastructure investment requirements to promote greater coordination and sequential delivery of serviced

lands for development. Regard shall be given to the respective housing, retail and other local authority strategies that may be in place.

- RPO 4.76: Support the sustainable development of environmentally sensitive, low intensity amenity development associated with the Barrow Blueway subject to compliance with the Habitats and Birds Directive and Floods Directive.

Relevance to Carlow Graiguecullen ABTA
This strategy is relevant as part of Carlow Town lies within Laois. Within the RSES there are regional policy objectives aimed at the Graiguecullen – Carlow area. It is named as a key town, showing its importance to the region. There are commitments to create a joint Local Area Plan, which should shape the proposals put forward in the ABTA. Additionally, there is a desire to support sustainable development which aligns with the objectives of the Carlow Graiguecullen ABTA.

2.2.7 Regional Spatial and Economic Strategy for the Southern Region 2040

Carlow lies within the South East region of Ireland, therefore it is important to understand the commitments made in the Regional Spatial and Economic Strategy (RSES) for the Southern Region. As mentioned above, the RSES sets out a framework which exists to direct future growth in the region over the medium to long-term. The RSES is seen as a tool to assist in delivering the strategy planning framework outlined in the NPF.

Within the RSES, Carlow is listed as a key town and has a 'pivotal inter-regional role' due to its strong links with the Midlands and Greater Dublin Area. Carlow Town is considered a regional centre for education, healthcare, public services, shopping, arts, culture, leisure, and recreation for a wide surrounding area including Laois, Kildare, and Wicklow. The paragraphs below summarise both wider Regional Policy Objectives (RPO), as well as RPOs specific to Carlow. Such objectives are important to consider when planning the future of Carlow Town to ensure development aligns with regional and national priorities.

RPOs for the Southern Region which are important to consider as part of the Carlow Graiguecullen ABTA process include:

- RPO 2: Planning for Diverse Areas – recognises strategic role played in all areas to achieve regional targets. Therefore, RSES supports sustainable enterprise growth, services, physical and social infrastructure investment, and sustainable community growth.
- RPO 4: Infrastructure Investment – investment into infrastructure to align with spatial planning strategy of the RSES.
- RPO 9: Holistic Approach to Delivering Infrastructure – ensure investment and delivery of infrastructure is comprehensive, meets growth targets and prioritises delivery of growth and sustainable mobility.
- RPO 31: Sustainable Place Framework – Local Authorities provide/implement this framework to ensure the development of quality places through excellent design and integrated planning.
- RPO 53: Tourism – sustainably develop the road, public transport network and walking/cycling trails to allow for more sustainable tourism.
- RPO 91: Decarbonisation in the Transport Sector – seek initiatives that will achieve decarbonisation, such as: non-fossil fuelled cars and public transport, reduced private car trips, modal shift towards sustainable modes, development of electric vehicle infrastructure.
- RPO 130: Air Quality – improve and maintain good air quality and help prevent harmful effects on human health and the environment.
- RPO 131: Noise – promote the pro-active management of noise where it is likely to have significant adverse effects on health or the environment.
- RPO 151: Integration of Land-Use and Transport, the principles guide this objective which are relevant to the Carlow Graiguecullen ABTA are: residential development on lands accessible by public transport or active modes, large trip generators (offices/retail) focussed on central locations accessible by sustainable modes, all non-residential developments subject to maximum

parking requirements, electric vehicle charging infrastructure and following the newest Design Manual for Urban Roads and Streets.

- RPO 152: Land Planning Objectives, the principles guide this objective which are relevant to the Carlow Graiguecullen ABTA are: high-level of permeability, priority of those travelling sustainably, facilitate complementary use of private car (strike a balance of mode share), maximise number of people living within walking/cycling distance of neighbourhood centres, cycle parking appropriately designed to fit urban realm, provide filtered permeability where possible, emphasis on sustainable modes for work and education travel.
- RPO 157: Local Transport Plans (LTP) – developed by Local Authorities, based on ABTA, and should aim to maximise opportunities for transport integration, assess existing transport movements, plan for efficient and sustainable movement of people, identify transport assets which can effectively accommodate future demand, prioritise delivery of sustainable active travel infrastructure, plan for and target a modal shift, retrofit permeability for active modes, and electric vehicle infrastructure.
- RPO 159: Role of Transport in Enabling Access for All – seek investment into transport networks that are socially inclusive and provide connectivity to meet societal needs.
- RPO 160: Smart and Sustainable Mobility – the relevant sub-objectives to this ABTA include seeking investment into intelligent transport systems (including real-time information), recognising importance of public transport networks and multi-modal interchanges, supporting 'steady state' investment to improve rail, road, and bus, investing to facilitate park and ride as well as delivering sustainable and comprehensive active travel networks.
- RPO 162: Multi-Modal Travel Integration – delivering sustainable mobility and investment to provide integration between all transport modes and support usage of sustainable modes. Options to consider include bike and ride facilities, park and cycle facilities, park and car pool facilities, bike share schemes, car sharing, integrating cycling and public transport network, carriage of bicycles on trains and buses, integrated ticketing, exploring feasibility of mobility hubs and e-scooter schemes.
- RPO 163: Sustainable Mobility Targets – through various plans (LAP, LTP, and so on) ensure reduction in private vehicle usage and increase use of sustainable modes. The national target of reducing private car community to 45% needs to be met and opportunities to achieve this need to be explored. Local Authorities must set complementary measures to achieve sustainable mobility targets and place greater influence on encouraging mixed-use developments which support sustainable trip patterns.
- RPO 166: Investment in Strategic Inter Regional Multi-Modal Connectivity to Metropolitan Areas and Economic Corridors – this RPO has two sub-objectives relevant to the Carlow Graiguecullen ABTA. These are maintaining the efficiency and safety of existing national primary and secondary roads by targeted transport demand management and that facilities for sustainable transport are supported in order to strengthen quality of inter-regional connectivity.
- RPO 168: Investment in Regional and Local Roads – this objective includes the Southern Relief Road which is currently subject to appraisal.
- RPO 171: Bus – through the functions of the NTA seek to develop the bus network in the region. During the RSES the following specifics are targeted: support development of bus service network and create a relevant strategy, investment in the bus network, service improvements, network review with aim of providing improved local bus services, review of bus services between settlements, new interchange facilities, improve waiting facilities, upgrade bus fleet to low carbon and low emission and ensure buses are accessible for all.
- RPO 174: Walking and Cycling – the following sub-objectives are given for walking and cycling: delivery of cycle routes, Greenway and Blueway corridors, delivery of high-quality safe cycle route network, development of safe cycling infrastructure for all population groups, safe walking and cycle infrastructure (especially near schools), creating a safer pedestrian environmental by expanding 30kph speed limits, provide a cycle network which is coherent, continuous and safe, provide alternative cycle routes which are quiet and ensure these are well sign-posted, place walkability and accessibility a central consideration in the planning and design process and support the accessibility of walk routes for those with a disability.

- RPO 175: Improving Regional Quality of Life through Infrastructure-Led Planning – support sustainable infrastructure-led planning for the future populations and use it as a tool to tackle the legacies of deprivation.
- RPO 176: 10-Minute City and Town Concept – ensure a range of community facilities and services are accessible in short walking and cycling timeframes to allow greater connectivity between people and the services/amenities they required.
- RPO 181: Equal Access – promote disability awareness and improve equal access for all through transport infrastructure and many other means.

Additionally, there are RPOs listed specifically for Carlow town. These exist to ensure the key town of Carlow fulfils its potential and regional role.

- RPO 14: Carlow – there are sub-objectives relevant to the Carlow Graiguecullen ABTA, as listed below:
    - Support role of Carlow Town as a self-sustaining regional and inter-regional economic driver by supporting strategic investment in employment development and economic integration, achieved through: strengthening role of education and innovation, supporting town-centre led economic regeneration, improve public realm and town-centre attractiveness, improved accessibility to rail station, support delivery of Southern Relief Road, delivering new crossings of River Barrow, seeking investment in sustainable travel, strengthening the 'steady state' investment into the rail infrastructure to achieve improved frequencies and journey times and supporting development of under-used lands along River Barrow.
    - Support the preparation of the cross-boundary Joint Urban Area Plan for Carlow Town by CCC and LCC. This should aim to provide a coordinated planning framework to identify and deliver strategic sites and regeneration, foster collaboration in allocation of funds to enable cross-boundary collaboration in Carlow in delivery of strategic infrastructure, consistency of approach on land-use and agreement on population distribution, by both councils, across the Carlow Town area.

Relevance to Carlow Graiguecullen ABTA
The RSES for the Southern region is a key policy document to consider. Carlow is listed as a key town in this region due to its proximity and strong connections to other areas as well as its status as a hub for healthcare, education, public services, shopping, culture and so on. The policies listed above are relevant to consider when producing the Carlow Graiguecullen ABTA to ensure that options developed align with the regional objectives and ambitions. Additionally, there are two policies related to Carlow specifically, these are to strengthen the role of Carlow as an economic driver and also to prepare a joint urban area plan with Laois for Carlow Town. Both of these need to be accounted for when creating the Carlow Graiguecullen ABTA; firstly the joint development goals between CCC and LCC for Carlow need to be considered and supported and also the transport system needs to be able to back economic success.

2.3 Local Policy

2.3.1 Laois County Development Plan 2021-2027

The purpose of the Laois County Development Plan is to set out a framework for the sustainable spatial and physical development of County Laois, whilst considering the conservation and protection of the built and natural environment. Chapter 10 of the strategy sets out the key objectives for infrastructure over the plan period, which includes transport, with the following aim:

'To achieve a sustainable, integrated and low carbon transport system for the county and to protect, improve and extend water services and other enabling infrastructure in line with national, regional and local population and economic growth for the county.'

Policy objectives outlined within the Plan, which will impact on this ABTA, are as follows:

- TRANS 1: Maintain, improve and protect the safety, capacity and efficiency of the road network and associated junctions;

- TRANS 2: Upgrade and improve the hierarchy of Laois's road transportation infrastructure including reserving corridors for proposed routes, free of development so as not to compromise future road schemes;
- TRANS 3: Co-operate with TII in the upgrade of existing Interchanges on the National Routes;
- TRANS 4: Prevent inappropriate development of lands adjacent to the existing road network, which would adversely affect the safety, current and future capacity and function of national roads;
- TRANS 6: Discourage the proliferation of access points onto public roads, particularly in areas where national speed limit applies or where road safety is of concern;
- TRANS 11: Integrate land use policies and transportation in a manner which reduces reliance on car based travel and promotes more sustainable transport choice and co-ordinates particular land uses with their accessibility requirements;
- TRANS 12: Support sustainable travel in the tourism sector by the promotion of public transport to use and by undertaking enhances to overall accessibility thereby making the County easier for visitors to navigate;
- TRANS 13: Encourage transition towards sustainable and low carbon transport modes, through the promotion of alternative modes of transport, and 'walkable communities' together with promotion of compact urban forms close to public transport corridors to encourage more sustainable patterns of movement.

Relevance to Carlow Graiguecullen ABTA
The County Laois Development Plan sets out the key policy objectives for transport, which the Carlow Graiguecullen ABTA should align with. There is a recognition that a focus needs to be given to sustainable transport, but also the importance of the region's roads are highlighted.

2.3.2 Carlow County Development Plan 2022-2028

The Carlow County Development Plan sets out the strategy for the proper planning and sustainable development of the County over the plan period from 2022 to 2028. The approach is centred on the core principle of sustainability with a focus on regeneration and economic development, supported by vibrant, liveable, climate resilient communities. Chapter 5 of the Plan sets out the priorities for Transport.

Chapter 5: Sustainable Travel and Transportation

This section of the development plan states that a "well-functioning multi-modal transport network is essential in transitioning to more sustainable modes of transport". CCC also acknowledge the importance of promoting and facilitating more sustainable trips by enhancing the transport network to ensure the county has the capacity to support sustainable development going forward.

There are numerous sections to this chapter which discuss the current challenges, policy which influences the transportation goals outlined in the development plan and then policies committed by CCC to ensure changes and improvements to the transport network, and in particular improving its sustainability, take place. The most relevant categories and policies to the ABTA along with a small summary of the policies for each are summarised below.

LT P1: Integration of Land-Use and Transportation

- Support sustainable modes through land-use zonings
- Encourage developments within walking, cycling and public transport distance.

MS O1 and O2: Modal Shift

- Seek investment to provide sustainable transport solutions, infrastructure, and connectivity.
- Support the modal shift from private vehicles particularly for access work and education.
- Provision of bus services in Carlow Town and into rural areas of the county.

Walking and Cycling

- WC P1: Prioritise and promote active modes through quality infrastructure.
- WC P3: Throughout the county ensure there is walking and cycling connectivity between people and places to maximise active mode trips for accessing local shops, education, public transport, employment as well as other important amenities.
- WC P2: Work with Government Departments and other stakeholders to improve infrastructure provision.

Public Transport

- PT P1: Promote sustainable development by supporting the delivery of improvements to public transport to ensure they are an attractive and convenient alternative to the car.
- PT P2: Support transport agencies in the provision of new services and routes as well as increasing quality, frequency and speed of existing rail and bus services.
- PT P3: Generate additional demand for public transport through integrated land-use planning and maximising accessibility through public transport.

Road Network

- NR P1: Work with Transport Infrastructure Ireland to develop and operate the motorway and national road network in Carlow and ensure capacity, efficiency, and safety is maintained in accordance with DECLG (2012).
- NR P2: Control development which could impact traffic safety or hinder future motorway upgrading.
- RR P1: Improve capacity, safety, and function of regional road network and ensure it is planned for and managed to enable sustainable economic development in the county.
- LR P1: Ensure safety and capacity of the local road network is maintained to suit the needs of the county.
- UR P1: Ensure all urban roads and streets following ‘Design Manual for Urban Roads and Streets’ (2013/2019) manual.
- UR P2: Where appropriate seek to introduce a wider 30kph speed limit in urban environments to make a safer, calmer, and more pleasant urban environment for vulnerable road users and also foster opportunities for increased active travel.

Car Parking

- CP P1: Carefully consider number of parking spaces required to service new developments and allow for a reduction in car parking requirements for developments in suitable town centre locations.
- CP P3: Ensure all new car parking facilities are provided to an appropriate standard and serve the development.
- CP P4: Ensure applications for surface parking are accompanied by landscaping proposals.
- CP P5: Promote provision of age friendly parking arrangements and improve parking for those who have disabilities.
- CP P6: Promote development of infrastructure to accommodate a change towards private vehicles and ensure electric charging points are provided at a ratio of 1:50 spaces in all new/extended car parks.

Bicycle Parking

- BP P1: Ensure provision of appropriate bicycle parking as part of any new application in urban areas to assist modal shift to sustainable modes.

Directional, Information and Waymarking Signage

- SG P1: Provide/facilitate provision of directional signage for amenities, tourist attractions, and local attractions along active mode routes in accordance with planning and traffic regulations.

Accessibility

- AC P1: Support suitable access for those with disabilities, this includes improvements to buildings, streets, and public places.

Chapter 2: Transport and Movement

The following text comes from chapter 2 of the County Development Plan. The proposed Transport and Movement Strategy aims to support Carlow's position 'as a first-class regional town'. Therefore, the strategy focuses on developing the transport infrastructure and promoting a behavioural change in regard to travel to capture health improvements. To succeed in gaining such benefits active and low carbon travel options need to be available to residents, workers, and visitors of Carlow to reduce car dependency and create opportunities for 'community interaction through liveable, vibrant, and welcoming streets and places.' There are five key principles to this, these are:

- Realise the full potential of infrastructure (road, air, rail and water).
- Promote a high quality of life and wellbeing.
- A town perceived as an exciting and safe place to live, work, and visit.
- Increased town centre footfall.
- Deliver high quality and person-centred buildings and public realm.

Relevance to Carlow Graiguecullen ABTA
Carlow County Development Plan has a key focus of providing a sustainable transport network. The plan outlines how this should be achieved as well as how efficiency and accessibility will be provided. The proposals outlined here are very important to the Carlow Graiguecullen ABTA, it is important that the suggestions made for the transport system work alongside greater development

2.3.3 Carlow County Council Climate Change Adaptation Strategy 2019-2024

Changes in climate have diverse impacts on Ireland, such as: more intense storms and rainfall events, increased river and coastal flooding, water shortages in summer, increased risk of pests and diseases, adverse impacts on water quality as well as changes in distribution and phenology of plants and animal species. This has impacts environmentally, economically, and socially. Climate change and its impacts will continue to intensify without any adaptation, hence the creation of such strategies which outline how specific areas will tackle climate change.

Nine thematic areas are set out and high-level goals are outlined. The themes and goals which relate to transport, and which are relevant to the production of this ABTA are as follows:

- Theme 1: Local Adaptation Governance and Business Operations
    - Goal: climate change adaptation considerations are mainstreamed and integrated successfully into all functions and activities of the local authority ensuring operational protocols, procedures, and policies implement an appropriate response in addressing the diversity of impacts associated with climate change.
- Theme 2: Infrastructure and Built Environment
    - Goal: increased capacity for climate resilient structural infrastructure is centred around the effective management of climate risk, informed investment decisions and positive contribution towards a low carbon society.
- Theme 3: Land-use and Development
    - Goal: sustainable policies and measures are devised influencing positive behavioural changes, supporting climate adaptation actions and endorsing approaches for successful transition to low carbon and climate resilient society.
- Theme 6: Community Health and Wellbeing

  - Goal: empowered and cohesive communities with strong understanding of climate risks, increased resilience to impacts of climate change with capacity to champion climate action at local level.

- Theme 7: Mobility
  - Goal: sustain transport networks throughout impacts of climate change and develop more sustainable adaptation methods of mobility
- Theme 8: Economic Development
  - Goal: protect the economy of CCC and communities acknowledging the benefits which can be gained from adjusting to a 'Green Economy'.
- Theme 9: Resource Management
  - Goal: promote awareness on importance of resource management and explore actions on becoming more efficient within the workplace and community.

The guiding principles that underpin these goals are:

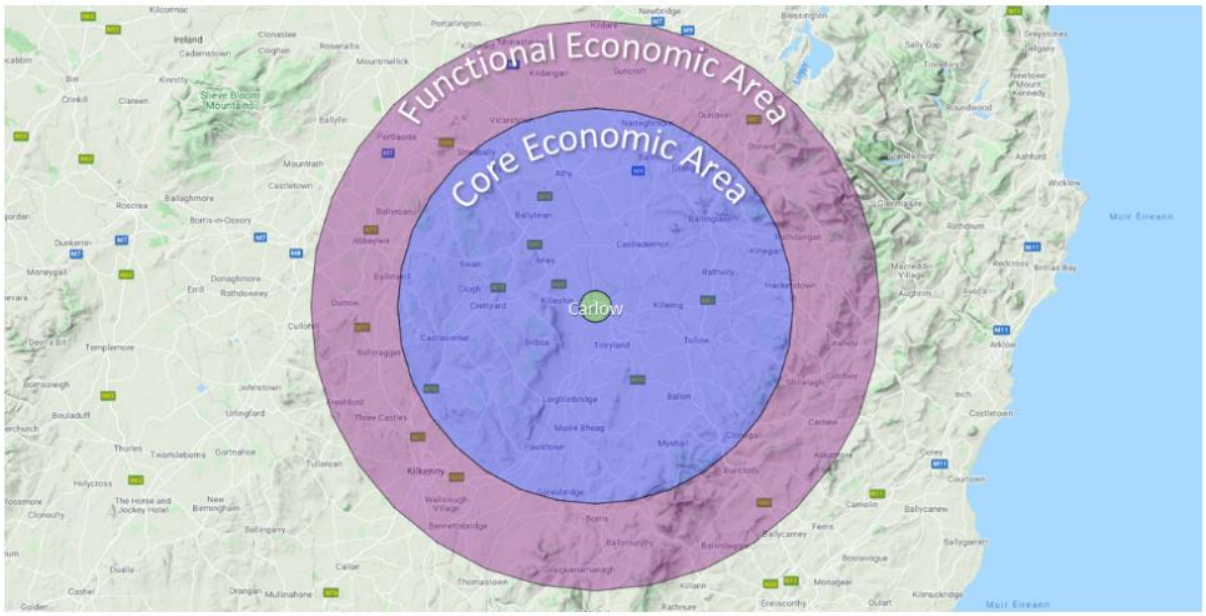
- Mainstream adaptation – climate adaptation is a core consideration and is mainstreamed in all functions and activities across the local authority. Also, ensure the local authority is well placed to reap potential economic development benefits which could emerge due to a proactive climate change adaptation stance.
- Informed decision making – effective and informed decision making which is based on reliable and robust evidence of impacts, risks, and vulnerabilities.
- Building resilience – needs of vulnerable communities are prioritised and addressed. Also, spread awareness so that there is a sustainable and robust response to climate change.
- Capitalising on opportunities – changes in climate could provide additional benefit opportunities and these need to be explored and capitalised upon.

Relevance to Carlow Graiguecullen ABTA
County Carlow is committed to achieving the same climate goals as the rest of the country. They understand that decision making, adaptation, resilience and building upon opportunities are all essential parts to gaining environmental benefits. There are further details in the sections above but naturally the transport system has a major role in cutting climate change. Therefore, it is essential that the Carlow Graiguecullen ABTA promotes methods of travel which are sustainable and can assist in achieving such goals.

2.3.4 Carlow Economic Development and Business Support Strategy 2022-2027

Within the strategy the Carlow geography has been used to define three areas, these are the County, an economic 'core' which consists of those within a 30-minute drive from Carlow Town as well as a Functional Economic Area which includes population within a 45-minute drive from the town. These areas were chosen to reflect the sphere of influence Carlow Town can have over the wider region in terms of providing employment, education, and other services. The image below (**Figure 2-2**) demonstrates the different geographic areas, with the Core Economic Area having a population of 109,000 and the Functional Economic Area having a population of 254,000.

Figure 2-2: Carlow Areas



The strategy outlines priority sectors for Carlow to provide the best opportunities for economic growth. In order to confirm what these sectors would be, a 'sector prioritisation' exercise was undertaken and classified the priority sectors into three categories, these include:

- Focus and Change – sectors considered likely to support significant economic growth. These are sectors which CCC should consider prioritising resource and effort.
- Sustain and Grow – sectors which are well established and continue to offer opportunities.
- Monitor and Intervene – sectors which may not produce sustained growth but could be important to the local economy. These should be monitored regularly to ensure opportunities to enhance any future growth is capitalised upon.

The table below summarises the sectors which were categorised.

Table 2-1: Priority Sectors

	Sector	Rationale for Strategic Priority
Focus and Step Change	Financial and Professional Services ICT Engineering Technology Tourism	• Sectors align to South East Development office as sectors of potential for the South East region. • Sectors identified as key to Carlow economy. • Each sector has a unique connection to Carlow. • Tourism is a specific area of focus as this is considered underdeveloped in the county. • Tourism offers a route to driver greater economic activity and Failte Ireland note a strong shift to outdoor leisure post-Covid, meaning Carlow could capitalise on their natural assets.
Sustain and Grow	Agri-Tourism Pharma Transportation	• Carlow has been highlighted as 'untapped' tourism potential, especially domestic short-breaks tourism. • Carlow's unique landscape and high Agricultural employment concentration, meaning Agri-tourism is a potential opportunity for growth. • Pharma has also been pointed out as an area where Carlow could build their reputation, with the current location and growth of MSD and their

	Sector	Rationale for Strategic Priority
		development of local supply chains and skills which can support the industry. • Carlow's proximity to the M9, with easy access to Dublin and other locations, allows Carlow to manifest itself as a distribution hub. • Carlow could develop itself as a net carbon zero distribution centre.
Monitor and Intervene	Retail (Town Regeneration) Green Energy 'Retrofitting'	• Retail sector traditionally market led, much of the success is being aligned with consumer confidence. • Impact of Covid has impacted confidence and the retail industry. • Regeneration of town centres will be key to the viability of the sector locally. • Analysis and consultation suggest the potential for Carlow to position itself as a leader in green energy.

Source: Carlow Economic Development & Business Strategy 2022-2027

Carlow also has to consider that the economy doesn't function in isolation and that European, National and Regional policies will all be impactful upon their economy. The strategy consultation put forward the main strengths, weaknesses, opportunities, and challenges for Carlow. These are presented below in **Table 2-2.**

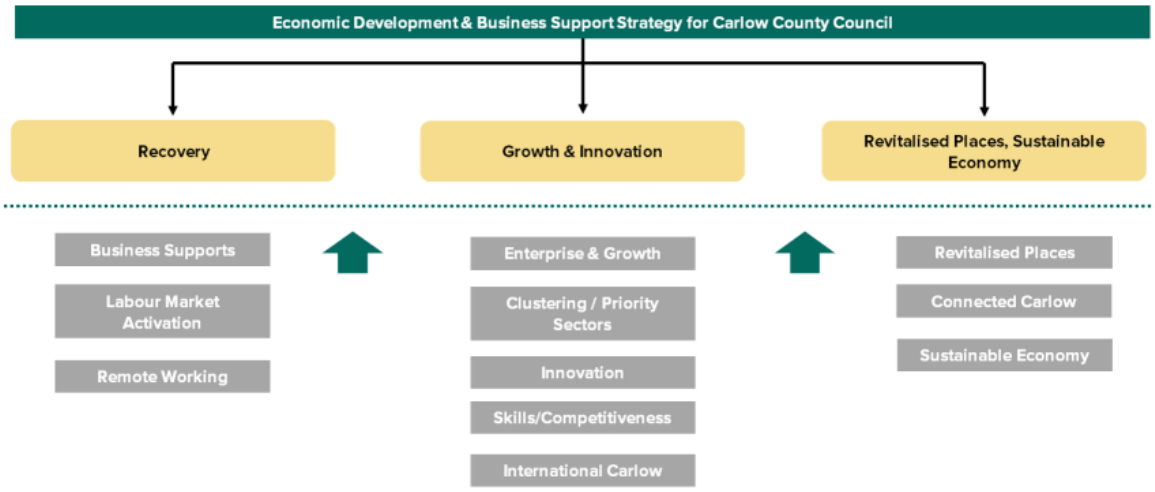
Table 2-2: SWOC Analysis for Carlow

	Comments
Strengths	• Geographic location is beneficial in Carlow, with ease of access to Dublin, Midlands and South East Region. • Development of the Technological University, here there is potential talent availability as well as R&D potential. • Quality of life is excellent, particularly for those wanting to 'settle down'. • Cost of living. • Strong transport connections – rail and road. • Strong industry clusters – financial services, tech, ICT, and engineering. • Natural beauty and tourism potential – River Barrow and Mount Leinster. • Strong business base.
Weaknesses	• Low profile in external markets. • Vacant property issue within the Town Centres. • Town Centre vitality, especially evening and retail economy. • Retention of student's post-graduation. • Difficulty in the attraction of FDI. • Lack of expansion/new space for hot desks and soft-landing type inward investment. • Linkages between indigenous firms and education sector could be stronger.
Opportunities	• Expansion of tourism. • Linking to Ireland's Ancient East brand – garden trials. • Potential development of 'remote hubs', building on Carlow's life quality excellence. • Increased potential for industry links with SETU – foster R&D and business development. • Improve outward brand of Carlow to enhance reputation and visibility to international and domestic investors and visitors. • Growth opportunities across sectors of strength and opportunity. • Improve skill profile through development of the Technological University. • Development of supply chain opportunities. • Development of distribution hub, utilising the convenience of Carlow's location to Dublin.
Challenges	• Broadband provision across the county. • Availability of 'suitably skilled' apprenticeships across the county and beyond. • Availability of suitable land and property for 'remote working hubs' limited or held by private investors. • Retention of talent. • Tourism – there is opportunities but are not well developed. • Export knowledge and key market development of knowledge of SME firms.

Source: Carlow Economic Development & Business Support Strategy 2022-2027

The vision and priority outlined for Carlow in the strategy are to "recover and grow sustainably to achieve a vibrant county, with revitalised towns and villages, which creates economic opportunities to enable people and businesses to thrive". Within the strategy, three 'pillars of focus' are outlined to help achieve the vision. The 'pillars of focus' and the relevant sub-themes to each pillar are presented below in **Figure 2-3**. This demonstrates that recovering from the Covid pandemic, whilst pursuing the revitalisation of places and new growth and innovation are essential to Carlow's vision and economic strengthening.

Figure 2-3: 'Pillars of Focus'



Within these themes there are policy actions to put achieving said visions into practice. It is especially important that the Carlow Graiguecullen ABTA and proposals for the future transport network consider these focus points and support recovery, growth, and innovation as well as revitalisation and sustainable economy of Carlow.

Relevance to Carlow Graiguecullen ABTA
This strategy is created to develop Carlow's economy. There are numerous measures and focuses which are highlighted as ways to improve the economic performance of Carlow. However, transport has a role to play. It is key that Carlow has sound reliable links to Dublin, via the M9, and also to other regions to make Carlow a potential distribution hub. However, within this there will also be a need to promote sustainability. Therefore, the transport system, whilst supporting the economic growth, needs to try and ensure it is done in a sustainable way, such as promoting sustainable travel for workers to businesses and tourists.

3. Study Area Characteristics

This section provides a review of the key demographic, employment, building use, and school location datasets within the Carlow Graiguecullen study area.

3.1 AIRO Estimate of 2021 County Carlow Population

Due to the Covid-19 pandemic, the Census which was originally due to be undertaken in April 2021 was postponed for one year, with Census night taking place on 3rd April 2022. The preliminary outcomes of the Census were released on 23rd June 2022; however, definitive outcomes will not be available until 2023.

Using the GeoDirectory address database combined with site visits, planning documentation and real estate marketing material, the AIRO project team created an evidence-informed listing of all new residential dwellings which were 'habitable' in Q3 2022 by bedroom size ranging from one bedroom to five bedroom. The team then applied an individual occupancy rate to each category of dwelling as follows:

- 1 bed (*2 persons);
- 2 bed (*2.5 persons);
- 3 bed (*3 persons);
- 4 bed (*4 persons); and,
- 5 bed (*5 persons).

The following data compares 2021 estimates to the last completed census (2016). Between the two years, the housing stock in County Carlow has increased by 6.1%, from 23,724 to 24,686 – an increase of 1412 dwellings, compared to 6% nationally. Vacancy rates have reduced by 4.9% from 1,864 to 1,722, excluding holiday homes which accounts for 275 dwellings. The additional population from the preliminary outcomes was 4,999. This results in a population estimate for County Carlow for Q2 2022 of 61,931, representing an increase of 8.8% compared to Census 2016. Comparably, County Laois, the bordering county to Carlow and also the County in which Graiguecullen sits, had a population increase of 8.2% since the 2016 Census, with the population standing at 91,657 in Q2 of 2022.

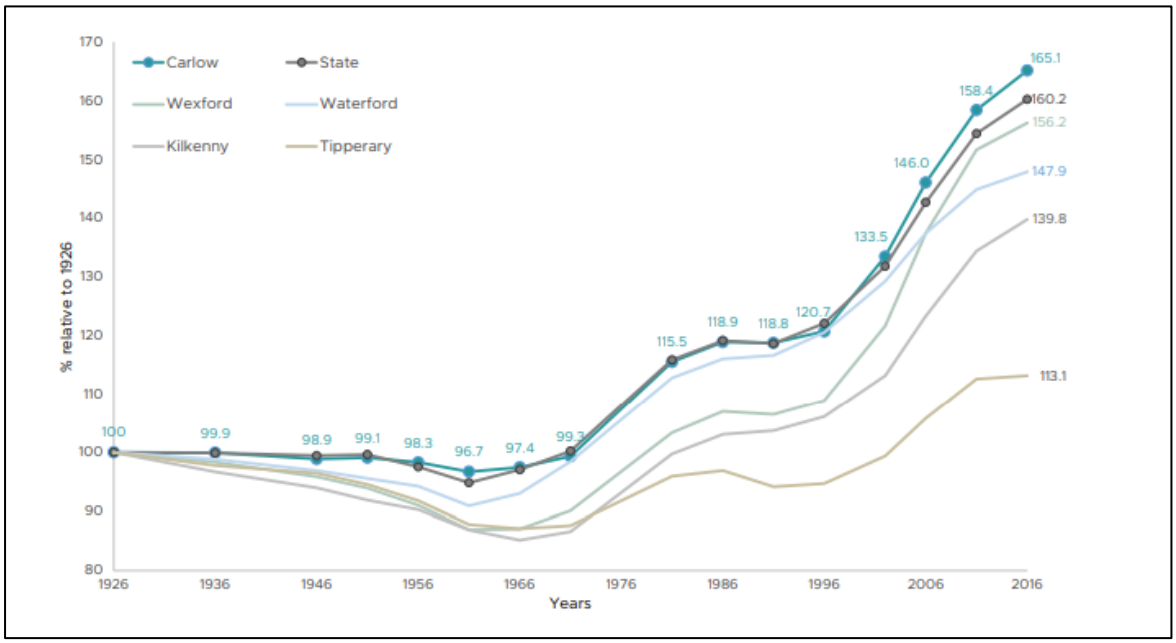
3.2 Population Change

The Central Statistics Office (CSO) stated that the population of County Carlow jumped 8.8% between 2016 and 2022 from 56,932 to 61,931 according to the preliminary results. This compares to a national increase of 7.6% demonstrating that County Carlow has had an above average population growth. The increase of nearly 5,000 was made up of a natural increase (births minus deaths) of 2,192 and an estimated net inward migration of 2,807. The population of Laois rose from 84,697 in 2016 to 91,657 in 2022, with 3,658 made up of a natural increase and 3,302 due to an estimated net inward migration. As only preliminary high-level data is currently available for the 2022 census the majority of the commentary in this section relates to the 2016 Census data.

The 2016 Census population count of 56,932 for County Carlow means that the County is the least populated relative to surrounding areas and has the third lowest population across Ireland. County Laois is reported to have a population of 84,697 in the 2016 Census, Kilkenny had a population of 99,232, Kildare had a population of 222,504 and Wicklow had a population of 142,425.

The population change for the Carlow County and the South East region between 1920 and 2020 is presented below in **Figure 3-1.**

Figure 3-1: Population Change in the South East Region between 1920 and 2020

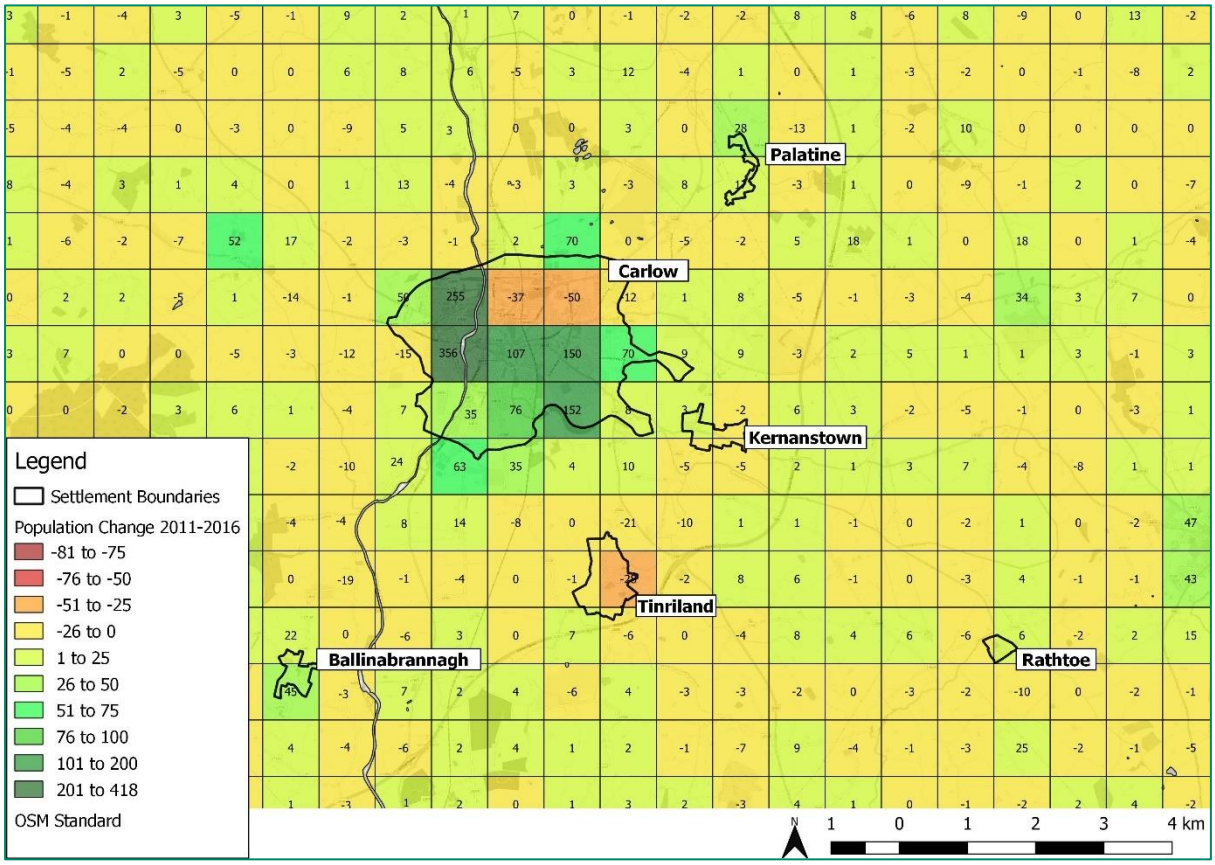


Carlow has the highest longitudinal population growth relative to other counties in the South East. However, since the mid-1990s Carlow's population growth rate has lagged behind its neighbours such as Laois, Kildare, and Wicklow. These three counties experienced unprecedented levels of population growth due to the expansion of the commuter belt around the Greater Dublin Area (GDA) – driven by the buoyant property market and improved transport connectivity.

Furthermore, the influence of the GDA is evident in Carlow's internal spatial patterns in respect of population change. Growth rates are consistently highest in those parts of Carlow that are most accessible to Dublin. This includes towns and villages in the north of the county, namely Tullow, Palatine and Rathvilly, and laterally settlements along the M9 in the west and northwest of the county such as Ballinabrannagh, Kernanstown and Leighlinbridge. The outskirts of Carlow Town have also experienced population increases, due to a process of suburbanisation, and there is evidence of a demographic recovery in the town core as well. In contrast, population levels are more stagnant in rural Carlow, and areas of decline persist in parts of the south.

Figure 3-2 shows the change in population between the 2011 census and 2016 census on square kilometre grids for the Carlow settlement and the surrounding areas. The analysis demonstrates that areas closer to large settlements, such as Carlow, have greater levels of population change. Rural areas experienced lower growth rates with many square kilometres having a very small or no population increase. Within the Carlow settlement itself, most areas experienced population increases, with the highest increase observed to the west of the River Barrow.

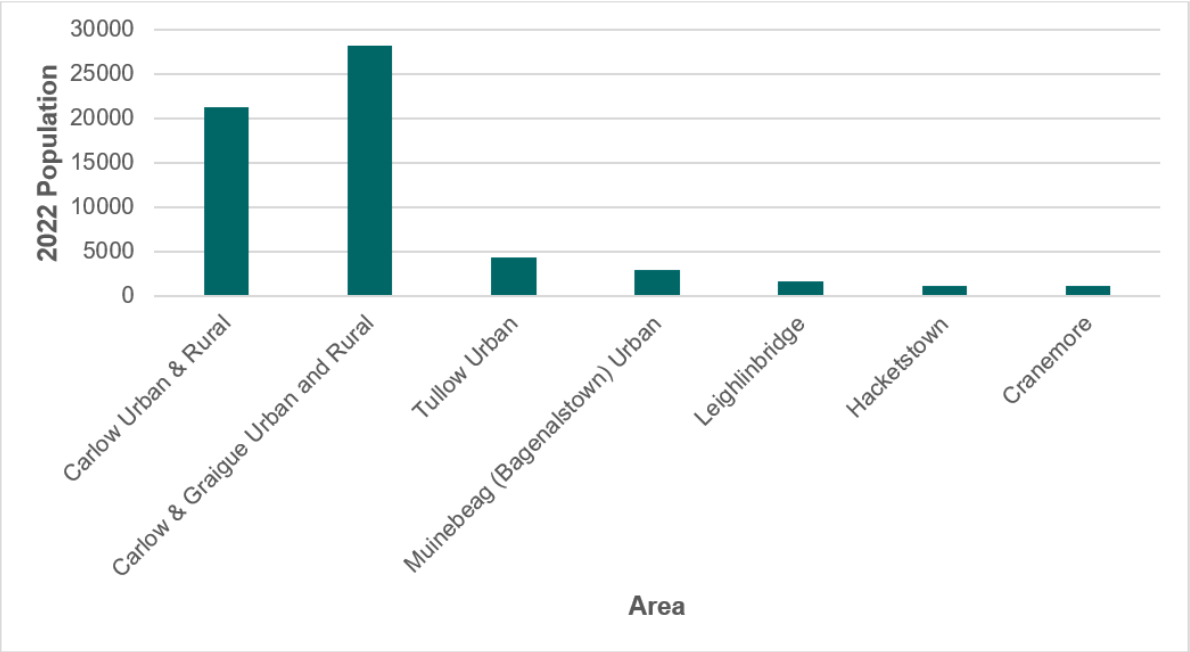
Figure 3-2: Regional Population Change on square km Grid (2011 – 2016)



Source: Census 2011 and Census 2016

The following figure sets out the population distribution across County Carlow based on 2022 population data. Note that due to the data being provided by electoral division (ED) some EDs have been grouped to best represent Carlow Town and the ABTA study area. The other EDs shown in the graph are those within the County Carlow area with a population above 1200. This demonstrates that in comparison to the county, Carlow Town has a very large population. The population for Carlow Urban and Carlow Urban/Rural is 21,246; making up 34% of the total County Carlow population. The next most densely populated ED is Tullow Urban with a population of 4,405 totalling only 7% of the County Carlow population. This data shows how populated Carlow Town is and how essential it is to provide a sound transport network to provide reasonable connections for residents and allow the town to thrive.

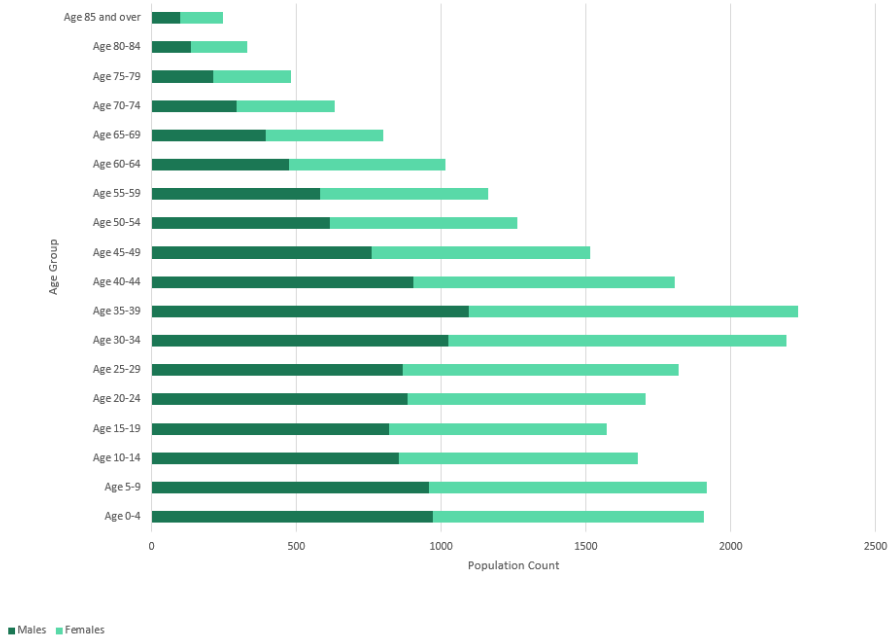
Figure 3-3: Population Distribution County Carlow



Source: CSO

Figure 3-4 shows the population pyramid for the Carlow settlement, as this is the closest available dataset to represent the ABTA study area, based on 2016 Census data. The population distribution between genders is almost evenly distributed with almost equal split between males and females, with only 392 more females than males (pink illustrates females, blue illustrates males). The Carlow settlement also has a distinctively younger population relative to the rest of the country. Just under half (47.7%) of its population is aged 34 or below, with a particular concentration of 25–34-year-olds (13.2%) according to the 2016 census. Overall, the working age population (those aged 15-64) accounts for 64.9% of the total population.

Figure 3-4: Carlow Settlement Population Pyramid



Source: CSO

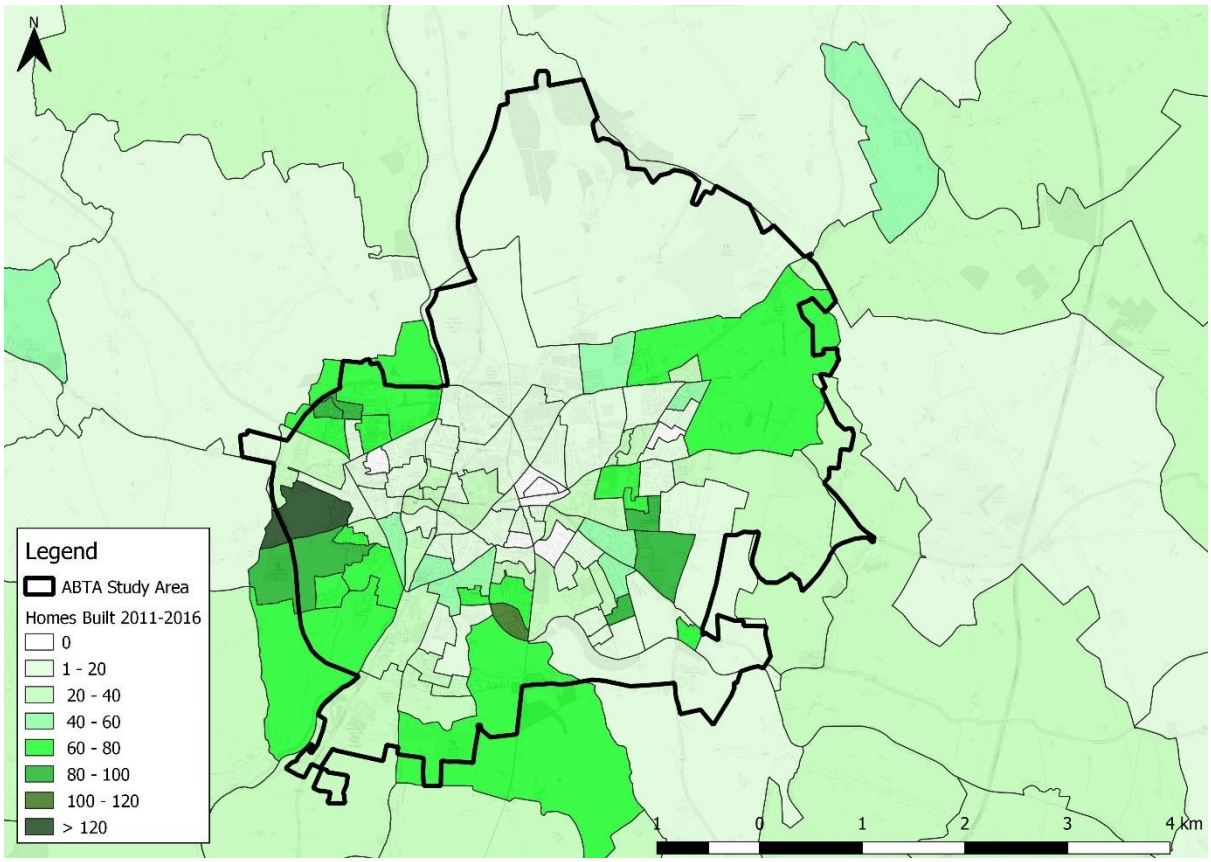
Demographic patterns and trends are closely related to economic factors, in particular the availability of, and ease of access to, employment. It is clear that Carlow is a significant employment base in the County, although other small towns, most notably Tullow, do host a considerable number of jobs. Therefore, population rises, and employment forecasts will produce increased travel demand in the town, and this must be accommodated for through the transport network provision. However, it is essential to promote sustainable travel, through various means, to prevent further car dependency. Additionally, it must be noted that evidence has demonstrated people are commuting to the Dublin area for work, so it is important that sustainable linkages between the Carlow Graiguecullen study area and external destinations are also supported.

3.3 Residential Construction

Figure 3-5 displays houses built between 2001 and 2016. The map is colour coded based on the number of homes built in different areas of Carlow, with lightest demonstrating fewer homes built between 2001 and 2016 and darker showing more homes built. Note that areas which have no colour indicate no homes were built within these areas between 2001 and 2016.

The map demonstrates that the majority of new home provision, between 2001 and 2016, was further towards the edges of the Carlow Graiguecullen study area and away from the core town centre. This supports the fact that urban sprawl as well as suburbanisation has taken place. The area with the greatest number of homes built in this time is situated in Graiguecullen to the west of Carlow Town centre as well as one small area to the south of Carlow Town centre near Mill Stream. Contrastingly, much of the area in the Northern section experienced only slight increased housing provision. The map highlights that many new homes are further away from key amenities or workplace zones, which are predominantly situated in the core centre, and suggests people will have to travel further distances. This may make active modes a less practical or desirable option and could increase the likelihood of car trips. Therefore, it is important that new homes provided remain in close proximity to employment opportunities in order to prevent further intensification of the suburbanisation and car dependency and an inability or unwillingness to use more sustainable travel options does not continue.

Figure 3-5: Number of Houses Constructed During 2001-2016 (Census, 2016)

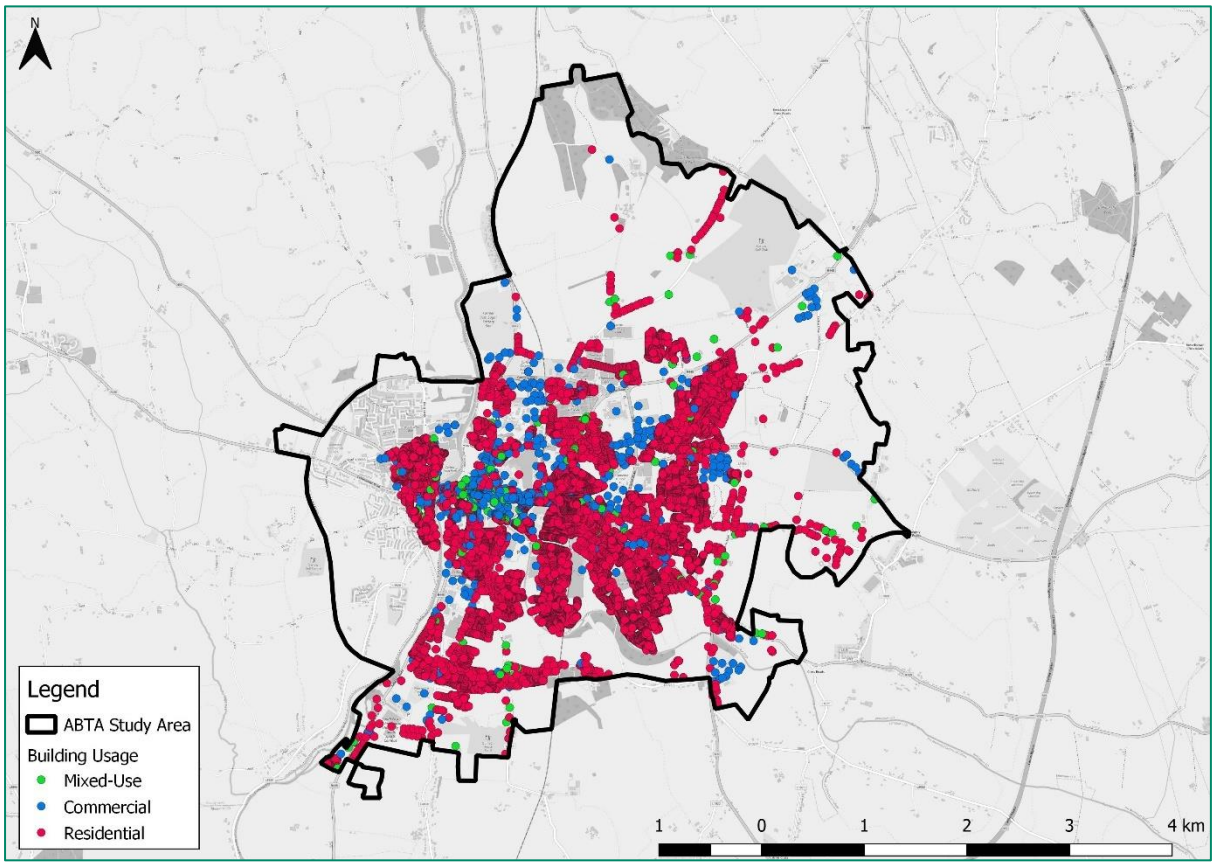


Source: CSO small area statistics (Census 2016)

3.4 Land Use Composition

Figure 3-6 provides an overview of the split between commercial and residential buildings in County Carlow, limited to the Carlow Graiguecullen study area, using the GeoDirectory dataset. The figure demonstrates that the majority of buildings in the study area are classified as residential, with 83% of buildings falling into this classification. The majority of these residential buildings are situated to the south and east of the town. Whereas, in the central urban core, for example streets such as Kennedy Avenue and Tullow Street, most of the buildings are classified as commercial. Overall, 7% of the buildings in the area are considered commercial. In addition to this there are mixed use buildings which host both residential and commercial facilities. These are present along Burrin Street, in the town centre, as well as outside the immediate town centre and particularly along radial routes. Mixed use buildings accounts for 10% of the buildings. The data demonstrates there is a large volume of residential homes within walking and cycling distance of commercial or mixed-use premises – this shows the potential to capture a modal-shift and increase sustainable travel if infrastructure improvements are provided.

Figure 3-6: Residential and Commercial Buildings in Carlow Graiguecullen



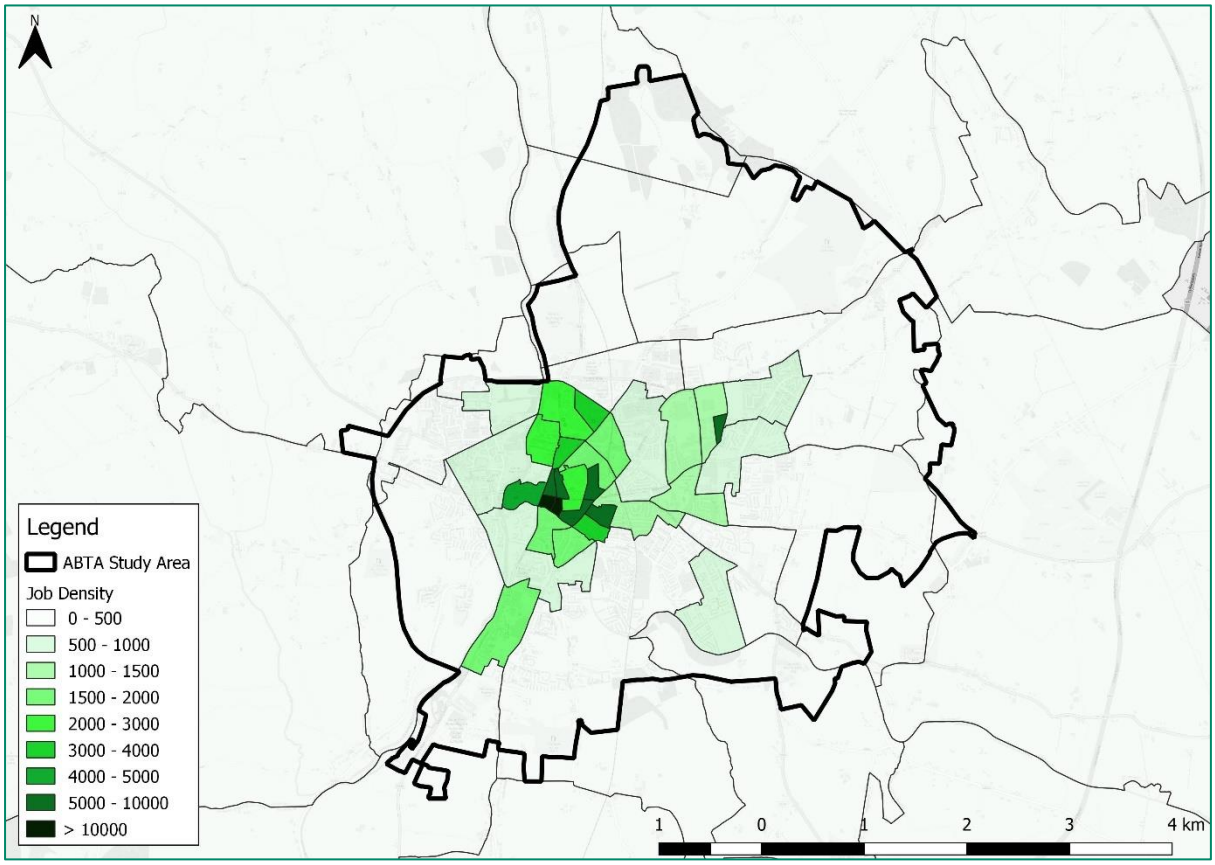
Source: GeoDirectory

3.5 Job Density

Figure 3-7 shows the density of jobs in Carlow based on CSO Workplace Zones in 2016. The image demonstrates that the highest densities per workplace zone are found in Carlow Town centre. This is as expected due to many employers been situated in this area. There is retail, hospitality, offices, educational facilities, the courthouse, hospitals and so on which will all offer various employment opportunities. Outside of the town centre, towards the edge of Carlow Town and the study area, the job densities reduce, which is not uncommon. However, there are out-of-town areas which do still retain relatively high job densities, and this is shown on the map. For example, to the east of Carlow Town centre, near the N80, there are many business parks explaining why job densities remain higher than other typical suburban areas. In particular, there is one workplace zone which has a job density of between 5000 and 10000. In addition to this area, the workplace zone in which SETU sits also shows to have a high job density and this supports the fact that SETU is a major employer in the area. Generally, the map is a helpful tool to infer where many of those who are employed within the study

area are likely to work and show where trip demand will be highest. This is important to ensure infrastructure provisions connect people to key places.

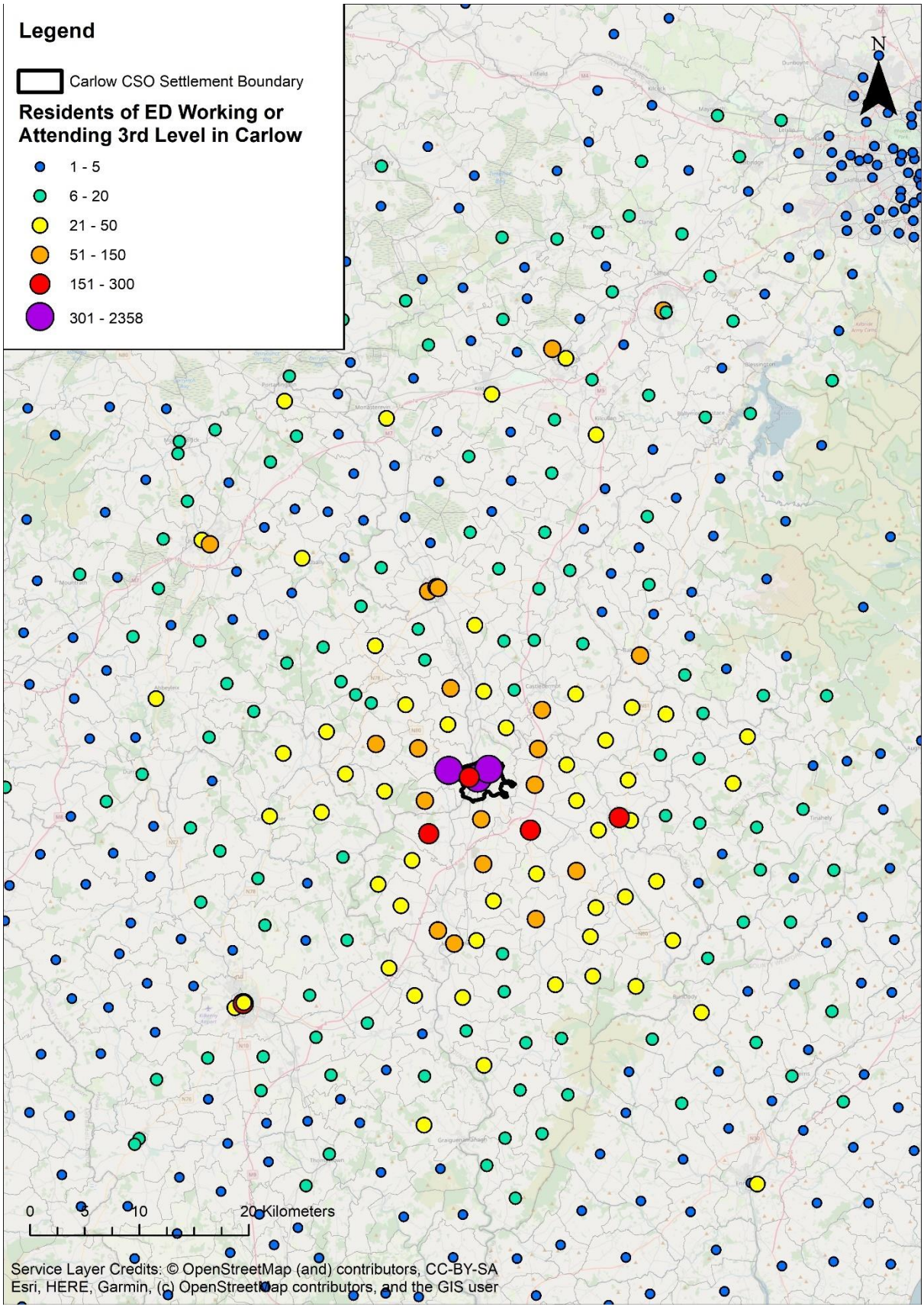
Figure 3-7: Job Density in Carlow Graiguecullen



Source: CSO Workplace Zones (2016)

Figure 3-8 shows the origins for those working in or attending a 3rd-level institution in the Carlow settlement, from any national origin, based on POWSCAR (2016). The map highlights that the origins of these trips are spread over a wide geographical area, however, as expected the majority of large origin creators are areas which lie closer to Carlow. With the exception of Graigue Rural and the areas within the Carlow CSO settlement boundary there are four areas producing between 151-300 trips, these are the Clogrenan, Kellistown, Tullow, and Kilkenny. This demonstrates there is some demand for people travelling into Carlow for work or further study. Again, this is supported by the varying origins of trips with these purposes. The high number of electoral divisions, albeit only producing between 1-5 trips, in or near Dublin show there is a potential link between Carlow and Dublin for work or study purposes and perhaps connections between these areas, and other regional major towns, need to be enhanced.

Figure 3-8: POWSCAR 2016 – Origins for Those Working or Attending a 3rd-Level in Carlow

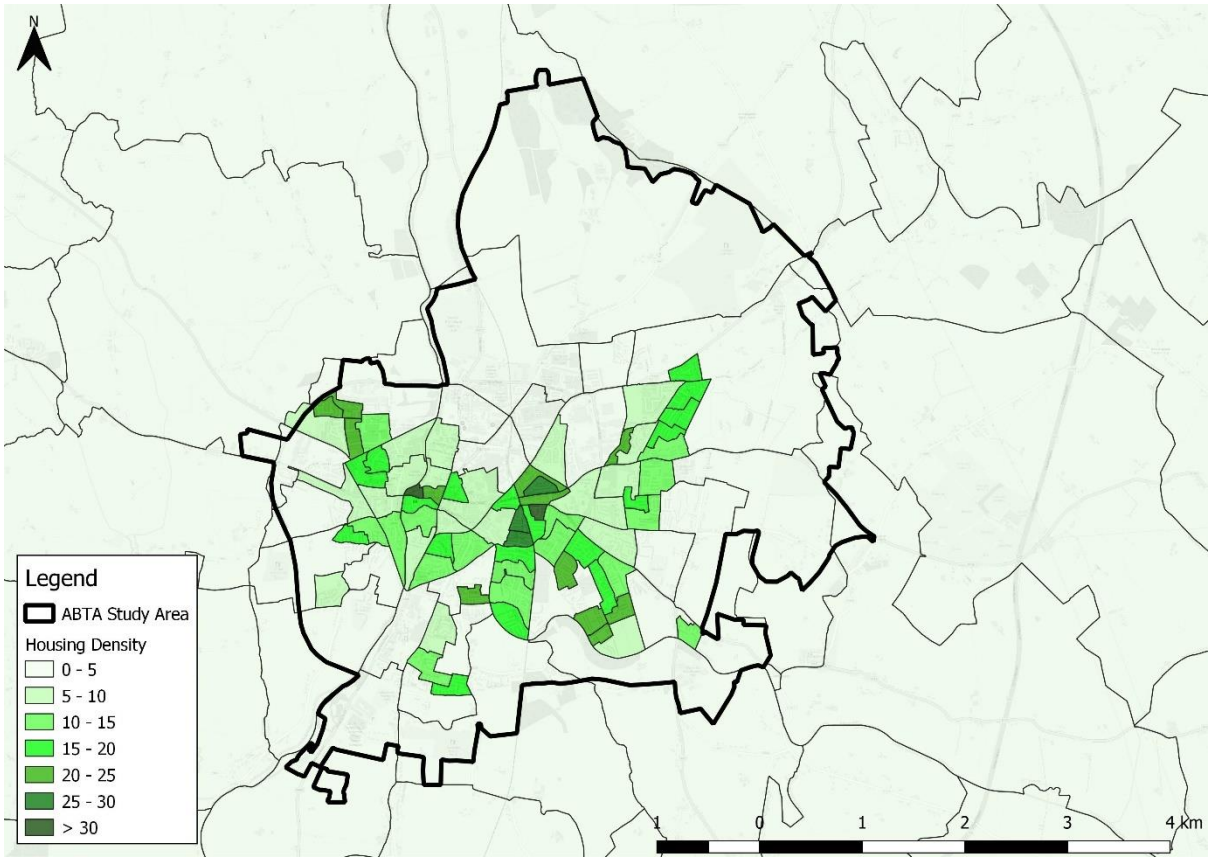


3.6 Housing Density

Figure 3-9 shows the housing density in the study area according to the number of residential units per hectare. The map highlights residential densities are lowest to the north of Carlow Town, near to the N80 as well as in certain pockets to the south of the town centre and more rural sections of Laois. The data indicates that some of these settlements have residential densities as low as 0.1 homes per hectare. Low residential densities do create implications when providing local public transport as routes with low patronage can potentially be not economically viable. Therefore, smart ways to serve such areas, for example by including low density areas on a route which has other major trip producers (employers and residential estates), to provide inclusive opportunities and prevent isolation and car dependency, are important. Additionally, in the case of the lower densities by the N80, it seems feasible a bus service may be an option along the N80 to provide good connections to employment opportunities.

Opposingly, highest housing densities are found within the immediate areas surrounding Carlow Town centre, especially in the area to the right of River Barrow and north of Bridge Street, and pockets to both the east and west of the town. These are areas which are likely to generate a lot of demand for trips, therefore, if high-quality infrastructure can be provided here then a large number of modal-shifts towards sustainable transport may be captured. However, it must be noted that infrastructure and promotion must combine to create a transport network which is attractive, reliable, and affordable otherwise increased usage is unlikely.

Figure 3-9: Census Small Areas (2016) – Housing Density (Ha)



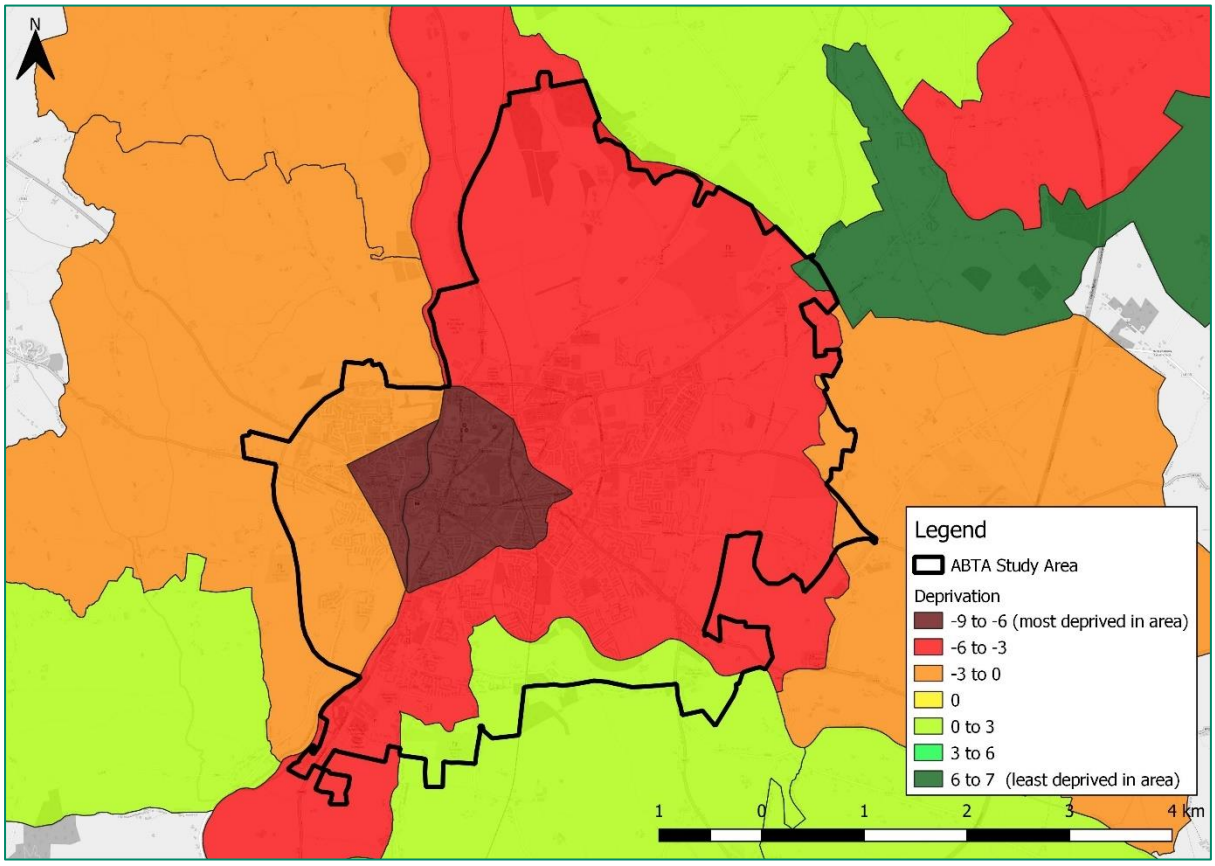
3.7 Deprivation Index

The Pobal HP Deprivation Index (2016) is a series of maps measuring the relative affluence or disadvantage of a particular geographical area. It is developed based on small-area statistics that relate to between 80 and 100 households on average, showing the extent to which, every neighbourhood, suburb and village is affluent or deprived. Deprivation has demonstrated strong correlations with a range of health and social outcome measures and in many countries, outcomes are worst in the most deprived areas.

At the county level the 2016 Pobal HP Deprivation Index for Carlow is -3.66, which is considered marginally below average, and is slightly worse that the 2011 and 2006 classifications of -3.41 and -2.81 respectively.

Figure 3-10 below shows the 2016 Pobal HP Deprivation Index at Electoral Division level. The map shows that Carlow Town centre core suffers from high levels of deprivation; these levels are the worst seen throughout the ABTA study area. Beyond these areas, somewhat alleviated levels of deprivation can be seen. For example, in Carlow Urban/Rural deprivation is between -6 and -3 and Graiguecullen Rural deprivation ranges from -3 to 0. Areas to the north east and south of the ABTA study area appear to have lower deprivation and are considered marginally above average. It is important to provide good connections for those in more deprived areas, so they have greater opportunities to access high quality jobs and education.

Figure 3-10: Carlow Graiguecullen Deprivation Indices



3.8 Schools and Education Facilities

There are 10 primary schools and 5 secondary schools considered in the Carlow Graiguecullen ABTA. In total there are 3005 children who study are primary schools within the study area and 3348 children studying at secondary schools in the study area. In addition to this, there is SETU which is the third-level institute in Carlow, situated along Kilkenny Road, which hosts around 11,000 students.

Table 3-1 provides a list of the schools in Carlow Town and the number of pupils who attend each school, with **Figure 3-11** showing the location of each school.

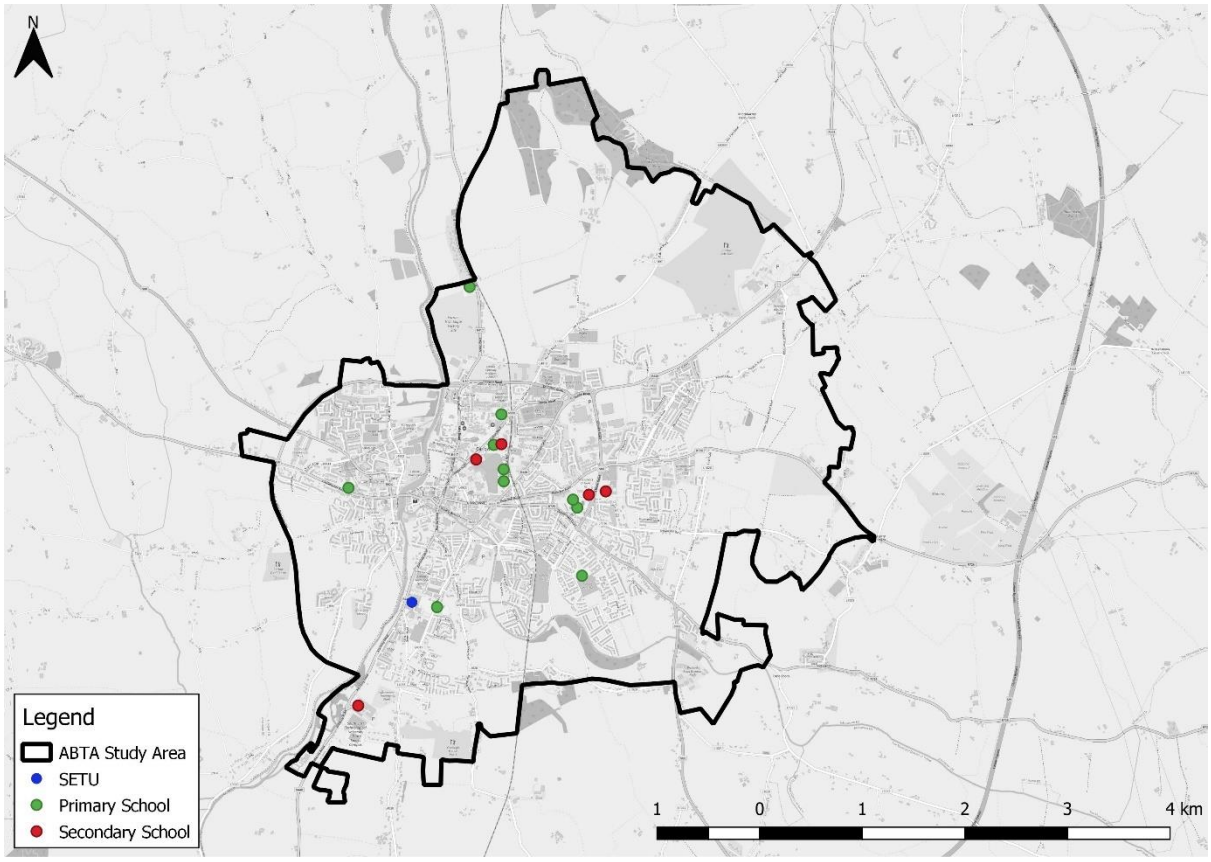
Table 3-1: Overview of Schools and Pupils in Carlow Graiguecullen Study Area (2021)

School Level	Official Name	Male Pupils	Female Pupils	Total Pupils
Primary	S.N. Naomh Fhiach	288	262	550
Primary	Scoil Naisiunta Ceatharlach	61	66	127
Primary	St. Josephs National School	115	3	118
Primary	Scoil Mhuire Gan Smal		367	367

Primary	St Laserians National School Special Sc	102	51	153
Primary	Bishop Foley Memorial School	213		213
Primary	Gaelscoil Eoghan Ui Thuairisc	244	222	466
Primary	Holy Family Girls National School		312	312
Primary	Holy Family Boys National School	286		286
Primary	Carlow Educate Together National School	220	193	413
Total		**1529**	**1476**	**3005**
Secondary	St. Leo's College		944	944
Secondary	Gaelcholáiste Cheatharlach	162	197	359
Secondary	Presentation College	395	408	803
Secondary	St Mary's Academy CBS	449		449
Secondary	Tyndall College	410	383	793
Total		**1416**	**1932**	**3348**
Higher Education	South East Technological University			**11000**

Most of the schools are within walkable or cycling distance from nearby residential areas, with the exception of Carlow Educate Together in the north and the SETU campus along with Tyndall College to the southwest. Four of the primary schools are in close proximity to Carlow rail station, one is situated in Graiguecullen, one near SETU along Green Road, one in a residential area to the southeast and a further two in Askea. In terms of secondary school establishments, there are two nearby to the railway station, two to the east of Carlow Town Centre, and then Tyndall College located south of Carlow. The SETU campus is located south of Carlow Town and is approximately a 15-minute walk. The 10-minute town policy report, completed by Arup, mentioned those who reside in the northeast section of Carlow are a further distance from the schools and therefore they fall outside the typical 10-minute walking catchment.

Figure 3-11: Carlow Graiguecullen School Locations



As mentioned in the demographics, Carlow settlement has a relatively young population compared to the national average, and the large student body will produce a high volume of education related trips, in order to access the learning centres. This provides an incentive to invest in more sustainable travel infrastructure, particularly along routes to educational facilities, to boost the usage of such modes. In the long run this can help contribute to a cleaner environment as well as a healthier more vibrant population.

3.9 PESTLE Analysis

Global trends and emerging themes will have an impact on the direction of Carlow's economy. To identify these global thematic trends, an in-depth Political, Economic, Social, Technological, Environmental & Legal (PESTEL) Analysis was undertaken.

Political

Any changes in political leadership would potentially impact on policies related to public health, housing, transport and so on. This may then directly affect local authorities' abilities to deliver key services. The impact of COVID-19 has also led to significant borrowing by the ex-chequer. This is debt that will have to be serviced over time and this could potentially lead to further impacts, such as increased business tax to generate additional funds – and this could have a great impact on Carlow and Graiguecullen where the majority of businesses are SMEs.

Economic

Ireland is internationally recognised among the top 25 of 190 economies to do business with. This reputation boosts Carlow Town's success in attracting inward investment from multi-national businesses and further strengthens the foundation for economic success. 50% of planned growth in Carlow is expected to occur in regional centres, towns, villages, and rural areas. Ireland 2040 provides the development framework with Carlow will work within to ensure transformational growth like that witnessed in the bigger cities like Dublin.

The Irish GDP contracted by 6.5% due to the reduce output from the retail, leisure, hospitality, and construction sectors during the COVID-19 safeguarding measures. High inflation and labour market

shortages continue to be a threat to economic stability. However, the recovery is underway and employment opportunities to continue to prove plentiful. There are skill shortages in certain sectors, like construction, engineering, and technology which are all significant job sources in the study area and therefore could be an issue in the foreseeable future. Although, as Carlow has an above national average proportion of the workforce with a technical qualification or apprenticeship, the supply of labour relative to demand should be evenly matched and assist in the post-pandemic recovery. It is likely that key employment sectors in Carlow, like construction and manufacturing, will be affected by the National Development Plan and Housing for All strategy.

Tourism remains an untapped potential resource for Carlow and Graiguecullen. Gains in this industry can be harnessed through utilising the Tourism Strategy and Action Plan 2020-2025. The aims to increase the County's tourism profile and market Carlow Graiguecullen as a holiday destination for both short-distance and long-distance trips. Agriculture is another large sector, especially when compared to the rest of the country, in Carlow 7.3% of the population is engaged within the industry compared to the national average of 4.4%. This industry is a major contributor to the Agri-food business economy in Carlow and aligns itself with the reformed EU CAP. Agri-tourism provides another avenue to generate more income for the area and provide opportunities of diversification of the local economy.

Project Carlow 2040 recognises the County's role in the region as a major economic hub. This goes hand in hand with ensuring the town is vibrant and full of vitality to reap benefits from the evening economy given the large student body relative to its size.

Social

Population projections from CSO have indicated that the proportion of those aged 65 years and over will continue to increase significantly in the coming years. Across Ireland, it is forecasted that 1.6 million people with be aged 65 or over by 2051, this is compared to around 630,000 in 2016 when the Census was undertaken. This means that in Ireland by 2051 roughly 20% of the population will be 65 or older compared to only 10% of the population now. Such a large proportion of older people can create significant fiscal implications for public policy and health services.

Furthermore, Carlow settlement has a younger population than many other areas across Ireland and the dependency ratio of the area is above the Irish average. Therefore, planning needs to focus on providing for the needs of the young population as they approach adulthood. The provision of high-quality education and a range of good job opportunities needs to be a priority in both Carlow and Graiguecullen.

The pandemic presented new opportunities for remote working. However, in the post-pandemic period the desire for remote working and/or a hybrid working style (part remote and part office based) has remained a popular option. However, businesses and towns need to ensure they can support and suit this new working style by providing appropriate remote working infrastructure. In particular, there is an opportunity for those who work in Dublin to live in Carlow, if suitable infrastructure is provided, where they could receive a higher life quality and experience a reduced living costs but still remain employed in the high-skilled and high-paid job they have in Dublin.

Technological

Technological advances and automation do pose a threat for jobs in certain industries. However, it is assumed that this would be matched with the creation of more jobs in sectors where skills cannot be readily automated, such as health and research and development. These markets are major employers in the study area. Furthermore, the 'innovate to zero' revolution is also becoming much more important, with continuous efforts to strive for zero emissions, zero accidents, zero data breaches, and so on. This is massively important in Ireland and across Europe and Carlow Graiguecullen will have a role to play, no matter how small. Therefore, it is important that Carlow Town can make committed contributions to such targets by measures such as providing a high-quality segregated active mode network, reducing car dependence, and providing improved internet connections as well as technology for current and future businesses in the area. If such gains can be captured in Carlow and Graiguecullen, it will bring about large benefits to assist with national goals and also improve the town for businesses and residents.

Legal

Ireland's legal systems regulatory aim is the freedom to do business. From a legal perspective, the most relevant aspects relate to changes to the planning legislation in order to support growth. Ireland 2040 notes that reforms of planning legislation in 2010 introduced a new approach to justifying land use zoning objectives in local authority plans. This ensures that sufficient land is provided for future development, but not so much that development becomes difficult to coordinate or undermines the need to regenerate existing but under occupied and run-down urban areas.

Environmental

Environmental challenges, which are arising due to climate change, are evident across Ireland. CCC have developed the Carlow Climate Change Adaptation Strategy 2019-2024 to address such challenges. Nationally, the Climate Action and Low Carbon Development (Amendment) Act was signed into law in July 2021. This works on the basis of providing carbon budgets which heavily influence the strategies of local areas, economic sectors, and businesses as they try and cut emissions. The national climate plans set the main target of carbon neutrality by 2050 and a subsidiary target of a 51% reduction in greenhouse gas emissions by 2030 relative to 2018 emission levels. To work towards these targets, Carlow, Kilkenny, and Wexford created the 3 Counties Energy Agency (3cea) which acts as an energy and emissions data observatory. The 3cea published an Energy Transition Strategy 2020-2030 which set out the aims for the three counties to be users of clean energy, energy efficient, and sustainable during the plan period. Additionally, the Government Climate Action Fund can be expected to further support CCC in its efforts to advance its sustainability and environmental improvements.

4. Existing Travel Demand

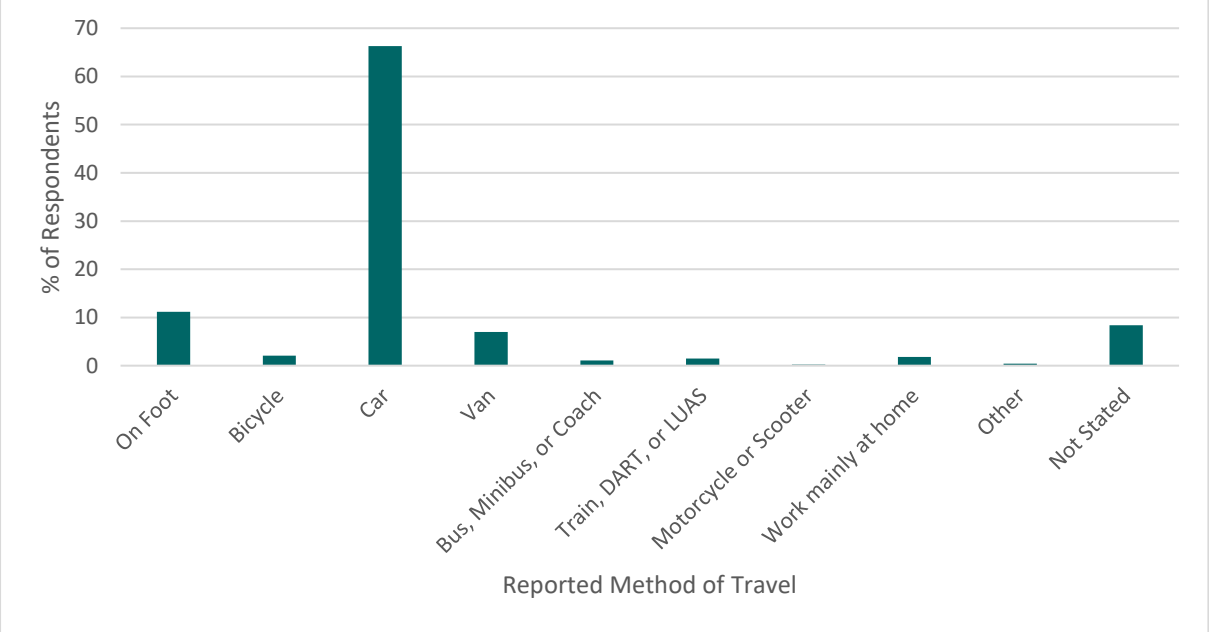
This section provides an overview of travel demand within the study area. The analysis looks at mode of transport, as well as where people are travelling to/from in the study area.

4.1 Modal Split Analysis

4.1.1 Work Trips

Figure 4-1 shows the modal split for travelling to work for Carlow settlement residents. The figure highlights that around 66% of residents travel to work by car, as either a driver or passenger. Furthermore, 7% of residents travel to work via van, resulting in a total of 73% of the population travelling to work in a private vehicle. This shows the significant car usage and car dependency in Carlow, which in turn assisted in producing some of the objectives of this ABTA; to encourage and promote modal shift to enable both environmental and physical health / mental wellbeing improvements to be captured. In terms of active mode transport, 11% of residents travel to work on foot and a further 2% travel to work on their bicycle, demonstrating the low usage of active modes, in particular cycling, for accessing the workplace. This highlights that there are barriers to active mode use as a means of travelling to work; possibly due to the lack of convenient safe routes or the option is seen as unattractive. Bus and rail services in Carlow are also not commonly used for commuting, with only 1.1% and 1.5% using the bus services and rail services respectively. Similarly, to active modes, this demonstrates that these services are not seen as a viable option for commuting trips highlighting the need for both improvements to infrastructure and increased promotion of the mode. Increasing the use of public transport and active mode travel, whilst decreasing private vehicle usage, is essential to hit wider national and regional ambitions. It should be noted that the data is from 2016, the work from home percentage may have changed alongside some of the travel patterns. However, it is likely that the pandemic restrictions have made car usage even more predominant.

Figure 4-1: Mode of Travel to Work for Carlow Town



Source: Census (2016)

Table 4-1 compares the modal split for travel to work in Carlow and neighbouring counties. The percentage of residents commuting on foot is slightly higher than the average for the neighbouring counties, and the percentage cycling is aligned with the average. This demonstrates that although walking and cycling trips are low for commuting in County Carlow, the trend is similar across other counties. The usage of public transport, both rail and bus services, in County Carlow for commuting is one of the lowest across the neighbouring counties. This highlights that the public transport provision in Carlow requires improvement to capture a modal shift and make these modes more feasible and attractive. Again, in County Carlow, car dependency is high, but this is not unusual when compared to

the other counties. This ABTA will seek to shift modal choices for travel to work to sustainable modes such as walking, cycling, bus, and rail.

Table 4-1: County Comparison of Mode of Travel to Work

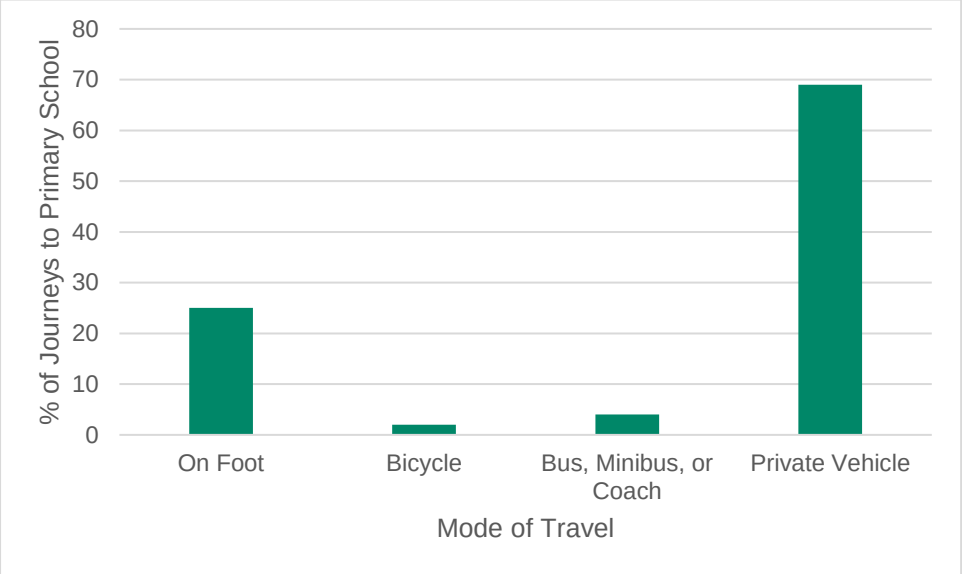
County / Area	On Foot	Bicycle	Private Vehicle	Bus	Rail
Carlow	7.5%	1.1%	76.9%	0.9%	1.0%
Kildare	6.0%	1.3%	75.0%	4.8%	5.1%
Kilkenny	7.9%	1.4%	77.2%	0.9%	0.5%
Laois	5.7%	0.8%	77.3%	1.4%	2.6%
Wexford	7.5%	0.8%	77.8%	1.3%	0.3%
Wicklow	6.6%	1.0%	71.9%	4.1%	5.8%

Source: Census 2016

4.1.2 Education Trips

Figure 4-2 shows the modal split for travel to primary school in the Carlow settlement. This is based on the POWSCAR analysis, informed by Census 2016 data. The data demonstrates that the main mode of transport to primary school is the private vehicle, with nearly 70% of students using this mode. The next most commonly used mode of travel for accessing primary school is on foot, however, in comparison the mode share for this is roughly 25%. Both cycling and the use of bus, minibus, or coach to access primary education is very limited.

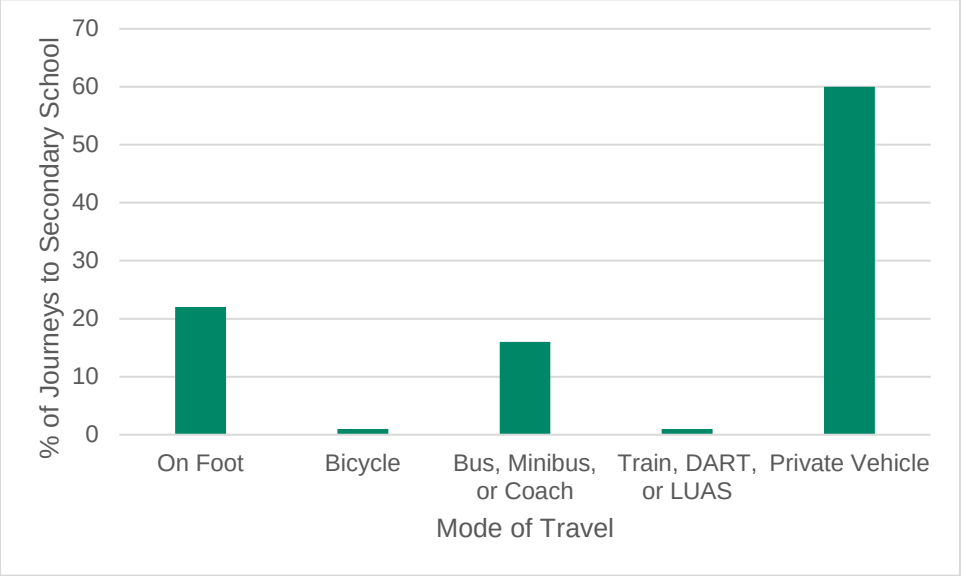
Figure 4-2: Mode of Travel to Primary School in Carlow



Source: Census (2016)

The figure below (Figure 4-3) shows the mode of travel used to access secondary schools in the Carlow settlement. Again, this is informed by the POWSCAR analysis based upon the Census 2016 data. Similar to primary school, the use of the private vehicle to access secondary school facilities is the majority option, however, the percentage of modal share falls to 60%. Walking is still the second most common option, with just over 20% of the modal share. Unlike primary school travel, the data demonstrates that for travelling to secondary school the use of bus, minibus, or coach has a larger modal share at over 15%. There is a very limited use of the train for accessing secondary school, up slightly from no reported use for accessing primary school. Cycling usage remains low.

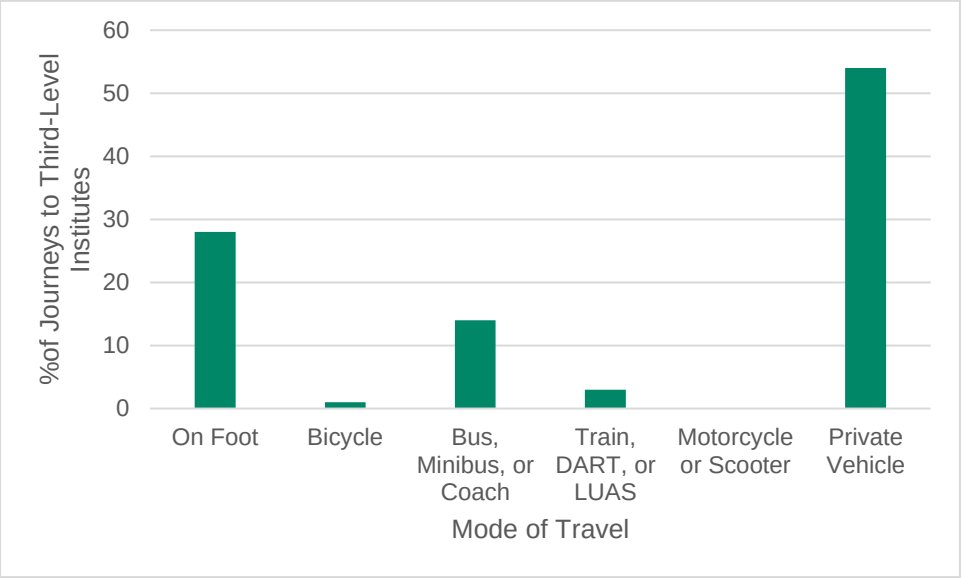
Figure 4-3: Mode of Travel to Secondary School Carlow



Source: Census (2016)

The figure below (Figure 4-4) shows the mode of travel used to access third-level institutions in the Carlow settlement. Similar to above, this is informed by the POWSCAR analysis based upon the Census 2016 data. In comparison to primary and secondary data shown above, the modal split is different from third-level institutes, and this is likely due to the very different nature of the typical education day. The most commonly used mode for accessing third-level institutes in Carlow is by private vehicle, at over 50%, however, in the case of third-level institutions more students are listed as drivers than passengers in a greater breakdown of the data. The use of walking makes up pushing 30% of the modal share, meaning this mode is used more to access third-level institutes than primary or secondary education. The use of public transport is still low, the percentage of modal share taken up by bus, minibus, or coach is similar to that of secondary school. Although, the use of train is slightly higher, and this is most likely caused by people travelling greater distances to access the third-level institute.

Figure 4-4: Mode of Travel to Third-Level Institution in Carlow



Source: Census (2016)

Table 4-2 shows the means of travel to education for the population of County Carlow as well as the neighbouring counties. County Carlow has the second highest percentage of the population who travel to their place of education on foot, with 24.1% utilising this mode, with only Kildare experiencing a higher percentage. However, cycling usage for travelling to school or college is much lower, albeit it is aligned with the percentages seen across the neighbouring counties. This strengthens the argument that

barriers exist that limit the potential usage of this mode for educational trips. The use of the private vehicle is still the majority option for accessing education, but the percentage of residents using this mode to access education is much lower than those using the mode to access the workplace. This shows work is needed to reduce the car dependency to bring about social and environmental benefits. Furthermore, bus usage for accessing school and college is the lowest in County Carlow compared to neighbouring counties. This shows that improvements to infrastructure, as well as promotion of services, are essential to increase the usage of this sustainable mode. Rail usage is limited, although this is expected due to the short length of education trips, unless people are travelling for third-level education.

Table 4-2: County Comparison of Mode of Travel to School or College

County / Area	On Foot	Bicycle	Private Vehicle	Bus	Rail
Carlow	24.1%	1.0%	56.6%	13.2%	0.7%
Kildare	26.9%	2.0%	48.0%	17.4%	2.3%
Kilkenny	17.6%	1.0%	57.2%	20.5%	0.5%
Laois	15.3%	1..0%	59.6%	18.4%	1.3%
Wexford	15.8%	0.6%	59.5%	20.4%	0.3%
Wicklow	21.4%	1.0%	52.8%	17.2%	4.0%

Source: Census 2016

4.2 Origin-Destination Analysis

The Place of Work, School, or College - Census of Anonymised Records (POWSCAR, 2016) dataset was used to assess the origin and destinations of trips to and from the Carlow CSO settlement, which is used to represent the Carlow Graiguecullen study area.

4.2.1 Trips from Carlow

This section provides information on the destination of trips made by residents of the Carlow settlement.

4.2.1.1 Work and Third Level Education Trip Destinations

Table 4-3 shows the destination of work and third-level education trips[1] by residents of Carlow based on the POWSCAR (2016) dataset. This table shows that nearly half of work/college trips are internal to Carlow (44.2%) and this shows the potential that a substantial number of local trips could be catered for by walking and cycling modes, with the correct infrastructure provision. Nearly 10% of residents (pre-covid) worked from home, with this numbers expected to be higher in the 2022 Census results due to the long-term impacts of the pandemic on remote working habits. There is a relatively low volume trips to nearby towns and other settlements, for example only 611 (7%) of people make the trip to Dublin.

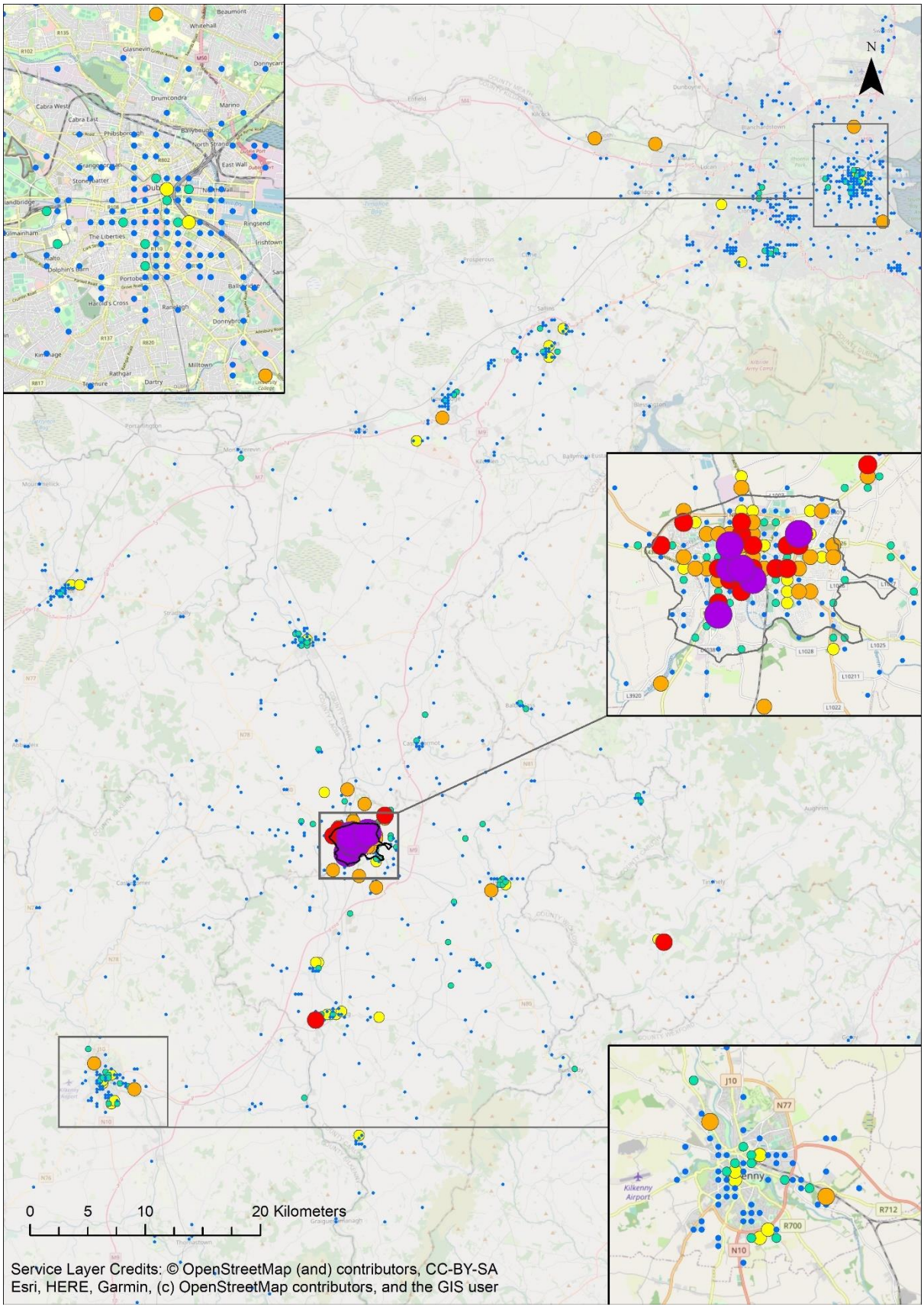
[1] Work and 3rd level trips have been combined because they involve similar independent, often long distance, travel by adults. In contrast with this, school travel is often shorter distance and escorted by a parent or involves the use of dedicated school buses rather than general public transport.

Table 4-3: POWSCAR Destination of Work and 3rd Level College Trips by Carlow Residents

Destination of Work and Third Level Trips (POWSCAR Town)	Number of Trips	Percent of all Work and Third Level Trips from Carlow
Carlow Co Carlow	3779	44.2%
Work From Home	723	8.4%
Carlow Rural	575	6.7%
Dublin city and suburbs	412	4.8%
Carlow Co. Laois	290	3.4%
Kilkenny	237	2.8%
Dublin city and suburbs	199	2.3%
Home School	197	2.3%
Kildare Rural	191	2.2%
Muinebeag (Bagenalstown)	184	2.2%
Laois Rural	122	1.4%
Wicklow Rural	121	1.4%
Athy	115	1.3%
Tullow	112	1.3%
Dun-Laoghaire Rathdown	110	1.3%
Naas	105	1.2%
Kilkenny Rural	104	1.2%
Portlaoise	94	1.1%
Newbridge	76	0.9%
Other Kildare Settlements	151	1.8%
Other Carlow Settlements	135	1.6%
Other Waterford Settlements	73	0.9%
Other Settlements	328	3.8%
Total	**8558**	

Figure 4-5 shows the destination of work and college trips by Carlow residents spatially. This demonstrates the themes explained in the table in geographic form, showing a large cluster in Carlow town and smaller clusters in Kilkenny, Naas, Newbridge and Portlaoise. It also highlights the dispersed trip destinations to the Dublin suburbs which will be more challenging to reach by public transport and likely contribute to car dependency. It may be the case in the future that different public transport upgrades which could make these locations more accessible to residents from Carlow.

Figure 4-5: POWSCAR Destination of Work and 3rd Level College Trips by Carlow Residents



4.2.1.2 Primary and Secondary Level Education Trip Destinations

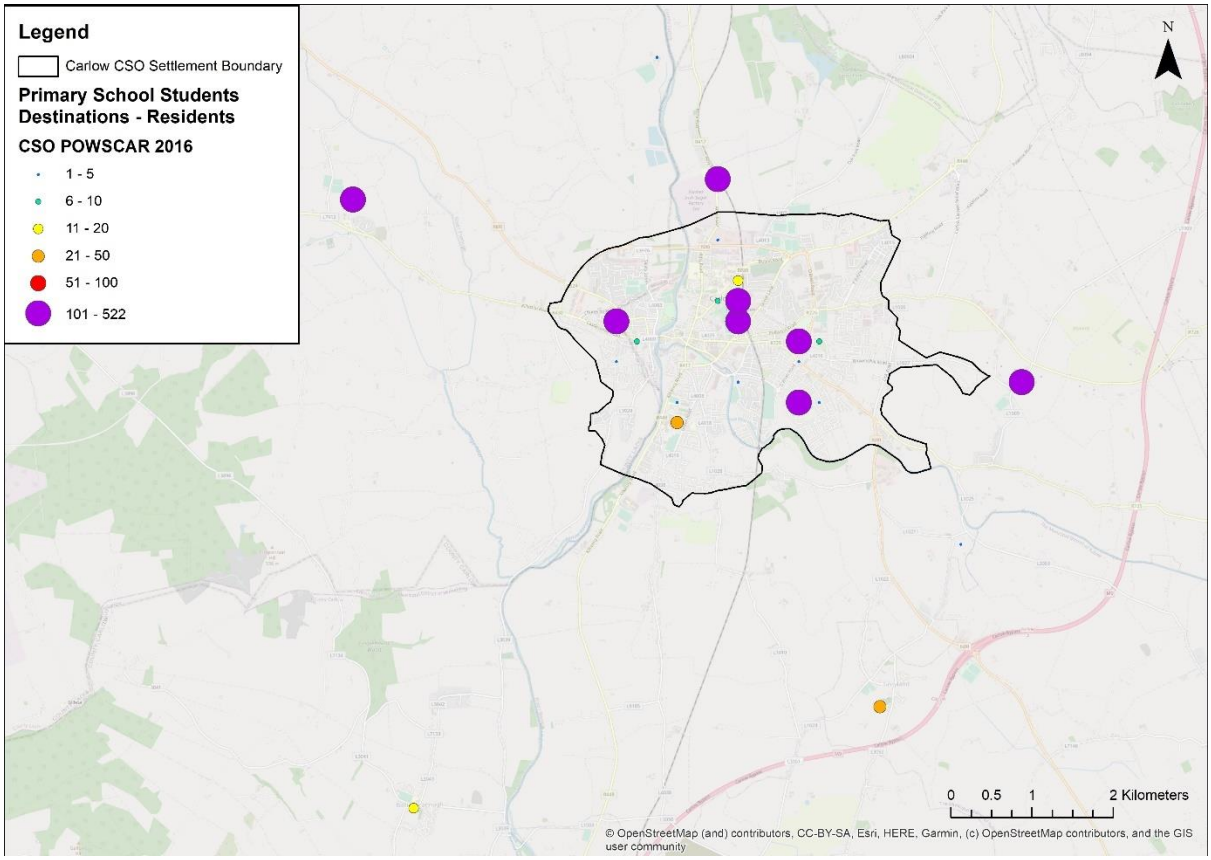
The data highlights that the majority of children residing in Carlow are also attending primary school in the area. 60.6% of the Carlow CSO primary school trips have a destination of Carlow, County Carlow. Following on from this, 15.2% and 13.6% of primary school trips originating in Carlow CSO are destined for Carlow, County Laois and Carlow Rural respectively. This demonstrates that trip distances, especially for those in Carlow, County Carlow and Carlow, County Laois, are likely to be within a reasonable walking or cycling distance. Therefore, if the correct infrastructure was provided, and more sustainable transport options became a viable option, then a modal shift for primary school travel could be captured. If a modal shift occurred, it would greatly reduce the usage of private vehicle to access schools in the study area which would generate a range of benefits. This includes alleviating congestion, and its adverse impacts, and improving physical and mental health if more physical activity is undertaken on the journey to school. It could be more challenging to convert trips for those travelling to Rural Carlow or further afield, who due to a potential lack of demand for connections may remain reliant on private vehicle. **Table 4-4** shows the destination of primary school trips by Carlow residents, as informed by POWSCAR 2016 data.

Table 4-4: POWSCAR Destination of Primary School Trips by Carlow Residents

Destination of Primary School Trips (POWSCAR Town)	Number of Trips	Percent of all Destination of Primary School Trips from Carlow
Carlow Co Carlow	1466	60.6%
Carlow Co. Laois	368	15.2%
Carlow Rural	329	13.6%
Laois Rural	140	5.8%
Tinriland	40	1.7%
Ballinabrannagh	15	0.6%
Leighlinbridge	10	0.4%
Castledermot	10	0.4%
Mobile worker	6	0.2%
Athy	6	0.2%
Other Carlow Settlements	15	0.6%
Other Settlements	13	0.5%
Total	**2418**	

The following image shows the destination of primary school trips by Carlow residents and is the geographical demonstration of the data in the table above. The figure demonstrates that many of the main destinations are within or just outside the Carlow Town area. Therefore, if sufficient alternative infrastructure is provided, there is potential to capture a modal shift and increased sustainable travel.

Figure 4-6: POWSCAR Destination of Primary School Trips by Carlow Residents



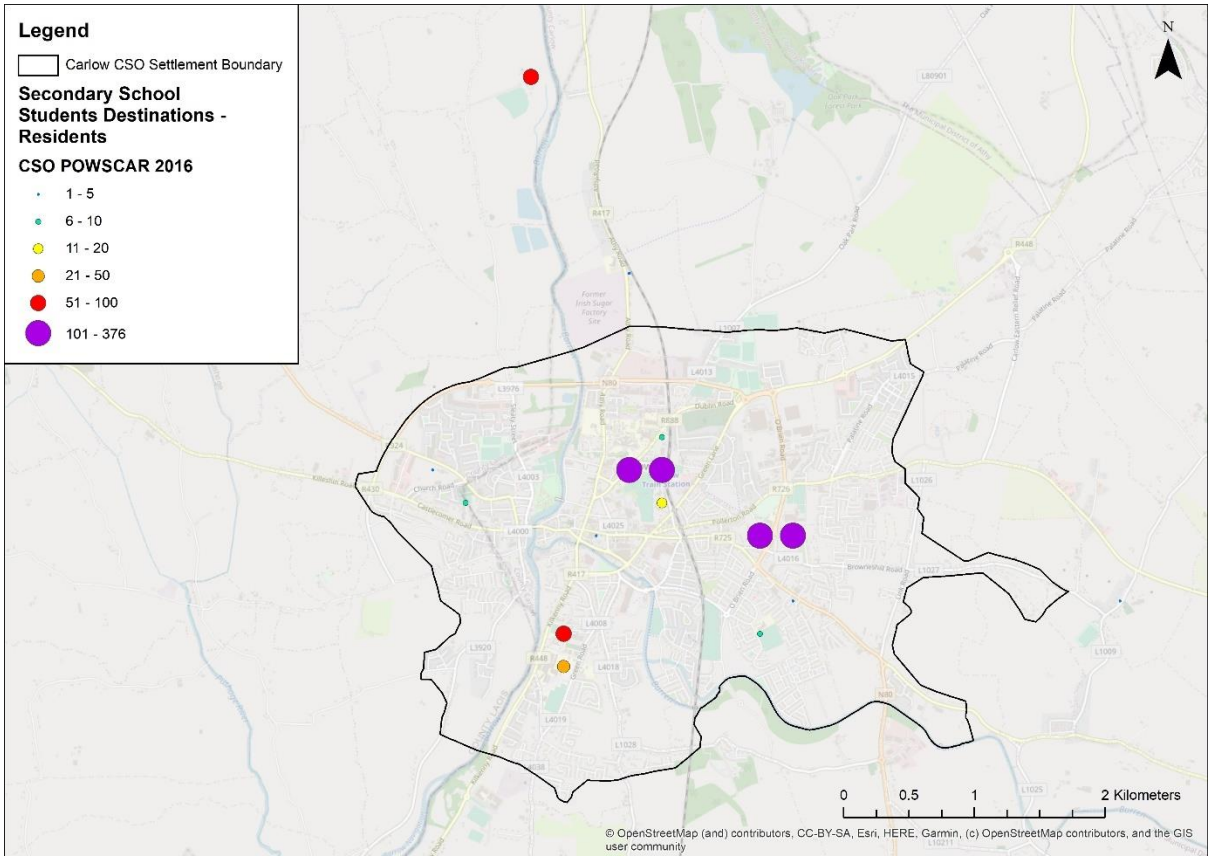
The below table (**Table 4-5**) presents the destination of secondary school trips completed by Carlow residents, based on POWSCAR 2016 data. In this data, 90% of Carlow residents attend a school that is located in Carlow, County Carlow. The next most common destination for Carlow residents to travel to secondary school was Laois Rural, however, only 3.9% of trips travelled to this area. All other areas accounted for 2% or below of trip destinations for secondary school trips. This supports the fact that many Carlow residents attend secondary school in the area local to them and their travel could be converted to sustainable trips.

Table 4-5: POWSCAR Destination of Secondary School Trips by Carlow Residents

Destination of Secondary School Trips (POWSCAR Town)	Number of Trips	Percent of all Work and Third Level Trips from Carlow
Carlow Co Carlow	1282	90.0%
Laois Rural	56	3.9%
Muinebeag (Bagenalstown)	14	1.0%
Kilkenny	13	0.9%
Mobile worker	8	0.6%
Castledermot	8	0.6%
Carlow Co. Laois	7	0.5%
Leighlinbridge	6	0.4%
Other Carlow Settlement	7	0.5%
Other Settlements	24	1.7%
Total	**1425**	

Figure 4-7 shows the destination of secondary school trips by Carlow residents in mapped form. As the data from the table suggested, the majority of Carlow residents are travelling to a secondary school destination within the Carlow Town area. This furthers the point that a modal shift could be successful if the correct infrastructure was provided. There is one destination shown on the map fall outside the Carlow Town area, however, this only receives 51-100 trips and is not too remote from Carlow.

Figure 4-7: POWSCAR Destination of Secondary School Trips by Carlow Residents



4.2.2 Trips to Carlow

This section provides a summary of the origin of trips to Carlow by people who work or study in the town based on the POWSCAR (2016) dataset.

4.2.2.1 Origin of Work Trips

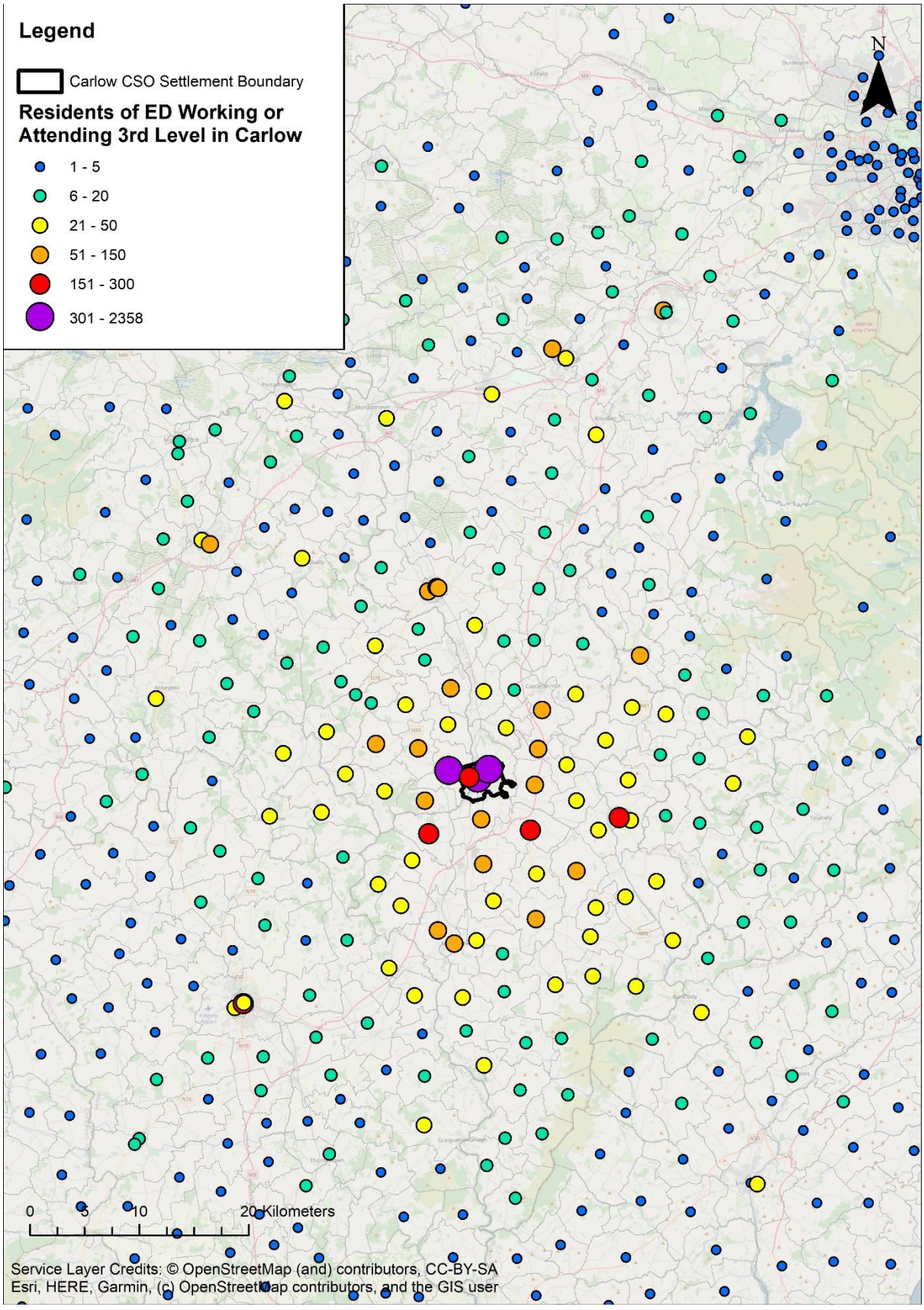
Table 4-6 shows the origin of trips to Carlow CSO Settlement in order to access work. This shows that around 30% of work trips originate within Carlow, County Carlow and these internal trips will have the greatest potential for modal shift to active travel due to shorter trip distances. Notably, less than 1% of trips originate in Dublin City and Suburbs so it is demonstrated that the town is not attracting longer distance work commutes along a radial corridor. However, this could be caused by currently poor public transport connections along that route. The table also highlights the important role of Carlow in providing employment for people from Carlow, County Laois, Laois Rural, Kildare Rural, Kilkenny Rural and Wexford Rural; showing the potential for improved public transport links with these areas to reduce car dependency whilst supporting Carlow's economy and labour pool. A proportion of this demand is likely to be travel to SETU for students who live outside of Carlow.

Table 4-6: POWSCAR (2016) - Origin of Work and 3rd Level Trips to Carlow CSO Settlement

Origin of Work and Third Level Trips (POWSCAR Town)	Number of Trips	Percent of all Work and Third Level Trips to Carlow
Carlow Co Carlow	3326	30.3%
Carlow	1533	14.0%
Carlow Co. Laois	743	6.8%
Laois Rural	712	6.5%
Kildare Rural	447	4.1%
Kilkenny Rural	355	3.2%
Wexford Rural	256	2.3%
Kilkenny	253	2.3%
Athy	213	1.9%
Tullow	209	1.9%
Wicklow Rural	193	1.8%
Portlaoise (formerly Maryborough)	143	1.3%
Muinebeag (Bagenalstown)	113	1.0%
Droichead Nua (Newbridge)	101	0.9%
Naas	97	0.9%
Ballinabrannagh	83	0.8%
Castledermot	75	0.7%
Leighlinbridge	74	0.7%
Tinriland	65	0.6%
Dublin City and Suburbs	57	0.5%
Ballon	56	0.5%
Palatine	56	0.5%
Offaly Rural	54	0.5%
Other Counties	1726	15.7%
Total	**10984**	

Figure 4-8 shows the Electoral Divisions where people start their journey when travelling to Carlow for work, based on data from POWSCAR (2016). This shows a similar theme to the table, with relatively high trip numbers from local towns and the rural hinterland with few longer distance trips from dispersed locations across County Dublin.

Figure 4-8: POWSCAR (2016) - Origin of Work and 3rd Level Trips to Carlow CSO Settlement



4.2.2.2 Origin of School Trips

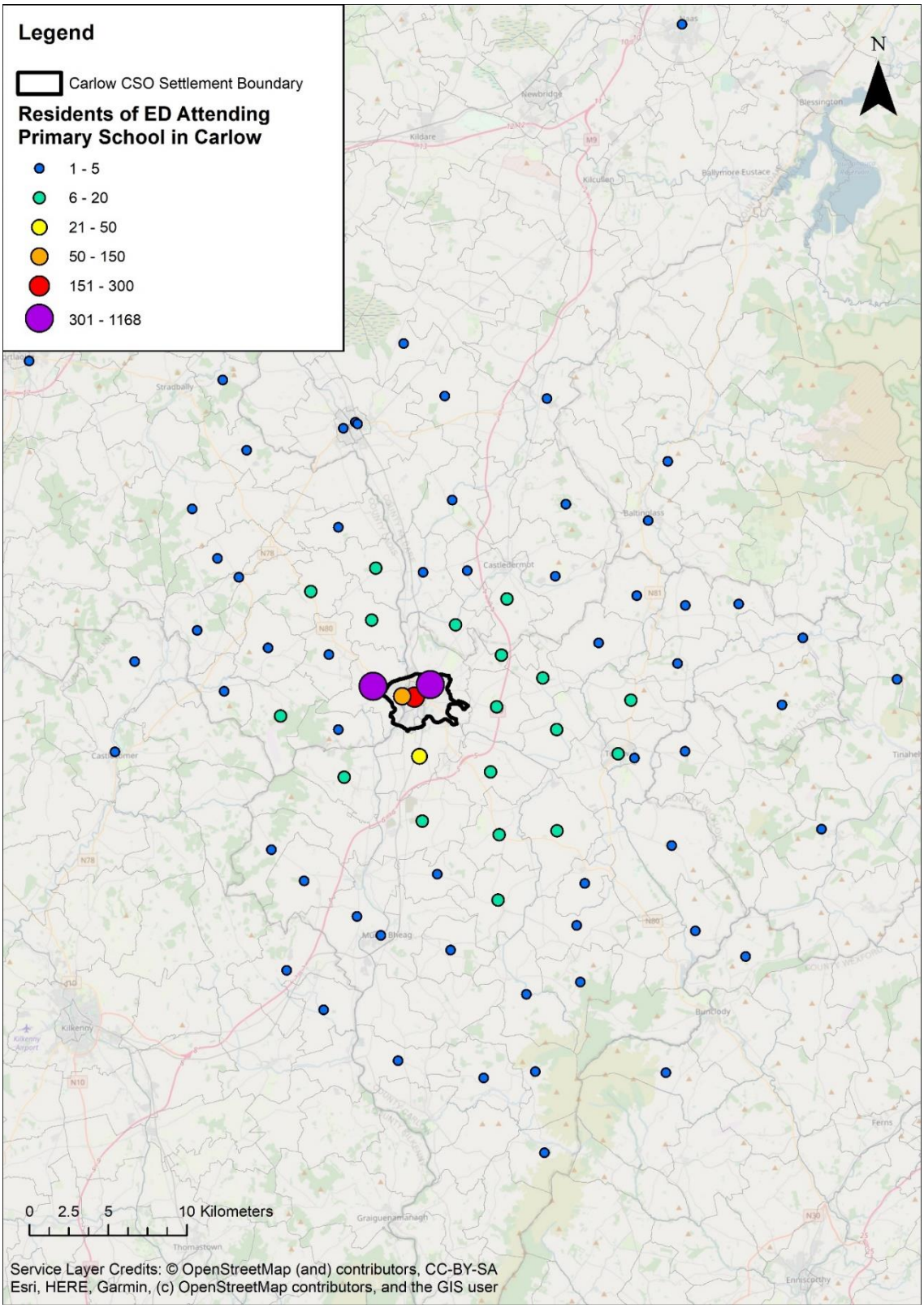
Table 4-7 presents the origin of primary school trips to the Carlow CSO settlement, based on POWSCAR 2016 data. Over 65% of trips travelling to primary school in the Carlow CSO settlement originate in the Carlow, County Carlow area – accounting for 1448 in total. Following this, Carlow County Laois is the origin for 17.4% of primary school trips and Carlow Rural is the origin for 7.2% of trips. This demonstrates that the majority of children travelling into the Carlow CSO settlement for primary school are originating in the very local area. This presents an opportunity to convert such trips to active modes or public transport for slightly longer distance local trips. With the exception of Kildare Rural and Carlow Other, less than 1% of primary school trips are originating from other neighbouring areas.

Table 4-7: POWSCAR (2016) - Origin of Primary School Trips to Carlow CSO Settlement

Origin of Primary School Trips (POWSCAR Town)	Number of Trips	Percent of all Work and Third Level Trips to Carlow
Carlow Co Carlow	1448	65.3%
Carlow Co. Laois	386	17.4%
Carlow Rural	159	7.2%
Laois Rural	71	3.2%
Kildare Rural	30	1.4%
Tullow	20	0.9%
Palatine	17	0.8%
Ballon	9	0.4%
Rathtoe	9	0.4%
Ballinabrannagh	7	0.3%
Wicklow Rural	6	0.3%
Other Carlow	26	1.2%
Other Kildare	8	0.4%
Other Counties	20	0.9%
Total	**2216**	

Figure 4-9 follows on from the above table, demonstrating the same data geographically. As suggested above, the majority of primary school trips to the Carlow CSO settlement also originate in the area. With the exception of one area in Laois, located in close proximity to Carlow CSO settlement, all other areas are producing 20 or less trips to primary schools within the Carlow settlement. Again, this provides further support for the concept of converting such trips to more sustainable modes.

Figure 4-9: POWSCAR (2016) - Origin of Primary School Trips to Carlow CSO Settlement



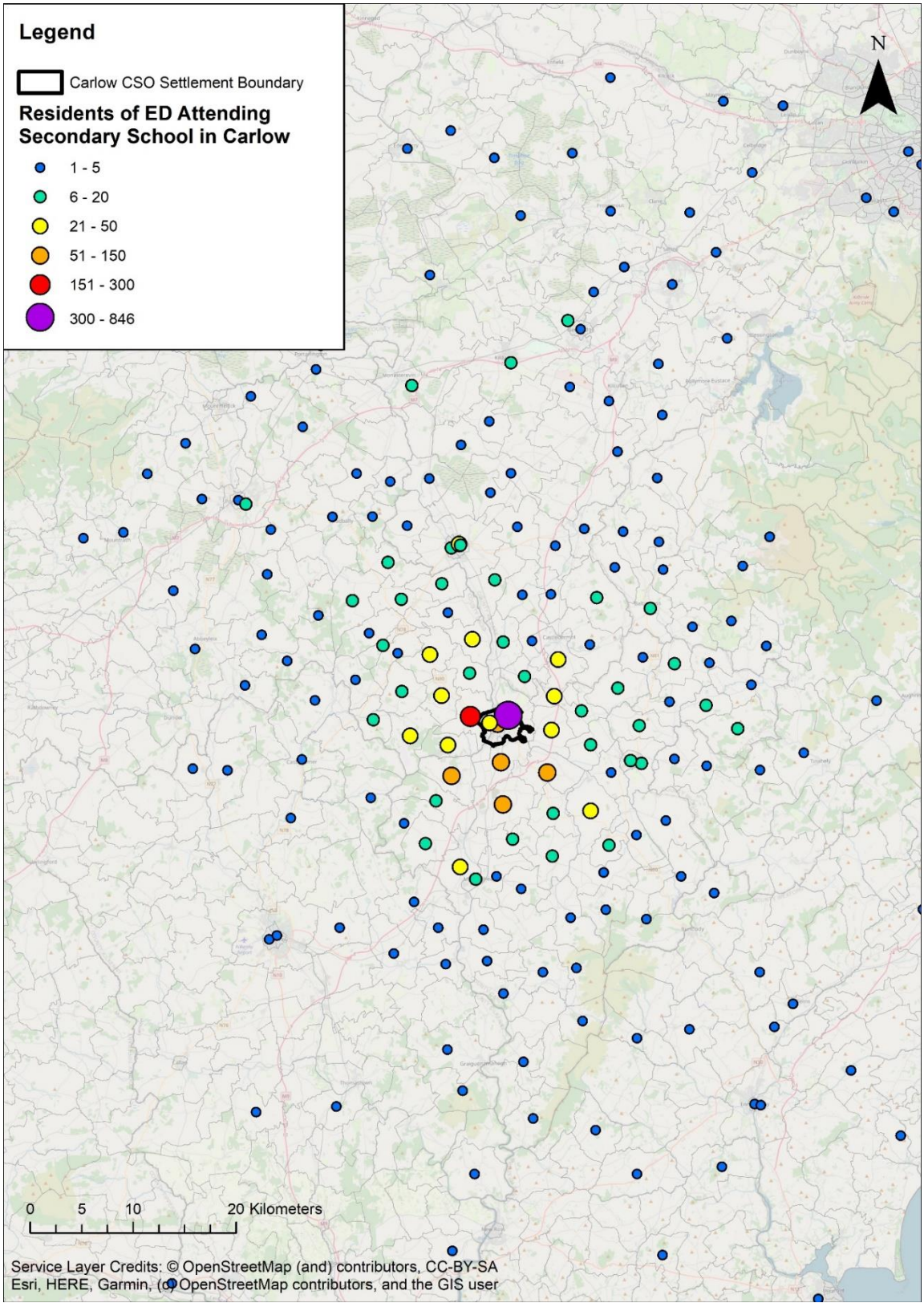
The following table (**Table 4-8**) presents the POWSCAR 2016 data showing the origin of secondary school trips into the Carlow CSO settlement. The trend for where secondary school trips, travelling to the Carlow CSO settlement, originate from is somewhat different to primary school and this is likely due to fewer, but larger, secondary schools meaning often people travel further. Again, Carlow, County Carlow is the largest origin point for those travelling to secondary school in the Carlow CSO settlement area, accounting for nearly 40% of trips. Other areas which are a common origin point for secondary school trips to Carlow CSO settlement include Carlow Rural (16.9%), Laois Rural (10.8%), and Carlow, County Laois (9.7%). Due to the more widespread origin points for these trips, converting them all to active travel could prove difficult, but where demand exists it is important to provide either public transport or multi-modal options that can assist in driving increased sustainable travel.

Table 4-8: POWSCAR (2016) - Origin of Secondary School Trips to Carlow CSO Settlement

Origin of Secondary School Trips (POWSCAR Town)	Number of Trips	Percent of all Work and Third Level Trips to Carlow
Carlow Co Carlow	1033	39.2%
Carlow Rural	445	16.9%
Laois Rural	284	10.8%
Carlow Co. Laois	256	9.7%
Kildare Rural	116	4.4%
Athy	52	2.0%
Ballinabrannagh	38	1.4%
Tinriland	34	1.3%
Wicklow Rural	28	1.1%
Tullow	25	0.9%
Kilkenny Rural	21	0.8%
Palatine	20	0.8%
Rathtoe	19	0.7%
Ballon	18	0.7%
Wexford Rural	16	0.6%
Castledermot	14	0.5%
Baltinglass	14	0.5%
Leighlinbridge	11	0.4%
Droichead Nua (Newbridge)	10	0.4%
Portlaoise (formerly Maryborough)	10	0.4%
Kernanstown	9	0.3%
Kildare	9	0.3%
Ballylinan	9	0.3%
Muinebeag (Bagenalstown)	8	0.3%
Rathvilly	7	0.3%
Other Kildare	29	1.1%
Other Laois	17	0.6%
Other Wicklow	11	0.4%
Other Carlow	11	0.4%
Other Wexford	11	0.4%
Other Kilkenny	8	0.3%
Other Cavan	6	0.2%
Other Counties	37	1.4%
Total	**2636**	

The figure below (**Figure 4-10**) presents the data shown in the previous table on a map. Unlike primary school trips, the origin points for secondary school trips are much more widespread with numerous places outside the Carlow CSO settlement area producing up to 150 secondary school trips. This data supports the notion that public transport provision or multi-modal options are going to be an important consideration in providing more sustainable travel to secondary schools in Carlow.

Figure 4-10: POWSCAR (2016) - Origin of Secondary School Trips to Carlow CSO Settlement



5. Transport Infrastructure and Services

The transport network within the study area is summarised in this chapter of the report. This summary considers all modes of transport, with gaps in network provision identified. Problems on the transport network are also identified.

5.1 Active Modes

Walking and cycling play an important role in minimising environmental impacts, while also contributing to improved wellbeing and quality of life. Increasing the uptake of these sustainable modes of travel is dependent on the convenience of walking or cycling as an option which directly relates to the level of connectivity, road safety and the quality of facilities provided. Project Carlow 2040; “A Vision for Regeneration” contains a detailed walking and cycling strategy for Carlow Town which provides for a number of new pedestrian routes within Carlow, linking residential areas to key attractions, with a focus on removing severance and improving connectivity together with improved pedestrian infrastructure (e.g., footpaths, safe crossings, junction upgrades etc).

5.1.1 Strava Data

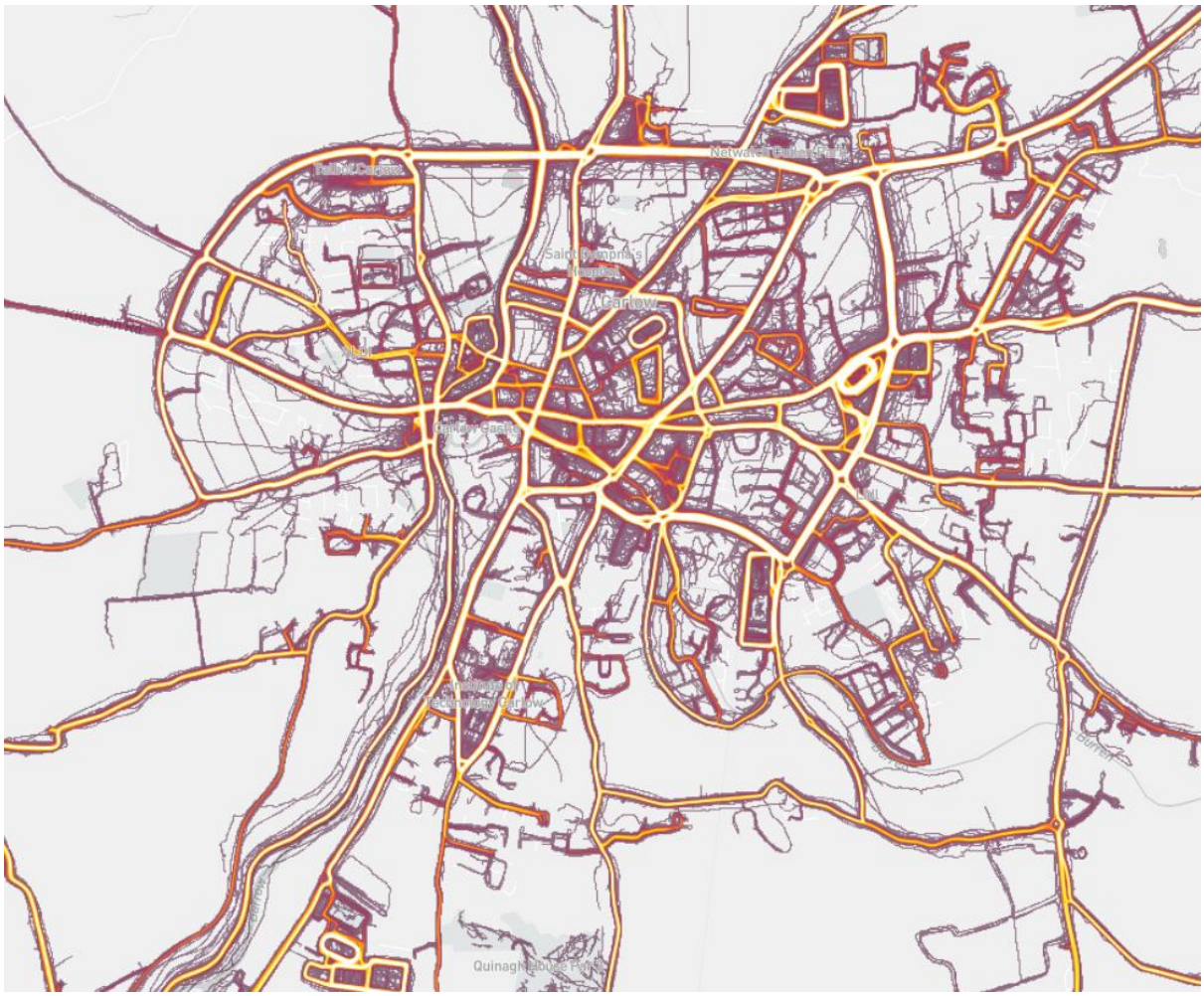
5.1.1.1 Walking and Running Trips

Strava measures walking, running, and cycling trips primarily for recreational, exercise or social trips. The figures in this section present a summary of the total cycling, walking and running trips which took place on each link. The Strava data is just a sample of the total walking and cycling trips which will have taken place in the study area, but the data is a valuable tool to provide understanding which routes are popular for active modes.

Evidence from the 2016 Census has shown that 11.2% and 35.5% of the Carlow settlement population are travelling on foot to work and school respectively. Walking as a mode, especially in terms of accessing education accounts for over a third of trips, however the usage of this mode could be further enhanced, especially for short-distance trips, to ensure that social and environmental benefits can be captured.

Figure 5-1 below presents the walking and running (on foot) trips undertaken in Carlow Graiguecullen area by utilising Strava data. The heatmaps produced by Strava are based on aggregated public activities over the last year. The data works by tracking Strava users walks, runs, and rides and once aggregated this provides insights into route trends. The figure shows that the N80, to the north and east of Carlow Town, is commonly used for walking or running. This could be to strategically access places, such as business parks or residential areas, as well as for exercises purposes as the road is flat and easy to walk. In addition, the regional routes and key towns links are commonly used for running or walking, which is likely to be so people can access shops, services, employment, or education. Furthermore, there are spots, such as local fields and football pitches, where walking or running is higher, which indicates places people use for recreation and helps inform key attractors by active modes for the option identification process. Providing enhanced connectivity and facilities will continue to encourage physical activity to benefits residents’ physical health and mental wellbeing.

Figure 5-1: Strava Walking and Running Trips

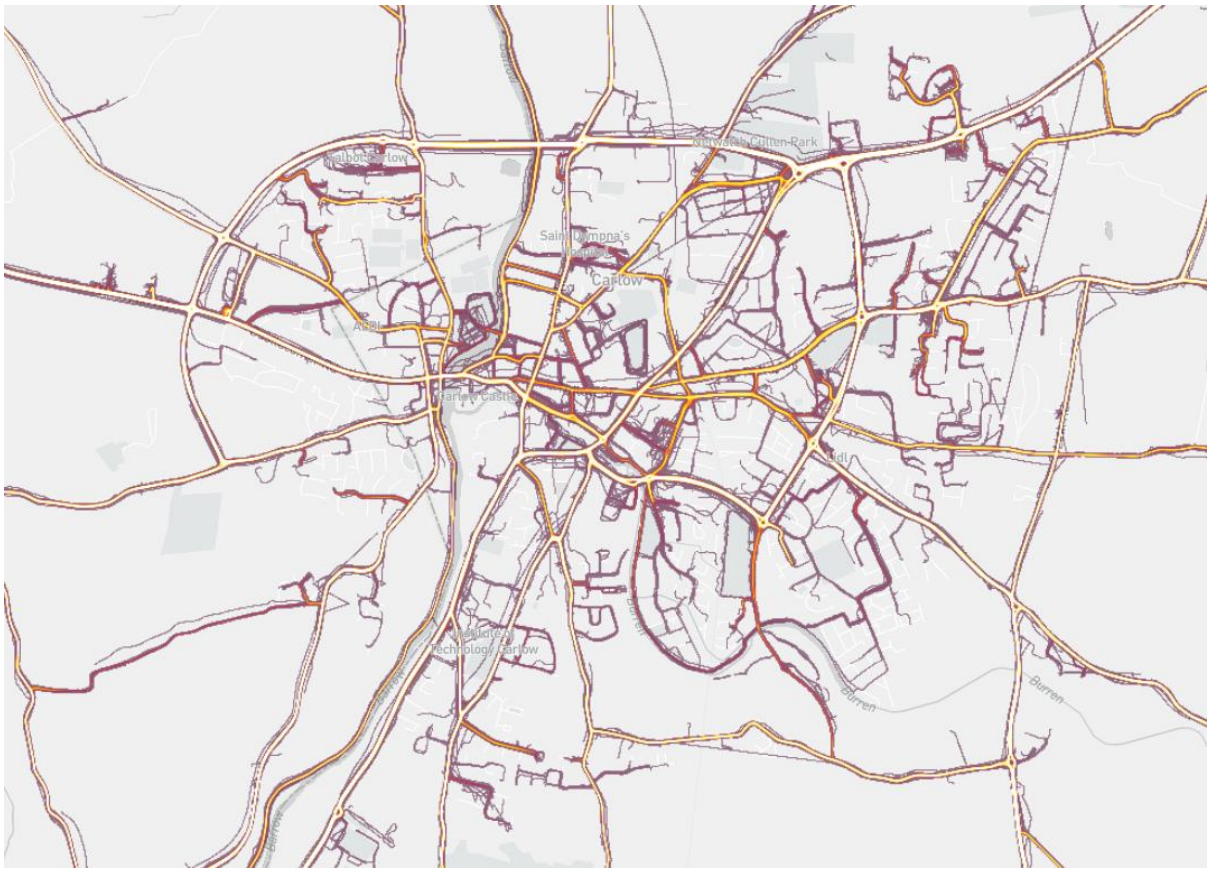


5.1.1.2 Cycling Trips

2016 Census data has shown that only 2.1% of the Carlow settlement population cycle to work, and similarly only 2% cycle to education. This is significantly below the State target of 10% of commuting trips being completed by bicycle. There has been some investment in cycling infrastructure in recent years, with the provision of cycle lanes along the N80 and some of the regional roads. However, further work needs to be done to improve the current infrastructure provision and address existing network gaps. Increasing the attractiveness and willingness to cycle is essential for people to undertake a modal shift. Safety is an extremely important part of increasing people's willingness to cycle, and this is especially important for children potentially using the network to access their place of education. The cycling strategy states there is a focus on creating safe, continuous segregated cycle routes which link residential communities to employment, education, the town centre, and recreation/leisure facilities.

Figure 5-2 shows the cycling trips in the Carlow Graiguecullen area based on Strava data. The Strava heatmap for cycling contains less 'heated' areas than shown in the on-foot figure above. This supports the observations from other data sources that there is less cycling than walking and running. Again, much of the cycling is focussed along the N80 where there are key attractors and cycle infrastructure is provided. Additionally, there is higher levels of cycling along the roads in the south of Carlow Town and along the R448 (Kilkenny Road), which passes SETU. This highlights that both routes are frequently used, indicating that cycle infrastructure would be well-used on these routes, and also that introduced infrastructure is being utilised. Again, there are areas where there are lower levels of cycling, but the more definitive trends can guide infrastructure provision and future provisions.

Figure 5-2: Strava Cycling Trips

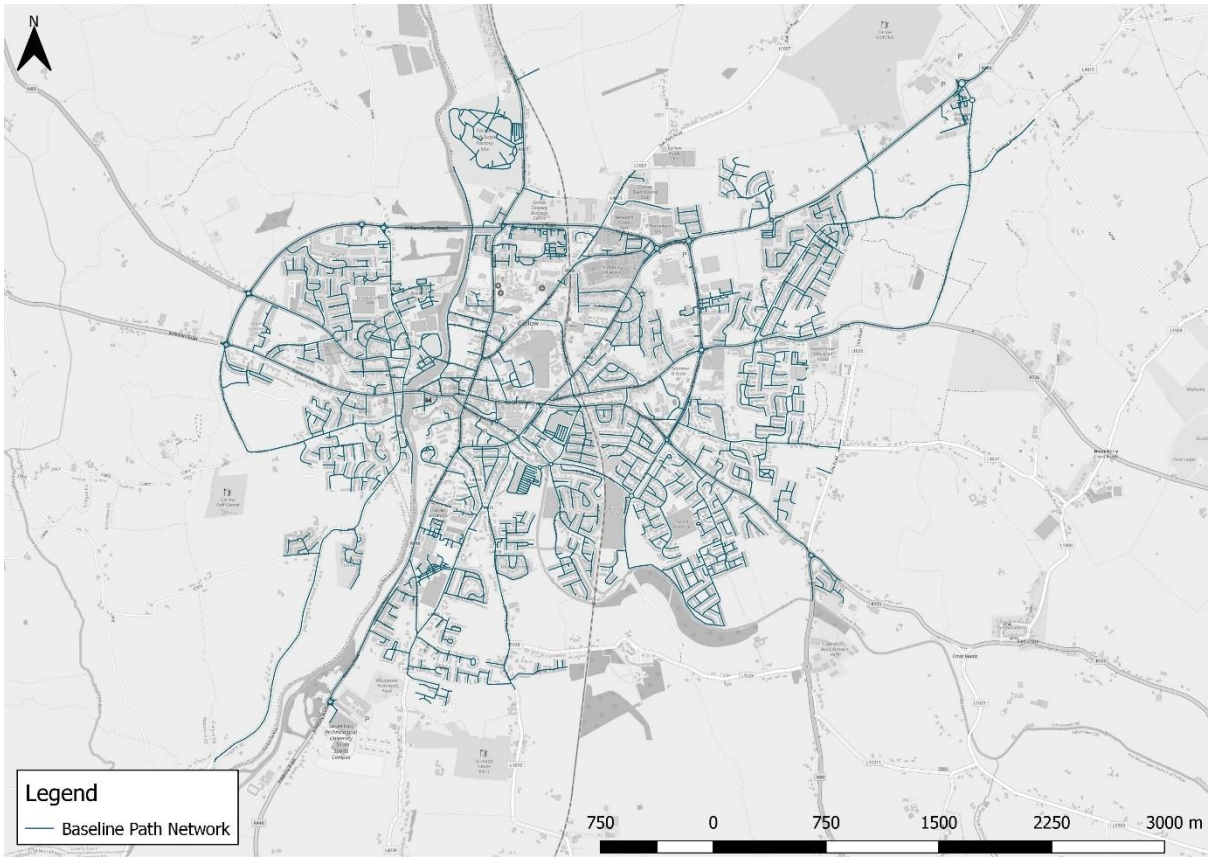


5.1.2 Permeability Assessment

Permeability allows for different land uses and spaces within the town to be connected, usually via an interconnected network of walking and cycle routes. In spite of ongoing demographic changes, particularly in promoting town centre living, Carlow Town is still affected by the legacy of suburbanisation and the hollowing out of the town centre. This explains the limited connectivity between residential and service areas.

In order to assess permeability and walking catchments in the Carlow Graiguecullen area, a path network has been developed. The advantage of this path network is that it can accurately assess pedestrian movements, rather than simply representing walking distances on the road network.

Figure 5-3: Baseline Path Network



5.1.2.1 Key Permeability Barriers

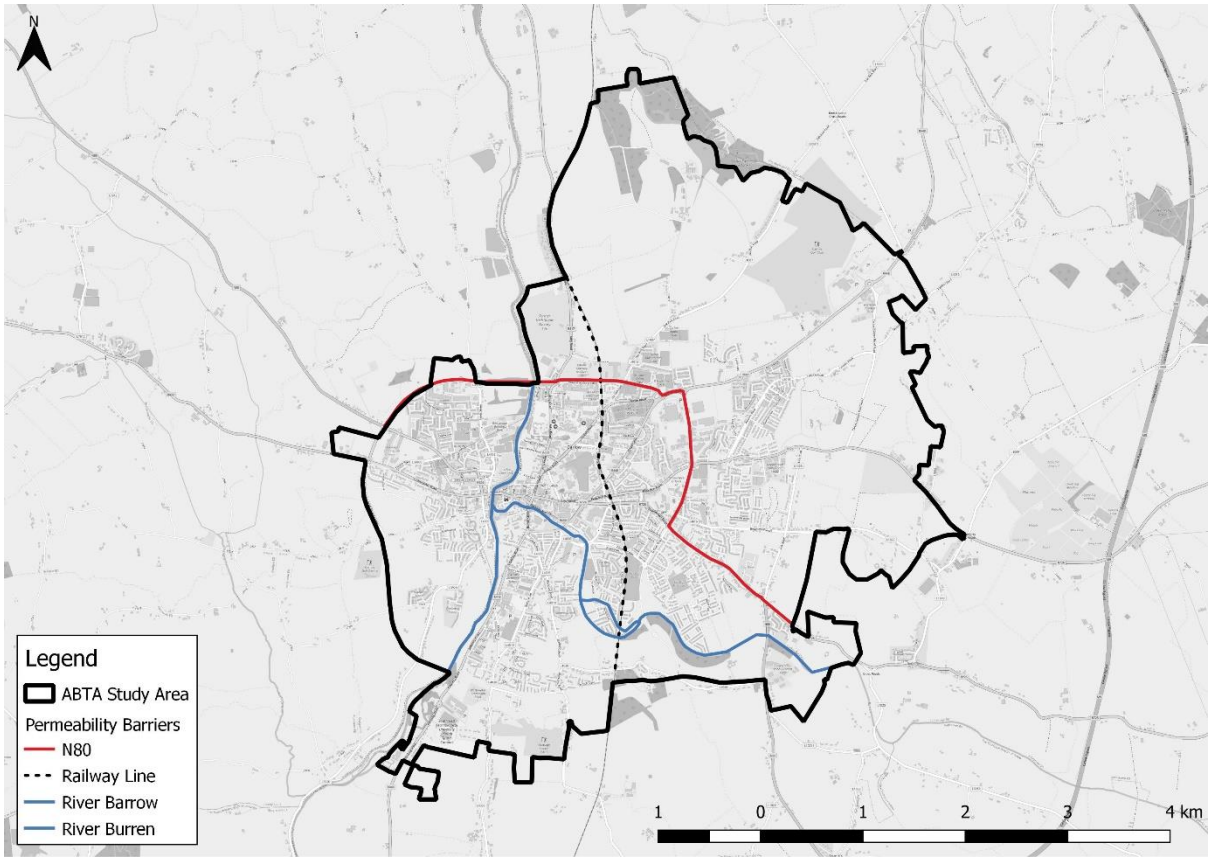
The study area has multiple linear barriers which spatially separate the study area, as shown in **Figure 5-4**. The main barriers include: the Dublin-Waterford railway, which runs through the middle of the study area, the N80 major road which is in the north and east of the study area and finally the River Barrow and River Burren which are situated to the west and south of Carlow town centre. Although these corridors do have crossing points, they do constrain permeability and improving access across them will be a critical part of the town expansion. The following few bullet points summarise the permeability issues related to each key barrier:

- Dublin-Waterford Railway Line – there are six crossing points along this route within the study area. These are all situated along roads, and although severance is not extreme, the presence of the railway line will prevent people from having free movement between certain areas. All routes, as mentioned, are along the road network, with many lacking high qualities active mode infrastructure, which could act as a further barrier to using this mode.
- N80 – there are points to cross the N80, particularly at roundabout junctions but such junctions are primarily set up to prioritise the traffic rather than active mode users. Therefore, crossing may be unsafe or inconvenient to those on foot or with a bicycle.
- River Barrow – there are three crossing points within the study area. Two of these are road bridges with a footpath, whereas the third is an active mode crossing through the park; however, this is only available during the day. This means that people wanting to cross the river are constrained leading to congestion for vehicles and longer trips. Due to only one vehicular crossing point in the town centre, if any collisions occur, the local road network around the town centre becomes gridlocked, or results in long diversion routes via the N80.
- River Burren – there are three crossing points within the study area, all immediately south of the town centre providing direct access between the southern residential areas, SETU and the town centre. All three of these crossing points are road bridges with footpaths; with two, Hanover Street and Paupish Bridge, benefiting from segregated cycle facilities.

A desktop analysis has revealed areas which may lack permeability and thus prevent sound accessibility and/or active mode trips. A key large residential area which may struggle with permeability is the homes situated between Cuirt Chnoc an Toradh and Leighlin Road, as well as north of Bridge Street in Graiguecullen. The housing areas to the east of Carlow Town centre, in particular those between the N80 and Link Road also suffer from poor permeability. Walk distances from some of the homes in these areas to access a main road are quite long and convoluted and are likely to prevent sustainable travel. However, there are other areas suffering with poor connections, due to the lack of active mode infrastructure or bus services, resulting in residents being forced to use private vehicles for trips.

There are plans to improve permeability through the SETU campus and across the River Barrow, however, sometimes permeability is difficult to deliver due to safety and anti-social behaviour concerns.

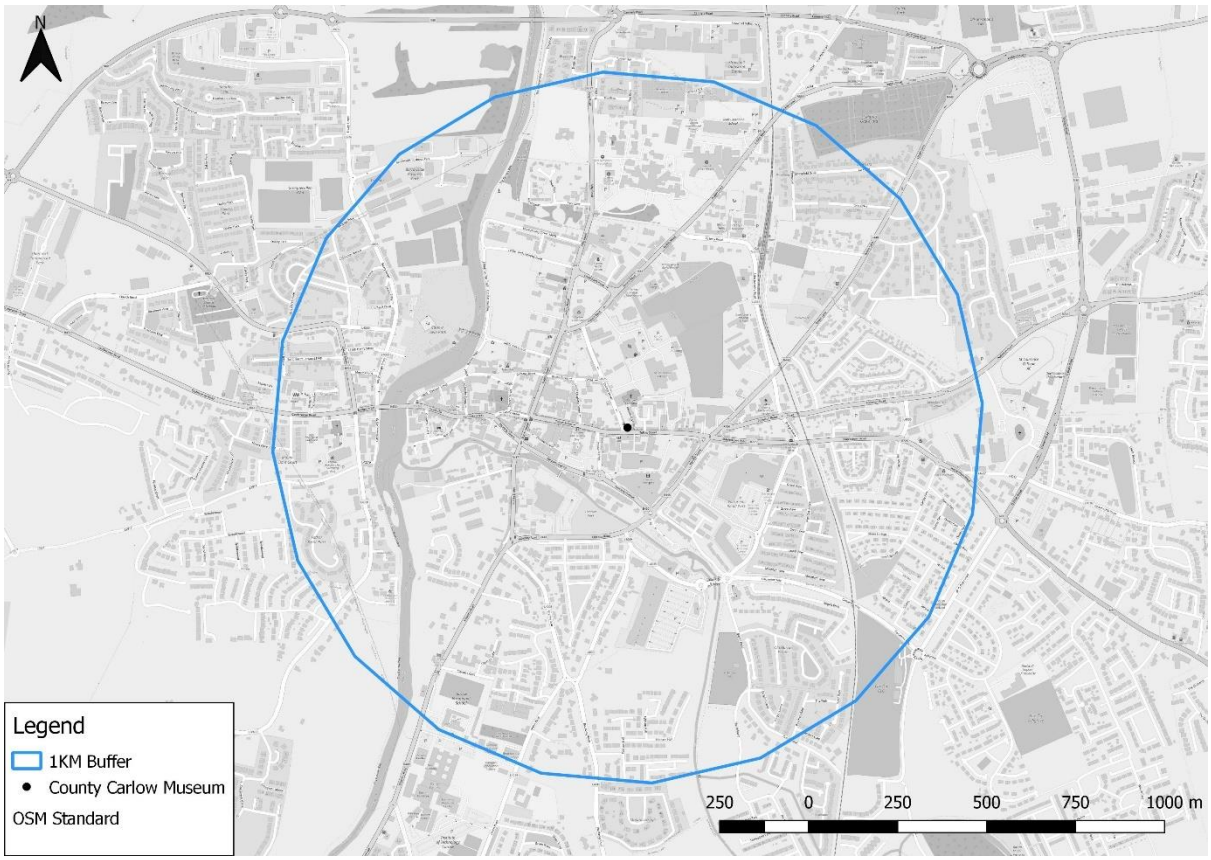
Figure 5-4: Key Permeability Barriers



5.1.2.2 Town Centre Catchment

Carlow County Museum, situated along the principal shopping street (Tullow Road) is a reasonable central landmark, and therefore this has been used to measure the 1km buffer catchment of the town centre. **Figure 5-5** presents the 1km buffer to the town centre based on the centre point of the Carlow County Museum. Existing access to this location is relatively good when compared to the 1km circular buffer, highlighting what is within a short walking distance of the town centre. The figure demonstrates that St. Dympna's Hospital, the local hospitals, five local primary schools, two secondary schools as well as other key important services, all fall within this catchment. Comparing the building use data, from GeoDirectory, to this 1km buffer shows that many residential buildings, particularly in the east and south, are within an acceptable walking distance of Carlow Town Centre. Movements from Laois, and east of the railway line are more constrained due to the permeability barriers.

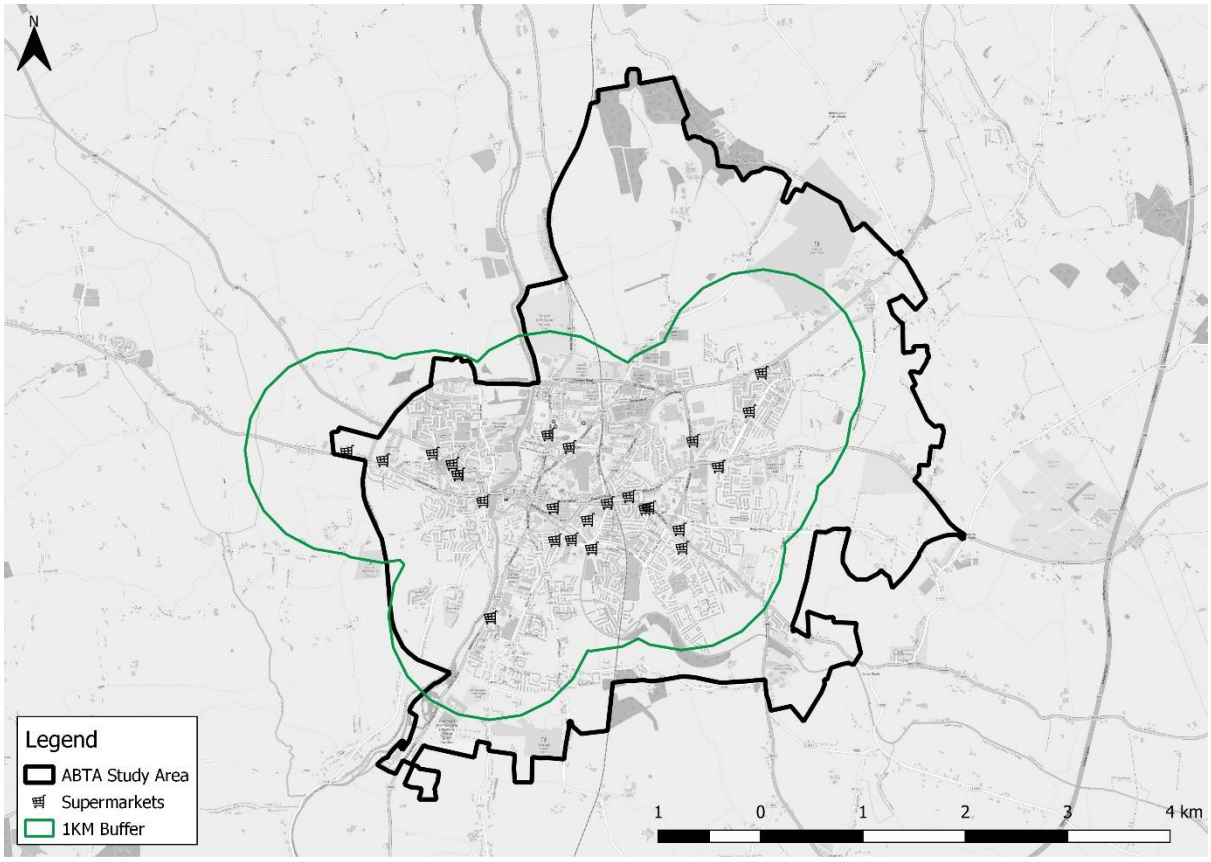
Figure 5-5: 1km Walking Distance to the Town Centre



5.1.2.3 Supermarket Catchment

There are many supermarkets within the Carlow Graiguecullen study area. This includes an Aldi situated in Graiguecullen, a Tesco superstore and Aldi very close to the centre of Carlow Town as well as a Lidl and Iceland along the N80. **Figure 5-6** below shows a 1km buffer around these supermarkets, to show accessibility to these stores on foot. Analysis has identified that all built-up residential areas within the study area fall within 1km of a supermarket, and therefore should be accessible via active modes. However, the possibility of these trips undergoing a modal shift is also dependent on other factors, such as where people prefer to shop and whether they can feasibly use active modes when completing their shopping trips.

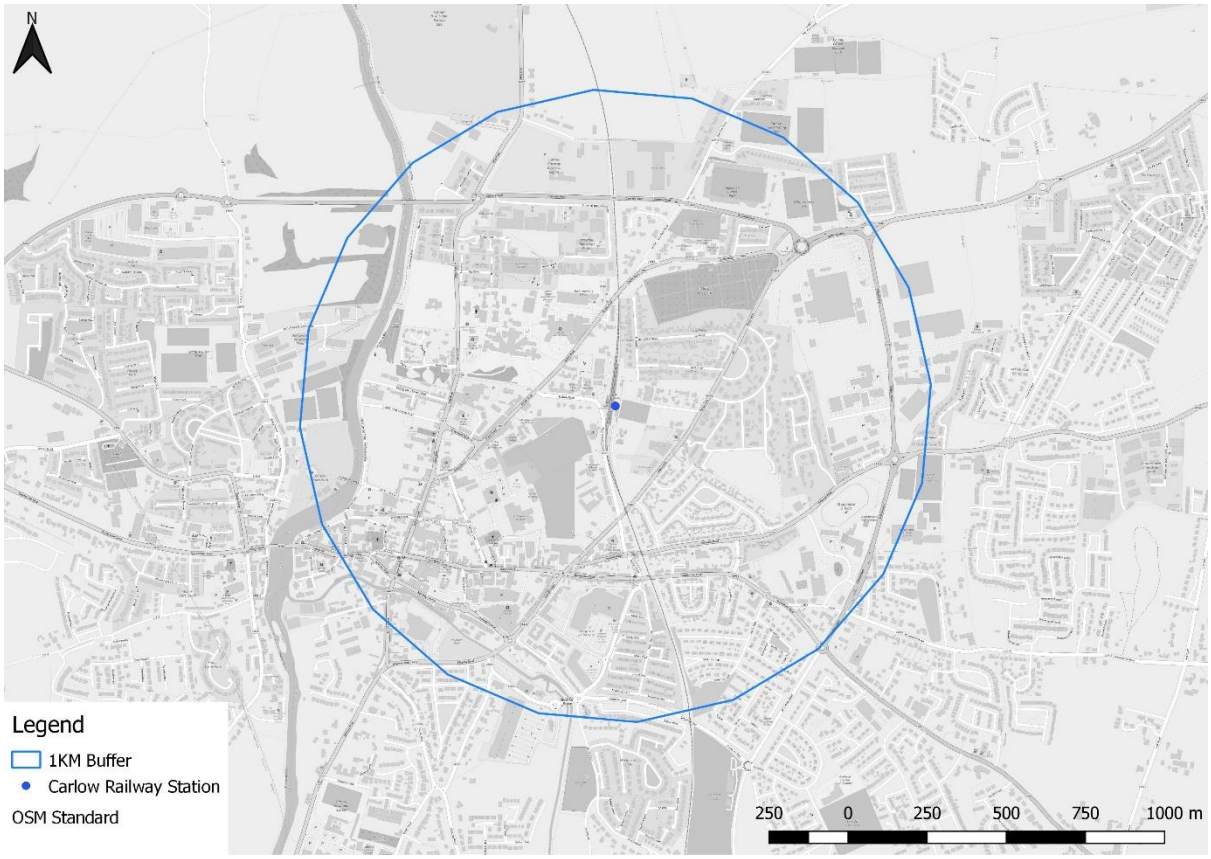
Figure 5-6: 1km Walking Distance to the Local Supermarkets



5.1.2.4 Train Station Catchment

There is one railway station within the study area, this is Carlow Town rail station and is around 1km from the core town centre. **Figure 5-7** below shows the 1km buffer around the rail station. It shows that the rail station is easily accessible on foot from the core of Carlow Town centre but is not as accessible from suburban residential areas. This is highlighted by the fact that only 27% of the residential buildings within Carlow Town fall within the 1km distance of the rail station. This means that on foot trips to here may be unfeasible and unattractive, which when coupled with potentially unreliable public transport routes and cheap readily available parking at the station, means that many people rely on their cars to access the station. It is essential that transport hubs like the rail station are connected by sustainable modes to prevent car reliance. Overall, the main areas containing commercial and mixed-use buildings are within the 1km railway station catchment, meaning access to employment areas in Carlow, if travelling from other areas, are feasible on foot.

Figure 5-7: 1km Walking Distance to the Rail Station



5.1.2.5 Bus Stop Catchment

The catchment distance used for bus stops is 500m, rather than 1km, based on the Sustainable Residential Development in Urban Areas (2009) guidelines. **Figure 5-8** below shows that there are five bus stops within the Carlow Town study area, meaning the distribution is quite sparse and it is not guaranteed that all of the bus stops below serve each route. Carlow Coach Park is situated very close to the core centre and serves the majority of the routes within and external to Carlow. The map demonstrates that Carlow Town centre sits well within the 500m of buffer of bus stops, meaning catching the bus from and to Carlow Town centre is viable. However, the mapping has also revealed that many residential areas (in particular to the east and south of Carlow Town as well as in Graiguecullen) and some other employment spots, like the business parks, are not close to a bus stop and aren't accessible on foot reasonably. This is likely to discourage people from using the bus to complete trips which may be possible with an enhanced bus network.

Figure 5-8: 500m Walking Distance to the Bus Stops

5.1.2.6 Primary Schools Catchment

There is a high density of primary schools within the Carlow Town study area. **Figure 5-9** below shows a 1km buffer surrounding these primary schools to determine which areas are within a reasonable walking distance. The majority of the residential buildings in Carlow Town, except for a small area to the very northeast and ad-hoc pockets to the east, all are within a 1km walk of a primary school. This demonstrates that active modes, in particular walking, is a feasible option for travelling to and from school, which would support sustainability goals as well as improve children's health. Although it must be noted that some educational facilities will cater for special educational needs pupils, and therefore travel patterns for these individuals may be more specialised. This means that active travel may not be a feasible option for many students attending this school so ensuring sound road connections are also particularly important. However, it must be noted that this catchment does not guarantee that a child will have a place at the school closest to their home and may in reality have to travel further. Also, it is paramount that safety and convenience of routes is prioritised for education trips otherwise a modal shift is unlikely to occur.

Figure 5-9: 1km Walking Distance to the Primary Schools

5.1.2.7 Secondary School Catchment

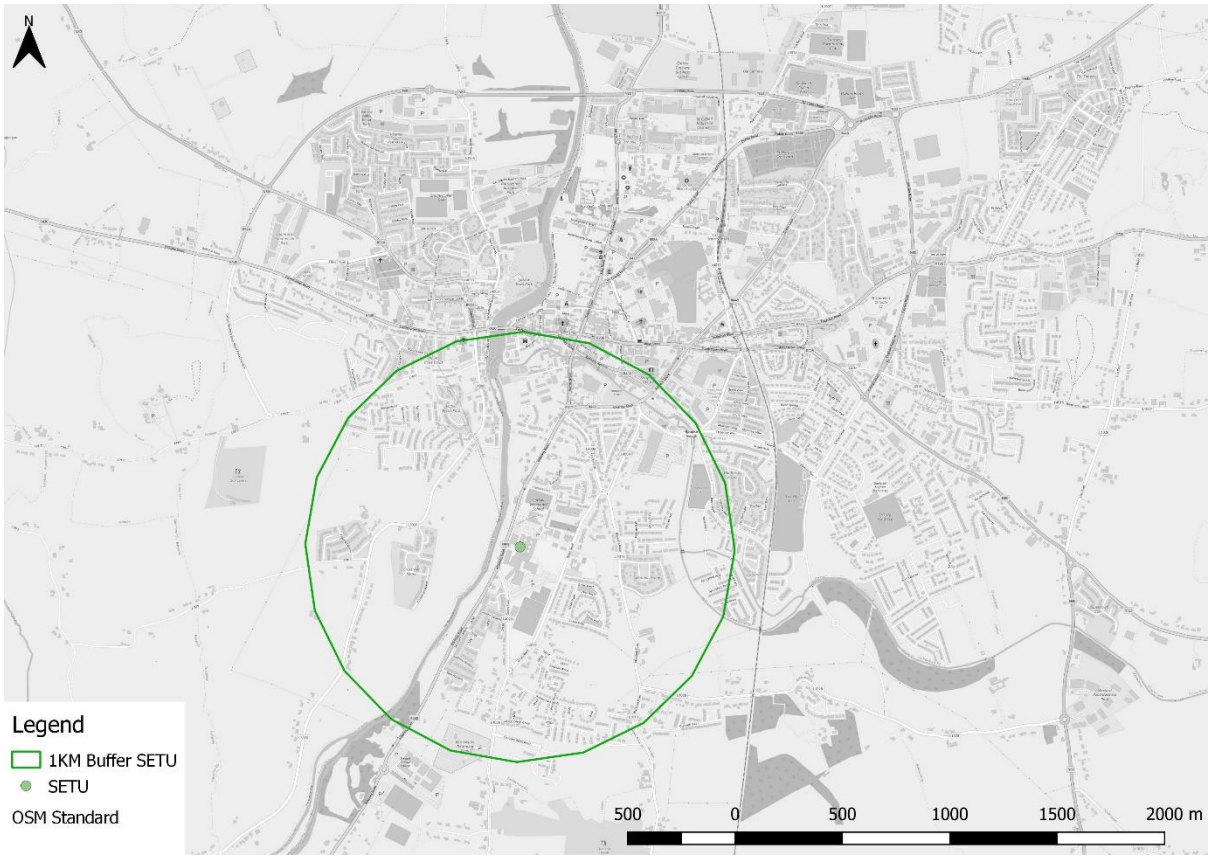
There are a four secondary schools within Carlow Town as well as Tyndall College which lies along Kilkenny Road. **Figure 5-10** shows that the patterns of residential homes falling into the 1km catchment area for secondary schools is similar to those discussed above. Again, homes to the far northeast of Carlow Town and pockets to the east are not within the 1km catchment area. However, additional to this many residential buildings in the south are not within this 1km buffer, meaning that trips from these areas are much less likely to be completed by foot. However, unlike primary schools, it may be much more feasible for children attending these schools to cycle or use public transport to access their school, as they are more independent. Therefore, other sustainable options could be very viable if the correct infrastructure and promotion is provided. Furthermore, the trips to Tyndall College are very likely to be completed using the car, due to few residential areas falling within the 1km walking buffer. Many students attending this school travel from Graiguecullen and are forced to travel to the school via Carlow Town Centre, creating longer trip distances and generating increased pressure on the traffic network in the town. This shows the importance of providing good connections to Tyndall College by road and active travel.

Figure 5-10: 1km Walking Distance to the Secondary Schools

5.1.2.8 University Catchment

The SETU Carlow campus is located to the southwest of the town and is approximately a 15-minute walk from the Carlow County Museum (the centre point selected for mapping purposes). Therefore, this shows good accessibility to the campus from the town centre. Due to the campus lying further outside the town centre, naturally less residential buildings fall within the 1km walking buffer, as shown in **Figure 5-11**. Homes to the southeast of the town centre are within the 1km buffer but the rest fall outside. Students who attend this university may live on, or very close to, campus or in the town centre; they may be able to travel further distances using other sustainable modes. However, like the other educational facilities, it is essential that this campus is served by solid sustainable transport modes to ensure a modal shift is achieved.

Figure 5-11: 1km Walking Distance to SETU



5.1.2.9 Permeability Statistics

The study area encompasses 8,115 residential addresses, 946 commercial addresses and 644 addresses which are categorised within the GeoDirectory database as 'mixed use'. **Table 5-1** provides an overview of the walking catchment for key locations throughout Carlow Town. It provides a count of the number of residential, commercial, and mixed addresses which fall within the catchment of each key amenity. The table also provides a breakdown of the percentage of total addresses in the study area which are within walking distance of each location.

The table highlights that primary schools have the highest percentage of buildings within the 1km catchment. The analysis shows that 93% of Carlow Town buildings are within 1km of a school. This demonstrates that the schools are accessible via sustainable modes either as an end destination or a diversion to facilitate drop off / pick up around other travel patterns. However, children may be allocated a school further away from home and this may prevent on foot trips. Furthermore, 82% of buildings in Carlow Town are within 1km of a supermarket, this demonstrates that in simple terms people could access the supermarket on foot – however, this will be impacted by individuals personal shopping styles, i.e., whether they undertake bulk shopping which may require a vehicle to transport. Opposingly, bus stops, the railway station, and SETU have the least number of nearby buildings falling in the relevant catchments. This is less of an issue for SETU, as it is served by bus routes, is easily accessed from the town, and students may live nearby. But for public transport accessibility it is a more pressing issue as individuals need to be able to easily access public transport services in order to see them as a viable option of travel and be encouraged to use them over the private vehicles. Moreover, only 43% of homes fall within the 1km distance of Carlow Town Centre, meaning people may turn to their car to access the amenities situated in town as demonstrated by the high levels of car use currently. This trend needs to be prevented, through good cycling and public transport links, to reduce the car reliance and usage.

Table 5-1: GeoDirectory Statistics for Building Coverage of Key Services

	Existing Path Network Catchment (Address Points)				% Total Study Area Buildings			
	Residential	Commercial	Mixed Use	Total	Residential	Commercial	Mixed Use	Total
All Buildings	8115	946	644	9705				
Bus Stops – 500m	2132	608	457	3197	26%	64%	71%	33%
Train Station – 1km	2225	703	519	3447	27%	74%	81%	36%
Primary Schools – 1km	7200	897	597	8694	89%	95%	93%	90%
Secondary Schools – 1km	5370	894	581	6845	66%	95%	90%	71%
SETU – 1km	2010	458	456	2924	25%	48%	71%	30%
Town Centre – 1km	3472	680	559	4711	43%	72%	87%	49%
Supermarkets – 1km	6561	822	587	7970	81%	87%	91%	82%

5.1.3 Accessibility to Opportunities and Services (ATOS) Assessment

To supplement the walking catchment analysis described in Section 5.1.2, walking accessibility was also examined using the ATOS tool. This section first introduces the tool and the methodology used for this analysis before presenting the results of the analysis for each type of service.

ATOS (Accessibility to Opportunities and Services) is a tool maintained by the NTA to investigate accessibility to a range of different services and opportunities by active modes including Employment, Primary Education, Post Primary Education, GPs, Food Shopping 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 path network shown previously was used for the baseline ATOS assessments. Similar to the standard permeability assessments, the ATOS assessment will be repeated using the proposed future path network following the development of the walking / permeability strategy in order to assess how proposed changes improve accessibility to services from different parts of the study area.

The locations of schools and supermarkets used in the ATOS assessments were the same as those identified for the 1km walking catchment analysis described in the previous section. GP services were identified by the NTA using GeoDirectory (NACE Q86.21); while the locations chosen for the Open Space assessment were also identified by the NTA and were based on the previous Development Plan. The Census Workplace Zones file produced by the CSO provides information on employment.

The spatially defined origin for the application of ATOS is based on a 100m grid. For most service types (excluding employment), the tool calculates the average journey time from the centroid of each grid square (origin) to the nearest (x number of) services within the specified travel time cut-off from the origin. If the specified number of services to be reached is greater than 1, the travel time is the average of the travel times from the origin to the nearest (x number of) services. Scoring for each origin (grid square) is calculated based on how the average travel time for the square compares to the overall average across all squares which are within the cut off time of at least one service, as shown in **Table 5-2**.

When the NTA designed the tool, they decided that although the parameters allow the user to specify that two or more destinations should be located, if a particular origin grid square is within range of at least one service but fewer than the specified number, it is not excluded from the calculations completely. Instead, a negative weighting is applied to the origin's calculated travel times prior to the final comparison with the over-all average and standard deviation. For example, if the selection criteria

are ‘nearest two schools’, but only one school is located within the cut-off time, the deficit is considered to be 50 percent and a corresponding negative weighting of 1.5 is applied to the travel time for that origin grid square.

Table 5-2: ATOS Score Ranges (All Destination Types 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	

The ATOS scoring for access to employment (number of accessible jobs) follows a different methodology to the methodology used for other types of destinations. The main dataset used to assess access to employment is the Workplace Zones (WPZ) file produced by the CSO. This is made up of polygons which contain information on the number of jobs within each WPZ. This allows for the job density of each WPZ to be calculated (Total Jobs/WPZ area in metres). A Network Service Area is then calculated for each origin grid square. For each WPZ accessible from the origin’s service area, the WPZ Accessible Jobs is: Accessible WPZ Area (metres) x WPZ Employment Density. Individual WPZ accessible jobs results are then aggregated to get an overall jobs result for each origin grid quare. The average accessible jobs and standard deviation of accessible jobs across all origin grid squares is calculated. Scoring for each origin (grid square) is then calculated based on **Table 5-3**. Note that this is inverse to the scoring used for other types of destinations, because in this case a higher value is better – i.e., more accessible jobs.

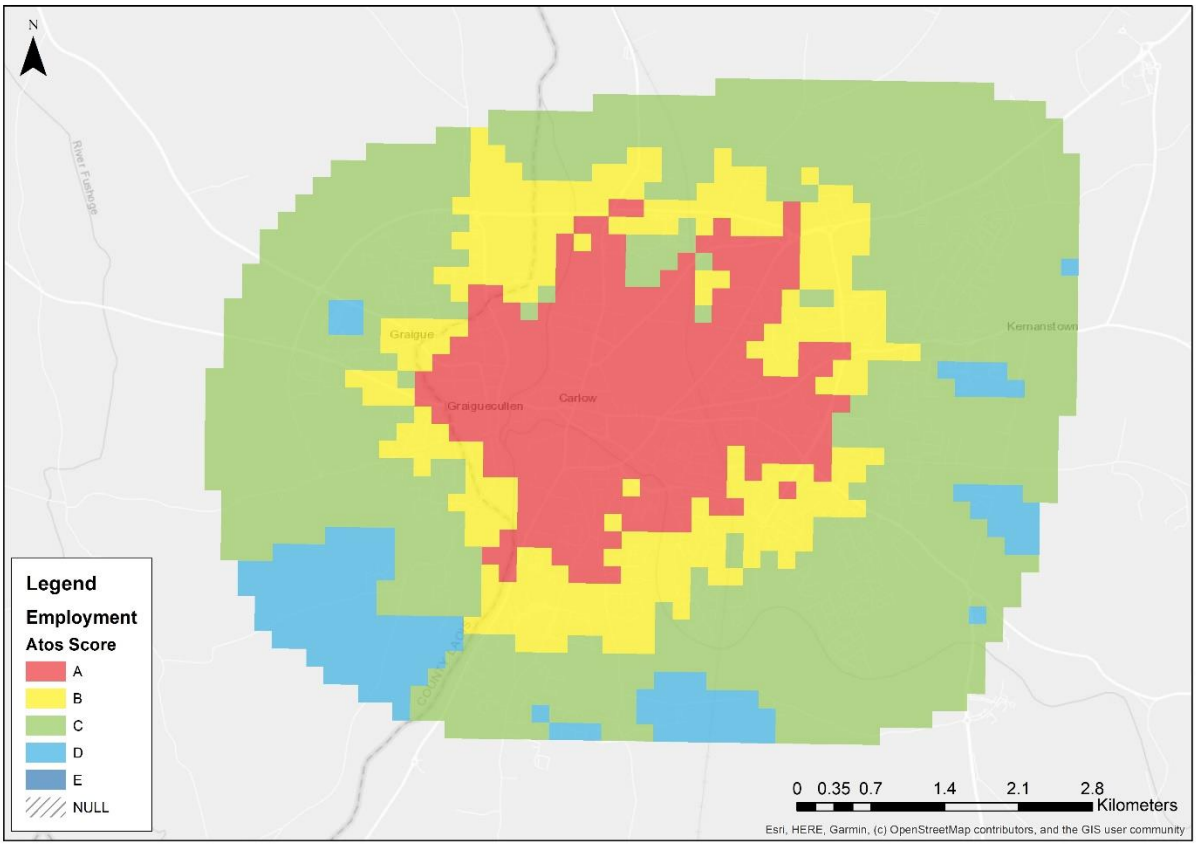
Table 5-3: ATOS Score Ranges (Number of accessible jobs)

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	

5.1.3.1 ATOS Assessment – Employment

Figure 5-12 shows the results of the ATOS analysis for walking accessibility to employment. As would be expected, areas closer to, and with direct routes to, the town centre, SETU, and out-of-town retail and business parks (where key employment sites are located) score well for walking accessibility to employment. Areas further out of the town centre, towards the suburban and rural areas of the ABTA study area, are shown to have lower employment accessibility through walking, however, in most cases this is still above average just not to the same degree. Overall, this demonstrates a good accessibility to employment through walking and demonstrates the potential of encouraging increased active travel, and a modal-shift, for commuting trips.

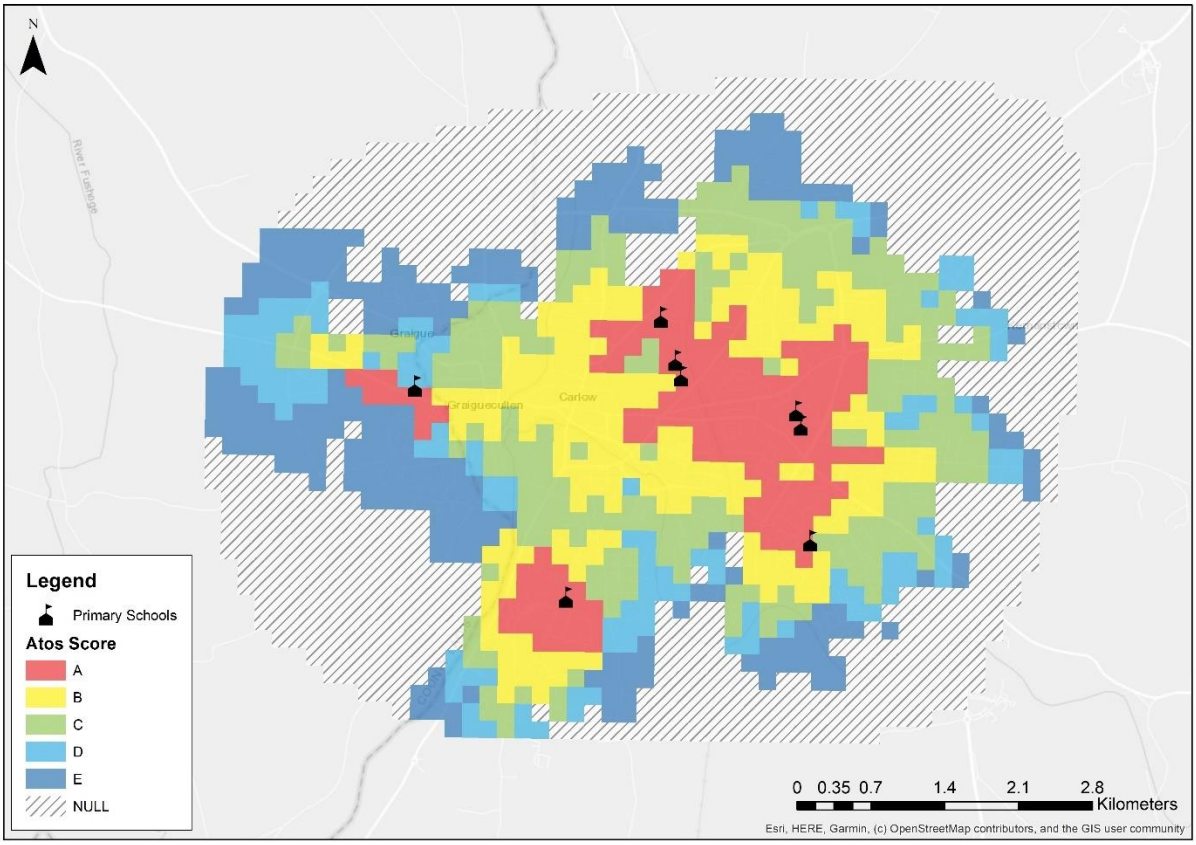
Figure 5-12: ATOS Analysis of Walking Accessibility to Employment



5.1.3.2 ATOS Assessment – Primary Schools

Figure 5-13 shows the results of the ATOS analysis for walking accessibility to primary schools in the Carlow Graiguecullen ABTA study area. The tool was set to search for the two nearest primary schools to each grid square (within a twenty-minute walking distance). Approximately 34% of the grid squares contained with the Carlow Graiguecullen ABTA study area have two primary schools within a twenty-minute walk. If the criteria were lowered to one school within a twenty-minute walk, then nearly 60% of the grid squares within the study area would be within a twenty-minute walk of a primary school. Many of these grid squares are located very close to the primary schools within the study area. In most cases the areas within poorer accessibility to primary schools are located further away from the primary schools themselves and are closer to the outskirts of Carlow and the study area.

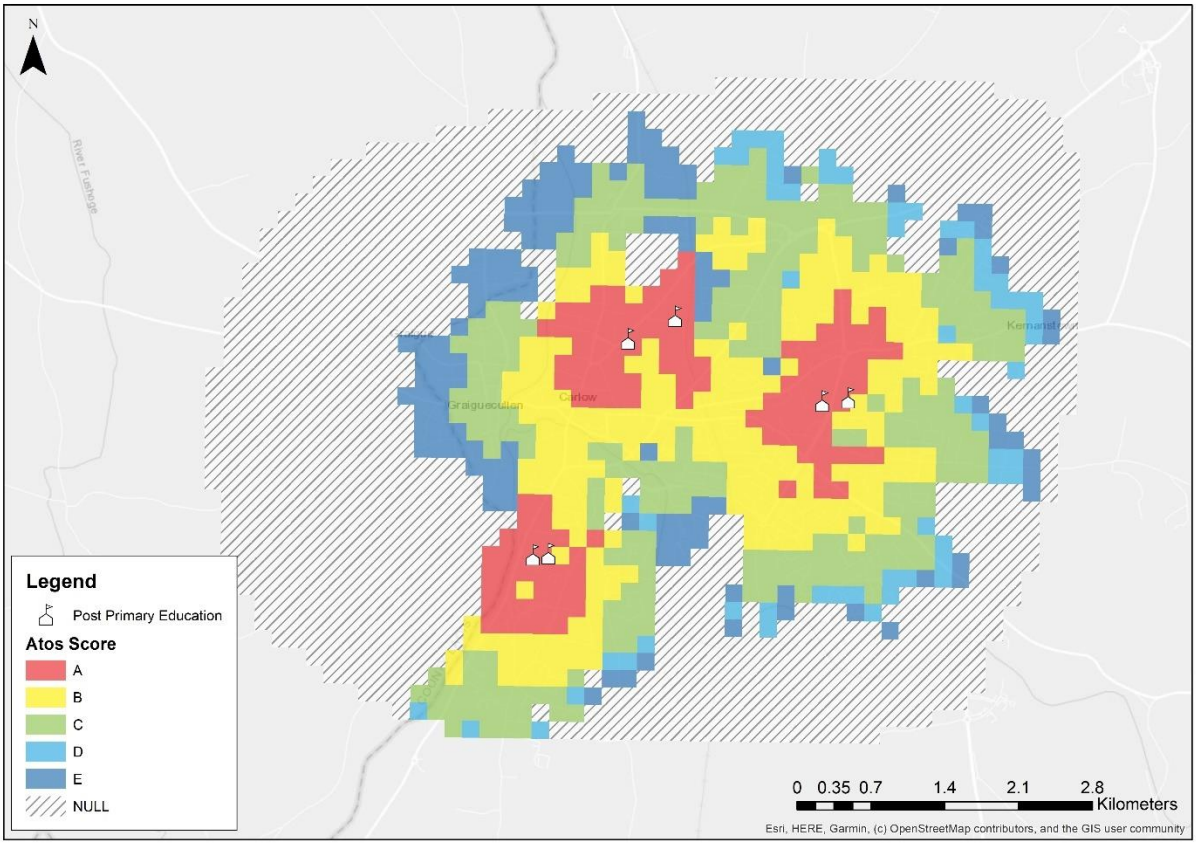
Figure 5-13: ATOS Analysis of Walking Accessibility to Primary School



5.1.3.3 ATOS Assessment – Post-Primary Education

Figure 5-14 shows the results of the ATOS analysis for walking accessibility to post-primary education. The tool again was set to search for the two nearest post-primary education to each grid square (within a twenty-minute walking distance). Approximately 42% of all grid squares have access to two post-primary education sites within a twenty-minute walk. This is likely due to the location of post-primary education within the study area, which are located just outside the town centre, along the N80 and near Kilkenny Road. Overall, the data shows that many who live in the area could access post-primary education on foot and could use walking more frequently for travel. However, a large proportion of the population (nearly half) have no post-primary education within a twenty-minute walk, therefore, without permeability improvements to shorten trip distances then a modal-shift towards walking is unlikely to occur. Similar to the primary analysis above, the areas with lower walking accessibility to post-primary education are located further out of the town centre and closer to the study area edges.

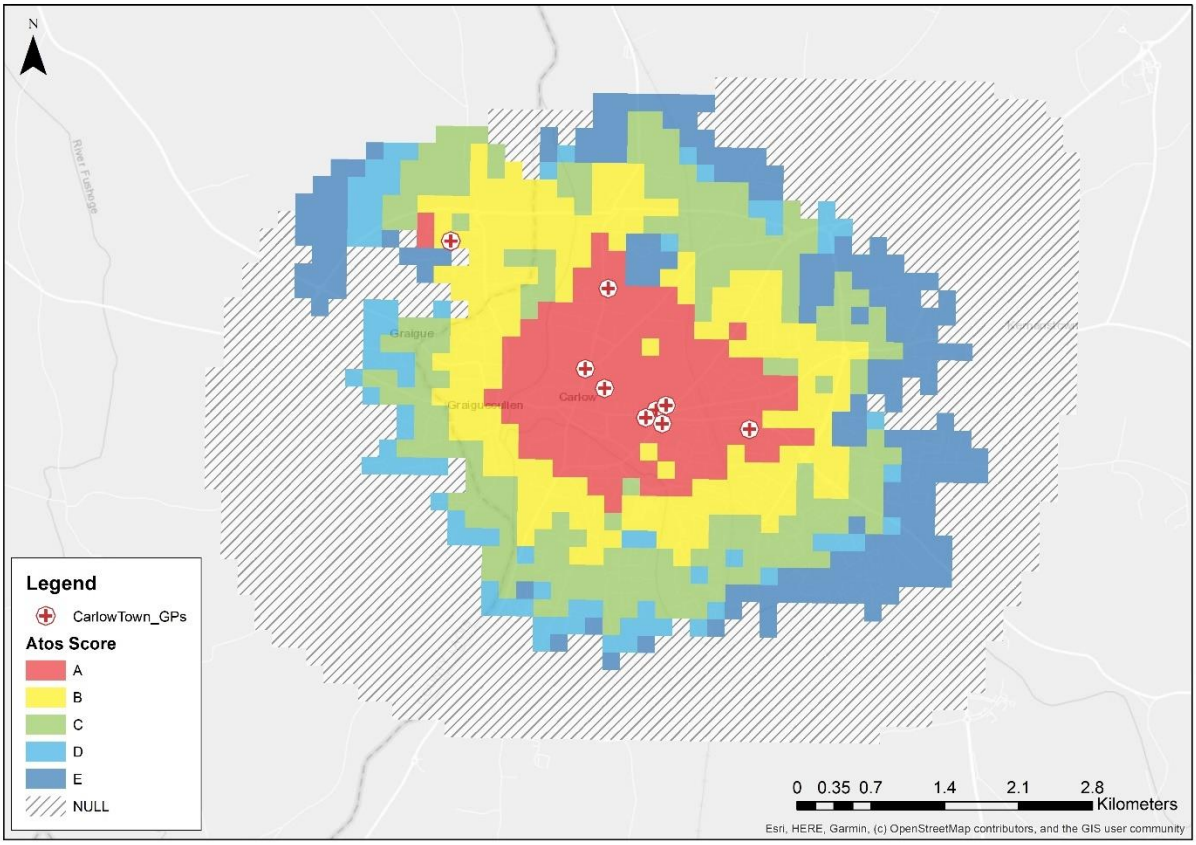
Figure 5-14: ATOS Analysis of Walking Accessibility to Post-Primary Education



5.1.3.4 ATOS Assessment – GP Services

Figure 5-15 shows the results of the ATOS analysis for walking accessibility to GP services in the Carlow Graiguecullen ABTA study area. The tool was set to search for the nearest two GP services to each grid square (within a twenty-minute walking distance). The map highlights that there are GP services scattered around the area within or close to the town centre, with the exception of one located in the northwest of Graiguecullen. In particular, there is a higher density of GP services near to Tullow Street / Barrack Street. Due to the central location of these services, 48% of grid squares are not within reach of any GP services within a twenty-minute walk. Locations with poorer walking accessibility to GP services are towards the northern and eastern sections of Carlow, further out from the centre – this could be a key issue given how many residential areas are situated to the east. Although, there are areas within closer walking proximity of GP services, just under 40% of grid squares are within a twenty-minute walk of two GP services. This shows that travel from these areas to GP services is short and manageable on foot. These locations, with higher accessibility, are within the town centre or the nearby surrounding areas.

Figure 5-15: ATOS Analysis of Walking Accessibility to GPs

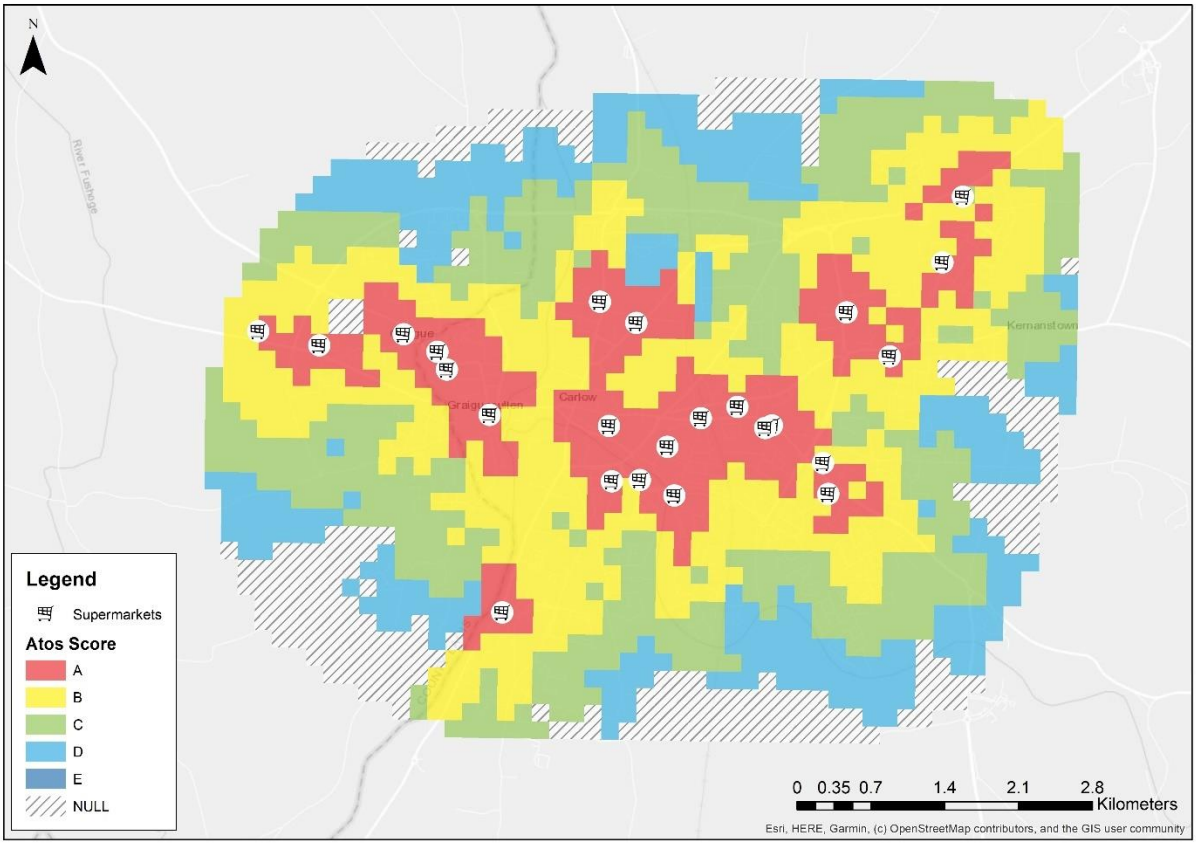


5.1.3.5 ATOS Assessment – Supermarkets

5.2

Figure 5-16 shows the results of the ATOS analysis for walking accessibility to supermarkets in the Carlow Graiguecullen ABTA study area. In contrast to the assessments outlined above, the tool was set to search for only the nearest supermarket to each grid square. The map shows that supermarkets are evenly spread across the Carlow area, with most residential areas being relatively close to a supermarket. This is supported by the ATOS results, over 88% of grid squares are within a twenty-minute walk of at least one supermarket. There are pockets of lower walking accessibility to supermarkets in northern and more rural sections of the Carlow Graiguecullen study area, however, generally walking access to these shops is good from most areas of Carlow and an uptake in walking for these trips could be promoted.

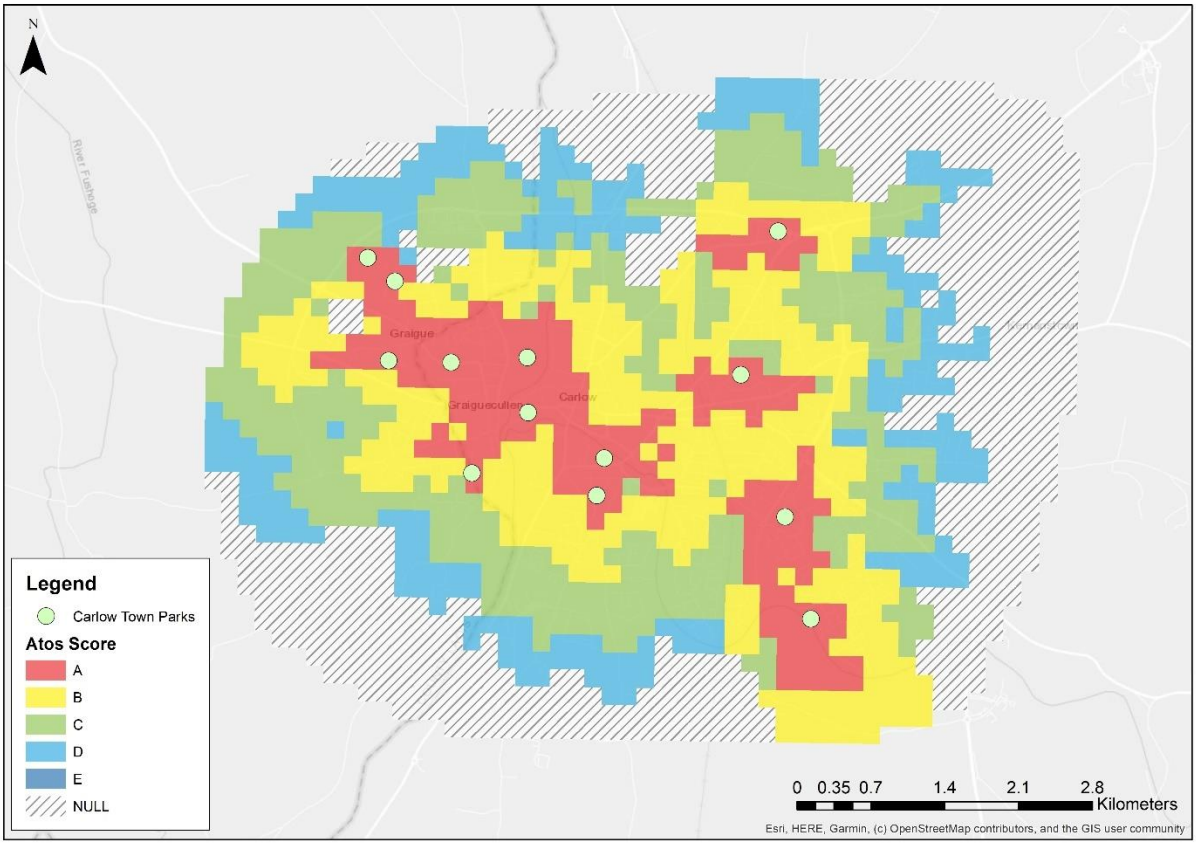
Figure 5-16: ATOS Analysis of Walking Accessibility to Supermarkets



5.2.1.1 ATOS Assessment – Parks and Open Spaces

Figure 5-17 shows the results of the ATOS analysis for walking accessibility to parks and open spaces in the Carlow Graiguecullen ABTA study area. Similar to supermarkets, and unlike other assessments, the ATOS tool was set to search for only one park or open space within a twenty-minute walk. The entranceway or middle point of the park or open space has been used as the measure point for this service. Roughly 70% of all grid squares have access to at least one park or open space within twenty-minutes of walking. This means that just 30% of grid squares are over a twenty-minute walk to a park or open space. The majority of these areas are either areas with little development or dense housing estates.

Figure 5-17: ATOS Analysis of Walking Accessibility to Parks and Open Spaces



5.3 Public Transport

5.3.1 Carlow Bus Services

5.4 The Carlow Graiguecullen ABTA study area is served by a number of bus services which offer connections within Carlow as well as to nearby towns and urban areas**. Figure 5-18** provides an overview of the routes which pass through Carlow Town, with The frequency of these services is outlined in the following table.

Table 5-4 below showing the bus service and timings. **Figure 5-19** provides the bus routing within Carlow Town for each of the services presented in the table. It should be noted there are some local link services, which are demand responsive services and usually run only one day a week, and therefore these are excluded from this mapping.

Figure 5-18: Bus Routes Origination/Passing Carlow Graiguecullen Study Area

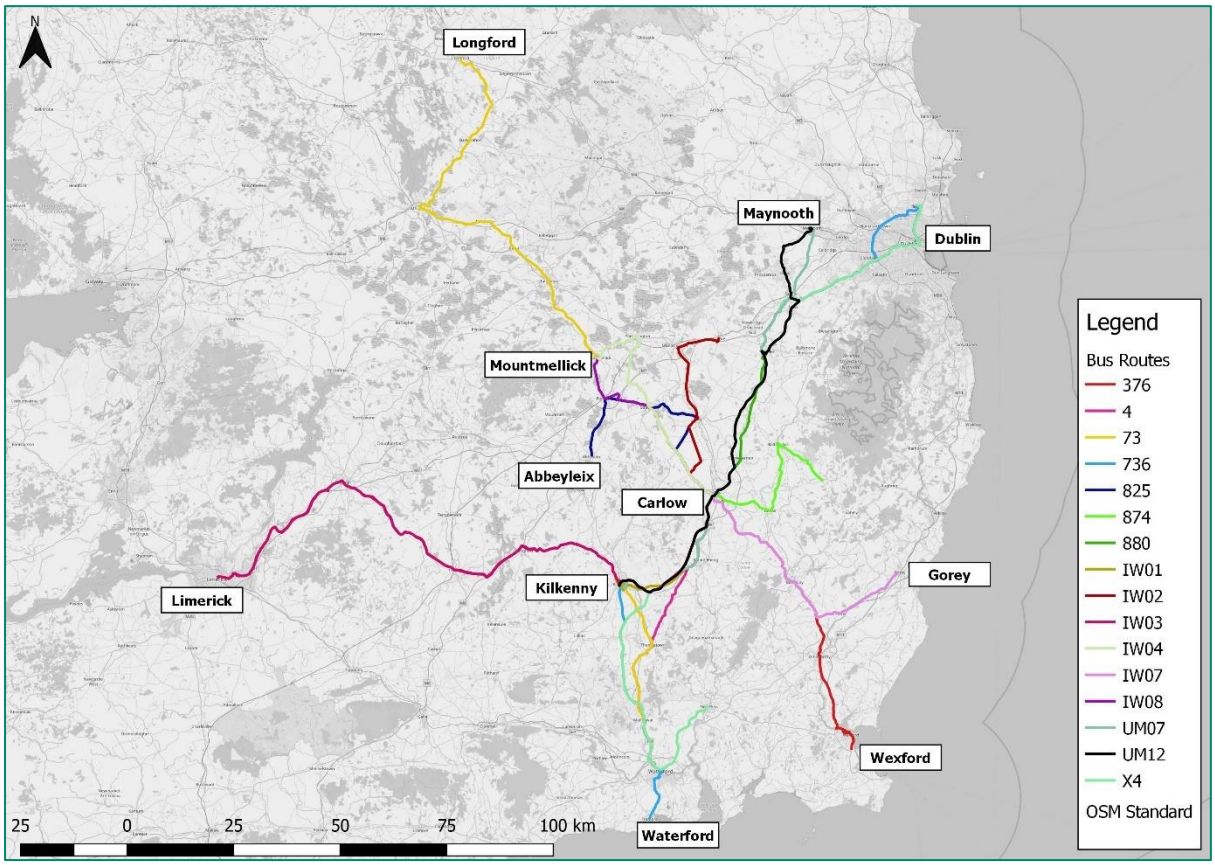
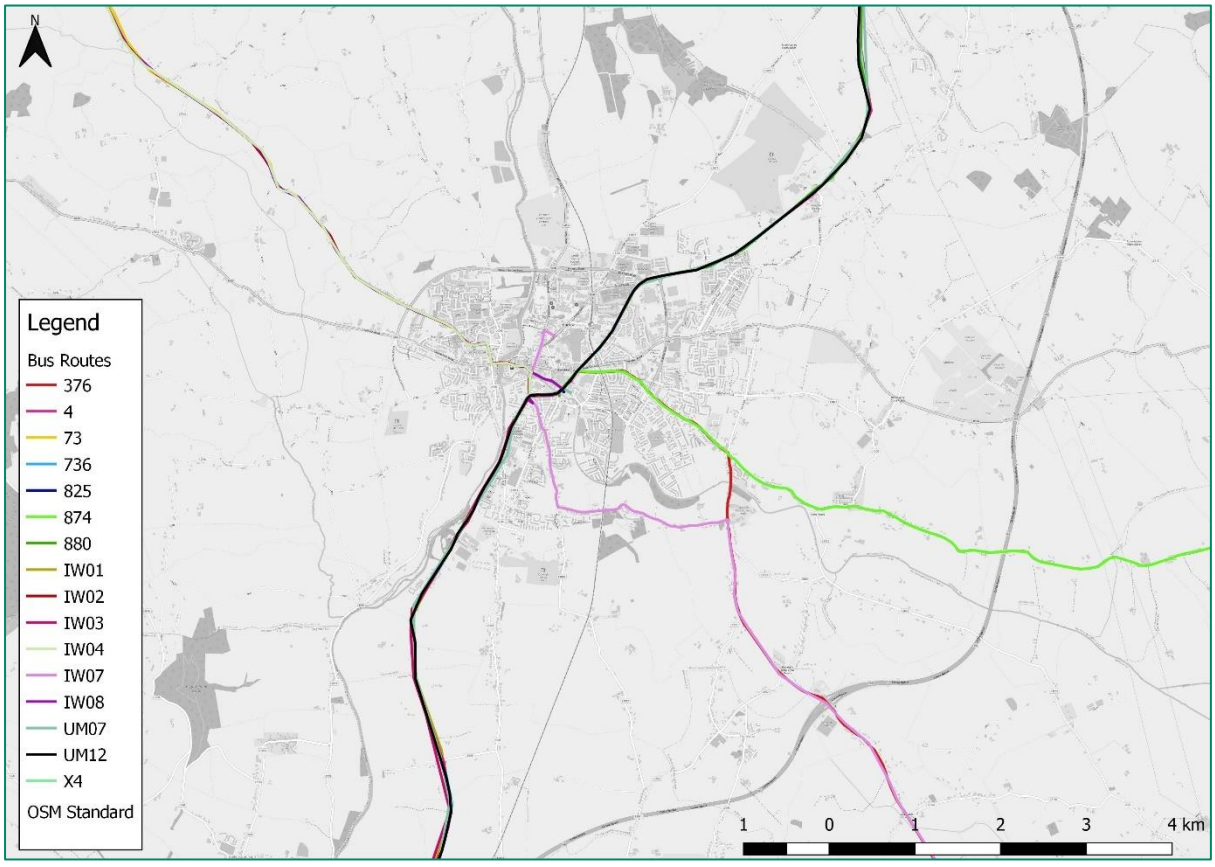


Figure 5-19: Bus Routes in Carlow Graiguecullen Study Area



The frequency of these services is outlined in the following table.

Table 5-4: Bus Services and Timings

Provider	Bus Service	Origin	Destination	Total Daily Services (operating to or via Carlow)	Days of Week
Brendan Dunne	IW01	Kilkenny	SETU Carlow	1	Monday – Friday
	IW07	Gorey	Carlow	1	Monday – Friday
Brian Callinan	UM07	Kilkenny	Maynooth University	1	Friday and Sunday
Bus Eireann	4 / X4	Dublin Airport	Waterford	12	Monday – Friday
	73	Waterford	Athlone	2	Monday – Saturday
	73	Waterford	Athlone	1	Sunday
PJ Martleys	IW08	Mountmellick	Carlow	3	Monday – Friday
Kenneallys	NG03	Galway	SETU Carlow	1	Friday and Sunday
	IW03	Limerick	SETU Carlow	1	Friday and Sunday
	UM12	Kilkenny	Maynooth University	2	Monday – Friday
	736	Dublin	Tramore	14	Monday – Friday
	736	Dublin	Tramore	13	Saturday and Sunday
JJ Kavanagh]98I	874	Hackettstown	Carlow	2	Monday – Friday
	825	Abbeyleix	Carlow	2	Monday – Friday
	IW04	Mountmellick	SETU Carlow	1	Monday – Friday
	IW02	Curagh	SETU Carlow	1	Monday – Friday
Wexford Bus	376	Wexford	Kilkenny	3	Monday – Saturday
	376	Wexford	Kilkenny	2	Sunday
Local Link	880	Carlow	Naas	3	Monday – Friday

5.4.1 Local Link Services

In addition to the more frequent services, there are also local link services that serve Carlow Town. These have been excluded from mapping and the table above due to the infrequency of the services and also, in most cases, the demand responsive nature. Demand responsive services are only run when demand is guaranteed, therefore, individuals are required to book in advance when they wish to travel on these services. There are six local link services, with each service calling at Fairgreen Shopping Centre. The services are listed below:

- 400 – Hackettstown to Carlow, this service runs on a Wednesday. The bus departs Hackettstown at 11:00am and begins its return from Carlow at 16:00. This is a demand responsive service.
- 473 – Graiguecullen to Carlow, this service runs on a Thursday and Friday morning. The bus departs Graiguecullen at 11:00 and begins its return from Carlow at 14:00. This is a demand responsive service.
- 469 – Graiguecullen to Carlow, this service runs on a Thursday evening. The bus departs Graiguecullen at 19:00 and begins its return journey from Carlow at 21:30. This is not demand responsive.
- 481 – Carlow South to Carlow Town, this service runs on a Monday and Wednesday. The bus departs Carlow South (Graiguenamanagh) at 09:00 and begins the return from Carlow at 13:30. This is a demand responsive service.
- 484 – Bunclody to Tullow and Carlow, this service runs Thursday and Friday. The bus leaves Bunclody at 08:30 and begins its return journey from Carlow at 14:30. This is a demand responsive service.
- 487 – Bilboa to Carlow, this service runs on a Monday. It leaves Killeshin at 11:15 and begins its return from Carlow at 15:30. This is a demand responsive service.

The ticketing for these services works on a flat fare rate, meaning the same rate is paid regardless of trip length. This often makes travelling more convenient and attractive. Adult single trip is 3 euros and an Under 16 single trip is 2 euros, additionally children under the age of 5 can travel for free.

5.4.2 Rail Services

Carlow railway station is located approximately 1km to the northeast of the town centre and sits on the Dublin to Waterford line. At the station there are two platforms, one serving the Dublin Heuston Station route and the other, Plunket Station Waterford. There are 190 car parking spaces and sheltered bicycle parking, as well as 5 bicycle lockers for rent. **Table 5-5** summarises the departures from Carlow Station, with just departure times noted as often arrival times are the same or only a few minutes earlier.

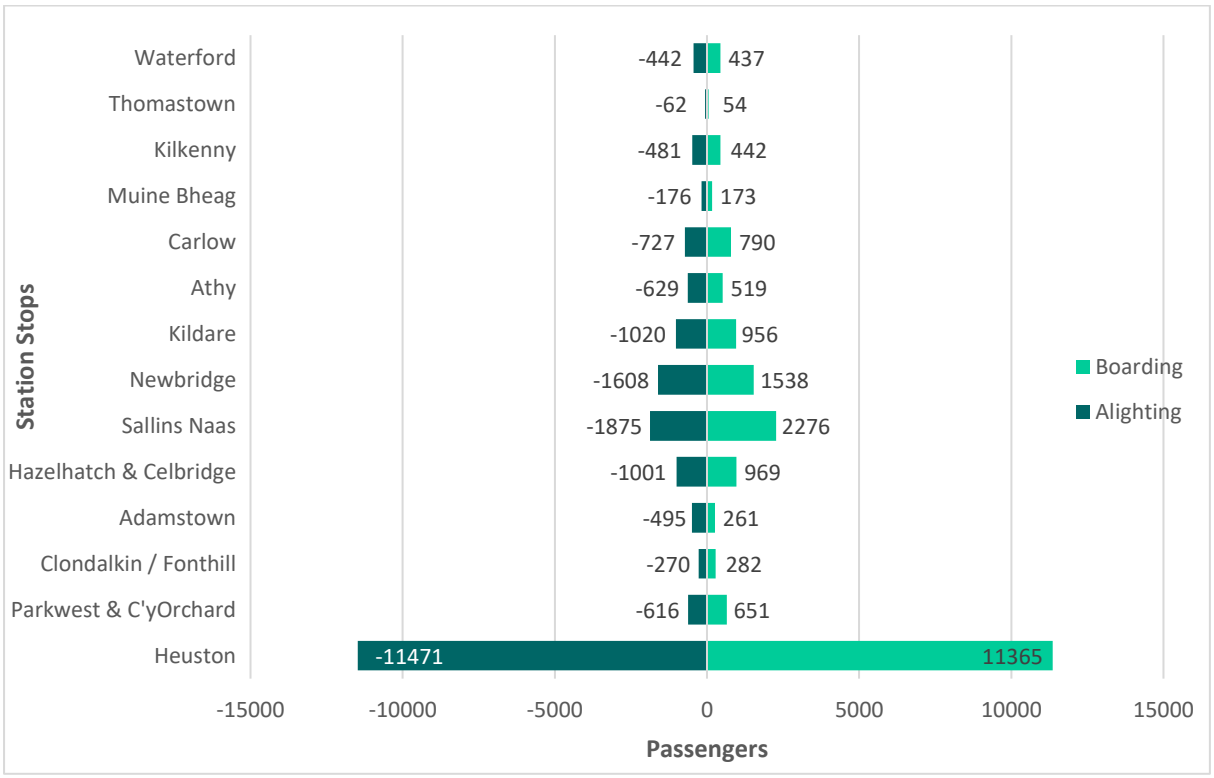
Table 5-5: Carlow Departures

Dublin – Waterford (Monday – Saturday)	Dublin – Waterford (Sunday)	Waterford – Dublin (Monday – Saturday)	Waterford – Dublin (Sunday)
08:22	10:14	06:30 (Weekdays only and starting stop is Carlow not Waterford)	10:15
11:11	15:11	07:03	13:48
14:12	18:46	07:55	16:18
16:10	19:42	08:58	19:15
17:25 (Friday only)		12:11	
17:53		14:12	
18:38		16:10	
19:42		17:00 (Friday and Saturday only and starting stop is Carlow not Waterford)	
		19:43	
		21:36 (Weekdays only and starting stop is Carlow not Waterford)	

Source: Irish Rail Online Timetables

Figure 5-20 shows the boarding and alighting profile along the Dublin – Waterford Line, based on data provided in the 2019 Heavy Rail Census. The data shows that Carlow has 790 daily boardings, compared with an average number of daily boardings along the line, excluding Heuston station, of 719 a day. This means that the number of passengers boarding daily at Carlow is just above the average for this line. Carlow Station ranks 5th overall in terms of the number of daily boardings and alighting's along the Dublin – Waterford Line (excluding Heuston).

Figure 5-20: Boarding and Alighting Profile along the Dublin Heuston – Waterford Line (2019)

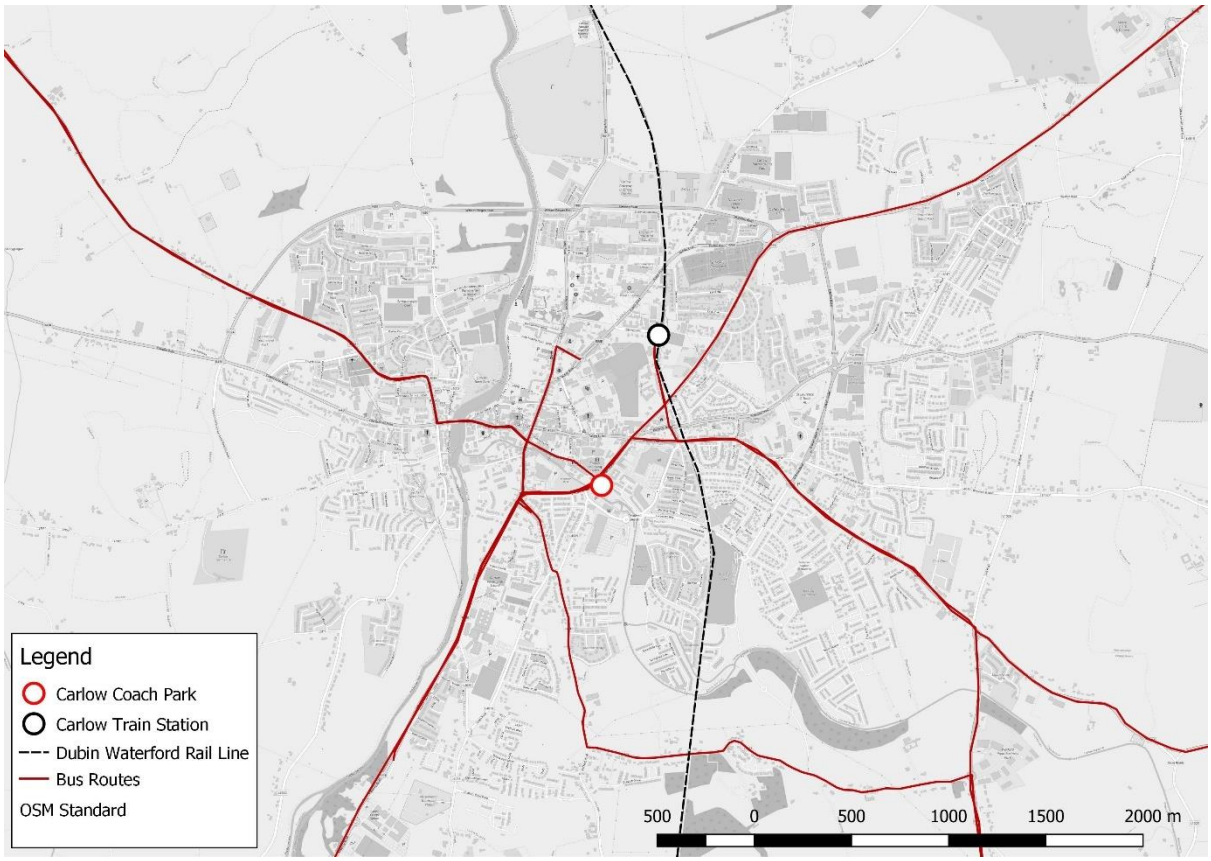


Source: Heavy Rail Census 2019

5.4.3 Existing Carlow Public Transport Network

As described above, Carlow town is served by both bus and rail services, with a summary of all routes shown in **Figure 5-21** below. While Carlow and Graiguecullen are well connected in terms of routes to neighbouring settlements, the frequency of connections could be improved, and there is potential to improve bus access along the local routes around the town.

Figure 5-21: Public Transport Network



5.4.4 Public Transport Capacity

A capacity analysis of public transport in Carlow Town has been undertaken which allows for comparisons between the existing public transport capacity and the desired capacity in the future. Operational capacity has been calculated based on the number of existing services multiplied by the capacity of the vehicle used to provide that service. Assumptions of the analysis are listed below in the relevant tables.

5.4.4.1 Existing Bus and Rail Capacity

Table 5-6 shows the existing capacity of inbound bus services to or through the study area. The service with the largest operational capacity is the 736, followed by the 4/X4. This demonstrates services running from, though, or to Dublin are more frequently provided.

Table 5-6: Bus Capacity

Service	Origin	Destination	No. Daily Services	Day of Week	Assumed Vehicle Capacity	Daily Operational Capacity
IW01	Kilkenny	SETU Carlow	1	Monday – Friday	55	55
IW07	Gorey	Carlow	1	Monday – Friday	55	55
UM07	Kilkenny	Maynooth University	1	Friday and Sunday	55	55
4 / X4	Dublin Airport	Waterford	12	Monday – Friday	55	660
73	Waterford	Athlone	2	Monday – Saturday	55	110
73	Waterford	Athlone	1	Sunday	55	55
IW08	Mountmellick	Carlow	3	Monday – Friday	55	165
NG03	Galway	SETU Carlow	1	Friday and Sunday	55	55
IW03	Limerick	SETU Carlow	1	Friday and Sunday	55	55
UM12	Kilkenny	Maynooth University	2	Monday – Friday	55	110
736	Dublin	Tramore	14	Monday – Friday	55	770
736	Dublin	Tramore	13	Saturday and Sunday	55	715
874	Hackettstown	Carlow	2	Monday – Friday	55	110
825	Abbeyleix	Carlow	2	Monday – Friday	55	110
873	Carlow	Kilkenny	2	Monday – Friday	55	110
IW04	Mountmellick	SETU Carlow	1	Monday – Friday	55	55
IW02	Curagh	SETU Carlow	1	Monday – Friday	55	55
376	Wexford	Kilkenny	3	Monday – Saturday	55	165
376	Wexford	Kilkenny	2	Sunday	55	110

Existing Bus Capacity Assumptions:

- Excludes local link services and university coach services, focused on commuter services
- It is assumed all services use coaches
- Based on 2019 GTFS data

Table 5-7 and **Table 5-8** provide the existing maximum operational capacity of the rail services for inbound and outbound services respectively passing through Carlow. The total operational capacity of inbound services is 2,128 and 2,736 for outbound services.

Table 5-7: Existing Inbound Train Capacity (Mon-Thurs)

Set Size	Origin	Destination	No. of Services	Total Maximum Seated capacity	Operational Capacity
InterCity Railcar 22000 Class	Dublin Heuston	Waterford	7	304	2128
		Total Capacity			**2128**

Table 5-8: Existing Outbound Train Capacity (Mon-Thurs)

Set Size	Origin	Destination	No. of Services	Total Maximum Seated capacity	Operational Capacity
InterCity Railcar 22000 Class	Waterford	Dublin Heuston	9	304	2736
		Total Capacity			**2736**

Existing Train Capacity Assumptions:

- Train capacity is based on seated passengers.
- Train capacity can differ depending on whether the train is 3, 4, or 5 cars in length. Therefore, a maximum operational capacity has been provided.

5.4.5 Public Transport Accessibility Analysis

This section explores local public transport accessibility through the study of PTALs (Public Transport Accessibility Levels) as well as region public transport accessibility through the study of POWSCAR trip distribution.

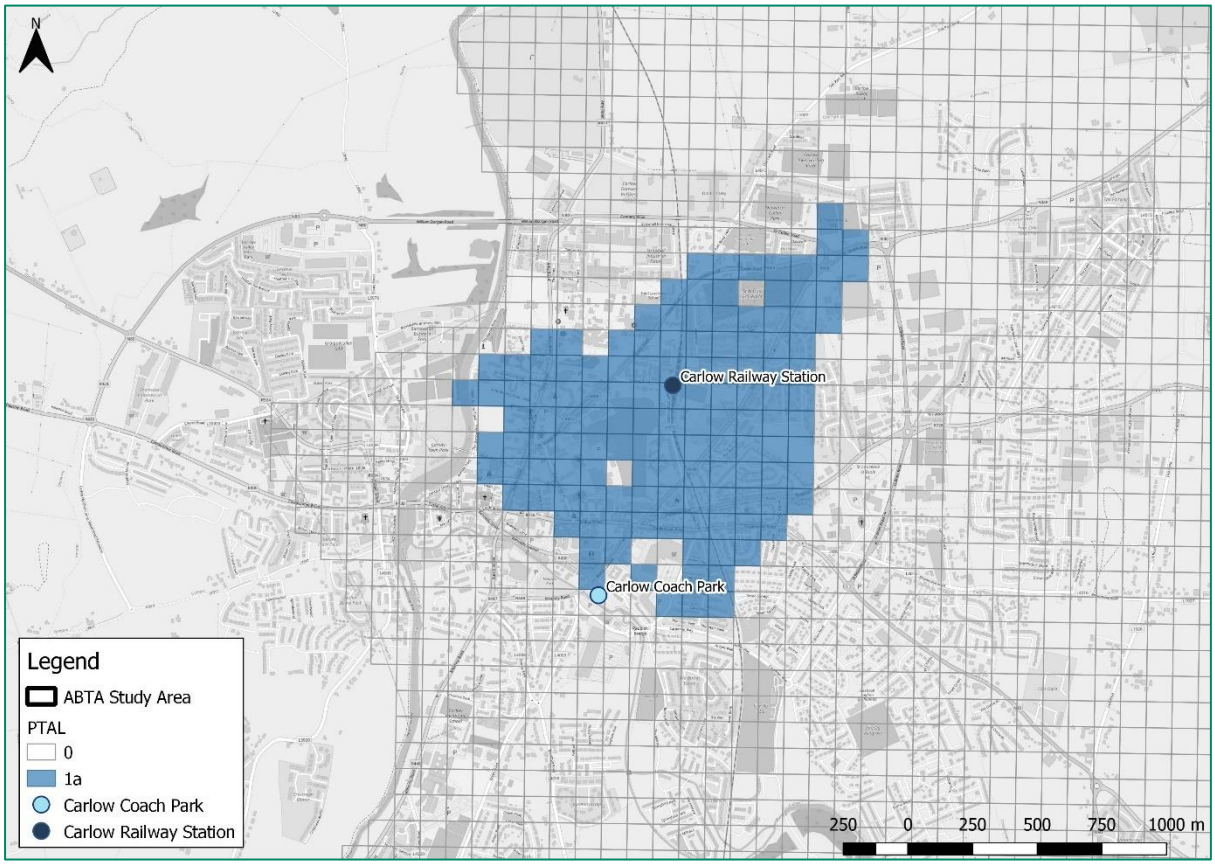
5.4.5.1 Public Transport Accessibility Levels (PTALs)

PTAL is a measure of the density of the public transport network. The analysis area is divided into a 100m grid, and each square receives a score. An accessibility index is calculated for each public transport stop and route at the stop. The index consists of the walk time to the public transport stop, service frequency and the average wait time at the stop. It also includes a reliability factor, which is different for rail and bus. The values of each stop and route in a square are summed and translated to a standardised score; the lowest score represents the worst and the highest score the best.

For Carlow, the highest PTAL scores are 1a. Squares which score a 1a are located in a small section of the study area. Areas such as along Dublin Street, Dublin Road, and Green Lane are considered to score 1a alongside parts of Tullow Street, Athy Road, Pollerton Road, and some south eastern parts of the town centre. These areas are likely to score a 1a due to their proximity to bus stops and the rail station, although higher scores are likely not achieved due to low service frequency and therefore high wait times.

The image clearly depicts a large area of the study area scores 0, the lowest possible score. This is probably caused by the fact that the rail station is not accessible to many on foot, bus stops are uncommon, and services are infrequent. Overall, there is a clear need to allow people easier access to public transport stops/stations as well as make other improvements to improve the public transport accessibility levels for the study area.

Figure 5-22: Carlow Graiguecullen PTAL Assessment



5.5 Road Network

5.5.1 Overview of Town Road Network

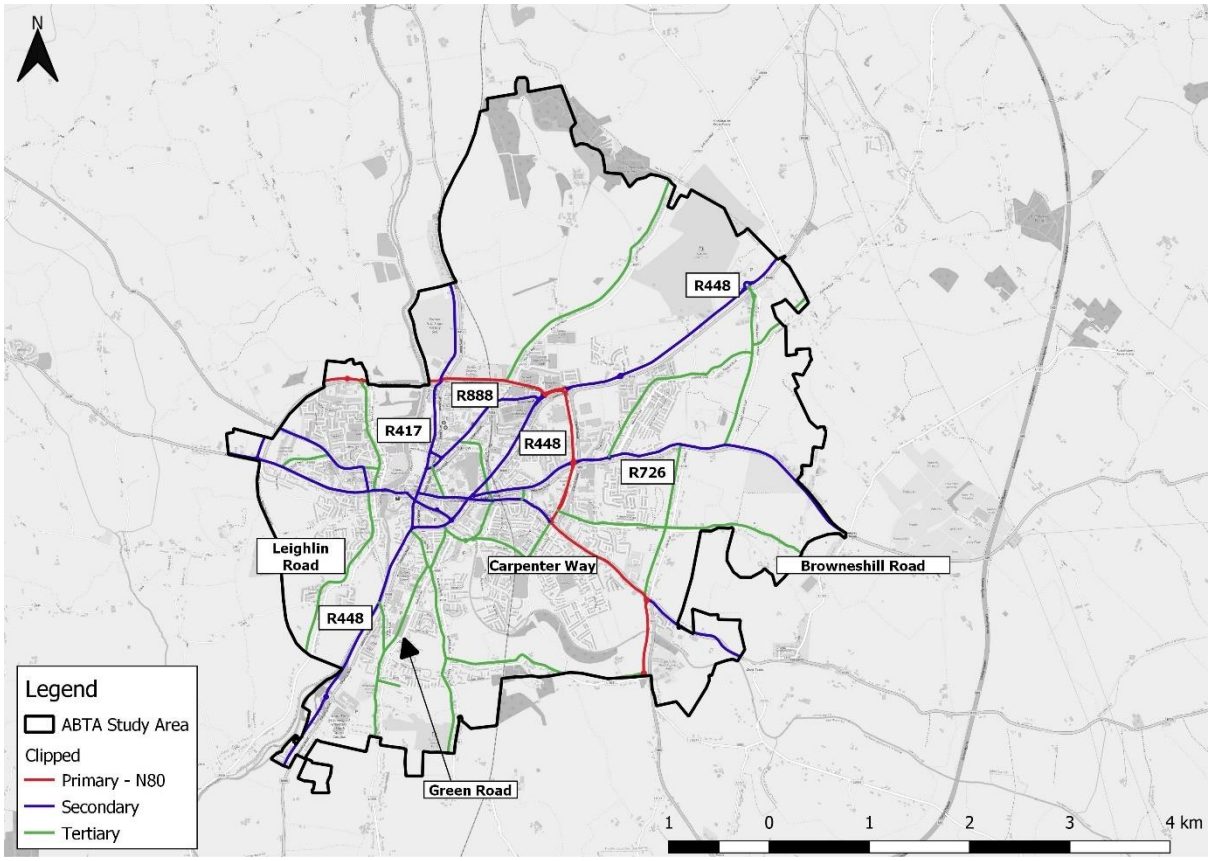
Figure 5-23 below shows the road network across the study area.

The N80 runs through the northern and eastern parts of the town. The N80 is a National Secondary Road that runs south-eastwards from its junction with N52 and R442 in Tullamore, in County Offaly, to the N30 junction just north of Enniscorthy in County Wexford. The N80 is around 71 miles long and usually is a two-lane road without hard shoulders, however, its characteristics changes throughout the route as it passes through busier and more rural areas. In Carlow, it is a single carriageway road, with wide footpaths either side, as well as cycle lanes or shared space along the majority of the route.

Additionally, the M9 motorway passes through Carlow just east of the town. The M9 is a motorway linking from near Kilcullen to Waterford, and the motorway section near to Carlow Town is the Carlow Bypass. Prior to the creation of the Carlow Bypass, opened in 2008, the N9 use to pass directly through the town centre.

There are regional roads which pass through Carlow town; these are: the R430 which links Carlow and Mountrath, R417 linking County Kildare and Carlow and R726 linking Rathvilly and Carlow. The R448 linking County Kildare with Waterford passes directly through the centre of Carlow from the north to the south; this route used to be the old national route 6. Regional roads are not classed as primary or secondary roads but still form an important link in the national route network. They are maintained by the local county or city authority and often have a speed limit of 80kph; but this does change in towns and residential areas. There are other smaller roads which are individually named, not making up part of the larger network, but acting as linkages in and about the town centre.

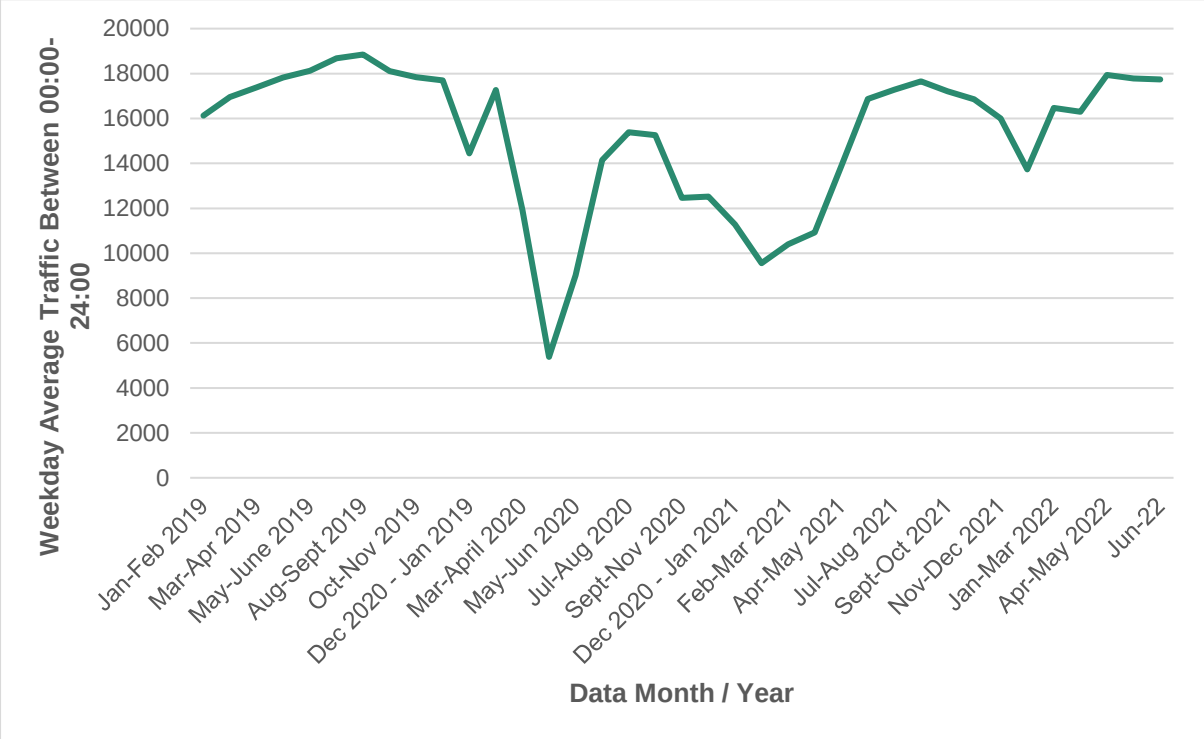
Figure 5-23: Carlow Graiguecullen Study Area Road Network



5.5.2 M9 Traffic Growth (motorway)

The Average Daily Traffic (ADT) from 2019 to 2022 is presented in **Figure 5-24,** which uses data taken from the TII permanent traffic counter located on the M9 Carlow Bypass between Junction 5 and Junction 6 (TMU M9 049.0 N). The data shown in the graph is the weekday average traffic for all days between January 2019 up until 29th June 2022. When the first month of data, which covers January and February 2019, is compared to the last month of data, covering June 2022, it is shown there is a 10% increase in traffic. However, the traffic flow growth has not been consistent, for example it peaked in August/September 2019 and then fell sharply during the COVID-19 restrictions.

Figure 5-24: M9 Daily Traffic Growth



However, this dataset only provides data for the last three years, limiting the scope to create a longer profile view of traffic growth in the area. Therefore, further NTA data which has traffic counts dating back to 2000 have been analysed in **Figure 5-25.** The data covering the longest timeframe used in the analysis has come from a traffic counter on the N80 in Carlow. In this dataset data is provided for the average daily volumes, broken down by month, for 2000 through to 2012. The graph demonstrates the yearly average of traffic volumes, produced by finding the average of the monthly average daily traffic volumes.

This demonstrates that year-by-year traffic volumes along the corridor are increasing, up until around 2008 after which the traffic volumes plateau and continues to experience less significant fluctuations in traffic volumes.

Figure 5-25: N80 Daily Traffic Growth

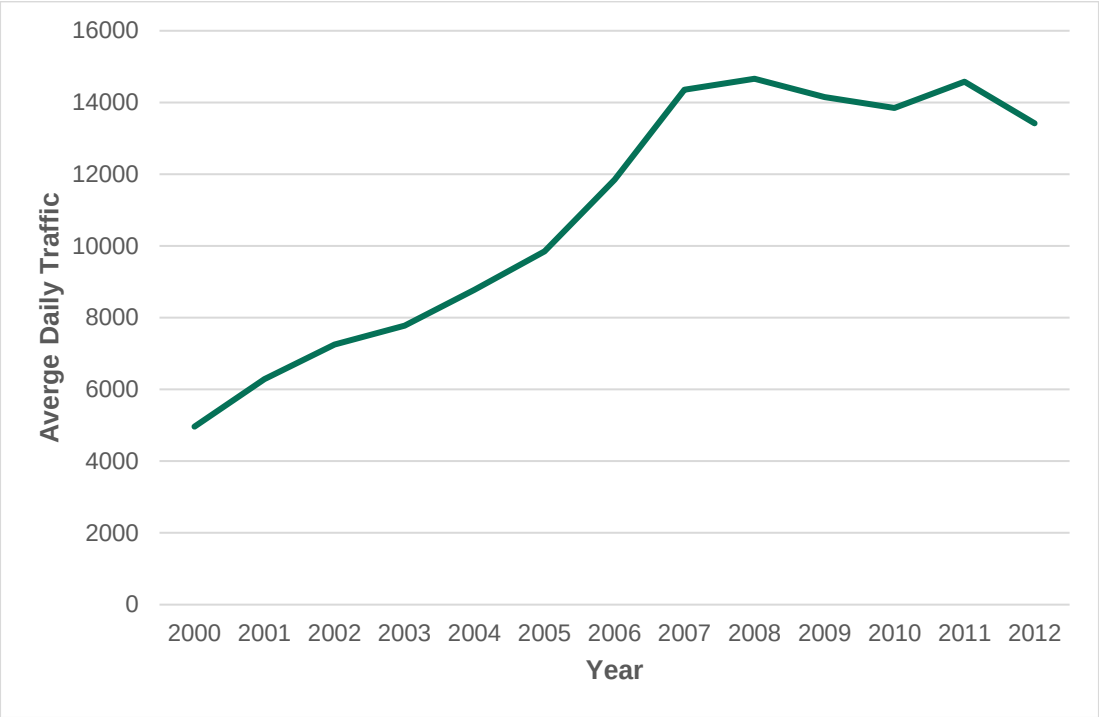
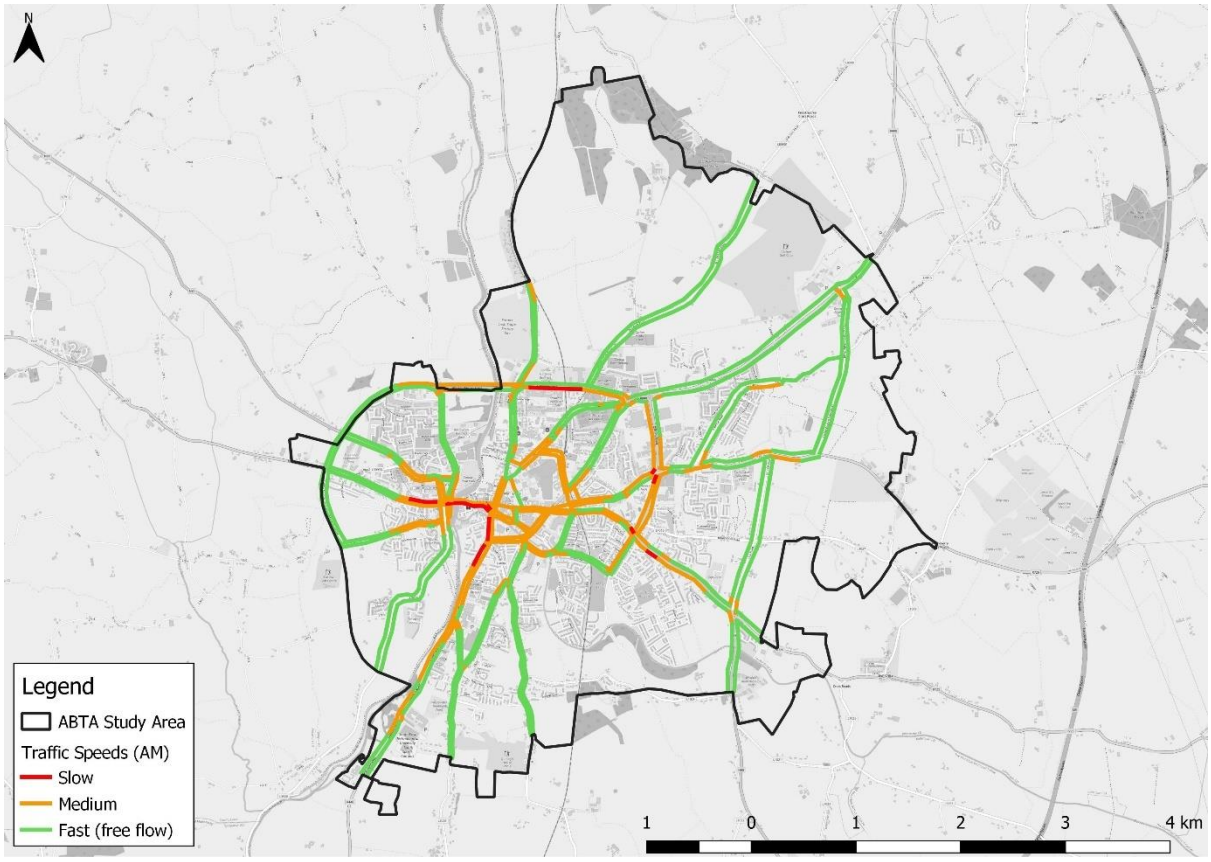


Figure 5-26 and **Figure 5-27** represent traffic congestion in the study area based on average speeds taken from Google. The times and weekdays chosen for the images were based on showing the worst-case scenario. Therefore, the AM peak is represented by 09:00 Wednesday and the PM peak represented by the 17:00 Thursday.

The images demonstrate that at 09:00 there is slower moving traffic in large sections of the town centre core, represented by the amber colouring. Slow moving traffic, which is suggestive of higher traffic volumes and potentially congestion, is seen on many key roads in Carlow, this includes Kilkenny Road, N80, particularly to the east, and Graiguecullen Bridge. The large areas of slow-moving traffic in the town centre core are likely to be caused by people commuting to workplaces and educational facilities, however, could also be caused by people wanting to access other amenities situated in this area.

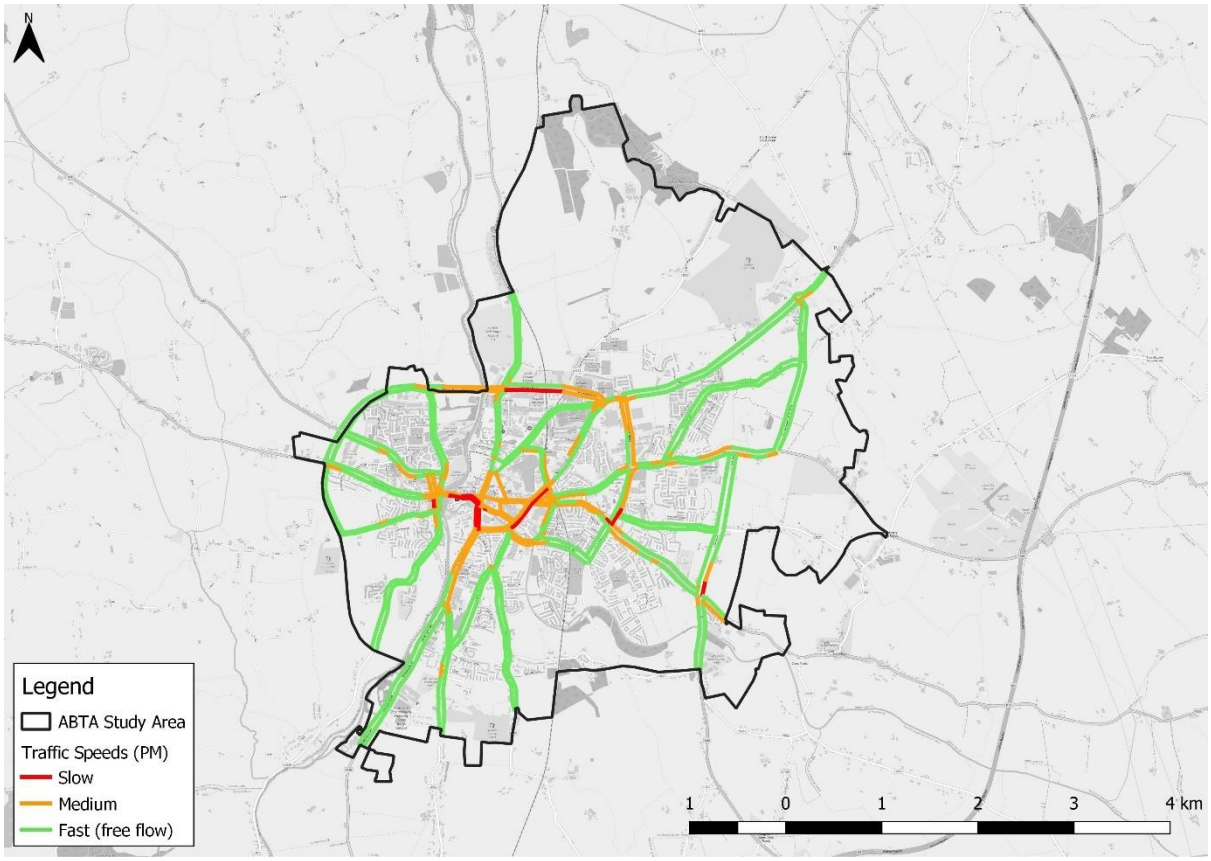
Congestion patterns are similar across both peak periods, with overlap of key pinch points. As with the AM peak, there is a lot of slow-moving traffic in the town centre, with some sections of Barrack Street and Burrin Street been coloured red showing that traffic is barely moving. The areas of very slow-moving traffic can be seen to be stretching over the bridge into Graiguecullen, with the physical constraints imposed by the bridge creating a barrier to free-flowing movement as all vehicles have to be funnelled through a single point. Contrastingly to the AM, there is better flow of traffic along Kilkenny Road and St. Joseph's Road in the PM, which could suggest the educational facilities in these locations are added to the traffic volumes in the morning.

Figure 5-26: AM Congestion (0900 Wednesday)



Source: Google Maps

Figure 5-27: PM congestion (1700 Wednesday)



Source: Google Map

5.5.3 Road Collisions

The Road Safety Authority (RSA) database of collisions in County Carlow and other nearby counties is presented below. **Table 5-9** sets out the number of persons killed, and persons injured between 2015 and 2019. Carlow has the lowest number of fatalities and persons injured during this period. Overall, there is progressive decline in numbers killed within Carlow from 4 in 2015 to 2 in 2019, and the same for number of people injured in accidents down from 95 in 2015 to 56 in 2018. Overall, within the south-east region, it is reasonable to assume that based on the casualty figures available road safety in Carlow County has improved over the years.

Table 5-9: Number of Persons Killed and Injured in Carlow and Comparative Counties (2015 – 2019)

County	Persons Killed					Persons Injured			
	2015	2016	2017	2018	2019	2015	2016	2017	2018
Carlow	4	0	3	2	2	95	86	76	56
Kildare	9	7	6	4	4	343	387	338	396
Kilkenny	2	6	4	2	6	166	169	136	122
Laois	4	3	2	5	1	96	106	172	159
Wexford	7	4	7	3	7	234	217	231	235
Wicklow	8	2	2	5	3	191	179	210	159

Source: Road Safety Authority (RSA)

Figure 5-28 below shows the location of serious and minor collisions in Carlow Town itself, between 2012 and 2016. This data period has been used as it is the most recent five years of full data available at the time of writing this report.

The mapping demonstrates that in Carlow Town, the majority of accidents were minor, with only nine accidents in these five years been classified as serious. Of these nine serious accidents, three occurred along the N80. Analysing accident locations, it is clear that during the five years, junctions such as N80/R726, N80/R417, and along Castle Hill (bridge crossing between Carlow and Graiguecullen) and the R726, were collision hotspots. Additionally, there were a few reported collisions near to the railway station along Saint Joseph's Road which is a concern due to the high number of schools within this area.

Figure 5-29 highlights accidents involving pedestrians; with accidents involving one pedestrian shown in green and accidents involving two pedestrians shown in blue. There was one accident involving two pedestrians within the five-year period, and this was along Burrin Street. The majority of the accidents involving pedestrians happened in the town centre and along the N80 to the east of Carlow Town. There are two accidents involving pedestrians near SETU, two along St. Joseph's Road near to a group of local schools, as well as in the core town centre near Potato Market, Tullow Street, and Kennedy Street.

Figure 5-28: Road Collisions 2012-2016

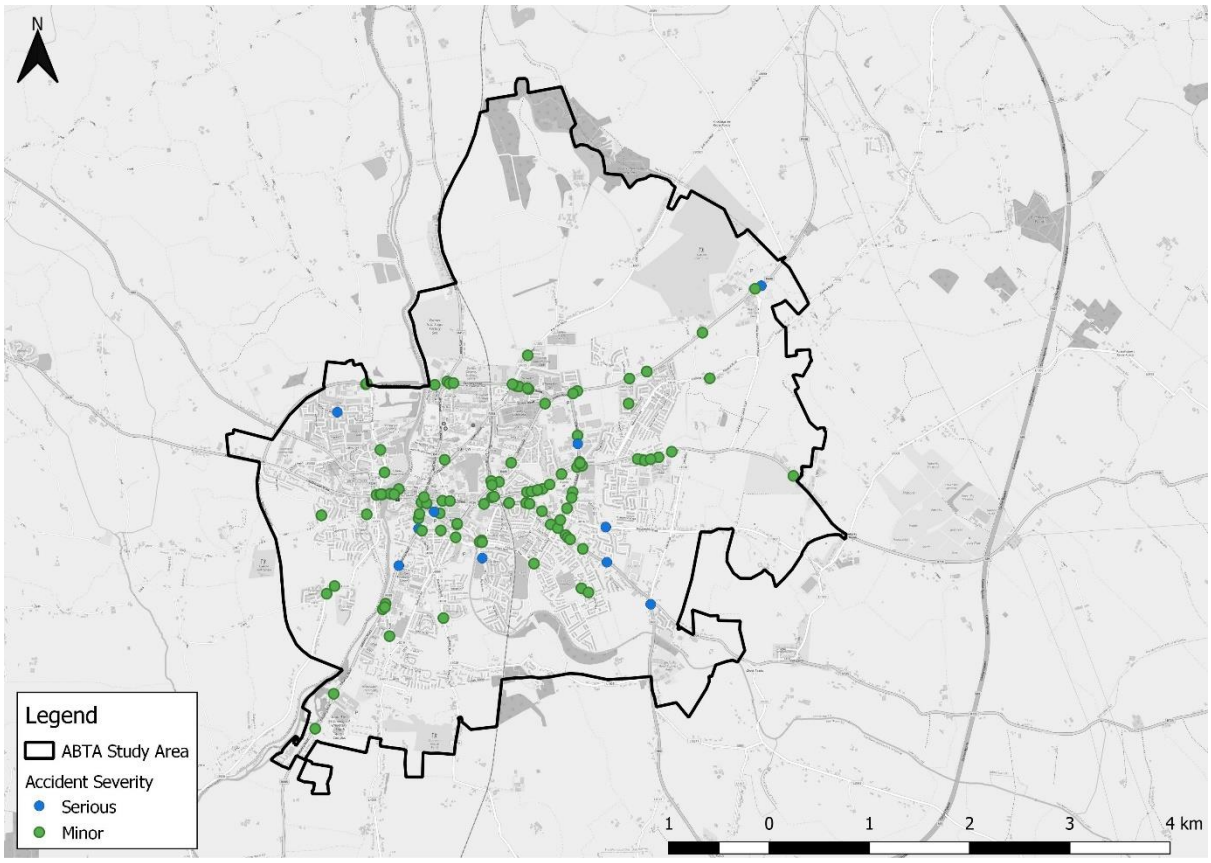
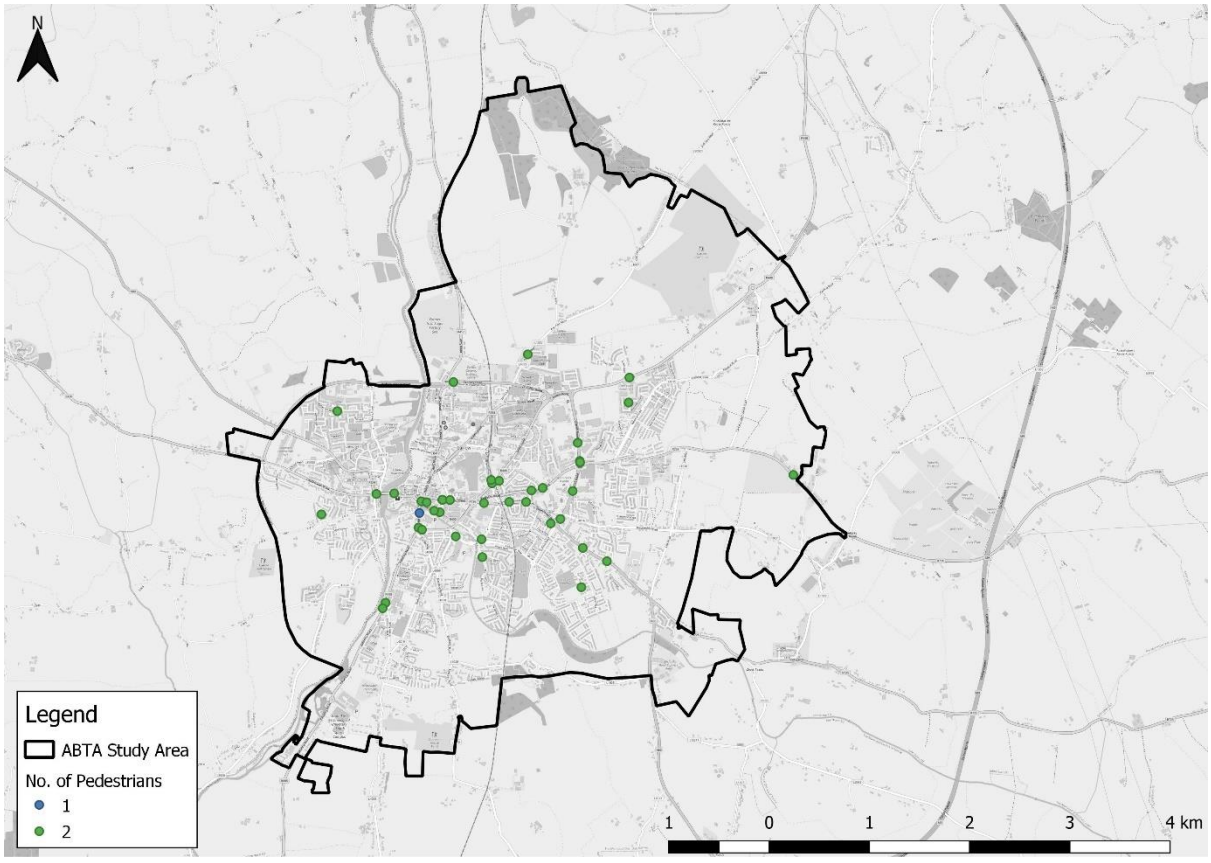


Figure 5-29: Road Collisions 2012-2016 Involving Pedestrians



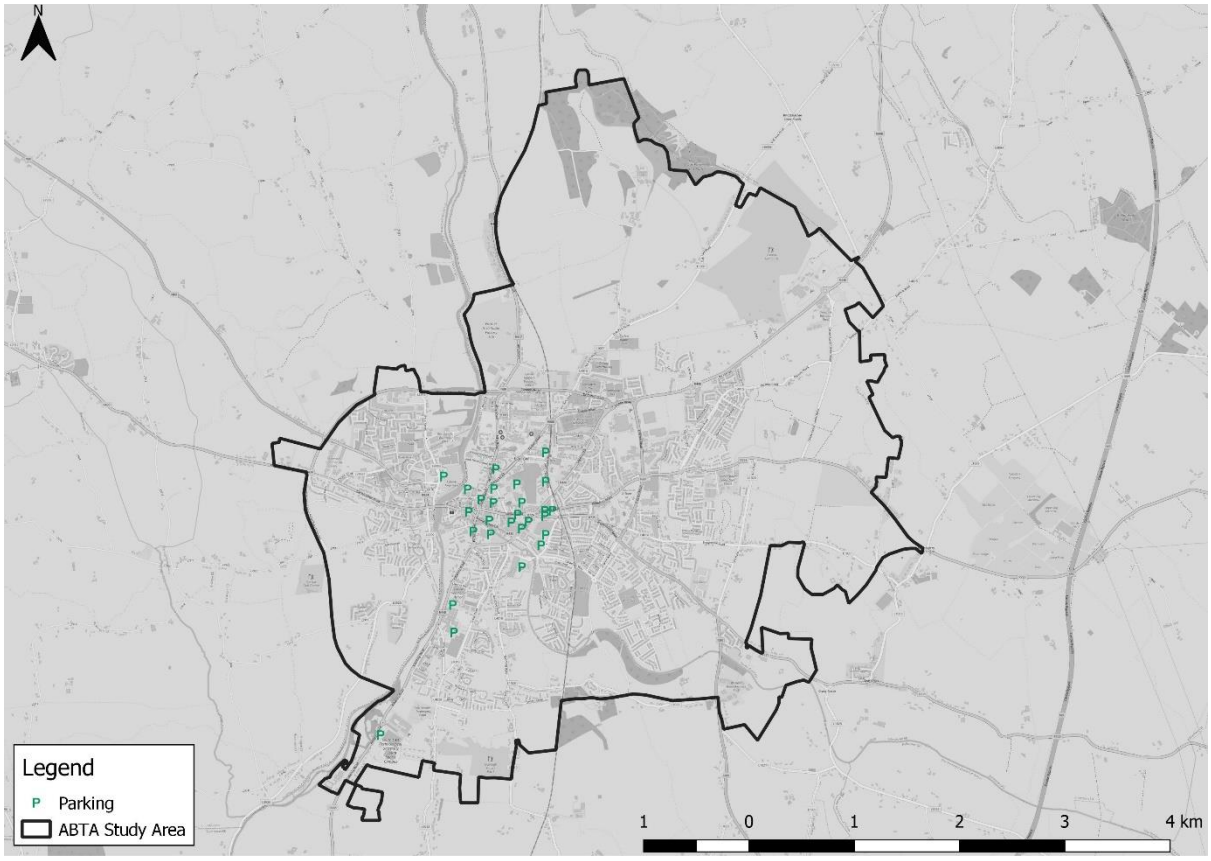
5.6 Parking

Figure 5-30 below highlights the parking provision in Carlow Town. A desktop study was undertaken to analyse the parking provision in the study area, focusing on Carlow Town centre, as it is likely that most of the official parking provision is within this area; and also, that parking demand is highest within the town centre. It is assumed much of the parking outside this area will be on-street parking for residents or private parking.

The map shows there is a high volume of parking available in Carlow Town centre. The data reveals that roughly 62% of the provision is on-street pay and display parking, a further 26% is off-street parking comprised of larger car parks which operate on pay and display or hourly rates. The remaining parking provision is on-street short-stay or set down only parking, found near shops, amenities, and schools. Additionally, there are other car parks in Carlow Town centre, such as at Penney's, shopping centres, supermarkets, or educational facilities.

The data has shown there is a lot of parking provision in the town centre, which coupled with the restricted sustainable transport network, reinforces the dominance of private cars as the preferred transport option. Therefore, changes to the parking provision are important to create a modal-shift towards sustainable modes and also provide a better public realm.

Figure 5-30: Carlow Graiguecullen Study Area Car Park Locations

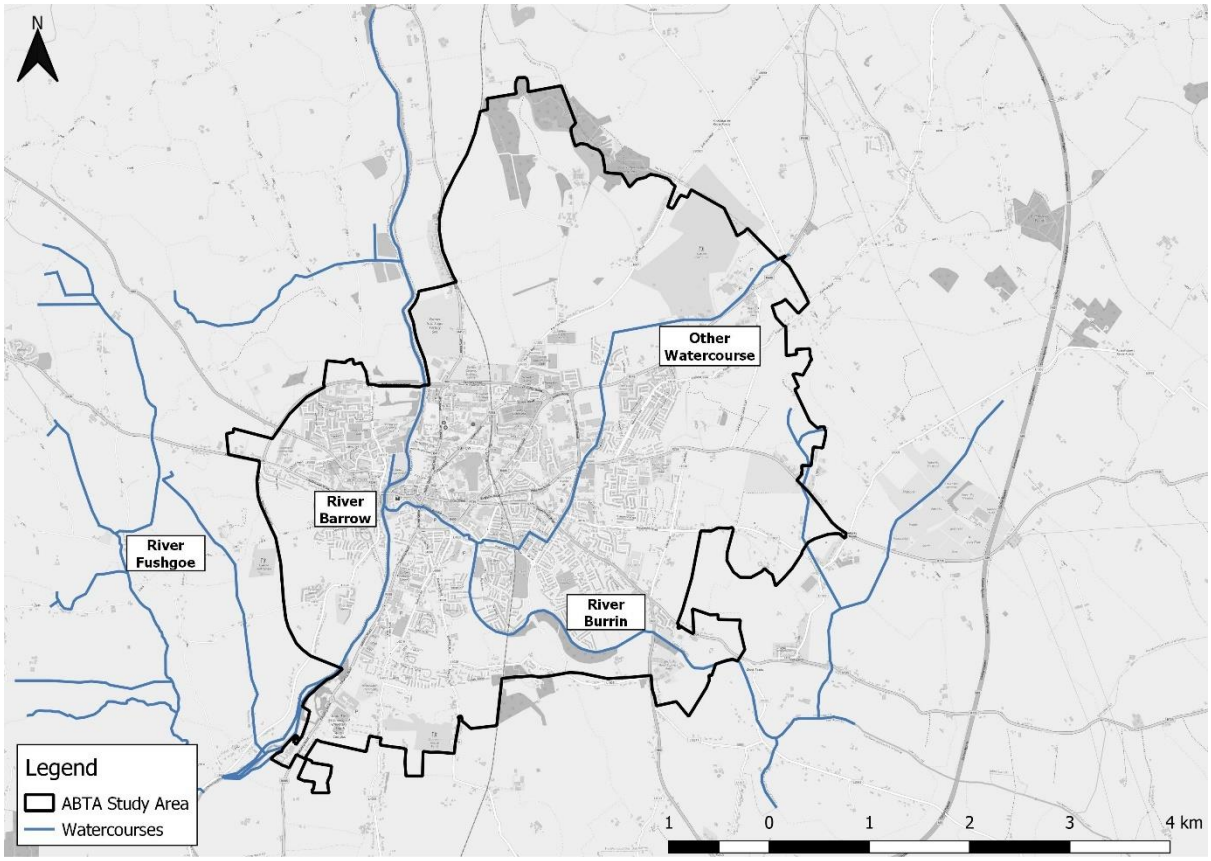


6. Physical Characteristics

The physical characteristics of the study area impact on existing connectivity as well as future transport infrastructure proposals. The two/three key types of physical characteristic which require consideration as part of the ABTA process are the rail line and waterbodies within the study area alongside the topography of the area.

Figure 6-1 shows the rivers and streams within the study area which are contained within the 'River Network Routes' dataset and published by the Environmental Protection Authority. The rivers and streams are classified according to their 'Strahler Stream Order', a standard classification based on stream / tributary relationships. The uppermost channels in a drainage network are designated as first-order streams, whilst a second order stream is formed below the confluence of two first-order channels. Furthermore, third-order streams are created when two second-order channels join, and so on.

Figure 6-1: Rivers and Streams[2]



Rivers can sometimes present opportunities for linear movement along their alignments subject to space and environmental constraints, but they can also present barriers to movement – particularly if there is an absence of sufficient and well-distributed bridges to facilitate direct trips by active modes of travel.

The two rivers in the study area, causing the greatest permeability barriers, are the River Barrow which runs north-south through Carlow splitting Carlow Town Centre from Graiguecullen and also the River Burrin running east-west just south of the town centre. In Carlow Town at present there is only one road bridge crossing the River Barrow, as well as two points of crossing for active travellers, one which is shared with road traffic and an active mode bridge accessed through Carlow Town Park; however, this is only accessible during certain periods of the day. This means the river acts as a pinch point creating both congestion, increased travel distances, and a barrier to movement.

[2] https://gis.epa.ie/EPAMaps/

Additionally, rail lines can present a constraint and barrier to movement. The rail line travels north-south through the centre of the Carlow Graiguecullen ABTA study area and sits to the east of Carlow town centre. This section of railway is part of the Dublin – Waterford line, with Carlow Station been the only calling stop within the study area. The location of the rail line can be seen in **Figure 5-4**, shown in dashed black line. Unlike the rivers in Carlow, the railway acts less as a permeability barrier, due to numerous crossing points through a bridge or under pas. However, such crossings could be upgraded to improve the active travel potential and additional crossing points could be provided to allow for improved free flow movement.

6.1 Environmental and Heritage Sites

The location of environmental and heritage sites within the study area may impact upon the feasibility of some potential transport and land use options. There are numerous National Monument Service Records and National Inventory of Architectural Heritage Structures within the study area. Further details on these are provided below.

The Sites and Monuments Record (SMR) is a database maintained by the Archaeological Survey of Ireland (ASI) which is a unit of the National Monuments Service. The SMR contains details of all monuments and places (sites) where it is believed there is a monument known to the ASI pre-dating 1700AD and also includes a selection of monuments from the post-AD 1700 period. There are 73 National Monuments Service sites within the study area which are listed in **Table 6-1**. As shown in the second column of the table, these sites consist of a wide variety of different types of features. The locations of all sites within and surrounding the study area are shown in **Figure 6-2**.

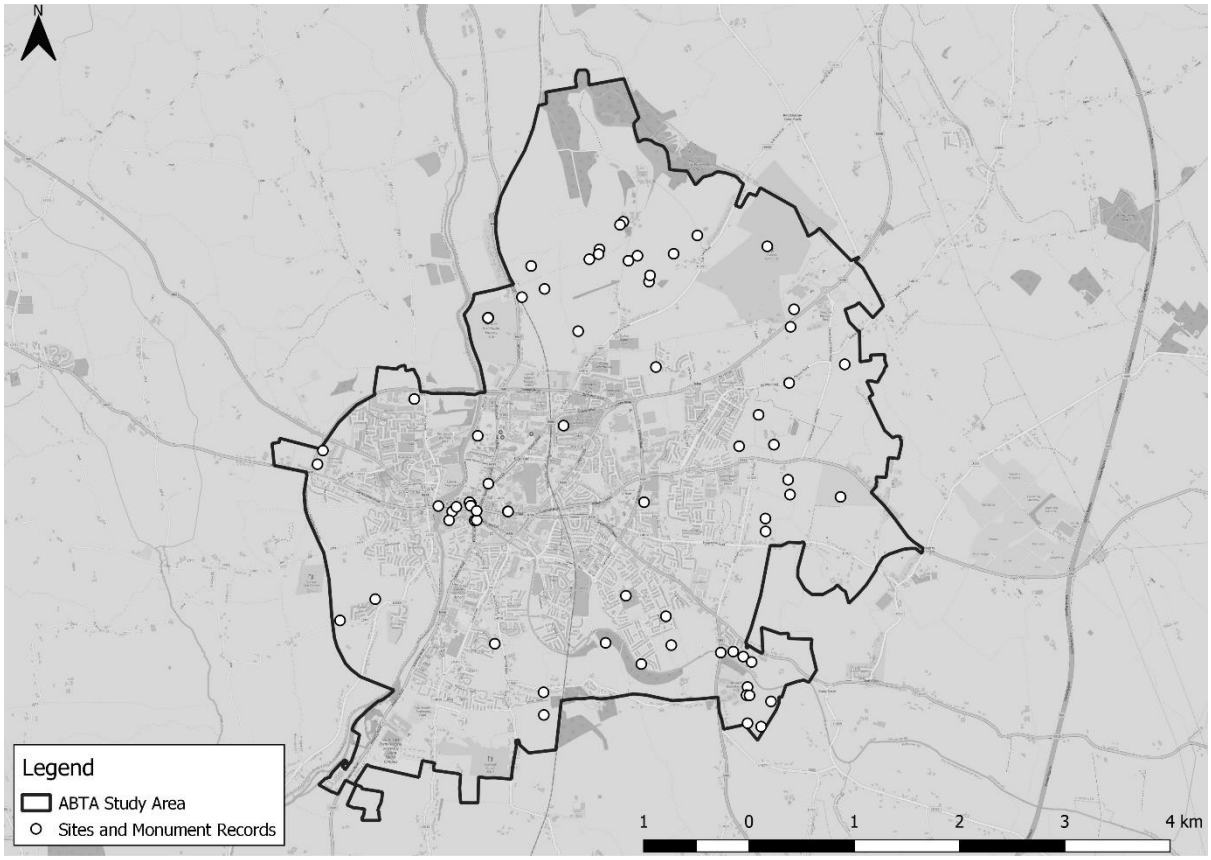
Table 6-1: National Monuments Service Sites and Monuments Records in Study Area

Entity ID	CLASSDESC	TOWNLAND_NAME
CW00140	Burial ground	POLLERTON LITTLE
CW00162	Town defences	CARLOW
CW00216	Enclosure	CHAPELSTOWN
CW00156	Historic town	CARLOW, GRAIGUE
CW00008	Redundant record	STRAWHALL
CW00009	Enclosure	STRAWHALL
CW00010	Ring-ditch	STRAWHALL
CW00011	Church	OAKPARK OR PAINESTOWN
CW00012	Ring-ditch	OAKPARK OR PAINESTOWN
CW00014	Ringfort - rath	OAKPARK OR PAINESTOWN
CW00015	Enclosure	OAKPARK OR PAINESTOWN
CW00016	Ringfort - rath	OAKPARK OR PAINESTOWN
CW00018	Enclosure	POLLERTON BIG
CW00137	Burial ground	CARLOW
CW00138	Dovecote	POLLERTON BIG
CW00139	Designed landscape - tree-ring	POLLERTON BIG
CW00141	Armorial plaque	POLLERTON BIG
CW00142	Enclosure	KERNANSTOWN
CW00143	Enclosure	KERNANSTOWN
CW00145	Ecclesiastical site	CHAPELSTOWN
CW00146	Megalithic tomb - portal tomb	KERNANSTOWN
CW00158	Castle - Anglo-Norman masonry castle	CARLOW
CW00159	Bridge	CARLOW

CW00160	Bridge	CARLOW
CW00161	Mill - unclassified	CARLOW
CW00163	Church	CARLOW
CW00165	Enclosure	CARLOW
CW00166	Moated site	BALLINACARRIG
CW00167	Enclosure	RATHNAPISH
CW00168	Enclosure	CARLOW
CW00169	Ringfort - rath	CARLOW
CW00170	Bridge	BALLINACARRIG, CHAPELSTOWN, STAPLESTOWN
CW00222	Burial ground	KERNANSTOWN
CW00224	Enclosure	CHAPELSTOWN
CW00225	Enclosure	CHAPELSTOWN
CW00226	Enclosure	CHAPELSTOWN
CW00228	Field system	STAPLESTOWN
CW00229	Redundant record	STAPLESTOWN
CW00230	Enclosure	STAPLESTOWN
CW00235	Enclosure	QUINAGH
CW01499	Redundant record	STRAWHALL
CW01500	Redundant record	STRAWHALL
CW01501	Ring-ditch	OAKPARK OR PAINESTOWN
CW01502	Ring-ditch	OAKPARK OR PAINESTOWN
CW01360	Ring-ditch	STAPLESTOWN
CW01361	Enclosure	STAPLESTOWN
CW01362	Enclosure	STAPLESTOWN
CW01639	Flat cemetery	STRAWHALL
CW01653	Tomb - effigial	CARLOW
CW01771	Cremation pit	POLLERTON LITTLE
CW01784	Ring-ditch	OAKPARK OR PAINESTOWN
CW01294	Graveyard	CARLOW
CW01295	Graveyard	CARLOW
CW01309	Graveyard	OAKPARK OR PAINESTOWN
CW01389	Redundant record	CARLOW
CW01797	Linear earthwork	CARLOW
CW01833	Enclosure	OAKPARK OR PAINESTOWN
CW01834	Field system	OAKPARK OR PAINESTOWN
CW01881	Ring-ditch	OAKPARK OR PAINESTOWN
CW01882	Designed landscape feature	OAKPARK OR PAINESTOWN
CW02021	Stone head (present location)	CARLOW
CW02024	Battlefield	CARLOW
CW02040	Enclosure	OAKPARK OR PAINESTOWN
CW02058	Enclosure	CARLOW
CW02059	Enclosure - large enclosure	QUINAGH

CW02084	Enclosure	POLLERTON LITTLE
CW02133	Ring-ditch	STRAWHALL
CW02159	Tomb - effigial (present location)	CARLOW
LA01941	Ringfort - rath	CROSSNEEN
LA02102	Burnt spread	GRAIGUE (Slievemargy By.)
LA02103	Burnt spread	GRAIGUE (Slievemargy By.)
LA02104	Burnt spread	GRAIGUE (Slievemargy By.)
LA02412	Ring-ditch	CROSSNEEN

Figure 6-2: National Monuments Services Sites and Monuments



The National Inventory of Architectural Heritage (NIAH) is a state initiative under the administration of the Department of Housing, Local Government and Heritage and is established on a statutory basis. The purpose of the NIAH is to identify, record and evaluation the post-1700 architectural heritage of Ireland, uniformly and consistently as an aid in the protection and conservation of built heritage. A Record of Protected Structures (RPS) forms part of each Local Authority's development plan and the Minister for Housing, Local Government, and Heritage may recommend structures to the Local Authorities for inclusion in the RPS. Sites, structures, or groups of structures which are given a Regional, National, or International Rating by the NIAH are included in the Minister's recommendations.

There are 19 structures included in the NIAH within the study area, all of which have a 'Regional' rating. Of this list many relate to Pollerton House, Oak Park House, and Browne's Hill House. All NIAH structures within the study area are summarised in **Table 6-2** according to their original type (which may not be the same as the sites current usage) and location. **Figure 6-3** shows the location of all NIAH structures within the study area.

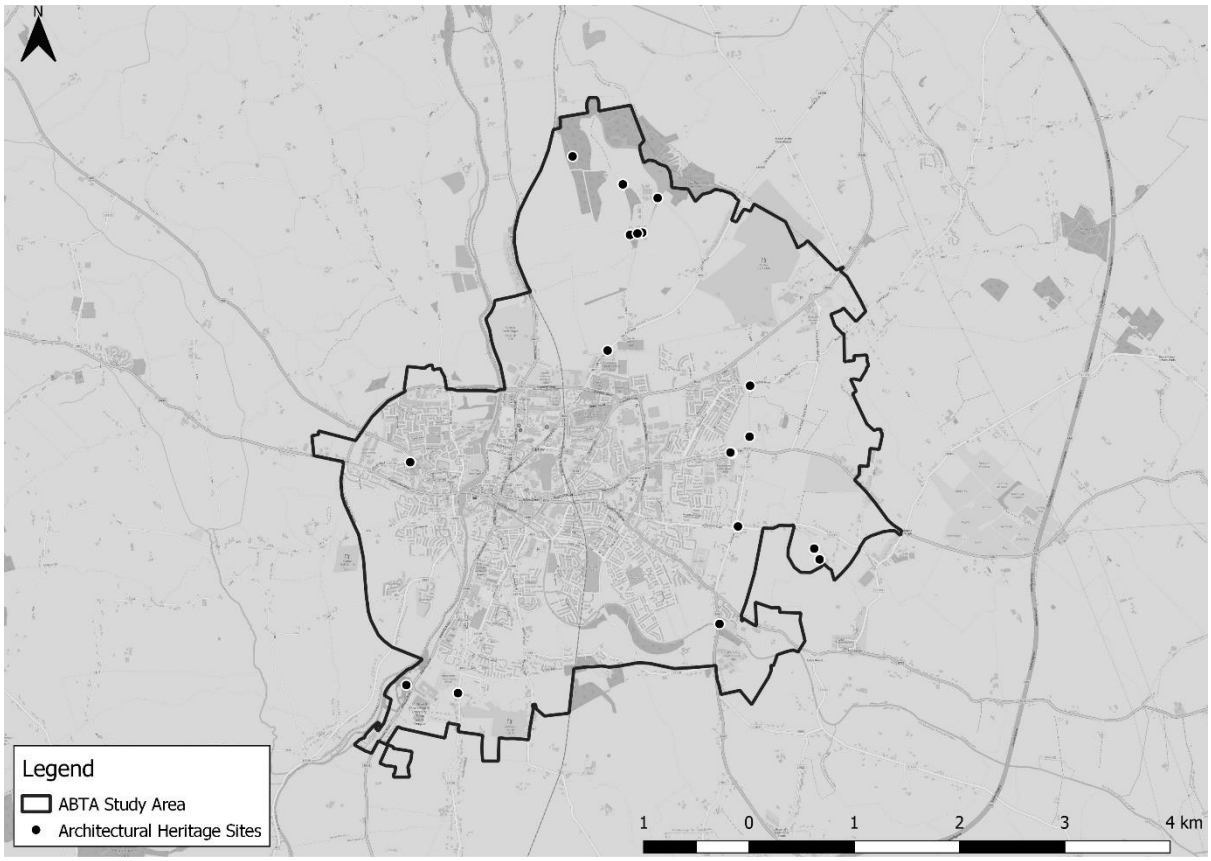
Further information on individual features contained within the SMR and the NIAH can be accessed using the Historic Environment Viewer provided by the Department of Housing, Local Government and Heritage[3] and both datasets are also available in a range of other formats[4].

Table 6-2: National Inventory of Architectural Heritage Structures

Original Type	Name	Date
mausoleum	Oak Park House	1840 - 1845
country house	Oak Park House	1740 - 1780
bridge	Oak Park House	1830 - 1840
dairy	Oak Park House	1840 - 1860
demesne walls/gates/railings	Oak Park House	1830 - 1840
graveyard/cemetery	Oak Park House	1700 - 1750
stables	Oak Park House	1750 - 1780
church/chapel	Killeshin Church	1825 - 1835
country house	Erindale	1800 - 1820
farm house		1840 - 1870
demesne walls/gates/railings	Pollerton House	1860 - 1880
gate lodge	Pollerton House	1860 - 1880
building misc	Pollerton House	1840 - 1900
demesne walls/gates/railings	Pollerton House	1800 - 1840
stables	Browne's Hill House	1840 - 1850
country house	Browne's Hill House	1760 - 1800
gate lodge	Browne's Hill House	1840 - 1850
culm crusher		1840 - 1870
church/chapel	Killeshin Church	1825 - 1835

[3] https://www.archaeology.ie/archaeological-survey-ireland/historic-environment-viewer-application
[4] https://data.gov.ie/dataset/national-inventory-of-architectural-heritage-niah-national-dataset?package_type=dataset; https://data.gov.ie/dataset/national-monuments-service-archaeological-survey-of-ireland?package_type=dataset

Figure 6-3: National Inventory of Architectural Heritage Structures



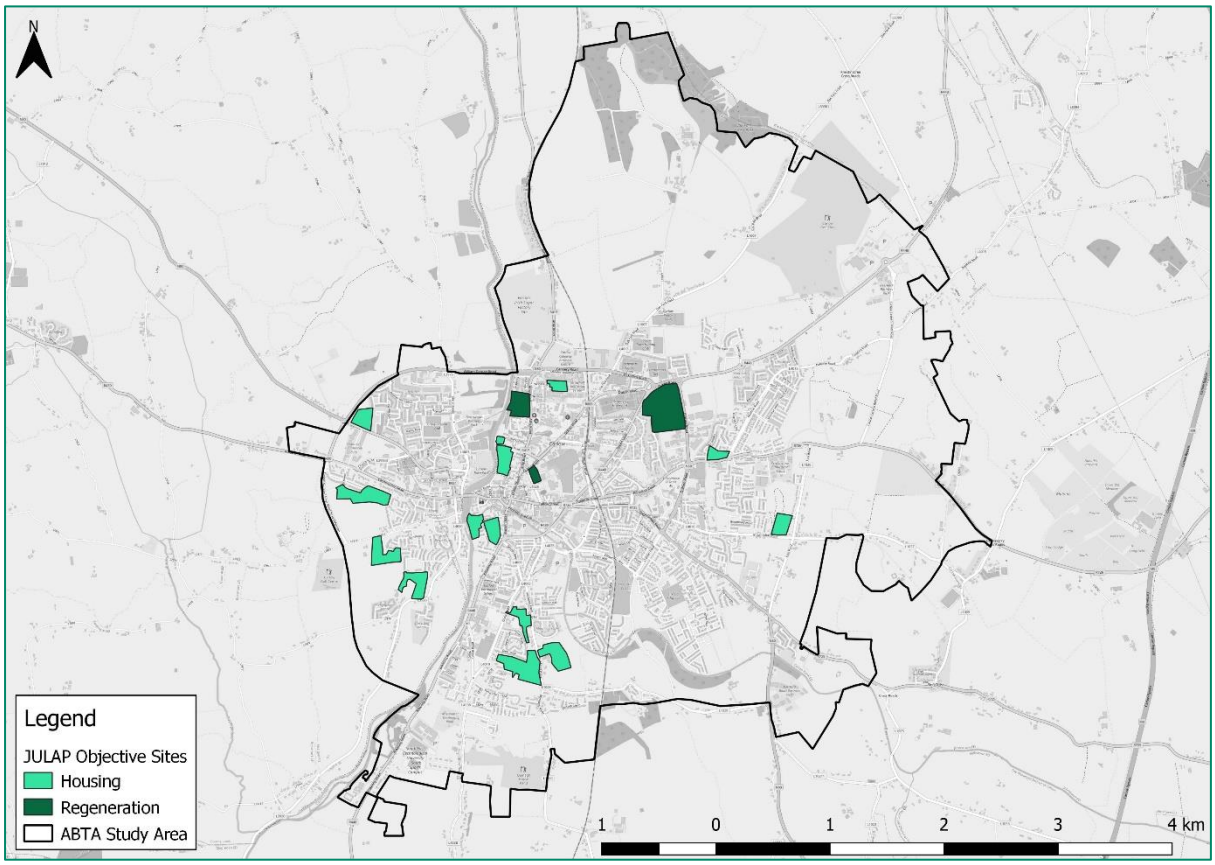
7. Future Context

Future changes in the spatial distribution of development will have a big impact on the operation of the transport network in the Carlow Graiguecullen study area. This chapter of the report sets out key development locations identified in the Local Area Plan. Future committed transport schemes are also identified in this chapter, to understand where transport improvements are already being proposed.

7.1.1 Future Developments

Carlow County Council and Laois County Council are currently undergoing a review of the existing Joint Spatial Plan for the Carlow Graiguecullen Greater Urban Area (2012 – 2018) which will be replaced by the new Joint Urban Area Local Area Plan (JULAP). The purpose of the JULAP is to set out land use in the Carlow town area for planning and sustainable development between 2022 and 2028. 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 following plan shows the sites identified for future development with the Carlow Graiguecullen ABTA study area.

Figure 7-1: Joint Urban Local Area Plan Development Sites



7.1.2 Committed Transport Schemes

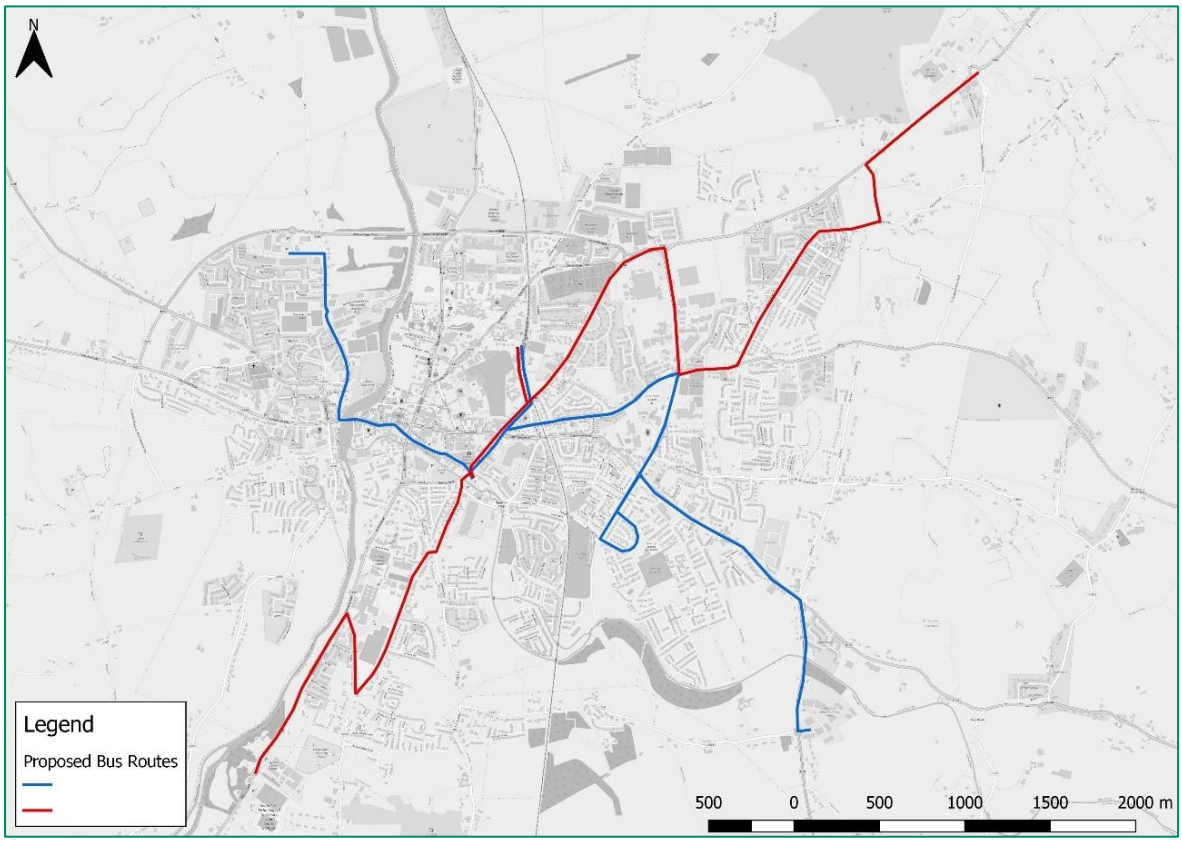
The Irish Government has committed a 2:1 ratio of expenditure between new public transport infrastructure and new road infrastructure in its government lifetime. This demonstrates the large commitment which is being made to the public transport network across Ireland.

7.1.2.1 Bus

There is a desire to provide enhanced bus services in Carlow Town as well as connections to rural areas of the county. Commitments have been made to support transport agencies providing these new services and also to increase the quality, frequency, and speed of existing services.

Figure 7-2 highlights the proposed future bus network in Carlow Town. This was produced in 2021 by the National Transport Authority and CCC and is set to be implemented in 2023. NB: At the time of publication, this bus service has now been implemented. The blue route travels from the northwest of Carlow Town, near to Barrow Valley Retail Park, and travels towards the southeast near to Wexford Road Business Park. Along the route, the service will pass by parks, tourist destinations, residential areas, Carlow railway station as well as Carlow Town. The red route travels southwest to northeast, serving Tyndall College and MSD Carlow at either end of the route. This route serves SETU, Carlow town centre, Carlow railway station, business parks and residential areas. These routes will provide enhanced connections to and between services in and around Carlow Town, making trips more accessible and more sustainable. However, these routes do have limitations, such as neither of them pass by the hospitals in Carlow Town and also, they are very compact to Carlow Town itself and may not be a feasible option for those residing farther out of town.

Figure 7-2: Future Bus Network Carlow Town



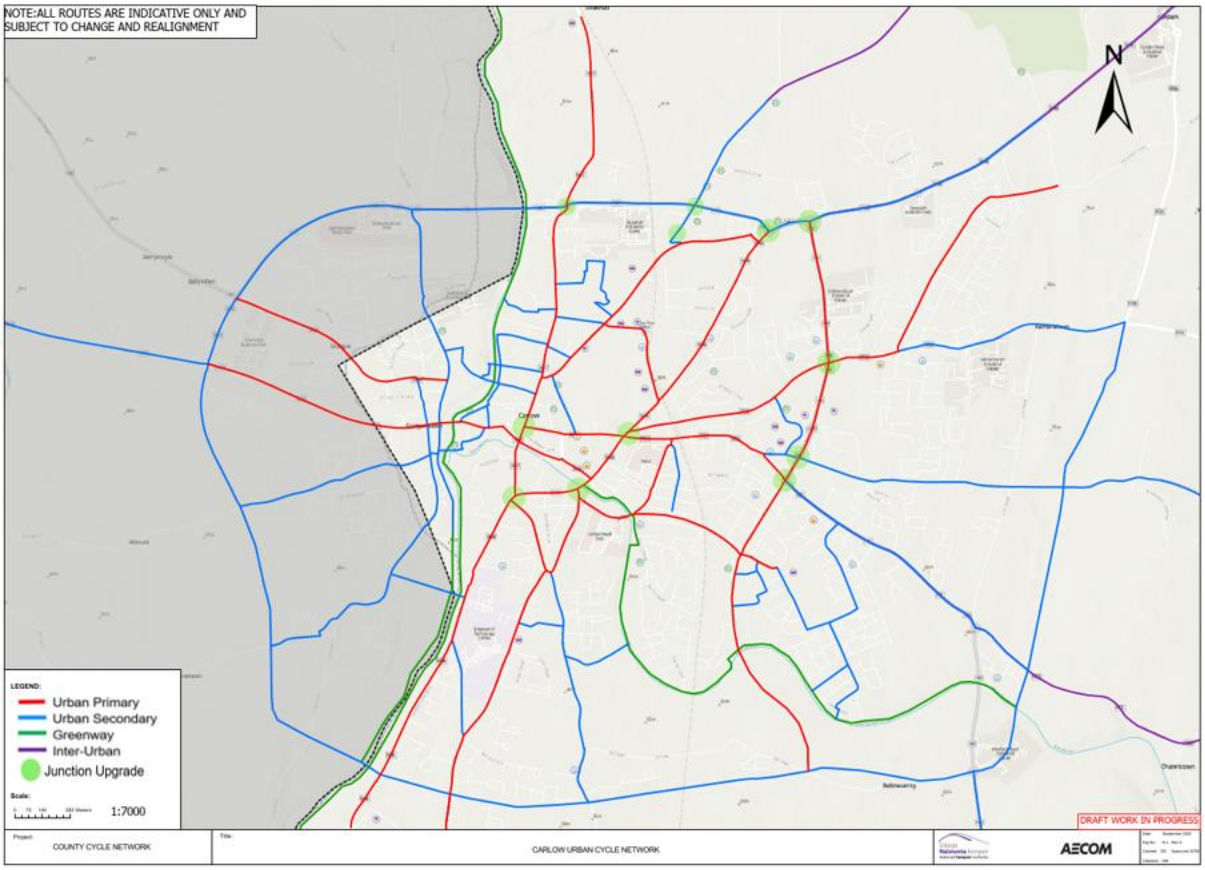
7.1.2.2 Rail

Like bus service improvements, it has also been stated that the transport agencies will be supported to provide new services and also increase quality, frequency, and standards of existing services. The Programme for Government: 'Our Shared Future' strategy, released in 2020, discusses the aim to enhance suburban commuter rail across the country. Alongside this, Iarnród Éireann committed general network improvements as well as enhancement of the outer Greater Dublin Area (GDA) commuter services. These services will pass through Carlow and provide trains to Dublin every 20-mintues in the peak hours and half hourly in the off-peak hours. The Southern Region, in their RSES, committed investment into existing rail infrastructure and services, to ensure renewal and maintenance occurs to a quality service, in terms of safety, accessibility, and frequency, can be provided.

7.1.2.3 Proposed Cycle Network

A study has been undertaken looking at the current and proposed cycle network across the whole country. The map in **Figure 7-3** sets out the proposed cycling route upgrades within Carlow, specifically focussing on the Carlow Urban Area. The routes for upgrading have been classified to provide a primary, secondary and greenway network, with key junctions highlighted for upgrading to further enhance the cycling routes. The urban primary cycle routes cover the core and east of Carlow Town, whereas the urban secondary routes cover the west of the town, as well as the built-up areas which are slightly farther out. There are 12 junctions which have been highlighted for proposed upgrades, with 7 of these being located along the N80. Furthermore, 2 greenway routes are proposed, these are not only beneficial for locals, but can be popular for recreation and tourism.

Figure 7-3: Proposed Future Cycling Network Carlow Urban Area



8. Conclusions and Next Steps

The Baseline Assessment has provided a comprehensive review of available data to identify problems in the existing transport network and highlight opportunities for improvement in Carlow and Graiguecullen. This evidence will feed into the development of options to improve conditions for all modes of transport; walking, cycling, roads, parking and public transport. In the final ABTA report, these options will be assessed thorough a Multi-Criteria Analysis (MCA) process to identify the preferred solutions to be incorporated into strategies for each mode.

8.1 Strengths, Weaknesses, Opportunities and Threats

Table 8.1 provides a summary of the strengths, weaknesses, opportunities and threats (SWOT) analysis for the Carlow Graiguecullen ABTA study area to inform the development of options for each mode.

Table 8-1: 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 its 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 pool of labour. • Quality of life for Carlow is deemed excellent and is seen as a great area for those wanting to 'settle down'. • The cost of living is respectable, especially compared to other major 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 in Carlow. • 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 are various shopping areas in Carlow, including high streets, shopping centres, as well as out-of-town retail parks. • There are bus services between Carlow and other nearby places, in particular Dublin and Dublin Airport. • There is a growing population. • Many of the population are aged 34 or under.	• Lack of sustainable 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 (River, 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 external 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 the new style of working. • Build upon Carlow's excellent quality of life. • Increase links between SETU and businesses to provide graduates work potential jobs and employers with improved pool of labour. • Providing more accommodation for town-centre living. • Improved the outwards brand of Carlow to attract new investment, residents, and visitors. • Improve the skill level in the population. • Improve active travel safety. • Improving public transport frequency and connectivity to other towns. • Increasing the number of bus stops to provide greater accessibility. • Provision of two new bus town services linking residential areas and key 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. • Delivery of compact growth in the town centre. • Reduction of on-street parking to deliver space back to people and improve the environment. • Improved permeability in the town, especially across the River Barrow for residents in Graiguecullen to access the town centre. • Promotion of electric vehicles. • Park and stride for educational 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, in particular parking and one-way systems or pedestrianisation, 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 if the town 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 demand 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.

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